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# Regulation of Trade in 3D Printed Goods and WTO Modernization: An Opportunity for New Preferential Rules of Origin

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## Abstract

Rules of origin are key legal tools for international trade. While they can pose a puzzle for trade analysts and traders to comprehend, they are not just technical elements of trade. It is important to understand how they function as rules can be utilized by states as non-tariff barriers to trade. This dissertation focuses on preferential rules of origin, which determine if a good receives preferential tariff treatment under a regional or bilateral trade agreement. WTO Members must follow the Common Declaration with Regard to Preferential Rules of Origin, an annex to the Agreement on Rules of Origin. This instrument gives Members sovereignty in designing rules. Prior to and since the formation of the WTO, Members have designed rules that traders find restrictive, especially for trade in inputs. As goods are constructed with parts sourced in global value chains, traders must verify the origin of each part to obtain preferential tariff treatment under an agreement. While digital technology facilitates access to information on rules of origin, traders must still understand and comply with national and regional custom procedures. Digital technology also is the basis for advanced manufacturing, which replaces or complements human labor with digitally based manufacturing techniques, such as additive manufacturing (3D printing). Traders looking to 3D printing to shorten global value chains and reshore manufacturing may face challenges when determining the origin of a 3D printed product, as current rules in trade instruments are based on human-labor manufacturing. Trade analysts have begun to explore rules of origin in the context of 3D printing, including whether the 3D file should be an origin-conferring input. This dissertation takes up these initial assessments and examines the potential outcomes of applying current rules to advanced manufactured goods (which are produced in developed and developing countries) or designing new rules. This investigation requires an exploration of the connections between digital trade and customs duties, the role of state sovereignty in a digital trade environment, and the impact of “deep” policy provisions in agreements on trade of advanced products. Using doctrinal, qualitative, and interdisciplinary research, this dissertation presents the rules under WTO law, the main criteria for determining the origin of a good, legal and economic critiques of preferential rules of origin, rules in the context of services and digital trade, the challenges of applying the

origin criteria to 3D printed goods, and recommendations for designing rules for advanced manufactured products and for making rules more trader-friendly. Looking at preferential rules of origin in the context of 3D printing allows us to experiment with modernizing rules to support trade in a digital environment. Identifying aspects of the design and administration of rules where there is a risk for protectionist intervention or a risk of generating more confusion for traders leads us to question how the trade law system should regulate such rules. These considerations also tie into some of the challenges international institutions, especially the WTO, face at this moment: what role should multilateralism play in forming a framework for trade and how can organizations modernize along with technological changes.

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## Table of Abbreviations

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|---|---|
| AB | WTO Appellate Body |
| AI | Artificial intelligence |
| AOR | WTO Agreement on Rules of Origin |
| AKFTA | ASEAN-Korea Free Trade Area |
| ASEAN | Association of Southeast Asian Nations |
| ATIGA | ASEAN Trade in Goods Agreement |
| CAD | Computer-aided design |
| CBP | United States Customs & Border Protection |
| CETA | Comprehensive Economic and Trade Agreement |
| CPTPP | Comprehensive and Progressive Agreement for Trans-Pacific Partnership |
| CRO | WTO Committee on Rules of Origin |
| CTH | Change of tariff heading |
| CVA | Customs Valuation Agreement |
| DSU | WTO Understanding on Rules and Procedures Governing the Settlement of Disputes |
| EFTA | European Free Trade Association |
| EC | European Communities |
| ECJ | European Court of Justice |
| EU | European Union |
| GATS | General Agreement on Trade in Services |
| GATT 1947 | General Agreement on Tariffs and Trade |
| GATT 1994 | General Agreement on Tariffs and Trade 1994 |
| GSP | Generalized System of Preferences |
| GVC | Global value chain |
| HS | Harmonized Commodity Description and Coding System |
| HWP | Harmonization Work Programme |
| ICC | International Chamber of Commerce |
| ITA | WTO Information Technology Agreement |
| LDC | Least developed country |
| LVC | Labor value content |
| MFN | Most favored nation |
| MSME | Micro/Small/Medium Enterprise |
| NAFTA | North American Free Trade Agreement |
| OECD | Organization for Economic Co-operation and Development |
| PEM | Pan-Euro Mediterranean Rules of Origin |
| PTA | Preferential trade agreement |
| R&D | Research and development |
| RoO | Rules of origin |
| RVC | Regional value content |
| SADC | Southern Africa Development Community |
| SAFTA | South-Asian Free Trade Area |
| SBO | Substantive business operations |
| SCM | WTO Agreement on Subsidies and Countervailing Measures |

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|---|---|
| TCA | Trade And Cooperation Agreement Between The European Union And The European Atomic Energy Community, Of The One Part, And The United Kingdom Of Great Britain And Northern Ireland, Of The Other Part |
| TFA | WTO Agreement on Trade Facilitation |
| TPP | Trans-Pacific Partnership Agreement |
| TRIMS | WTO Agreement on Trade-Related Investment Measures |
| UK | United Kingdom |
| UNCTAD | United Nations Conference on Trade and Development |
| US | United States of America |
| USITA | US International Trade Administration |
| USMCA | Agreement between the United States of America, the United Mexican States, and Canada |
| USTR | Office of the US Trade Representative |
| VCLT | Vienna Convention on the Law of Treaties |
| WCO | World Customs Organization |
| WTO | World Trade Organization |
| 3DP | Three-dimensional printing |

## Introduction

### Setting the Global Trading Stage

The 1980s was a decade of birth and growth that set the stage for international trade and manufacturing in the first decades of the 21st Century. First, in 1984 Charles W. Hull filed a US patent for an "Apparatus for production of three-dimensional objects by stereolithography."[1] This patent covers the basic technology of 3D printing, and Hull would found 3D Systems, one of the first companies to commercialize 3D printing machines.[2] In 1986 members of the GATT, the pre-cursor to the World Trade Organization (WTO), met in Punta del Este, Uruguay for talks on a wide range of trade policy issues.[3] At this meeting, and at several more over the years, negotiations among 123 countries eventually led to the formation of the WTO.[4] Across the world, the manufacturing of goods shifted from centralized production to compartmentalizing production into discrete processes located in diverse facilities across the globe; in other words, the decade witnessed the rise of global value chains (GVCs).[5] Finally, trade analysts began to notice some activity by national policymakers – extensive use of a legal tool called rules of origin to regulate trade in imported goods.[6] Over 30 years later, the WTO and GVCs have been instrumental to the progress of international trade, and 3D printing offers some new potential for manufacturing goods, both in terms of the technology used but also in reconfiguring how goods are made (and possibly shortening GVCs). All three can be linked together by rules of origin, but doing so brings to light some important challenges to the legal framework for international trade in this new era of growth, the era of digital trade.

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[1] US Patent No. 4, 575,330 (Apparatus for Production of Three-Dimensional Objects by Stereolithography), Filed 8 August 1984, issued 11 March 1986. <https://patentimages.storage.googleapis.com/5c/a0/27/e49642dab99cf6/US4575330.pdf> accessed 2 December 2021.

[2] Jukka Tuomi, Segei Chekurov and Jouni Partnanen, '3D Printing History, Principles and Technologies,' in Rosa Maria Ballardini, Marcus Norrgård, Jouni Partanen (eds), *3D Printing, Intellectual Property, and Innovation: Insights from Law and Technology* (WoltersKluwer 2017) 2

[3] World Trade Organization (WTO), 'The Uruguay Round' (wto.org) <https://www.wto.org/english/thewto_e/whatis_e/tif_e/fact5_e.htm> accessed 2 December 2021.

[4] ibid.

[5] Petros C Mavroidis, *The Regulation of International Trade*, vol. 1 (MIT Press 2016) 233.

[6] Edwin Vermulst and Paul Waer, 'European Community Rules of Origin as Commercial Policy Instruments?' (1990) 24 J World Trade 55, 55-57.

## I. Why Study Rules of Origin and 3D Printing

Traders importing goods into foreign markets and the customs officials at ports of entry across the world must comply with rules of origin. A Webinar held by the Committee on Rules of Origin of the WTO on 21 May 2021 explored "What drives the utilization of trade preferences." One factor are rules of origin requirements.[7] The webinar had over 500 registered participants. One of the speakers, Jeremy Harris, remarked that he was pleased "to chat with such a huge group of what some of us refer to as origin geeks. It always felt like a niche topic," but seeing "250 people logged in and paying attention" was "quite gratifying."[8] The number of participants suggests that rules of origin are a topic that interests the general trade community.

Before proceeding further, it is important to clarify that this dissertation focuses on preferential rules of origin. There are two types of rules: non-preferential rules of origin and preferential rules of origin. They both aim to assign a country or territory (e.g. the EU) to a product, but for different objectives. As Peter Van den Bossche and Werner Zdouc explain, non-preferential rules of origin are "used in non-preferential trade policy instruments (relating to, inter alia, MFN treatment, anti-dumping and countervailing duties, safeguard measures, origin marking or tariff quotas)," while preferential rules of origin are "applied by [WTO] Members to determine whether goods qualify for preferential tariff treatment under contractual or autonomous trade regimes."[9] Preferential rules of origin are found in preferential trade agreements (PTAs), like the USMCA[10] or CETA.[11] For example, under CETA, the preferential rules are used to determine if a good is a Canadian product. If so, it is applied a preferential tariff rate when imported into the EU.

Preferential rules of origin in a PTA discriminate against goods from different states, but this discrimination is not an absolute barrier against importation into the

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[7] 'What Drives the Utilization of Trade Preferences,' conference held 19 May 2021. Videos and presentations available at <https://www.wto.org/english/tratop_e/roi_e/preference_utilization_190521_e.htm> accessed 3 November 2021.

[8] Jeremy T Harris, 'Rules of Origin Preference Utilization' (What Drives the Utilization of Trade Preferences, WTO, 19 May 2021) <https://www.wto.org/english/tratop_e/roi_e/s1_harris19may21.pdf> accessed 1 December 2021.

[9] Peter Van den Bossche and Werner Zdouc, *The Law and Policy of the World Trade Organization: Text, Cases and Materials* (4th edn, CUP 2019) 458.

[10] Agreement between the United States of America, the United Mexican States, and Canada (USMCA) (entered into force 1 July 2020) ch 4.

[11] Comprehensive and Economic Trade Agreement (CETA) (signed 30 October 2016, some provisions entered into force on 21 September 2017).

territory covered by the PTA. If a good does not qualify for a preferential tariff rate, it can still enter the territory of the PTA under the applicable MFN (Most-Favored-Nation) tariff rate. This is the tariff rate that each WTO member lists in their Schedule of Concessions upon accession to the WTO.[12] If bicycles imported into the US from Japan or Australia under the US's MFN tariff rate for bicycles, the same MFN rate must be applied to the Japanese bicycle and the Australian bicycle at the US border. On the other hand, preferential tariff rates are specific for each PTA.[13] For example, when importing a Canadian bicycle into the EU, the tariff rate is 0% as established by CETA.[14] If the bicycle originates from Singapore, the rate is 7.00%, as established by the Free Trade Agreement between the EU and the Republic of Singapore.[15]

Further, preferential rules of origin also differ from measures that grant access to a domestic market based on compliance with sanitary or technical requirements. Bernard Hoekman and Stefano Inama point out:

> RoO does not act to prohibit or prevent a product from entering the market, as can be case for other types of policy – for example, if mandatory health and safety-related product standards are not satisfied. That said, different types of RoO and the specific criteria that apply will have a differential impact on the cost of production and thus the probability that an exporter will choose (or be forced) to pay the applicable MFN tariff.[16]

Whether, in practice, failure to obtain preferential origin for a good and the necessity to pay MFN rates impedes a trader from importing into a specific market is an issue which will be explored in this dissertation.

Further, there are distinctions between the legal approaches to regulation of non-preferential rules of origin and preferential rules of origin. The Agreement on the Rules of Origin (AOR) is one of the legal texts included in the WTO's Multilateral Trade Agreements, and is thus an integral part of the Marrakesh Agreement Establishing the World Trade Organization and is binding on all members of the WTO.[17] Its main purpose was to initiate negotiations on harmonizing non-preferential rules of origin

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[12] Van den Bossche and Zdouc (n 9) 436-437.
[13] Andrew T Guzman and Joost HB Pauwelyn, *International Trade Law* (2nd edn, WoltersKluwer 2012) 337.
[14] Tariff rate found using the European Commission's My Trade Assistant tool, available at: <https://trade.ec.europa.eu/access-to-markets/en/home> accessed 1 December 2021.
[15] Tariff rate found using the European Commission's My Trade Assistant tool.
[16] Bernard Hoekman and Stefano Inama, 'Harmonization of Rules of Origin: An Agenda for Plurilateral Cooperation' (2018) 22 East Asian Economic Rev 3, 4-5.
[17] The Marrakesh Agreement Establishing the World Trade Organization (15 April 1994) LT/UR/A/2, art II <https://docs.wto.org> accessed 30 October 2021.

which would apply to all uses for non-preferential rules, such as tariff quotas, anti-dumping duties, or marks of origin for product labels.[18] The Harmonization Work Programme (HWP) was initiated after the entry into force of the WTO Agreement (1 January 1995) and was to be concluded within 3 years from initiation.[19] A proposal was submitted in 1999 by the Technical Committee on Rules of Origin to the Committee on the Rules of Origin. As the HWP's focus turned to designing product specific rules for 5,000 tariff lines, political interests and opinions of Members on suitable origin criteria diverged leading to an impasse in drafting rules.[20] Although an agreement among Members on these rules has not yet been reached, the Committee on Rules of Origin continues to meet though its focus has shifted away from harmonization of non-preferential rules of origin to non-reciprocal preferential rules of origin for LDCs (Least Developed Countries).[21]

Despite the impasse on the HWP, rules of origin are significant rules for world trade. In fact, as Mitsuo Matsushita, Thomas J. Schoenbaum, Petros Mavroidis, and Michael Hahn (collectively referred to as "Matsushita") explain in their book on the WTO, "[r]ules of origin are necessary to implement differential trade policies, such as applying higher tariff rates from developed countries than from least developed countries, applying low or zero tariff to imports from PTA partners, and, last but by no means least, applying trade remedy measures."[22] Further, preferential trade relationships have increased and "in today's trade environment, much like in pre-GATT days, the origin of a product determines the tariff rate and other border measures."[23] The fate of the HWP does not impact preferential rules of origin in PTAs nor their application by customs officials as these rules do not come under the HWP mandate.[24]

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[18] Van den Bossche and Zdouc (n 9) 458-459.
[19] Agreement on Rules of Origin (AOR) (15 April 1994) LT/UR/A-1A/7, art 9:2(a) <https://docts.wto.org> accessed 5 January 2022.
[20] Stefano Inama, *Rules of Origin in International Trade* (CUP 2009) 47-71; Mavroidis, *The Regulation of International Trade*, vol. 1 (n 5) 225. Mavroidis and Edwin Vermulst note that the Members "managed to find agreement only with respect of 55% of the 2,744 products." Petros C Mavroidis and Edwin Vermulst, 'The Case for Dropping Preferential Rules of Origin' (2018) 52 J World Trade 1, 6 (referring to Committee on Rules of Origin, 'Draft Consolidated Text of Non-Preferential Rules of Origin' (11 February 2010) G/RO/W/111/Rev.5).
[21] WTO, "Event marks 25th anniversary of the WTO's Agreement on Rules of Origin' (wto.org 4 March 2020) <https://www.wto.org/english/news_e/news20_e/roi_04mar20_e.htm> accessed 1 December 2021.
[22] Mitsuo Matsushita, Thomas J. Schoenbaum, Petros C Mavroidis, and Michael Hahn, *The World Trade Organization: Law, Practice, and Policy* (3rd edn, OUP 2017) 237. This book will be referenced as "Matsushita."
[23] ibid.
[24] Peter van den Bossche, *The Law and Policy of the World Trade Organization: Text, Cases and Materials* (2nd edn, CUP 2008) 437-438 [Note: this version of the book is cited, as the fourth edition

This dissertation will only reference non-preferential rules when relevant to the particular topic under discussion. Regarding preferential rules of origin, they are brought under the aegis of the WTO through an annex to the Agreement on Rules of Origin, Annex II: The Common Declaration with Regards to Preferential Rules of Origin. The legality of preferential rules of origin under WTO law is a scholarly debate that will be presented in Chapters 2, 4, and 6.[25]

Such a debate points to another important aspect of rules of origin: they are more than a technical element of international trade. Certainly, the study of rules of origin can be linked to economics and trade practices, and knowledge of these fields should be applied when drafting the rules and when performing an empirical assessment of the functionality of such rules and their impact on trade.[26] However, in 1990, Edwin Vermulst and Paul Waer, in reference to the impact of the European Communities (EC) non-preferential rules of origin on stimulating "buy-European" policies, wrote:

> The time has come to realize and to explicitly acknowledge that rules of origin – while technical in nature – will always have consequences for corporate sourcing policies. They should therefore be the result of a transparent procedure in which all affected parties have their say.[27]

This observation brings light to a belief shared by Stefano Inama and Moshe Hirsch, the design of rules should not just be left to a few government technical experts and politicians.[28] Instead, many actors, including policymakers, lawyers, scholars, businesses, and customs officials should be involved in the design and implementation of the rules. In 2009, regarding preferential rules of origin, Inama argued that"…rules of origin demand a multi-disciplinary approach comprising knowledge of customs laws, industrial trade policy aspects, and ultimately, economics."[29] While knowledge of the Harmonized System Nomenclature for classification of goods, customs valuation, and practical experience in customs administration are needed when "dealing with rules of origin…the time has gone since the rules were considered as a rather obscure and

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does not include this information in the discussion on rules of origin]; Mavroidis, *The regulation of International Trade*, vol. 1 (n 5) 227.

[25] See also, Mavroidis, *The Regulation of International Trade,* vol 1 (n 5) 228.

[26] See Chapter 3, Part II.

[27] Vermulst and Waer (n 6) 98.

[28] Inama, *Rules of Origin in International Trade* (n 20) 482; Moshe Hirsch, 'The Politics of Rules of Origin' in Tomer Broude, Marc L. Busch, and Amelia Porges (eds), *The Politics of International Economic Law* (CUP 2011) 328.

[29] Inama, *Rules of Origin in International Trade* (n 20) 481

technical customs issue, with little bearing on trade and economic policy."[30] One reason for studying preferential rules of origin is that they can be a non-tariff barrier to trade. This concern was raised in 2006 by economists comparing the NAFTA and Pan-Euro Mediterranean Rules of Origin (PEM). Olivier Cadot, Celine Carrere, Jaime De Melo, and Bolormaa Tumurchundur found that while:

> [i]n principle, RoOs are used in FTAs to prevent trade deflection[31]…in practice, however, RoOs have proved to be powerful protectionist tools…far from being the technical matter that they were until recently taken for, [rules of origin] act as surrogates for protectionist instruments that are no longer available under multilateral trade rules. In that sense, they matter for the same reason that anti-dumping or technical barriers matter to trade: in a world where traditional instruments of protection are increasingly constrained, new indirect barriers take on increasing importance.[32]

This dissertation will examine how preferential rules of origin can be used as non-tariff barriers to trade, but it will also connect these rules to other areas of trade law and the role of the WTO in regulating international trade.

Knowledge of how preferential rules of origin are designed and function may assist lawyers, policymakers, and scholars in understanding how to regulate and design laws for trade impacted by GVCs and digital technologies. The fragmentation of production processes and the dispersion of production locations across the globe has complicated identifying the origin of a good, which in turn has made it more costly for traders to import goods under preferential tariff rates.[33] The expansion of GVCs results not just from trade liberalization, Mavroidis notes, but also from the widespread adaption of information technology which has facilitated the breaking up of production processes into units.[34] This then raises the question, Mavroidis continues, on the role of the multilateral trade regime in a world linked by GVCs and what the WTO should do to facilitate trade and promote trade liberalization.[35] Mavoridis finds that there is still

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[30] ibid.
[31] Trade deflection occurs when a trader from a country that is not a party to a FTA imports the good through a FTA country with the lowest external tariff, thus gaining access to the FTA market at a lower cost and reexporting goods to other parties of the FTA, which decreases tariff revenue for the FTA parties. Preferential rules of origin aim to ensure that only goods originating from FTA countries can access the FTA market at a lower tariff rate. Olivier Cadot, Celene Carrere, Jaime de Melo, and Bolormaa Tumurchudur, 'Product-Specific Rules of Origin in EU and US Preferential Trade Arrangements: An Assessment' (2006) 5 World Trade Rev 199, 200.
[32] ibid 200-201.
[33] Paul Brenton, 'Preferential Rules of Origin' in Jean-Pierre Chauffour and Jean-Christophe Maur (eds), *Preferential Trade Agreement Policies for Development: A Handbook* (World Bank 2011) 161.
[34] Mavroidis, *The Regulation of International Trade*, vol 1 (n 5) 234.
[35] ibid.

"a lot that needs to be done for the WTO to keep pace with the current aspirations of the business community in this respect. Importantly, GVCs would greatly benefit from more rational, less complicated rules of origin."[36] If this cannot be achieved at a multilateral level, then Mavroidis suggests that "trading nations profiting from their participation in GVCs could find it to their advantage to simplify or rationalize their own national regimes."[37] Therefore, lawyers, scholars, and policymakers should study preferential rules of origin beyond a multilateral context, as nations can design rules to favor domestic intermediate part producers in PTAs.[38]

The preferential rules of origin chapters of trade agreements are lengthy, at times over 200 pages[39], but once one starts to delve into the details of these chapters, some interesting observations can be made on the use of PTAs to regulate trade. Despite their length, rules of origin could be categorized as a "shallow" approach to the trade law framework.[40] A shallow integration of goods results from reciprocal exchanges of commitments focused on the reduction of tariffs and discriminatory border measures.[41] "Deep" integration of goods occurs in trade agreements when, Hoekman and Nelson report, the "focus is not on removing discrimination…but to attenuate adverse trade effects of domestic regulation."[42] Thus, deeper provisions are found in trade agreements linked to labor or environmental standards. Some of the USMCA's preferential rules enter into "deep" territory: traders must demonstrate that the production of a vehicle includes a certain amount of labor paid at a minimum wage rate for the vehicle to obtain USMCA origin.[43] Whether, the labor requirements in the rules will result in more vehicles and parts made in the USMCA territory or in changes to national labor laws will be explored further in this dissertation. Thus, looking at

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[36] ibid.
[37] ibid.
[38] Paola Conconi, Manuel García-Santana, Laura Puccio and Roberto Venturini, 'From Final Goods to Inputs: The Protectionist Effect of Rules of Origin' (2018) 108 American Economic Rev 2335, 2336-2337.
[39] USMCA ch 4, the chapter on rules of origin, is 270 pages including annexes. CETA's Protocol on Rules of Origin and Origin Procedures is 206 pages.
[40] Joost Pauwelyn, 'Taking the Preferences Out of Preferential Trade Agreements: TTIP as a Provider of Public Goods' reprinted in Joost HB Pauwelyn, Andrew T Guzman, Jennifer A Hillman, *International Trade Law* (3rd edn, WoltersKluwer 2016) 374
[41] Bernard Hoekman and Douglas Nelson, '21st Century Trade Agreements and the Owl of Minerva' (2018), EUI Working Papers, RSCAS 2018/04, 10-11 <https://cadmus.eui.eu/bitstream/handle/1814/50964/RSCAS_2018_04.pdf?sequence=1&isAllowed=y> accessed 23 October 2021.
[42] ibid 11.
[43] David A Gantz, 'North America's Shifting Supply Chains: The USMCA, COVID-19, and the U.S.-China Trade War' (2020) Rice U. Baker Institute for Public Policy, 16 <https://doi.org/10.25613/0gaq-h036> accessed 8 January 2022.

preferential rules of origin allows an examination of how negotiating mega-regional agreements and bi-lateral agreements can impact trade.

Trade analysists writing about rules of origin encourage policymakers to make trade negotiations more transparent and more inclusive of contributions from multiple actors in the trade community. With preferential rules of origin we can also catch a glimmer of united efforts to redesign legal rules to benefit trade. The EU and 20 trading partners in the European and Mediterranean region have agreed to revisions to the Pan-Euro Mediterranean Convention that aim to simplify the product-specific rules (the rules that a product must meet to qualify for origin) as well as the origin certification requirements.[44] The transitional rules are now in effect and applied by 13 parties (including the EU).[45] Looking at preferential rules of origin in trade agreements provides an opportunity to study changes in trade law, such as the shift to deeper trade agreements, the practice of trade negotiations, and finally the impact of such agreements on the practice of trade.

The changes that 3D printing brings to manufacturing leads to another topic: determining the origin for digital products. If the value of a product derives from a digital input, such as a file that instructs a 3D printer, what role should these digital inputs have in determining the origin of a good? Exploring this question takes up the thread of Duy Dinh's and Dylan Geraets, Colleen Carroll, and Arnoud R. Willems's work on rules of origin.[46] Dinh examines whether a digital services and Geraets, Carroll, and Willems explore whether R&D and design could be origin conferring inputs. Reports for the Swedish National Board of Trade and the World Economic Forum on 3D printing point to another aspect: how will rules of origin function in identifying origin of goods made through advanced manufacturing techniques, such as 3D printing which require minimal human involvement and more digital and automated processing?[47] These

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[44] Commission, 'The Pan-Euro-Mediterranean Cumulation and the PEM Convention' (ec.europa.eu) <https://ec.europa.eu/taxation_customs/customs-4/international-affairs/pan-euro-mediterranean-cumulation-and-pem-convention_en> accessed 5 May 2022.
However, the rules are still 147 pages in length including the Annexes. See, eg, Council Decision (EU) 2019/2198 of 25 November 2019 on the position to be taken on behalf of the European Union within the Joint Committee established by the Regional Convention on pan-Euro-Mediterranean preferential rules of origin as regards the amendment of the Convention [2019] OJ L 339/1–148 (PEM Transitional Rules, referred to in the dissertation also as 'revised PEM' or 'PEM revisions').
[45] Commission, 'The Pan-Euro-Mediterranean Cumulation and the PEM Convention' (n 44).
[46] Duy Dinh, *Rules of Origin for Services: From the Early Days of GATS to the Era of Servicification* (Edward Elgar 2020); Dylan Geraets, Colleen Carroll, and Arnoud R Willems, 'Reconciling Rules of Origin and Global Value Chains: The Case for Reform' (2015) 18 J Intl Economic L 287-305.
[47] National Board of Trade – Sweden, 'Trade Regulation in a 3D Printed World: A Primer' (2016) Kommerskollegium 2016: 1; Ziyang Fan, Jimena Sotelo, and Venkataraman Sundareswaran, '3D

types of questions provide an opportunity to study how rules for trade are designed, where rules start to become out-of-synch with new manufacturing and trade practices, and whether any modifications to rules are necessary.

Finally, lawyers and legal scholars interested in digital trade or trade of goods with digital inputs (such as smart goods) may wish to become familiar with the basic concepts of rules of origin for services and for goods. Given the WTO moratorium on custom duties on electronic transmissions and provisions in trade agreements prohibiting such duties, tariffs on the transmission of digital files, like the 3D file, are not currently applied.[48] However, as states impose other barriers to trade, through data localization requirements for example, understanding where that digital product originated could be useful for scholars and lawyers focusing on information technology law. This dissertation briefly examines rules of origin for services, the impact of custom duties and moratoriums of such duties on electronic transmissions, and e-commerce, and discuss these issues in the context of 3D printing technology and manufacturing.

## II. Research Question and Methodology

Looking at preferential rules of origin in the context of 3D printing allows us to experiment with modernizing such rules to support trade in a digital environment. Identifying aspects of the design and administration of rules where there is a risk for protectionist intervention, or a risk of generating more confusion for traders, leads us to question how the trade law system should regulate such rules, which are mainly situated in regional and bilateral preferential trade agreements. These considerations also tie into some of the challenges international institutions, especially the WTO, face at this moment: what role should multilateralism play in forming a framework for trade and how can organizations modernize along with technological changes to promote trade liberalization and development.

The main point of departure for this exploration was an examination of how preferential rules of origin could be applied to 3D printed goods. This required a review of the literature on rules of origin for goods or services, 3D printing, and rules of origin

Printing: A Guide for Decision-Makers' (January 2020) World Economic Forum – White Paper 13 <http://www3.weforum.org/docs/WEF_Impacts_3D_Printing_on_Trade_Supply_Chains_Toolkit.pdf> accessed 24 October 2021.

[48] Rashmi Banga, 'Growing Trade in Electronic Transmissions: Implications for the South' (2019) UNCTAD Research Paper No. 29, 30-31 < https://unctad.org/system/files/official-document/ser-rp-2019d1_en.pdf> accessed 23 October 2021.

and digital products, as well as literature on the trajectory of international trade law from 1995 to today, which will be described in more detail in the next Part. From this review, the main research question was developed: What can the study of rules of origin for 3D printed goods (a category of advanced manufactured goods) tell us about the role of the WTO in an era of digital-based trade and about designing trade rules that support a predictable and equitable regulation of trade and are also responsive to changes in the technical production of goods.

To reach a conclusion for this question, two sub-questions were assessed. First, at a technical level, what would be the result of applying rules of origin to 3D printed goods? Second, taking what we find from the results of this analysis, how should rules of origin for advanced manufactured products be designed in trade instruments? For both of these sub-questions it was necessary to investigate the following: 1) the history of rules of origin in international trade, 2) how preferential rules of origin fit into the WTO legal framework, 3) the technical rules existing in PTAs and regional agreements, and 4) the work of economists and trade analysists who have identified inefficiencies in the current rules of origin regime and tendencies to use the rules as protectionist trade measures. For this last focus, in addition to literature review, interviews were held with rules of origin specialist Prof. David A. Gantz and trade analyst Dr. Anna Jerzweska.

Having established this groundwork, it was possible to move towards the first sub-focus, the application of preferential RoO to a tangible 3D printed product. The first step identifies the points where a RoO determination for goods based on traditional manufacturing processes is out of synch with additive manufacturing. The second step delves into the debate on whether service inputs, such as design and development, should have individual roles in conferring origin to final goods. This analysis is built from the work of Gareats, Carroll and Willems, who have proposed that service inputs be incorporated into the rules of origin analysis, as well as Dinh's examination of the origin of a 3D product and the 3D design file within a greater proposal of a rules of origin regime that incorporates the economic origin of a service input.

There were several technical and legal findings. First, not taking into consideration the 3D file as an input, it is possible to apply current preferential rules of origin to 3D printed goods and other advanced manufactured goods. However, there are some oscillations regarding the outcome of the origin in comparison with the application of such rules to traditionally manufactured goods. When based on whether

sufficient processing is completed on the good, the rules could become too permissive or too restrictive due to interpretations of sufficient processing. When based on value produced in the territory, the origin conferring value could shift from labor costs to material costs. Secondly, attempting to append the service input to the origin analysis resulted in some points of friction at the level of WTO law due the distinctions in the purposes between services classifications and goods classifications under WTO instruments and the Harmonized System of Nomenclature. Further, as rules of origin for services in the GATS and in trade instruments designate origin based on the legal seat of the supplier, this study confirms Dinh's findings that combining the origin determination of the tangible and service inputs requires either changing to an economic-based rules for services or adjoining the current legal-supplier-based rules for services with the economic-based rules for goods, which forms an uneasy alliance legally. Finally, this dissertation identified that the potential for a service input to confer origin on a good can provide opportunities for policymakers and trade negotiators to strategically design new rules to favor domestic industries or to take advantage of a global production chain to achieve preferential tariff treatment for key goods.

The observations made in studying the application of the technical rules of origin on advanced manufactured goods set the foundations for the second focus of the dissertation: how could a rules of origin regime that is responsive to changes in technology, but that still functions to distinguish goods that qualify for preferential treatment, be developed and supported by international trade organizations and states? The idea of a plurilateral WTO Instrument is put forth as one option, but the scope and limitations of such Instrument is critically assessed by comparisons to existing plurilateral agreements. How to place such an Instrument among legal instruments related to e-commerce and the transmission of digital files is also discussed. The general finding is that such an Instrument would need to cover a narrow range of goods, give parties sovereignty in designing rules, and have its own legal core independent from the development of rules on e-commerce and electronic transmissions. Next, the study examined how existing resources at trade organizations, such as at the WTO and the World Customs Organization, can be applied to assist states in developing a functional rules of origin regime for advanced manufactured goods. The key term that emerges from this review is "collaboration." It will be necessary for these organizations and states to work together and to work with traders and trade and technology experts to devise rules that perform their legal

purpose (distinguish goods for preferential treatment), that are not too complex, that minimize negative externalities (such as being too restrictive or trade distortive), and that can be updated as technological methods of production change and the types of goods traded change. The main finding of this part is that a comprehensive review of rules of origin in the era of digital trade should be considered by policymakers and lawyers and they should design rules that are predictable and that enhance the legitimacy of the international trade law framework as one that liberalizes trade while promoting development, innovation, and even-handed trade practices.

By linking preferential rules of origin and 3D printing, this dissertation aims to explore how trade law is interconnected with changes in how trade is conducted and how goods are produced. The study of rules of origin in trade instruments and as well as the newer inclusions of "deep" provisions in rules of origin chapters allows us to establish the groundwork for the investigation of rules of origin in connection with advanced manufactured goods as well as identify the issues (trade restrictiveness, protectionist intervention) that we must be attentive to when performing this investigation. The application of the technical rules to advanced manufactured products shows where the current rules of origin regime could begin to be incompatible for advanced manufactured products and where those who design rules could take advantage of this process to strategically obtain or retain origin based on where the file originates or the good is printed. These results support a proposal for a globally united effort to design a new rules of origin regime that can be situated within a framework for trade in a digital era and a dedicated endeavor by organizations and states to make the design process and the administration of the rules more trader-friendly. Finally, this study demonstrates that international trade organizations, and especially the WTO, are still necessary. The Declaration on Preferential Rules of Origin allows Members much sovereignty in design of the rules and it is still unknown the type of rulings the WTO judicial bodies could issue on claims brought under the Declaration. This allows us to think about the WTO apart from its role as a trade dispute adjudicator. Instead, with rules of origin, we can focus on those aspects of the WTO that have made it an important element for the progress of trade over the last 27 years: its role as negotiating platform and its technical assistance and resource services. By becoming more active in the research and design process of rules of origin in the digital area, as well as observing and pointing out the weak points of these rules, the WTO could also become

more supportive to traders and continue to function as a key part of an international trade law framework that fosters a predictable and equitable trade environment.

## III. Literature Review

This dissertation's research approach is a combination of doctrinal, qualitative, and interdisciplinary research. This is partially because there are few international disputes and judicial decisions on rules of origin, and rules of origin impact trade in global value chains, which are influenced by other fields of law, such as intellectual property and corporate law, and which are the subjects of studies by economists and business scholars. Further, legal innovation in rules of origin occurs at the regional level, while interpretations of the rules generally occur at the national or territorial level. The various legal layers (international, regional, national) as well as the various sectors (trade, economics, technology) that rules of origin can be situated in suggests a multi-discipline approach to understanding the role of rules of origin as legal rules in trade.

The first stratum of this research approach is a doctrinal analysis, combined with policy-based research. As Ian Dobinson and Francis Johns propose, doctrinal research "is often done from a historical perspective and may also include secondary sources such as journal articles or other written commentaries on the case law and legislation," in addition to such case law and legislation.[49] For this dissertation, the relevant WTO case law and legislation, relevant national or EU law and legislation, as well as the historical perspective of rules of origin in the international trade law system, GATT, and the WTO will be examined. Discussions on rules of origin form a minor portion of the main commentaries of the WTO. The textbooks by Mitsuo Matsushita, Thomas J. Schoenbaum, Petros C. Mavroidis, Michael Hahn and by Peter Van den Bossche and Werner Zdouc, tomes over 1000 pages in length, devote a few pages to rules of origin. This may be because of the relatively scarce WTO case-law on such rules. Van den Bossche and Zdouc note that as of 2019, there has been only one dispute before a panel dealing with the Agreement on Rules of Origin (AOR) – *US-Textiles Rules of Origin* (2003) – nor has any WTO Member "been found in dispute settlement proceedings to have acted inconsistently with the obligations under the

[49] Ian Dobinson and Francis Johns, 'Qualitative Legal Research,' in Mike McConville and Wing Hong Chui (eds), *Research Methods for Law* (Edinburgh UP 2007, reprinted in 2012) 19.

[AOR]."[50] Authors who have examined preferential rules of origin for goods in relation to the GATT 1947 and the WTO are Bernard Hoekman, Edmund Vermulst, Petros Mavoridis, Laura Puccio[51], and Stefano Inama, and their work will be referenced throughout this thesis. Scholars examining rules of origin for services are Duy Dinh, Americo Zampetti and Pierre Suavé[52], and Richard Baldwin.[53]

Yet, some of these authors are economists and all look beyond WTO jurisprudence when examining rules of origin. Such an exploration could be placed under a group of qualitative research that Dobinson and Johns call "problem, policy and law reform based research."[54] In fact doctrinal and policy and law reform both form the foundation for legal research, first by examining existing law, then by considering "the problems currently affecting the law and the policy underpinning the existing law, highlighting, for example, the flaws in such policy," which "in turn may lead the researcher to propose changes to the law (law reform)."[55] This dissertation follows in part such an approach. However, Philip Langbroek along with other scholars studying legal research methodology has proposed that even within a "traditional perspective" to researching law - "referring to academic publications, scholarly comments, case law and legislation" – such a perspective also includes, "referring to the outcomes of studies in other disciplines."[56] This dissertation will examine the work of economics and business scholars on rules of origin, as such works are cited by legal scholars or provide data on how traders and customs offices are impacted by rules of origin. This dissertation will not delve very far into technical details, such as formulas for determining whether a certain percentage of regional content is included in the good, or statistics on utilization rates of preferential rules of origin.

While rules of origin are an issue for those traders operating and producing in GVCs, the fragmentation of trade and the emergence of regional and bilateral

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[50] Van den Bossche and Werner Zdouc (n 5) 457-459.
[51] Laura Puccio, '20 Years After Marrakesh: Reconsidering the Effects of Preferential Rules of Origin and Anti-Circumvention Rules on Trade in Inputs and Global Production Networks' 2014 Eur YB Intl Economic L 173, 173-200.
[52] Americo Beviglia Zampetti and Pierre Sauvé, 'Rules of Origin for Services: Economic and Legal Considerations,' in Olivier Cadot, Antoni Estevadeordal, Akiko Suwa-Eisenmann, and Theirry Verdier (eds), *The Origin of Goods: Rules of Origin in Regional Trade Agreements* (OUP 2006) 114-146.
[53] Richard Baldwin, '21st Century Regionalism: Filling the Gap between 21st Century Trade and 20th Century Trade Rules' (May 2011) *Policy Insight* (Centre for Economic Policy Research) <https://cepr.org/sites/default/files/policy_insights/PolicyInsight56.pdf> accessed 24 October 2021.
[54] Dobinson and Johns (n 49) 19.
[55] ibid 19-20.
[56] Philip Langbroek and others, 'Methodology of Legal Research: Challenges and Opportunities' (2017) 13 Utrecht L Rev 1, 2.

approaches to regulating trade also suggests a research approach that examines both the role of the WTO in international trade and also looks towards a more comprehensive analysis of international, regional, and local actors in trade relations. As Manfred Elsig, Bernard Hoekman, and Joost Pauwelyn propose, GVCs and the WTO had an impact on restraining protectionism after the 2008 global financial crisis as "the open, rules-based multilateral trading system underpinned the shift by companies towards greater specialization, cross-border investment and international production networks."[57] Yet, nearly 15 years later the WTO found itself confronting the stagnation of the Doha Round and the disappearance of the Appellate Body due to the expiration of the last sitting member on 30 November 2020. This dissertation aims to balance, on the one hand, an expectation that the WTO and its Members can work together to improve the international trade system for all, with, on the other hand, a recognition that legal work and innovation, at least for rules of origin, is occurring at the regional and bilateral level. This dual approach requires a research scope that looks beyond WTO law and scholarly work on the WTO. Ernst-Ulrich Petersmann suggests that the way trade is conducted requires reconsidering the design of international and national legal system:

> Globalization entails that traditional legal distinctions [e.g. between private law, national public law, and international law] …are increasingly challenged by the emergence of transnational and multilevel regulatory systems; the latter are driven no longer by only states, but increasingly by non-governmental and international actors, as illustrated by transnational regulation of global supply chains [and] of the internet (lex digitalis)…Understanding worldwide legal regimes (like WTO law) and multilevel governance institutions (like the WTO dispute settlement bodies, regional and national economic courts) requires interdisciplinary studies that often explain political actors in different ways.[58]

Rules of origin is a politicized element of trade law: lobbyists for domestic industries and politicians aim to influence the design of the rules, as will be examined in Chapter 3. Thus, the dissertation looks at various sources – doctrine, decisions of customs courts, economic studies, reports by international organizations, and research on new technologies – to examine rules of origin at the multilateral level and at regional and bilateral levels.

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[57] Manfred Elsig, Bernard Hoekman, and Joost Pauwelyn, 'Thinking About the Performance of the World Trade Organization: A Discussion Across Disciplines' in Manfred Elsig, Bernard Hoekman, and Joost Pauwelyn (eds), *Assessing the World Trade Organization: Fit for Purpose?* (CUP 2017) 23.
[58] Ernst-Ulrich Petersmann, '20 Years WTO Law and Governance: Some Legal Methodology Problems' (2016) 13 Manchester J Intl Economic L 106, 111.

Regarding the research on international trade and economic law, the following sources were consulted: treaties, judicial decisions, acts of international organizations, and non-binding instruments.[59] Stephan Hall calls treaties "the real workhorses of international law because they are used for an array of indispensable tasks ranging from the creation of commercial commitments" to "the regulation of technical matters."[60] This could be the case for agreements that include rules of origin chapters. However, Hall also states that "[u]nlike custom, whose evolution can take long periods of time and whose precise requirements can frequently be unclear, treaties are capable of furnishing States with instant and more or less clearly defined rights and obligations."[61] As referenced previously, the only WTO instrument on preferential rules of origin is a Common Declaration that provides guidelines on designing rules, but does not establish any prohibitions on using rules to cause trade distortions. It could be said that when academics, customs officials, and traders refer to trade instruments on rules of origin, they struggle to identify the rights and obligations established by the instrument.[62] Thus, the examination of international trade agreements requires an understanding that such research will produce questions along with potential answers. This said, the trade instruments examined in this dissertation were selected according to the following criteria: (1) the geographical scope, (2) the novelty of design of the rules, (3) recentness, (4) or utilization in demonstrating an element of the rules. The first category includes the PEM and the PEM revisions, the CPTPP, and the USMCA; the second category includes the PEM revisions and the USMCA; the third category includes the previously mentioned agreements as well as the Trade And Cooperation Agreement Between The European Union and the United Kingdom (TCA) and the New Zealand-Singapore Closer Economic Partnership (CEP) Upgrade; and the fourth category includes ASEAN treaties, EU bilateral treaties such as CETA, and US bilateral treaties, such as the US-Japan Trade Agreement.

Rules of origin also require a flexible approach to reviewing judicial decisions, acts of organizations, and non-binding instruments. As mentioned above, there have been no WTO adjudicated disputes on preferential rules of origin. However, WTO case law is useful for examining topics related to the study of rules of origin, such as cases

[59] See generally, Stephen Hall, 'Researching International Law' in Mike McConville and Wing Hong Cui (eds), *Research Methods for Law* (Edinburgh UP 2007, reprinted 2012) 181-203
[60] ibid 183.
[61] ibid.
[62] See Chapter 3, Parts I and II.

on the use of the Harmonized System Nomenclature (HS) in trade instruments and cases on whether GATT or GATS applies to a measure in a trade instrument.[63] The dissertation also examines post-1994 acts of WTO Members. The Trade Facilitation Agreement (TFA), the Information Technology Agreement (ITA), and the 2013 Bali and 2015 Nairobi Ministerial Decisions on Rules of Origin for LDCs will be referred to, mainly in Chapter 5, when proposing suggestions for greater WTO involvement in the design of rules of origin. Finally, the instruments of the World Customs Organization (WCO) are important to the study of rules of origin. The WCO administers The International Convention on the Harmonized Commodity Description and Coding System (HS Convention) and the International Convention on the simplification and harmonization of Customs procedures (Revised Kyoto Convention). As of 7 March 2022, there are 160 contracting parties to the HS Convention, and as of 15 March 2022, 131 to the Revised Kyoto Convention.[64] The WCO also provides dispute settlement mechanisms for the Convention and under the HS; in both instances, the parties may agree in advance to make the recommendations issued by the responsible Committees binding.[65] Looking at the WCO also provides an opportunity to compare and contrast the WCO's activities as an organization with those of the WTO in relation to rules of origin.

Additive manufacturing, which is also referred to as 3D printing, was chosen as the lens through which to examine preferential rules of origin because of the changes it may bring to production and trade in goods. In reports by the Swedish National Board of Trade and the World Economic Forum, Dinh's book on rules of origin for services, and a conference in 2020 by the George Washington University's DataGov Hub, questions were raised on how 3D printing technology and manufacturing could impact

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[63] As Stephen Hall explains, judicial decisions area are not "sources of law, but may be used to ascertain the existence and scope of rules sourced in treaties." Hall (n 59) 196.

[64] World Customs Organization (WCO), 'Position of Contracting Parties to the Harmonized System Convention and Non-Contracting Party Administrations' (wcoomd.org 7 March 2022) <http://www.wcoomd.org/-/media/wco/public/global/pdf/topics/nomenclature/overview/hs-contracting-parties/positions-of-cp/situation_hs.pdf?db=web> accessed 5 May 2022; WCO, 'Positions as regards ratifications and accessions (as of 15 March 2022): International Convention on the Simplification and Harmonization of Customs Procedures (as amended)' (wccomd.org 15 March 2022) < http://www.wcoomd.org/-/media/wco/public/global/pdf/about-us/legal-instruments/conventions-and-agreements/revised-kyoto/pg0321ea.pdf?la=en> accessed 5 May 2022.

[65] Customs Co-operation Council (WCO), International Convention on the Simplification and Harmonization of Customs Procedures (as amended) (Revised Kyoto Convention) (entered into force 3 February 2006) art 14; WCO, International Convention on the Harmonized Commodity Description and Coding System (HS Convention) (entered into force 1 January 1988), art 10. The legal effect of such recommendations in connection with trade matters within the jurisdiction of the WTO will be discussed in Chapter 1.

determining the origin of a good. Additionally, examining rules of origin and 3D printing technology leads into the greater questions of modernization of trade law, and more specifically, the steps the WTO can take to meet the needs of traders and customs officials as production and trade adapt to changes in technology. Mavoridis argues that:

> [t]he fact that it will be some time before 3D printing can be fully utilized on a wide commercial scale does not mean that similar questions should be like sleeping dogs that can lie a few yards outside the WTO headquarters, and are handled only at the moment when they start to bark. The WTO can become attractive only if it shows the capacity to address similar concerns preemptively, and not only ex post facto (which might be too late).[66]

This dissertation examines how technical rules of origin are impacted by 3D printing and suggests how the WTO could approach the design of rules for 3D printed goods to provide a framework for the regulation and support of international trade.

3D printing also allows us to consider other elements of trade influenced by the rise of digital technology, such as the regulation of digital transmissions or the hybridization of goods and services. It is debated among analysts at the OECD and UNCTAD what impact 3D printing will have on the rate of international trade, and whether this necessitates imposing custom duties on the transmissions of digital files.[67] In general, research on 3D printing proposes that it will not entirely substitute traditional, labor-intensive manufacturing, but will act as a compliment to such manufacturing, for example, by providing specialized parts for machines or customized consumer goods.[68] 3D printing, while expensive and requiring advanced digital skills, is of interest to both developed and developing countries.[69] Thus, 3D printing has the

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[66]Petros C Mavroidis, *The Regulation of International Trade*, vol 3 (MIT Press 2020) 242-243.

[67] Rashmi Banga, 'Growing Trade in Electronic Transmissions: Implications for the South' (n 48) ; A Andrenelli and J López González, 'Electronic Transmissions and International Trade - Shedding New Light on the Moratorium Debate' (2019) OECD Trade Policy Paper, No. 233 <http://dx.doi.org/10.1787/57b50a4b-en> accessed 23 October 2021; A Andrenelli and J López González, '3D printing and International Trade: What is the Evidence to Date?' (2021), OECD Trade Policy Paper, No. 256 <https://www.oecd.org/publications/3d-printing-and-international-trade-0de14497-en.htm> accessed 26 November 2021.

[68] A Andrenelli and J López González, '3D printing and International Trade: What is the Evidence to Date?' (n 67) 4; Caroline Freund, Alen Mulabdic and Michele Ruta, 'Is 3D Printing a Threat to Global Trade? The Trade Effects You Didn't Hear About,' (2020) World Development Report Policy Research Working Paper, No. 9024, 2-3 < https://openknowledge.worldbank.org/handle/10986/32453> accessed 26 November 2021.

[69] See eg, 'GE Nigeria Launches e-learning Portal at Lagos Garage Week 2018' (ge.com 7 December 2018), <https://www.ge.com/news/press-releases/ge-nigeria-launches-e-learning-portal-lagos-garage-week-2018> accessed 2 November 2021; Ministry of Electronics and Information Technology, 'National Strategy for Additive Manufacturing' (Meity.gov.in December 2020) 3, 5

potential to become a global form of manufacturing and the trade of 3D printed goods could occur under PTAs as well as GSPs (General Systems of Preferences). This potential global dimension of such trade suggests that the classification of digital products, a hybridization of the GATT and GATS, and the addition of a Mode 5 for services under GATS can be examined through 3D printing. Such an analysis can also be linked to a rules of origin analysis of 3D printed goods or goods with a significant digital component, like a CAD file. However, this dissertation proposes that exploring how rules of origin impact trade of 3D printed goods should not be reliant on first establishing an agreement on e-commerce at the WTO or the existence of a Mode 5.

The dissertation proceeds in the following manner:

- Chapter 1 focuses on preferential rules of origin in the context of WTO agreements and jurisprudence. This allows us to see why preferential rules vary considerably in PTAs and why they can perform a discriminatory function. This chapter also introduces the debate as to the legality of preferential rules of origin under WTO law.
- Chapter 2 presents the main criteria for determining the origin of a good: the good was wholly obtained or produced in a territory or it satisfies one (or more) of the three substantial transformation criteria: manufacturing a good results in a change of tariff (line) heading[70], a completion of a specific manufacturing or operating process, or the meeting of an *ad valorem* percentage requirement. These criteria will be examined in the context of traditional manufacturing techniques. Innovations to the rules found in the revisions to the PEM Rules of Origin and the USMCA will be referenced. Finally, the chapter concludes with an overview of the origin certification and procedural requirements for trading under preferential tariff rates.
- Chapter 3 turns towards legal and economic critiques of preferential rules of origin to set the stage for an understanding of how the design of these rules can be motivated by protectionist trade policies and how the complexity of the rules can discourage traders from seeking trade preferences. With this awareness, the Chapter next questions whether “deeper” provisions, such as on labor or

<https://www.meity.gov.in/writereaddata/files/National%20Strategy%20for%20Additive%20Manufacturing.pdf> accessed 2 November 2021.

[70] More specifically, the inputs of the good are classified on one tariff line and the final good is classified in a different tariff line.

environmental regulations, should be included in rules of origin chapters. The Chapter then initiates an exploration of how the design of rules would be integrated in a framework for trade in a digitally interconnected world. The Chapter concludes with establishing that the 3D file, the digital instructions downloaded into the 3D printer, is a service.

- Chapter 4 mirrors in part Chapter 2. The wholly obtained/produced and the three substantial transformation criteria are examined in the context of 3D printed goods. Challenges in applying these criteria to determine the origin of a 3D file are discussed. The Chapter mainly focuses on the *ad valorem* criterion and signals where the design of rules under this criterion could lead to favoring a domestic industry or impeding third parties from trading with partners of a PTA.
- Chapter 5 links together the topics of each Chapter to provide recommendations for designing rules in the context of 3D printed goods and also for making rules generally more functional and trader-friendly elements of trade law at the WTO and in PTAs. Then, the Chapter explores the possibility of a plurilateral WTO agreement on preferential rules for PTAs while looking at the Bali and Nairobi Ministerial Decisions on Preferential Rules of Origin for LDCs as well as the ITA and the TFA. Next, the Chapter proposes areas where the WTO can utilize its institutional resources and expertise to assist traders with preferential rules when determining the origin of advanced manufactured product. In this way, the WTO could be responsive to the modernization of trade production. Finally, the Chapter presents some recommendations for the design of the rules in PTAs and regional trade instruments.
- A Conclusion brings together the topics discussed in the thesis, provides a summary of the findings, and proposes some suggestions for the design of rules of origin for advanced manufactured goods.

## IV. Contributions and Conclusion

Elements of this dissertation are relevant to the study of technology and data law and international law, as well as to the study of the impact of rules of origin and 3D printing in international trade. First, a more narrow perspective. One aim of this dissertation is to examine discussions on rules of origin by Dinh, the Swedish Board of Trade, and the World Economic Forum, and take the analysis a few steps further. In

this way, the dissertation explores the implications of designing rules of origin that recognize the digital file as an origin conferring input of 3d printed goods. What should be the response of WTO Members and the WTO as an organization to the changes advanced manufacturing techniques could bring to origin determination, the use of preferential tariff rates, and the design of PTAs?

Next, this dissertation aims to be of use for analysts of digital technology and trade measures on data transmissions. Electronic transmissions in the form of 3D files, AI powered 3D machines, and customization of 3D designs by consumers tie into issues of liberalization of data transfer, e-commerce provisions, and considerations of how to build a framework for trade that enhances innovation while limiting protectionist trade policies. Yet, once we have a 3D printed good made from a digital file downloaded into a machine that uses AI technology to perform post-processing cleaning, and which is also customized to meet the particular design of a vehicle—what happens when that 3D printed part is shipped across the border and comes under the supervision of customs officials? Two very practical questions arise that may not be easy to answer: where did this good come from, and what tariff rate should be applied? This dissertation brings to attention the potential legal and practical connections between digital trade and customs duties which extend beyond debates on the moratorium of custom duties on electronic transmissions.

Rules of origin also can be of interest when exploring the role of state sovereignty in a digital trade environment. One reason for the exclusion of preferential rules of origin from the GATT 1947 and from the Harmonized Work Programme established by the AOR was a recognition that such rules are linked to a state or territory's commercial policy.[71] States wished to maintain sovereignty in the design, implementation, and administration of these rules. On the other hand, despite this professed wish of sovereignty, preferential rules of origin provide interesting examples of collaborations between states that suggest a more fine-tuned approach to the study of sovereignty in the ambit of trade law. The PEM, which has 23 contracting members, requires that the preferential RoO are identical in each PTA that the contracting members enter upon with other contracting members.[72] Thus, by joining the PEM, a state concedes liberty in designing rules. On the other hand, the minimum wage rate requirement in the USMCA could be seen as impinging upon the parties' (mainly

[71] See Chapter 1, notes 97–111.
[72] Commission, 'The Pan-Euro-Mediterranean Cumulation and the PEM Convention' (n 44).

Mexico's) sovereignty in labor regulations.[73] Finally, the obligations in the Bali and Nairobi Ministerial Decisions on preferential rules of origin for LDCs apply to WTO Members with GSPs, although it has been reported that not all of these Members have submitted utilization data as instructed by the Decisions.[74]

At the end of the introduction to WTO webinar on the utilization of tariff preferences, a question was raised by a participant on whether there were any plans for the WTO to study reciprocal trade agreements, such as PTAs. The presenter, Darlan F. Martí, responded that there are two limitations to studying PTAs: 1) limited data pool, as not all WTO members notify PTA imports to the Secretariat, and 2) while the Secretariat perceives the need to study PTAs, efforts to initiate such a study, "rest largely with the WTO Membership and whether or not they believe the assistance of the Secretariat, there too, would be useful" in promoting best practices and conducting research.[75] This points to a greater issue that underlies not just states and the design of rules of origin, but the dynamic between state sovereignty and international institutions. In order for the WTO Secretariat to conduct research on a topic that has an impact on trade, the WTO Members must provide necessary data to the WTO and also agree to such a study. In other words, is this an instance where it would be beneficial for an organization to act independently of its membership? According to Professor John Jackson, "in order for the world to cope with the challenges of instant communication" and "fast and cheap transportation," the notion of sovereignty must also be updated to something that "can be called 'sovereignty-modern."[76] Yet, the world still needs international institutions: "a general perspective suggests that a key lesson of the last one hundred years is that international institutions (including judicial institutions) are critical and are here to stay. They increasingly play a larger role in world and local affairs."[77] How states rely on international organizations to provide legal frameworks for rules of origin, as well as develop new tools and update instruments related to rules, while also maintaining a perception that rules fall under

[73] David A Gantz, 'The United States-Mexico-Canada Agreement: Tariffs, Customs, and Rules of Origin' (2019) Baker Institute Rep. no. 02.21.19, 3-5.
[74] See Chapter 5, notes 1181 – 1187.
[75] Darlan F Martí, 'What Drives the Utilization of Trade Preferences? Lessons from the work of the WTO Committee on Rules of Origin; (What Drives the Utilization of Trade Preferences, WTO, 19 May 2021) < https://www.wto.org/english/tratop_e/roi_e/s1_harris19may21.pdf> accessed 1 December 2021.
[76] John H Jackson, 'The Evolution of the World Trading System – The Legal and Institutional Context' in Daniel Bethlehem, Isabelle Van Damme, Donald McRae and Rodney Neufeld (eds), *The Oxford Handbook of International Trade* (OUP 2009) 52-53.
[77] ibid 53.

the purview of national (or regional) commercial policy presents an opportunity for international trade analysists to examine the tension between sovereignty and international institutions in the current trade environment.

Finally, this dissertation proposes some (modest) recommendations for the design, implementation, and administration of rules of origin at the level of the WTO and at regional and bilateral levels. These suggestions are made in the context of 3D printed goods to demonstrate that as the production and trade of goods changes, so may the design and interpretation of the substantial transformation criteria and origin certification requirements also require updating. However, this dissertation does not propose a radical change of the preferential rules of origin regime, nor does it propose any specific technical recommendations, such as changing one of the formulas used in the *ad valorem* criterion. Yet, the recommendations echo the calls by trade experts for the simplification of the rules. Preferential rules of origin have a purpose, to distinguish goods that qualify for preferential tariff treatment, but they risk becoming purposeless if they are so complicated that traders forgo preferential tariff treatment because it is too costly to comply with such rules. Thus, this dissertation, using 3D printed goods as an example, highlights some elements in the design of rules in PTAs and trade instruments that could be simplified or where the administration of the rules could be more efficient. Finally, the dissertation argues that the WTO can have an important role to play in assisting Members in designing and regulating rules of origin. Such activity could result from a providing a platform for a plurilateral agreement, or by tapping into characteristics that have been the WTO's cornerstone for the last 27 years, such as its role as a provider of technical assistance.

## V. A Quick Note on Terminology

RoO – This dissertation abbreviates rules of origin as RoO. This applies both to preferential and non-preferential rules. The sources cited may have different versions of abbreviations, such as ROO or ROOs.

Additive Manufacturing and 3D Printing – "Additive Manufacturing" in very basic terms is the manufacture of a product by the addition of successive layers of a material (i.e., the layers are added on top of each other). 3D printing is a general term for this

type of manufacturing.[78] There are specific methods of 3D printing, which will be examined in Chapter 4.

Advanced Manufacturing vs. Traditional Manufacturing – "Advanced Manufacturing" refers to manufacturing processes that use robotics, 3D printing, and computer modelling as significant elements of the production process.[79] This dissertation uses the term "Traditional Manufacturing" to refer to processes that require a significant human labor component. This could be purely manual manufacturing or the use of machines that require substantial set up, configuration, and operation by human activity.

[78] Andreas Gebhardt, Julia Kessler, and Laura Thurn, *3D Printing: Understanding Additive Manufacturing* (2nd edn, Hanser 2019) 2.
[79] Commission, 'Advanced Manufacturing' (ec.europa.eu) < https://ec.europa.eu/info/research-and-innovation/research-area/industrial-research-and-innovation/key-enabling-technologies/advanced-manufacturing_en> accessed 2 December 2021.

## Chapter 1

### Preferential Rules of Origin in the WTO Legal Framework

This Chapter presents preferential RoO in the framework of the WTO and its agreements. Where to situate preferential RoO within the WTO is a question that WTO officials, WTO Members, and trade experts are not quite sure how to answer. Hoekman and Kostecki argue that "the WTO has no rules regarding rules of origin" and Inama finds that the WTO is "conspicuously silent" on the administration of rules of origin.[80] In 2002, the Negotiating Group on Rules of the WTO prepared a "Compendium of Issues Related to Regional Trade Agreements."[81] They found that "[t]he Agreement on Rules of Origin does not contain disciplines on non-preferential rules of origin. No multilaterally agreed guidelines exist, apart from the Common Declaration with Regard to Preferential Rules of Origin annexed to the Agreement, which might be used in dealing with issues raised with respect to RTA rules of origin.[82]" Even if the Agreement on Rules of Origin (AOR) sets some obligations on non-preferential rules of origin until the completion of the Harmonized Working Progamme (HWP), Mavroidis points out that "preferential rules of origin do not come under the HWP mandate."[83] Hoekman and Inama contend that preferential RoO "fall outside the ambit of the WTO" because Members retain discretion to grant non-reciprocal trade preferences.[84] Regarding PTAS, "there is a tacit consensus that WTO members should be free to define their own RoO to determine if a product is eligible for tariff preferences."[85] Nearly 27 years

[80]Bernard Hoekman and Michel M Kostecki, *The Political Economy of the World Trading System: The WTO and Beyond* (3rd edn, OUP 2009) 211. In 2009, Inama wrote "There are not multilateral rules on administering rules of origin. On the one hand, the World Trade Organization (WTO) Agreement on rules of origin is conspicuously silent in this regard. On the other hand, the Kyoto Convention provides only guidelines." Inama, *Rules of Origin in International Trade* (n 20) 530. In 2012, Guzman and Pauwelyn wrote, "There is currently no comprehensive multilateral agreement governing rules of origin. There is, however, an agreement reached during the Uruguay Round, the Agreement on Rules of Origin, which was intended to be a first step toward a harmonization of MFN rules of origin that to date has not been achieved (the agreement does not address rules of origin in PTAs, which tend to be different for each PTA)." Guzman and Pauwelyn (n 13) 336-337.

[81] Negotiating Group on Rules, 'Compendium Of Issues Related To Regional Trade Agreements, Background Note by the Secretariat, Revision' (1 August 2002) TN/RL/W/8/Rev. 1 <https://docs.wto.org> accessed 5 January 2022.

[82] ibid para 40.

[83] Mavroidis, *The Regulation of International Trade*, vol 1 (n 5) 227; Inama finds that "the AOR failed to regulate preferential rules of origin" Inama, *Rules of Origin in International Trade* (n 20) 23

[84] Hoekman and Inama, "Harmonization of Rules of Origin: An Agenda for Plurilateral Cooperation?" (n 16) 6.

[85] ibid.

after entering into force, the extent that the AOR or the GATT 1994 govern preferential RoO continues to be uncertain.

The first part of the Chapter provides a brief overview of the history of RoO as a part of the WTO legal texts. The second part will discuss the debate on the legality of preferential RoO under Article XXIV of the GATT. The third part will introduce the role of the World Customs Organization as administer of the Harmonized System Convention (the HS code), which is used to identify goods in tariff schedules and in preferential RoO in PTAS. The Chapter will conclude with a brief discussion on the differences, but also the similarities, between "Local Content Requirements" under the TRIMS and SCM agreements[86] and preferential rules requiring a certain level of local content of a good for qualifying for preferential tariff treatment.

## I. The Agreement on Rules of Origin: Transitional Provisions for Non-Preferential Rules and Guidelines for Preferential Rules

Throughout the 20th Century, provisions on preferential tariff treatment and origin labelling have been included in trade agreements.[87] In the early part of the century, trade agreements amongst colonial territories provided for preferential tariff treatment, but did not always include rules on determining the origin of goods.[88] The 1923 International Convention relating to the Simplification of Customs Formalities (such as origin certification) was signed by many of the original GATT members, however, not by the US.[89] Mavroidis notes that while the GATT 1947 "adopted a friendly attitude towards prior agreements to which its Members had adhered," it "stopped short, nonetheless, of fully espousing the 1923 Convention, and the discussion on origin started anew."[90] Inama proposes that the GATT 1947 probably did not address rules of origin, because the negotiators focused on establishing the unconditional MFN principle in Article 1 of GATT 1947, and in "a MFN world there is no need to examine the origin of goods", as the same tariff would be applied to identical

[86] Agreement on Trade-Related Investment Measures (TRIMS) (15 April 1994) LT/UR/A-1A/13; Agreement on Subsidies and Countervailing Measures (SCM Agreement) (15 April 1994) LT/UR/A-1A/9; both at <http://docsonline.wto.org>.
[87] Inama, *Rules of Origin in International Trade* (n 20) 2.
[88] Hironori Asakura, 'The Harmonized System and Rules of Origin' (1993) 27 J World Trade 5, 6.
[89] Mavroidis, *Regulation of International Trade*, vol 1 (n 5) 216-217; International Convention relating to the Simplification of Customs Formalities (entered into force 27 November 1924) XXX LNTS 775. Article 11 of the Convention endorsed reducing the need for certificates of origin as well as simplifying the issuance of certificates of origin, while acknowledging that states had the right to verify the origin of imported goods.
[90] Mavroidis, *Regulation of International Trade*, vol 1 (n 5) 217.

or like goods irrespective of their origin.[91] In 1947, a subcommittee of the Preparatory Committee of the United Nations Conference on Trade and Employment, in reference to the article on "General Most Favoured Nation Treatment," considered "it to be clear that it is within the province of each importing member to determine, in accordance with the provisions of its law, for the purpose of applying the most-favoured-nation provision whether the goods do in fact originate in a particular country."[92] This emphasis on origin determination as within the "province" of Members is a perception that continued throughout the 20th Century and, as will be discussed further below, is one of the factors that have complicated reaching a multilateral discipline on RoO.

While GATT 1947 had provisions on regulating the application of marks of origin (which were incorporated by reference into GATT 1994 as Article IX)[93], these must be distinguished from provisions on RoO. Marks of origin are intended to inform consumers of the geographical location from which a good came as well serve as an identification of origin for customs duties; however, in order for customs authorities to determine whether the good qualifies for the preferential tariff rate, a good must also be accompanied by a certificate of origin in compliance with the applicable rules of origin of a PTA.[94] Article IX requires that marking requirements may not be discriminatory or unreasonably burdensome as they would violate the national treatment provisions of the GATT.[95] In contrast, preferential RoO discriminate by distinguishing goods that receive preferential tariff treatment from those that do not qualify for such treatment.[96]

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[91] Inama, *Rules of Origin in International Trade* (n 20); The General Agreement on Tariffs and Trade (GATT 1947) art I(1): General Most-Favoured-Nation Treatment: "With respect to customs duties and charges of any kind imposed on or in connection with importation or exportation…and with respect to the method of levying such duties and charges, and with respect to all rules and formalities in connection with importation and exportation…any advantage, favour, privilege or immunity granted by any contracting party to any product originating in or destined for any other country shall be accorded immediately and unconditionally to the like product originating in or destined for the territories of all other contracting parties."

[92] Preparatory Committee of the United Nations Conference on Trade and Employment, 'Report to Commission A by The Sub-Committee on Articles 14,15,& 24' (15 August 1947) E/PC/T/174, 3-4 <https://docs.wto.org> accessed 5 January 2022; Inama, *Rules of Origin in International Trade* (n 20) 2.

[93] General Agreement on Tariffs and Trade 1994 (GATT 1994) art 1(a) https://www.wto.org/english/docs_e/legal_e/06-gatt_e.htm; Moshe Hirsch, 'Agreement on Rules of Origin' in Rüdiger Wolfrum, Peter-Tobias Stoll and Holger P. Hestermeyer (eds), *WTO – Trade in Goods* (Koninklijke Brill NV 2010) 1103.

[94] Mavroidis, *Regulation of International Trade,* vol 1 (n 5) 215, 217; Matsushita (n 22) 237.

[95] Matsushita (n 22) 237.

[96] Puccio (n 51) 176.

There were attempts prior to the formation of the WTO to establish multilateral rules for RoO.[97] In 1953, the GATT Contracting Parties examined a Resolution submitted by the International Chamber of Commerce on a uniform set of rules, but a text on the definition of origin based on this Resolution was not accepted by all the Parties.[98] This impasse resulted from differences in opinion on technical terms as well a understanding that rules of origin were an integral part of a state's commercial policy and a general hesitancy to establish rules for such a politically sensitive subject.[99] Until the AOR, the only international, but non-binding, instrument providing guidelines was the 1973 International Convention on the Simplification and Harmonization of Customs Procedures (the Kyoto Convention),[100] which will be discussed in more detail later in this Chapter. Prior to the WTO, however, states and the European Communities (EC) developed and utilized RoO for implementing anti-dumping investigations and measures, restrictive textile and apparel quotas, General System of Preferences (GSPs) regimes, and preferential trade agreements.[101] By the late 1980s, RoO had become a complex and unwieldly tool which could be utilized for protectionist purposes, and had an impact on trade covered by the GATT.[102]

### A. AOR Provisions on Non-Preferential Rules of Origin

During the Uruguay Round of Negotiations, the participants recognized that some multilateral discipline on RoO was needed, as van den Bossche and Zdouc relate, "in order to prevent these rules from being a source of uncertainty and unpredictability in international trade."[103] As such, the AOR was included with Annex I to the Marrakesh Agreement, which established the HWP for the multilateral harmonization of non-preferential RoO. The three year time limit for the HWP completion passed in 1998, and in an article reporting on the 25th Anniversary of the

[97] Hirsch, 'Agreement on Rules of Origin) (n 93) 1103-1104.
[98] Asakura (n 88) 6-7.
[99] William E James, 'Rules of Origin and Rules of Preference and the World Trade Organization: The Challenge to Global Trade Liberalization' in Patrick F J Macrory, Arthur Edmond Appleton and Michael G Plummer (eds), *World Trade Organization: Legal, Economic and Political Analysis* (Springer 2005) 265.
[100] Bernard Hoekman, 'Rules of Origin for Goods and Services: Conceptual Issues and Economic Considerations' (1993) 27 J World Trade 82, 84.
[101] James (n 99) 265–266.
[102] Negotiating Group on Non-Tariff Measures, 'Meeting of 30 November 1989' (19 December 1989) MTN.GNG/NG2/14, para 10; Hirsch, 'Agreement on Rules of Origin' (n 93) 1104.
[103] Van den Bossche and Zdouc (n 9) 458; See generally, Negotiating Group on Non-Tariff Measures, 'Points Made in Relation to Rules of Origin: Synopsis by the Secretariat' (13 March 1990) MTN.GNG/NG2/W/54/Rev.1 <https://docs.wto.org> accessed 5 January 2022.

AOR, WTO staff writers note that "[t]he efforts to negotiate global harmonized non-preferential rules of origin…has not delivered final results."[104] The desire of Members to maintain sovereignty in the use of rules of origin as commercial policy instruments in connection with the textile, agricultural, and large and electrical machinery sectors, is one of the reasons negotiations on harmonization of non-preferential RoO have not progressed towards a conclusion.[105]

Until the HWP is complete, Members are required to administer non-preferential RoO (if they apply rules of origin for non-preferential purposes) pursuant to Article 2, "Disciplines during the Transition Period."[106] Under Article 2(c) "Members shall ensure" that "rules of origin shall not themselves create restrictive, distorting, or disruptive effects on international trade."[107] Members shall not use non-preferential RoO to pursue trade objectives directly or indirectly, to impose conditions unrelated to manufacturing or processing, or to discriminate between Members.[108] Further, Members shall ensure that the rules for determining origin under the three criterion (Change of Tariff Heading, *ad valorem* percentage, and manufacturing and processing operations) are clearly defined,[109] administered consistently, uniformly, impartially, and reasonably[110], and are based on a positive standard.[111]

Article 2 of the AOR was at the center of disputes on changes by the US to its non-preferential rules for non-apparel textile products for administering its textile quota regime pursuant to the WTO's Agreement on Textiles and Clothing.[112] On 22 May 1997, the EU submitted a request for consultations to the DSB arguing that these changes to the rules did not respect Article 2 of the AOR, but both parties reached a mutually agreed solution, which was notified to the DSB on 11 February 1998.[113] On

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[104] The WTO staff writers also mentioned that several speakers suggested that the work done on harmonization of non-preferential Roo was still beneficial for efforts on rule design outside of the WTO and the former chair of the CRO, Stefan Moser, claimed that "many of these rules found their way into free trade agreements." WTO, 'Event marks 25th anniversary of the WTO's Agreement on Rules of Origin' (n 21).
[105] Inama, *Rules of Origin in International Trade* (n 20) 104-109; James (n 99) 271.
[106] AOR, art 2; Matsushita (n 22) 238.
[107] ibid art 2(c).
[108] ibid art 2(b, d); Hiroshi Imagawa and Edwin Vermulst, 'The Agreement on Rules of Origin', in Patrick FJ Macrory, Arthur Edmond Appleton and Michael G Plummer (eds), *World Trade Organization: Legal, Economic and Political Analysis* (Springer 2005) 612.
[109] AOR, art 2(a).
[110] ibid art 2(e).
[111] ibid art 2(f).
[112] Van den Bossche and Zdouc (n 9) 459-460.
[113] *United States – Measures Affecting Textiles and Apparel Products*, Request for Consultations by the European Communities (3 June 1997) WT/DS85/1; *United States- Measures Affecting Textiles and Apparel Products*, Notification of Mutually-Agreed Solution (11 February 1998) WT/DS85/9.

25 November 1998, the EU submitted a second request for consultations alleging that the US had failed to implement the agreed-upon changes, and on 31 July 2000, the parties again notified the DSB that they had reached a solution on the basis that the US propose to Congress to make agreed-upon changes to the Change of Tariff Heading and processing rules as well as rules regarding a single import visaed invoice/license for multiple shipments.[114]

In *US-Rules of Origin for Textiles and Apparel Products* (2003), the only decision on the AOR, the Panel established that Members have a wide degree of discretion in designing non-preferential RoO and that restrictive rules can be legitimate measures under the AOR. India argued that the rules were changed by the US to provide greater protection to domestic industries than allowed by a legitimate quota regime.[115] The Panel noted that in this instance the rules were being used to support a "trade policy instrument – quotas – which, by definition, is trade-restrictive."[116] The Panel confirmed that the provisions regulating non-preferential RoO during the transition period, Article 2(b)-(d), set out what Members cannot do, and thereby give them the "discretion to decide what, within those bounds, they can do."[117] Thus, Article 2(b)-(d) "does not prevent Members from determining the criteria which confer origin, changing those criteria over time, or applying different criteria to different goods."[118] However, the Panel clarified that Article 2(b) distinguishes rules of origin from commercial policy instruments and that rules may implement such policy, but they may not be used to pursue trade objectives.[119] Although US changes made the rules more restrictive, the Panel found that India did not provide sufficient evidence that the US was using the rules as an additional trade policy instrument or that the restrictive effects of the rules were "not incidental to the pursuit of legitimate objectives."[120]

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[114] *United States – Measures Affecting Textiles and Apparel Products (II)*, Request for Consultations by the European Communities (25 November 1998) WT/DS151/1; *United States- Measures Affecting Textiles and Apparel Products (II)*, Notification of Mutually Agreed Solution (31 July 2000) WT/DS151/10; Mavroidis, *The Regulation of International Trade*, vol 1 (n 5) 216.
[115] Panel Report, *United States- Rules of Origin for Textiles and Apparel Products* (Panel report circulated 20 June 2003, adopted 21 July 2003) WT/DS243/R para. 6.49.
[116] ibid para 6.8.
[117] van den Bossche and Zdouc (n 9) 460. Panel Report, *US-Rules of Origin for Textiles and Apparel Products*, paras 6.23-24.
[118] Panel Report, *US-Rules of Origin for Textiles and Apparel Products*, para 6.23.
[119] ibid, para. 6.137; Hirsch, 'Agreement on Rules of Origin' (n 93) 1114.
[120] *US-Rules of Origin for Textiles and Apparel Products*, paras 6.94-96.

India also argued that the measures at issue create trade distorting effects in violation of Article (2c)[121] due to the "sheer complexity" of the rules, which made it difficult for Indian exporters to engage in trade with the US due to the "complexities" of a commercial production chain between Indian wholesalers and Sri Lanka processers and manufacturers.[122] The US argued that India did not present any evidence that the rules "discouraged exporters from shipping their products to the United States because they simply could not understand them."[123] The Panel responded that "rules of origin are, by their nature, complex."[124] The Panel was unable to accept that the measures had trade disruptive effects due to their complexity, because India did not show that the measures were more complex than necessary or how such complexity disrupted trade, and it did not provide evidence that traders or producers stopped exporting to the US due to such complexity.[125] This ruling thus sets out a principle for non-preferential RoO that could potentially influence a ruling on preferential RoO, as under Annex II, rules should also be " clearly defined." Rules are complex given differences in types of goods, production processes, costs, and policy objectives, but such complexity does not necessarily mean that the rules create trade distortive effects, even if traders cannot always understand these rules. However, a further question is, even if such complexity causes trade distortion, would it be possible to bring a claim before the DSB under Annex II? It is time to examine this addition to the AOR.

### B. The Common Declaration with Regard to Preferential Rules of Origin

Provisions on preferential RoO are found in the Common Declaration with Regard to Preferential Rules of Origin, Annex II to the AOR. During the Uruguay Round negotiations, several states including the US and Japan proposed that the AOR should cover preferential RoO, which the EC rejected arguing that preferential rules were based on the relations between the parties of trade arrangements.[126] The Secretariat's Note for a meeting of the Negotiating Group on Non-Tariff Measures held 14 – 15 February 1990 references the EC delegation as making the distinction that preferential

[121] Hirsch, 'Agreement on Rules of Origin' (n 93) 1114.
[122] *US-Rules of Origin for Textiles and Apparel Products*, para 6.176.
[123] ibid, para 6.177.
[124] ibid, para 6.179.
[125] ibid.
[126] Hirsch, 'The Politics of Rules of Origin' (n 28) 331-332; Negotiating Group on Non-Tariff Measures, 'Meeting of 30 November 1989' (n 102) para 9; Negotiating Group on Non-Tariff Measures, 'Meeting of 14-15 February 1990' (13 March 1990) MTN.GNG.NG2/16, para 18 <https://docs.wto.org> accessed 6 January 2022.

rules of origin "were only instruments to implement trade policy, rather than elements of trade policy" and "rules applicable to preferential trade could only be examined in the context of bilateral agreements of which they were part, and which were reviewed under Article XXXIV of the GATT."[127] Instead, the focus of discussions should be on MFN rules, or non-preferential RoO.[128] This perspective is reflected in the AOR: preferential rules appear as an annex and only as a declaration.

Given the proliferation of regional and bilateral trade agreements since 1995, preferential RoO have multiplied in various formations, without having yet been subject to dispute settlement or multilateral review under Article XXIV or the AOR.[129] Bernard Hoekman and Michael M. Kostecki find that "[r]ules of origin have been problematical mostly in the context of PTAs," a context that the WTO rules have had limited effectiveness in disciplining.[130] As Stefano Inama puts it, the AOR's failure "to regulate preferential rules of origin…leaves an enormous loophole in the multilateral disciplines of rules of origin. WTO members that are negotiating free trade-areas (FTAs) or are granting autonomous preferences are free to determine their rules of origin."[131] Inama also notes that many of the provisions in the Common Declaration were already contained in rules of origin of existing agreements, and the Declaration "did not constitute a novelty nor require action or further obligations from the major users of preferential rules of origin."[132]

Thus, the Declaration provides Members with discretion in designing and applying preferential rules of origin, while establishing some guidelines. While the US proposal in 1989 that preferential RoO should be included within harmonization procedures was not accepted by those Members finding such rules part of negotiated PTAs,[133] there was a general understanding among the Members that "some broad

[127] Negotiating Group on Non-Tariff Measures, 'Meeting of 14-15 February 1990' (n 126) para 18. The delegation also warned that during the Uruguay Round, general principles regarding non-preferential RoO should be reached first before the Customs Co-operation Council (CCC) began work on any technical provisions, otherwise, "a situation might arise where rules negotiated at great length by the CCC were only applied for statistical purposes, but not for commercial policy ones." Annex II first appeared a draft of the AOR distributed on 6 June 1991. Negotiating Group on Rule Making and Trade-Related Investment Measures, 'Rules of Origin, Note by the Secretariat' (6 June 1991) MTN.GNG/RM/W/2 <https://docs.wto.org> accessed 6 January 2022.
[128] Negotiating Group on Non-Tariff Measures, 'Meeting of 14-15 February 1990' (n 126) para 18.
[129] Hirsch, 'The Politics of Rules of Origin' (n 28) 332; Mavroidis, *The Regulation of International Trade*, vol 1 (n 5) 228.
[130] Hoekman and Kostecki (n 80) 483.
[131] Inama, *Rules of Origin in International Trade* (n 20) 23.
[132] ibid 25.
[133] Negotiating Group on Non-Tariff Measures, 'Meeting of 30 November 1989' (n 102) paras 9-10.

and general principles and procedures for the application of rules of origin [should be developed] in order to ensure that they were not abused for protectionist purposes."[134] The first provision of the Declaration recognizes "that some Members apply preferential rules of origin, distinct from non-preferential rules of origin."[135] Preferential RoO are defined as "those laws, regulations and administrative determinations of general application applied by any Member to determine whether goods qualify to the granting of tariff preferences going beyond the application of paragraph 1 of Article I of GATT 1994 [most-favored-nation treatment]."[136] Members must "agree to ensure that: when they issue administrative determinations of general application, the requirements to be fulfilled are clearly defined. In particular:

(i) in cases where the criterion of change of tariff classification is applied, such a preferential rule of origin, and any exceptions to the rule, must clearly specify the subheadings or headings within the tariff nomenclature that are addressed by the rule;
(ii) in cases where the ad valorem percentage criterion is applied, the method for calculating this percentage shall also be indicated in the preferential rules of origin;
(iii) in cases where the criterion of manufacturing or processing operation is prescribed, the operation that confers preferential origin shall be precisely specified."[137]

Further, the Declaration requires that "preferential rules of origin are based on a positive standard."[138] Details on these criteria will be discussed in the next chapter.

Annex II also encourages transparency and certainty in legal texts and procedures.[139] Article 3(c) requires Members to publish "their laws, regulations, judicial decisions and administrative rulings of general application relating to preferential rules of origin … as if they were subject to, and in accordance with, the paragraph 1 of Article X of GATT 1994."[140] Under Article X:1, such material must be "published promptly in such a manner as to enable governments and traders to become acquainted with

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[134] ibid para 10.
[135] AOR, Annex II, art 1.
[136] ibid.
[137] ibid Annex II, art 3(a).
[138] Negative standards "are permissible as part of a clarification of a positive standard or in individual cases where a positive determination of preferential origin is not necessary." (AOR, Annex II, art 3(b)).
[139] Puccio (n 51) 192-193.
[140] Negotiating Group on Rules, 'Compendium Of Issues Related To Regional Trade Agreements, Background Note by the Secretariat, Revision' (n 81) fn 27: "The preamble to the Agreement recognizes that clear and predictable rules of origin and their application facilitates the flow of international trade, and states the desirability that rules of origin themselves do not create unnecessary obstacles to trade. The Common Declaration provides disciplines for preferential rules of origin; in particular, Article 3(c) requires that laws and regulations relating to them be published "as if they were subject to, and in accordance with, the provisions of Article X of GATT 1994".

them."[141] In addition, Article X requires publication of agreements affecting international trade policy between governments or governmental agencies and contracting parties. However, the article does not require the publication of confidential information that could impede law enforcement, be contrary to the public interest, or prejudice legitimate commercial interests of public or private enterprises.

Laura Puccio argues that by using the language "as if they were subject to", Article 3(c) of Annex II excludes preferential RoO from the laws, regulations, decisions, and rulings in Article X(I) of GATT 1994, and this results in the exclusion of the application of Article X(3)(a) to preferential RoO.[142] Article X(3)(a) requires Members "to administer in a uniform, impartial and reasonable manner all its laws, regulations, decisions and rulings of the kind described in paragraph 1" of Article X.[143] As Puccio, referring to Pauwelyn's work, points out, this rule "is important to ensure predictability."[144] Thus, by excluding preferential RoO from GATT X(3)(a), a State is not required to keep RoO uniform among different RTAs and FTAs to which it is a party.[145] An examination of several trade instruments reveals that even those having a common member, such as the ASEAN agreements, there are minor and also significant variations in the design of the RoO.[146]

Looking at some instruments on RoO, one can wonder whether the origin criteria are indeed clearly defined, and this leads to a greater question as to the legal stringency of the Declaration on regulating the use of preferential RoO in preferential

[141] GATT 1994, art. X(1).
[142] Puccio (n 51) 192.
[143] GATT 1994, art X(3)(a). Subparagraph (c) requires the parties to institute or maintain independent tribunals to review administrative rulings.
[144] Puccio (n 51) 192, referring to Joost Pauwelyn, 'Comment – Nothing Dramatic (…Regarding Administration of Customs Laws)' (2009) 8 World Trade Rev (Special Issue 1) 45, 47.
[145] The final subsections of Article 3 and Article 4 of Annex II focus on administrative procedures. Article 3(d) requires Members to issue "upon request of an exporter, importer or any person with justifiable cause, assessments of the preferential origin they would accord to a good" as soon as possible, but no later than 150 days after the request is submitted. Further, "requests for such assessments shall be accepted before trade in the good concerned begins and may be accepted at any later point in time," the assessments remain valid for three years as long as the RoO, facts, and conditions remain comparable, and shall be made public provided that rules regarding confidentiality in subsection (g) are complied with (arts 3(d) & 3(g)). As long as the parties are notified in advance, assessments "are no longer valid when a decision contrary to the assessment is made in a review referred to in subparagraph (f)", such as an administrative action by a judicial, arbitral, or administrative tribunal independent of the authority issuing the assessment (arts 3(d) & 3(f)). These tribunals can also modify the assessment. Changes to preferential RoO shall not apply retroactively (art 3(g). Finally, Article 4 requires Members to notify the WTO Secretariat promptly of their preferential RoO as well as judicial decisions, administrative rulings, modifications to the rules or any new rules (art 4).
[146] See Stefano Inama and Edmund W Sim, *Rules of Origin in ASEAN* (CUP 2015).

trade arrangements. There are some important distinctions between the disciplines that apply during the transition period for non-preferential RoO under Article 2 of the AOR and the Common Declaration (Annex II) for preferential RoO. A draft of the Final Act embodying the results of the Uruguay Round of Multilateral Trade Negotiations circulated 3 December 1990, included a draft of the AOR (but without Annex II as the Members had not yet decided whether preferential RoO should be covered by the agreement).[147] Footnote 1 of Article 2(d)states: "It is understood that this provision does not apply to rules of origin used for preferential trading arrangements."[148] In that draft, Article 2(d) is the provision that prohibits the use of non-preferential rules "as instruments to purse trade objectives directly or indirectly."[149] That footnote was absent in the 20 December 1991 draft [150], and is not included in the final text of the AOR. However, the idea that such prohibitions do not apply to preferential RoO is preserved through the language of Annex II.

The obligations against using rules of origin to create restrictive or distortive effects on international trade or the requirements that the rules be applied in a consistent manner established by Article 2 (AOR) do not appear directly or by reference in Annex II.[151] While the Declaration includes provisions similar to Article 2 of the AOR, such as the rules should be clearly defined and based on positive standards, the provisions in the declaration, Moshe Hirsch asserts, are legally non-binding.[152] Despite this, "it seems that the rules of Annex II exert some pressure upon Members to comply with its standards of conduct. It should be noted that while preferential RoOs are not legally subject to the disciplines provided for under the Agreement's [AOR] provisions (mainly Arts 2 and 3), their legality may be challenged under other WTO provisions," such as under Article XXIV:5 (b) of the GATT.[153] Examining the legality of RoO under Article XXIV will be discussed in the next section. Even if the Declaration is non-binding and does not prohibit rules from having trade distortive effects, the extent to which Members have sovereignty under Annex II to

[147] Trade Negotiations Committee, 'Draft Final Act Embodying the Results of the Uruguay Round of Multilateral Trade Negotiations (3 December 1990) MTN.TNC/W/35/Rev.1,12 <https://docs.wto.org> accessed 6 January 2022.
[148] ibid 16.
[149] ibid 15.
[150] Trade Negotiations Committee, 'Draft Final Act Embodying the Results of the Uruguay Round of Multilateral Trade (20 December 1991) MTN.TNC/W/FA, D.3 <https://docs.wto.org> accessed 6 January 2022.
[151] Imagawa and Vermulst (n 108) 612; Hirsch, 'The Politics of Rules of Origin' (n 28) 333.
[152] Hirsch, 'Agreement on Rules of Origin' (n 93) 1149-1150.
[153] ibid 1152.

design rules that impact trade is still unknown as no dispute on the substance of the Declaration has come before the DSB.

In *Turkey-Restrictions on Imports of Textile and Clothing Products* (1999), India claimed that the quantitative restrictions imposed by Turkey on imports of textiles and clothing products were inconsistent with the GATT 1994 and the Agreement on Textiles and Clothing.[154] Turkey imposed the restrictions on the basis of harmonizing their import regime with the EC, otherwise the EC would have excluded Turkish products from free trade to prevent trade diversion (i.e., Indian products imported into Turkey and then re-exported to the EC as "Turkish" products).[155] The Appellate Body (AB) found that the measures were inconsistent and proposed that instead of quantitative restrictions, an alternative for meeting the requirements of Article XXIV:8(a) GATT (governing the formation of a customs union) were rules of origin:

> Turkey could adopt rules of origin for textile and clothing products that would allow the European Communities to distinguish between those textile and clothing products originating in Turkey, which would enjoy free access to the European Communities under the terms of the custom union, and those textile and clothing products originating in third countries, including India. In fact…Turkey and the European Communities themselves appear to have recognized that rules of origin could be applied to deal with any possible trade diversion.[156]

Thus, the AB recognized preferential RoO as means to prevent trade diversion, but it did not proceed with interpreting provisions in Annex II of the AOR. Laura Puccio, however, asserts that "the declaration on preferential rules of origin unambiguously inserts these rules as part of the trade rules recognized within the WTO framework. The Appellate Body in Turkey-Textiles even recognizes the role of rules of origin in preferential trade agreements in order to avoid trade deflection."[157] The AB does appear to have recognized rules of origin as an option for avoiding trade diversion, but under subparagraph 8(a), which governs customs union. The AB does not refer to subparagraph 8(b), governing FTAs, or Article XXIV:5 governing the duties or regulations imposed under an FTA. However, the fact that the AB did not examine FTAs in the context of Article XXIV is not unique to disputes that touch upon rules of

[154] *Turkey-Restrictions on Imports of Textile and Clothing Products* (1999) WT/DS34/14 <https://www.wto.org/english/tratop_e/dispu_e/cases_e/ds34_e.htm> accessed 2 December 2021.
[155] Appellate Body Report, *Turkey-Restrictions on Imports of Textile and Clothing Products* (adopted 19 November 1999) WT/DS34/14, para 61.
[156] ibid para. 62.
[157] Puccio (n 51) 191.

origin; WTO jurisprudence on FTAs, in comparison to that on antidumping duties or subsidies is sparse.[158] This relative paucity of jurisprudence on the legality of FTAs and also RoO provides the foundation for scholarly debate as to the legality of preferential RoO under Article XXIV.

## II. The Legality of Preferential Rules of Origin in Free Trade Agreements

The disciplines in Article XXIV of GATT 1994 aim to ensure that PTAs create more trade for all WTO members even though RTAs establish preferences, such as tariff rates that apply only to members of the agreement.[159] Or, in other words, a PTA should not make trade between the third-party countries and PTA countries more difficult.[160] As Hoekman and Kostecki note, "Article XXIV is entirely silent on rules of origin, which is rather surprising given that they have an important bearing on the effects of a PTA."[161] However, are Preferential RoO permitted in PTAs under Article XXIV: 5 and Article XXIV: 8[162]?

Under Article XXIV: 5(b):

> The duties and other regulations of commerce maintained in each of the constituent territories [of a free trade area] and applicable at the formation of such free-trade area or the adoption of such interim agreement…shall not be higher or more restrictive than the corresponding duties and other regulations of commerce existing in the same constituent territories prior to the formation of the free-trade area, or interim agreement as the case may be."

The question is whether RoO are "a regulation of commerce" that falls under Article XXIV:5(b). Matsushita, Schoenbaum, Mavroidis, and Hahn (Matsushita) find that in addition to non-tariff duties and charges, "the other instrument most likely to change as a result of the establishment of a PTA is the rules of origin."[163] This is because rules of origin "are of particular interest in the FTA context": if a certificate of origin is not required upon importation, exporters could ship goods to the FTA party with the cheapest port of entry and then ship the goods to other FTA parties.[164] Thus, parties

[158] Elsig, Hoekman, and Pauwelyn (n 57) 32.
[159] Peter Van den Bossche and Denise Prévost, *Essentials of WTO Law* (2nd edn, CUP 2021) 139-140.
[160] Mavroidis, *The Regulation of International Trade,* vol 1 (n 5) 299.
[161] Hoekman and Kostecki (n 80) 485-486.
[162] Under Article XXIV: 8(b), "a free-trade area shall be understood to mean a group of two or more customs territories in which the duties and other restrictive regulations of commerce…are eliminated on substantially all the trade between the constituent territories in products originating in such territories."
[163] Matsushita (n 22) 524.
[164] ibid.

to a FTA design rules to ensure that only goods from states party to the FTA receive preferential tariff treatment.[165] Yet, as Matsushita point out, "it is difficult to state" whether preferential RoO across PTAs are "more favorable (or at the least, not more burdensome) than those applied on an MFN basis," and thus are consistent with Article XXIV.5(b).[166] This aspect of preferential RoO will be discussed in Chapter 3.

In 2002, the Negotiating Group on Rules in its "Compendium of Issues Related to Regional Trade Agreements" questioned how to define "other regulations of commerce" in GATT Article XXIV:5. The Group noted that "it might have a wider scope for FTAs than for customs unions, especially if, as it has been argued sometimes, FTA rules of origin should be considered as a regulation of commerce in that context."[167] Later in the Compendium, the Group made the following observations in a section called "The qualification of RTA rules of origin as 'other regulations of commerce.'" Under Article XXIV:5, "distinct interpretations subsist:

- RTA origin rules constitute an ORC [other regulation of commerce]
- RTA origin rules do not constitute an ORC, given that by definition they do not affect trade with third parties.
- A case-by-case examination of the preferential rules of origin in RTAs is needed. That examination would clearly indicate whether these rules had restrictive effects on the trade vis-à-vis third parties."[168]

Further, rules of origin raise questions on "whether it is appropriate to compare the rules of origin of a new RTA with those of an earlier RTA with overlapping membership which it superseded" and "whether diagonal cumulation schemes contravene WTO rules, as they favour certain third-parties to a particular RTA, while discriminating against the rest."[169] Diagonal cumulation is a core principle of the PEM which applies to trade among the EU, EFTA, and countries in the Mediterranean region. This will be examined in the next Chapter.

The debate on whether preferential RoO constitute on ORC has been a long one. In 1993, Hoekman examined whether Article XXIV (of the GATT 1947)

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[165] ibid.
[166] ibid.
[167] Negotiating Group on Rules, 'Compendium Of Issues Related To Regional Trade Agreements, Background Note by the Secretariat, Revision' (n 81) para 52.
[168] ibid para 78.
[169] ibid. para 79. In paragraph 80, the Group also reported that "[m]ore recently, it has been noted that a harmonization of RTA rules of origin might be desirable in the long run. However, it has been argued that this might not be workable given that those rules derived from production and trade structures in place between the RTAs parties."

encompasses RoO.[170] While that Article "does not impose any specific disciplines with respect to rules of origin," it "does not necessarily imply that countries, therefore, remain free to negotiate whatever rules of origin they like for preferential purposes, in practice this does appear to be the case." Thus, "a third party may be able to argue that rules of origin are detrimental to its interest."[171] As an example, he refers to a dispute raised by the US on whether the rules of origin between EEC and Austria raised barriers to third countries exports.[172] He notes that the question on whether RoO are "one of the 'other regulations of commerce' referred to in Article XXIV:5(b) has never been settled"[173] and in 2008 raised again the issue of whether the term 'other regulations of commerce' in Article XXIV:8 includes preferential rules of origin.[174]

Indeed, scholars continue question whether preferential RoO fall under Article XXIV:5(b). In 2018, Mavroidis and Vermulst argued that references in Article XXIV GATT (1994) and GSP schemes to "commerce" mean "international commerce" and thus Article XXIV and the Enabling Clause likely concern "instruments that apply exclusively to imported goods, like custom duties."[175] Rules of origin are "not necessarily" a regulation of international commerce, "since, unlike duties that concern imported goods, rules of origin concern domestic goods as well." As Article XXIV "should be read as covering border instruments only," the Article does not cover domestic instruments like rules of origin.[176] Further, Mavroidis and Vermulst find that "the legal basis for enacting preferential rules of origin is shaky, to say the least. The adoption of such rules is predicated on the widespread belief (as opposed to proof) that, absent these rules, the granting of preferences will suffer."[177] In a footnote, the authors question why there has been no litigation on preferential RoO and also provide the answer: "for strategic reasons (all WTO members participate in at least one FTA), litigation is not an option" and beneficiaries of GSPs "might legitimately fear total exclusion from preferences in case they complain about the restrictiveness of preferential rules of origin."[178] Manfred Elsig, Bernard Hoekman, and Joost Pauwelyen

[170] GATT 1947, art XXIV (5)(a) and (b), This article was incorporated into the GATT 1994 through the Understanding on the Interpretation of Article XXIV of the General Agreement on Tariffs and Trade 1994, <https://www.wto.org/english/docs_e/legal_e/10-24_e.htm> accessed 2 December 2021.
[171] Hoekman, 'Rules of Origin for Goods and Services' (n 100) 86.
[172] ibid.
[173] ibid.
[174] Hoeckman and Kostecki (n 80) 485.
[175] Mavroidis and Vermulst (n 20) 11.
[176] ibid.
[177] ibid 6.
[178] ibid 11, fn 16.

note that the absence of disputes under Article XXIV can be explained by "the adage that 'people who live in glass houses shouldn't throw stones.'"[179] In other words, a Member may be unwilling to have its own compliance with Article XXIV questioned by starting a dispute at the WTO claiming violations of the Article by another Member.[180]

Van den Bossche and Puccio assert that a legal basis for preferential RoO can be found in the WTO texts. According to Van den Bossche, Annex II of the AOR leads "to the granting of tariff preferences going beyond the application of the MFN treatment obligation."[181] Puccio also finds that in addition to the "tolerance for preferential rules of origin" being established in Annex II, such rules "can be further legitimated and are still bound by the requirements under article XXIV GATT," because Article XXIV acknowledges the tension between the objectives of a customs union and the reduction of the trade distorting effects of the customs union through the chapeau to Article XXIV:5.[182] Puccio proposes that it is possible that preferential RoO could be considered an "other regulation of commerce".[183] However, as, under Article XXIV:4 the purpose of a customs union or a free trade area is facilitating trade among the constituents and not raising barriers to trade to third-parties, preferential RoO should not impede third parties from trading with the parties of the PTA.[184] Even if an argument can be made that preferential RoO comply with Article XXIV, the possible protectionist impact and trade distorting effect must be taken into consideration, and as Puccio notes, this does support some further regulation from the WTO on preferential RoO if full harmonization is not achievable.[185]

Finally, Mavroidis finds that Article XX of GATT 1994 should be applicable to rules of origin, though he does not specify whether he is referring to both non-preferential and preferential rules.[186] Article XX performs a balancing function, allowing Members to deviate from obligations under GATT or GATT 1994 in order to protect societal values and interests.[187] According to Mavriodis, "WTO members are free to decide on origin of goods sold in their market and have to observe an obligation not to discriminate. As a result, we are squarely under the purview of GATT here.

[179] Elsig, Hoekman, and Pauwelyn (57) 32.
[180] ibid.
[181] van den Bossche (2008) (n 24) 436.
[182] Puccio (n 51) 192-193.
[183] ibid 198
[184] ibid 193-194.
[185] ibid 175.
[186] Mavroidis, *The Regulation of International Trade*, vol 1 (n 5) 477.
[187] Van den Bossche and Prévost (n 159) 108.

Consequently, Article XX of GATT should be applicable."[188] However, Van den Bossche and Prévost note that "Article XX of the GATT 1994 is not available to justify inconsistencies with any other WTO agreement unless it has been expressly or implicitly incorporated."[189] No express reference to Article XX is made in the AOR or Annex II. There have been no disputes brought before the DSB which examine whether Article XX has been implicitly incorporated into the AOR or Annex II.

Although the legal status of preferential RoO under WTO jurisprudence may be in question, states justify the inclusion of such rules in trade agreements, because, as the AB noted in *Turkey-Textiles*, they can prevent trade deflection.[190] Preferential rules must be discriminatory to prevent free-riding of the benefits of a FTA. According to Puccio, they guarantee that "preferential treatment is granted only to goods having the origin of one of the preferential trade partners…they ensure that third country goods cannot *circumvent* [italics original] MFN or other duties when shipped from a preferential trade partner and passing therefore through a border within the free trade area."[191] One way the rules perform this discriminatory function is by establishing that manufacturers utilize a certain level of local material or perform a certain amount of processing in the territory in order for the goods to qualify for preferential tariff treatment.[192] The WTO gives Members States discretion in designing preferential RoO, and as a result, this has created a wide range of differing preferential rules regimes among FTAs.[193] However, these various preferential RoO do share a common link: the use of the Harmonized Commodity Description and Coding System (HS, HS nomenclature) to identify goods in the lists of product specific rules.

## III. The World Customs Organization and the Harmonized System Nomenclature

The WTO is not the only source for international guidelines on rules of origin. Indeed, another important name associated with rules of origin is the World Customs Organization, for two reasons: from a legal perspective, the Kyoto Convention, and

[188] Mavroidis, *The Regulation of International Trade*, vol 1 (n 5) 477.
[189] Van den Bossche and Prévost (n 159) 107.
[190] Puccio (n 51) 174-175; Mavroidis & Vermulst (n 20) 4.
[191] Puccio (n 51) 176.
[192] ibid 177.
[193] ibid; Anne van de Heetkamp and Ruud Tusveld, *Origin Management: Rules of Origin in Free Trade Agreements* (Springer 2011) 41.

from a more practical perspective, the HS. Understanding the role these two instruments play in the design and the administration of rules of origin is fundamental for understanding how and why substantial transformation criteria share some characteristics though differ in other aspects. In addition, product-specific rules are origin are based on tariff lines, and such lines are usually based on the HS. From the perspective of international trade law, the WTO and the WCO claim distinct jurisdiction on trade matters, but cooperate and assist each other in disputes and with training Members of both organizations on trade matters.

The Revised Kyoto Convention, administered by the World Customs Organization (WCO), includes guidelines for determining the origin of a good. The 1973 Convention was amended in 1999, and the Revised Convention entered into force 3 February 2006. Promoting trade facilitation independent from, but complementary to the AOR, it aims to limit the use of RoO as trade impediments with guidance on designing the substantial transformation criteria and certification procedures.[194] Matsushita note that while "the Kyoto Protocol is not an integral part of WTO law, most [WTO] members are contracting parties of the treaty."[195] As of 5 May 2022, the Revised Kyoto Convention has 131 contracting parties.[196]

The 1973 Kyoto Convention was instrumental in providing a standard definition for when a good undergoes an origin conferring "substantial transformation."[197] National or regional courts had been determining origin based on two general criteria: the good was wholly obtained in the territory or a transformation to the product occurred in the territory which resulted in a new product.[198] The 1973 Convention defined the "substantial transformation criterion" as the "criterion according to which origin is determined by regarding as the country of origin the country in which the last substantial manufacturing or processing, deemed sufficient to give the commodity its essential character, has been carried out".[199] The substantial transformation criterion "can be expressed" through a rule requiring a change of tariff heading, a list of

[194] Inama, *Rules of Origin in International Trade* (n 20) 8-9; Matsushita (n 22) 237-238.
[195] Matsushita (n 22) 239.
[196] Comoros and Guatemala joined in 2022. WCO, 'The Revised Kyoto Convention Management Committee Meeting (RKC/MC) held its 28th Meeting and welcomed two new contracting parties' (wccomd.org 17 March 2022) <http://www.wcoomd.org/en/media/newsroom/2022/march/the-rkc-mc-held-its-28th-meeting-and-welcomed-two-new-contracting-parties.aspx> accessed 6 May 2022.
[197] Inama, *Rules of Origin in International Trade* (n 20) 5.
[198] ibid.
[199] International Convention on the Simplification and Harmonization of Customs Procedures (Kyoto Convention 1973, signed 18 May 1973, entered into Force 24 September 1974) Annex D.1, Definitions.

manufacturing or processing operations, or an *ad valorem* percentage rule.[200] The 1973 Convention did not select one criterion as a preferred criterion on the basis that differences in manufacturing processes may mean that one criterion is better suited for one type of good while a different criterion may be more apt for another type of good, and it gave members flexibility to design rules that combine two criteria.[201]

Vermulst and Waer note that the 1973 Kyoto Convention did not require Contracting Parties to accept general principles such as MFN, national treatment, and transparency.[202] The 2006 revision, in the Preamble, recognizes that the simplification and harmonization of customs procedures can be accomplished through the modernization of customs procedures to enchance "efficiency and effectiveness" and through "the application of Customs procedures and practices in a predictable, consistent, and transparent manner."[203] While this language has some resemblance to the calls for transparency and predictability in the preamble of the AOR, there is no mention in the annex on rules of origin (Specific Annex K) on not designing rules to create trade distortive effects or not using the rules to pursue trade objectives.[204] While Annex K provides some recommendations on how to design the substantial transformation criteria, there is no requirement that such rules be clearly defined.[205] Finally, in 1990, Vermulst and Waer point out that the 1973 Convention included a dispute settlement procedure, which had never be used with regards to origin or any matter covered by the Kyoto Convention. The 2006 Revision also includes a dispute settlement procedure which encourages the parties to first settle the matter through negotiation and if no settlement is reached, a Management Committee would make recommendations for settlement; however, Article 14 states that "Contracting Parties in dispute may agree in advance to accept the recommendations of the Management Committee as binding." A search online and on the WCO's website did not find any references to disputes brought under Article 14. However, the language of Article 14 produces a similar perception that arises when looking at Annex II of the AOR: that within the areas of origin and customs procedures, states are given discretion in adhering to guidelines or decisions on the design of rules.

[200] ibid Annex D.1, Introduction.
[201] James (n 99) 269.
[202] Vermulst and Waer (n 6) 60.
[203] Revised Kyoto Convention, preamble.
[204] ibid Annex K.
[205] ibid.

The WCO is also responsible for the development, maintenance, and updating of the Harmonized Commodity Description and Coding System [HS/HS Nomenclature]. The Customs Cooperation Council (CCC) designed a tariff classification system called the Brussels Tariff Nomenclature after World War II.[206] In the 1980s the system was updated and renamed to the HS, and the CCC became the WCO in 1994.[207] The HS was designed to be used for customs tariffs, trade statistics, data transmission, freight tariffs and transport statistics, and commercial commodity description and coding systems.[208] It is currently used by governments, international organizations, and the private sector.[209] In the context of the WTO, the HS nomenclature has, in the words of the WTO's website, "become the de facto standard for Members" in their schedule of concessions under Article II of the GATT and is used by almost all members "as a tool to define the products which are covered by certain agreements" even if those Members are not also members of the WCO.[210] The HS is also used in PTAs in at least two places: first, in the schedule of preferential tariffs, which set the tariff rates that differ from the rates in the parties' schedules of concessions at the WTO;[211] secondly, in the product-specific list in the preferential RoO chapter that specify the products that must undergo certain changes within the territory.[212]

While the HS is utilized by WTO Members, the WTO and the WCO have different competencies, especially regarding disputes that center on interpretations of the HS. The WCO has exclusive competency in the classification of goods in the HS, and the WCO's goal is to make customs administrations more efficient through the use of the HS.[213] Therefore disputes arising from the application of the HS Convention or the classification of a good in the HS should be brought before the WCO's dispute settlement system, even though it can only issue non-binding advisory opinions.[214]

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[206] Ian S Forrester and Tashi Kaul, 'Tariff Classification,' in Patrick F J Macrory, Arthur Edmond Appleton and Michael G Plummer (eds), *World Trade Organization: Legal, Economic and Political Analysis* (Springer 2005) 1583.
[207] ibid.
[208] Asakura (n 88) 8-9.
[209] WCO, 'What is the Harmonized System (HS)?' (wcoomd.org) <http://www.wcoomd.org/en/topics/nomenclature/overview/what-is-the-harmonized-system.aspx> accessed 2 December 2021.
[210] WTO, 'The WTO and World Customs Organization' (wto.org) <https://www.wto.org/english/thewto_e/coher_e/wto_wco_e.htm> accessed 2 December 2021.
[211] Forrester and Kaul (n 206)1586.
[212] ibid.
[213] ibid 1584.
[214] ibid 1585.

While the WTO has competency over trade regulation, panels and the AB at times assess a measure's inconsistency by referring to the HS; for example, when determining whether a measure violates the national treatment principle by treating domestic like products differently from foreign like products.[215] Likeness can be based on how the goods are classified in the HS.[216]

The role of the HS in forming the basis of Members' Schedules of Concessions was examined in *EC-Customs Classification of Frozen Boneless Chicken Cuts* (2005). The AB found that although the HS was not part of the Marrakesh Agreement, "there was broad consensus among GATT Contracting Parties to use the Harmonized System as the basis for their WTO schedules....[thus] this consensus constitutes an "agreement" between WTO Members 'relating to' the *WTO Agreement* that was 'made in connection with the conclusion' of that Agreement, within the meaning of Article 31(2)(a) of the *Vienna Convention*."[italics original][217] Article 31(2)(a) of the Vienna Convention on the Law of Treaties (VCLT) provides that "a treaty shall comprise, in addition to the text, including its preamble and annexes: (a) any agreement relating to the treaty which was made between all the parties in connection with the conclusion of the treaty."[218] Joost Pauwelyn, Andrew Guzman and Jennifer Hillman note that this "decision is significant because it means that [under Article 31(2)(a) of the VCLT] the HS treaty forms part of the 'context' that is relevant in the interpretation of the schedule of concessions under GATT Article II."[219]

However, Maria Foltea finds that while panels and the AB may seek advice from the WCO and accord WCO instruments different weight in WTO disputes that relate to the HS, this does not suggest "that the WTO dispute settlement organs should, as a matter of law, defer to the WCO interpretations or practice with respect to HS classifications."[220] Yet, she proposed (in 2012) that WCO practice "may be useful in future WTO disputes dealing" with subject matter other than classification disputes,

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[215] ibid 1584-1585.
[216] ibid 1588.
[217] Appellate Body Report, *European Communities – Customs Classification Of Frozen Boneless Chicken Cuts* (circulated 12 September 2005, adopted 27 September 2005) WT/DS269/AB/R and WT/DS286/AB/R, para 199.
[218] Vienna Convention on the Law of Treaties (VCLT) (entered into force 27 January 1980) 1155 UNTS 331, art 31(2)(a).
[219] Joost HB Pauwelyn, Andrew T Guzman and Jennifer A Hillman, *International Trade Law* (3rd edn, WoltersKluwer 2016) 184.
[220] Marina Foltea, 'The World Customs Organization' in Marina Foltea (ed), *International Organizations in WTO Dispute Settlement* (CUP 2012) 236.

such as “rules of origin”.[221] A dispute on RoO could be linked to an interpretation of the HS, because the “tariff classification” referred to in the “change in tariff classification” criterion of a PTA is likely the HS given that most members of the WTO are also members of the WCO.

For purposes of RoO analysis, however, there are some elements of the HS that require familiarity. A country or territory (in the case of the EU) develops a code based on the HS code: the first six digits must be the HS code if the state is a party to the HS convention[222], and numeric extensions are added by the national or regional customs authorities.[223] The first two digits indicate a Chapter Heading and the subsequent digits indicate subheadings.[224] Generally, the Chapter Heading represents a category of goods, and the subheadings represent degrees of processing of those goods.[225] Additionally, the WTO allows Members some flexibility in classification of goods provided that the GATT Articles I:1 (MFN) and II:I (Schedule of Concessions) are not violated.[226]

While the HS provides a classification system that is accessible to custom officials, traders, and industry analysists[227], this system poses several challenges in terms of determining the origin of a good. First, it was not designed to be applied to determine origin.[228] The progression of subheadings in every Chapter is not consistent in terms of degree of processing, which creates some challenges when applying a general change of tariff classification criterion to determine origin.[229] Further, the HS is mainly designed for classifying completed goods, although it does provide some guidance on where to classify unfinished or disassembled goods or goods that are composites of different materials based on their characteristics.[230] The HS is amended every 5 years to keep up to date with technical developments and changes in

[221] ibid 244.
[222] Forrester and Kaul (n 206) 1590.
[223] Heetkamp & Tusveld (n 193) 7.
[224]WCO, ‘Frequently Asked Questions’ (wcoomd.org 10 June 2020) <http://www.wcoomd.org/en/topics/nomenclature/overview/harmonized_system_faq.aspx> accessed 2 December 2021.
[225] Asakura (n 88) 12.
[226] Forrester and Kaul (n 206) 1599; Van den Bossche and Zdouc (n 9) 450.
[227] Asakura (n 88) 14.
[228] ibid 20.
[229] ibid 16.
[230] van den Bossche (2008) (n 24) 430; WCO, ‘General Rules for the Interpretation of the Harmonized System’ (wcoomd.org) <http://www.wcoomd.org/-/media/wco/public/global/pdf/topics/nomenclature/instruments-and-tools/hs-nomenclature-2017/2017/0001_2017e_gir.pdf?la=en> accessed 2 December 2021.

international trade,[231] but this also means that custom officials and importers must also keep up to date with these revisions as tariff schedules and product specific rules of origin in trade instruments may not be revised or there may be a delay in revising them.

Finally, the AOR established the WCO Technical Committee on Rules of Origin, TCRO, which was tasked with "establishing the overall framework of the harmonized rules of origin (HRO) and completing all necessary technical work."[232] The TCRO was unable to complete such work by the 1998 deadline due to numerous outstanding issues.[233] The TCRO continues to meet and to provide technical assistance on other elements of rules of origin. For example, a 2018 report describes efforts to develop a database of preferential agreements and publish a "Comparative Study on Preferential Rules of Origin."[234]

### IV. Local Content Requirement – Not to Be Confused with Prohibited Local Content Requirement under the SCM and TRIMS Agreements

Before examining in more detail the methods for determining the origin of a traditionally manufactured product, a clarification of the use of the term "Local Content Requirement" is needed. A "Local Content Requirement" can be a law or provision in a legal text requiring a manufacturer to incorporate a certain level of locally produced inputs into a product to qualify for a benefit such as market access, import licenses, or tax benefits.[235] Local Content Requirements are prohibited under the TRIMS and SCM Agreements and Article III.4 of the GATT.[236] When reading preferential RoO, for example in the USMCA, one finds the phrase "regional value content" or "local value content," to refer to value produced in the region when manufacturing a good. This value can come from the costs of materials, the labor performed, or the direct overhead costs.[237] Thus a preferential rule can require that a good include a certain amount of

[231] Asakura (n 88) 11-12; WCO, 'What is the Harmonized System (HS)?' (n 209). As a result of the HS updates, the Schedule of Concessions and the Information Technology Agreement must be updated so that the codes of the products covered under those instruments correlate to of the amended HS. WTO, 'The WTO and World Customs Organization' (n 210).
[232] WTO, 'The WTO and World Customs Organization' (n 210).
[233] Inama, *Rules of Origin in International Trade* (n 20) 26.
[234] Technical Committee on Rules of Origin, 'Intersessional Developments Director's Report' (21 December 2018) OC0211E1a, paras 18-21 <https://docs.wto.org>
[235] Holgar P Hestermeyer and Laura Nielsen, 'The Legality of Local Content Measures under WTO Law' (2014) 48 J *World Trade* 553, 554.
[236] ibid 555; Pierre Sauvé, 'Life beyond local content: exploring alternative measures of industry support in the context of WTO accession' (2016) 1 J Int'l Trade 1, 13.
[237] See eg, USMCA, art 4.1 (definition of Total Cost), and art 4.5.

inputs produced in the territory to qualify for preferential treatment under the PTA. Is not this a type of Local Content Requirement?

It can be challenging to differentiate prohibited Local Content Requirements from rules of origin. In their article, "The Legality of Local Content Measures under WTO Law," Holgar Hestermeyer and Laura Nielsen "classify local content requirements according to the benefit granted," as they "condition a benefit on the use of local content."[238] However, local content requirements:

> can also be categorized by their method of calculating the domestic content, most commonly by 'value added'. This is normally done referring to the 'rules of origin', which also decide whether a product counts as national for purposes of benefiting from a certain FTA. The construction of these rules can be used and often is used as a policy tool for advancing local industry too. This article will however solely focus on the local content rules relating to obtaining a benefit.[239]

Although a product specific rule may require a level of local content value, rules of origin are not prohibited local content requirements. Prohibited local content instruments that lead to obtaining a benefit are licenses, government procurement, financial incentives, such as feed-in tariffs (FIT), financing, and "other financial incentives, including tariffs."[240]

Hestermeyer and Nielsen, when discussing tariffs, slightly blur the distinction between WTO inconsistent local content requirements "relating to obtaining a benefit" and rules of origin which "decide whether a product counts as national for purposes of benefiting from a certain FTA." Hestermeyer and Nielsen write that the "most traditional way to grant a preference in international trade is by granting preferential tariffs. Preferential tariff treatment is also used with respect to local content requirements. An example of this type of practice can be found in Ecuador's imposition of a new tariff on automobile knock-down kits, where a discount of 1% for every 2% of local content is granted."[241] However, they do not connect this sentence with any reference to rules or origin. Preferential tariffs in FTAs discriminate against third party imports and this can be achieved through rules of origin requiring a certain level of local content. If traders comply with the rules, they receive a benefit – preferential tariff treatment.

Pierre Sauvé's article, "Life beyond local content", distinguishes "rules of origin" as a trade policy similar to, but different from, "local content requirements." He notes

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[238] Hestermeyer and Nielsen (n 235) 557.
[239] ibid.
[240] ibid 557-564.
[241] ibid 564.

that there has a been a decline in local content requirements since the Uruguay Round due to a state's need to comply with the TRIMS and SCM agreements for accession to the WTO, growing doubts about the efficacy of local content requirements, and the rise of production fragmentation and GVC-driven trade.[242] However, he points out, there has also "been a trend towards using trade policy measures that achieve objectives similar to those of selected performance requirements. These include rules of origin in preferential trade agreements…"[243] Member States take "advantage of flexibilities under Article XXIV of the GATT, 1994" to achieve trade policy aims that enhance the local market.[244] As a result, they:

> have made extensive use of the rules of origin to increase local value added. Rules of origin determine the extent of domestic content a product must have to qualify as an internal product in a preferential trading area and, hence, have similar effects as local content requirements.[245]

Like Hestermeyer and Nielsen, Sauvé does not delve deeper into the legal implications of this conclusion: why are "Local Content Requirements" considered illegal under the TRIMS and SCM, while rules of origin in PTAs may be permitted, or at least are not contested, even though they can achieve the same aim of requiring producers to use local inputs. As Mavroidis and Vermulst argue, using Article XXIV as a legal basis for granting preferential RoO is "shaky."[246] What we can take away from these references to rules of origins in the articles by Hestermeyer and Nielsen and Sauvé is that (1) states use PTAs to achieve trade policy aims, (2) a state will try to use rules of origins to benefit the local industry, and (3) the use of these rules to achieve effects similar to local content requirements is a growing trend. The work of economists in documenting how RoO lead to protectionists effects in trade will be discussed in Chapter 3.

## V. Conclusion

The WTO seems to govern preferential RoO with a light touch. Annex II of the AOR sets guidelines for designing the rules and is silent on preventing preferential RoO in a PTA from having a trade distortive effect. Whether RoO are inconsistent with

[242] Sauvé, 'Life beyond local content: exploring alternative measures of industry support in the context of WTO accession' (n 236) 19.
[243] ibid.
[244] ibid.
[245] ibid.
[246] Mavroidis & Vermulst (n 20) 6.

Article XXIV GATT is open for debate, but what is not debated is that they are widely used legal tool by Members of the WTO.

A few notes before looking at the substantial transformation criteria in the next Chapter. Preferential RoO are found in GSPs, and in that context they are referred to as non-reciprocal preferential RoO, as they are determined only by the preference-giving country.[247] Inama and Hoekman have found that these rules are not necessarily designed with the developing countries' trading and producing practices in mind and they are so complex or restrictive that traders forgo seeking preferential tariff treatment.[248] The WTO has shifted its energy away from the HWP for non-preferential rules of origin towards establishing a framework for non-reciprocal preferential RoO. A General Council decision from 2010, "Transparency Mechanism For Preferential Trade Arrangements", requires for PTAs formed under the Enabling Clause, PTAs with LDCs, and any other non-reciprocal preferential treatment, that the notifying member include the "product-specific preferential rules of origin as defined in the PTA" as part of the initial notification of the PTA to the WTO.[249] In 2013, the Bali Ministerial Conference presents multilateral guidelines for rules of origin for LDC non-reciprocal preference schemes to facilitate qualifying for preferences and market access opportunities.[250] In 2015, the Nairobi Ministerial Decision provided further guidelines on rules in non-reciprocal preferential trade arrangements.[251] In this dissertation, non-reciprocal preferential RoO will be referenced when relevant to a certain issue. Chapter 5 includes a more detailed look at the Bali and Nairobi Ministerial Decisions.

The two DSB cases dealing with RoO referenced in this chapter were related to textiles, and although RoO are significant to trade in textiles, this dissertation will not explore textiles in much depth. Rules for textiles add an additional level of complexity to the analysis of RoO due to their increased restrictiveness and contentiousness,[252] and the regulation of trade in textiles underwent significant modifications at the multilateral level before being integrated into the GATT/WTO framework.[253] An examination of RoO in the context of textiles would provide enough material for at least

[247] Inama, *Rules of Origin in International Trade* (n 20) 9, 390.
[248] ibid 174-177, 389-392; Hoekman, 'Rules of Origin for Goods and Services' (n 100) 93.
[249] General Council Decision, 'Transparency Mechanism for Preferential Trade Arrangements' (14 December 2010) WT/L/806, Annex I, para 28(d).
[250] WTO, 'Rules of Origin' (wto.org) <https://www.wto.org/english/tratop_e/roi_e/roi_e.htm#documents> accessed 2 December 2021.
[251] ibid.
[252] Inama, *Rules of Origin in International Trade* (n 20) 84-86.
[253] Matsushita (n 22) 248-249.

an additional chapter. This dissertation focuses on the determining the origin of a good in which a digital service input is a high value input, such as a 3D printed good. Although 3D printing is being used to print fabric, it is still an avant-garde use of the technology, while parts for automobiles, bicycles, airplanes, and machines are being produced with more frequency by 3D printing .[254]

In their article on the design of 21st Century trade agreements, Hoekman and Nelson argue that rule-making in the context of shallow trade agreements, those based upon a reciprocal exchange of commitments, are still needed to address the issue of national policies imposing negative international spillovers. This requires "the major trading powers to agree on additional rules of the game for domestic industrial policies that are not captured by existing WTO agreements."[255] They do not refer to rules of origin, but in fact, such rules are motivated by domestic industrial policies that have negative international spillovers, as will be discussed further in Chapter 3. Before designing new rules of origin for 21st century trade in products incorporating digital technology, it is necessary to understand what the current rules of the game are. Therefore, the next chapter will focus on preferential RoO designed to determine the origin of traditionally manufactured goods.

[254] Vincent Duchêne and others, *Identifying Current and Future Application Areas, Existing Industrial Value Chains and Missing Competences in the EU, in the Area of Additive Manufacturing (3D printing)* Final Report for the Commission Executive Agency for Small & Medium-Sized Enterprises (Publications Office Eur Union 2016) 288 <https://data.europa.eu/doi/10.2826/72202> accessed 8 January 2022.
[255] Hoekman and Nelson (n 41) 22.

## Chapter 2

## Rules of Origin in the Context of Traditional Manufacturing

The previous Chapter focused on the history of rules of origin in international trade instruments and their position in the multilateral trade law system. However one finds preferential RoO, and all of their variations, in bilateral and regional trade instruments. In this Chapter, the focus is on the 'nuts-and-bolts' of RoO and the main criteria for determining origin. While the legality of preferential RoO may be questioned, for traders, RoO are not legal theory: non-compliance may result in fines and sanctions. Understanding how these rules function with regards to traditionally manufactured goods will prepare the discussion in Chapter 4 on how 3D printing may disrupt not only the legal purpose of rules of origin but also the administrative processes of determining origin.

The Chapter begins with an introduction to the two main origin criteria: wholly obtained or produced and substantial transformation. Then, the Chapter focuses on the three categories of the substantial transformation criteria: change of tariff heading (CTH), specific manufacturing or operating processes, and *ad valorem* percentage. As Imagawa and Vermulst state, none of these tests are "perfect" and there is no "'one size fits all' rule for the origin determination of thousands of products" and this "may also explain why rules of origin tend to be so complicated."[256] The examples in this chapter demonstrate how the rules vary from the general guidelines proposed by the Kyoto Convention and Annex II of the AOR. The Chapter will mainly focus on the methods for determining whether a good has sufficient local content to meet the *ad valorem* percentage requirement. The Chapter will conclude with a brief discussion of the administrative procedures for certifying the origin of a good, the national or regional regulatory offices with judicial and supervisory functions, and the roles of other international organizations besides the WTO in origin determination. Examples will mainly come from the Pan-Euro-Mediterranean Cumulation System of Origin Rules (PEM) and the USMCA, but references to the ASEAN Trade in Goods Agreement will be included (ASEAN TIGA).

The PEM is the basis for the rules of origin of FTAs among the EU, EFTA, and countries in North Africa, the Middle East, the Balkans and Eastern Europe.[257] The

[256] Imagawa and Vermulst (n 108) 609.
[257] Commission, The pan-Euro-Mediterranean cumulation and the PEM Convention (n 44).

Pan-European cumulation system was created in 1997, initially covering the EC, EFTA states, the Central Eastern European Countries, and the Baltic States.[258] In 2005 the "pan-Euro-Mediterranean cumulation system of origin" was created and Turkey and states in the mid-East and North Africa ("The Barcelona Process") were added.[259] The Membership expanded to include states in the Balkans and the Caucasus, and the current instrument in effect is the "Regional Convention on the pan-Euro-Mediterranean preferential rules of origin," [the PEM Convention].[260] The PEM Convention, signed by 23 parties, aims to replace 60 bilateral protocols on RoO with a single legal instrument.[261] The PEM is different from a traditional hub-and-spoke arrangement of FTAs.[262]

The PEM allows for a system of cumulation of certain processing of inputs traded between members to count for origin qualifying processing.[263] This system of diagonal cumulation will be discussed further in the Chapter. In their 2009 book on trade, Hoekman and Koestecki suggested that the PEM resulted from states seeking to reduce the costs of production by addressing the administrative costs of the hub-and-spoke system, and in particular rules of origin.[264] However, traders have found the PEM to be complex due to the product-specific rules and the requirements for certificates of origin.[265] As a result, the parties began discussions on simplifying the instrument. Revised rules to the PEM Convention have been drafted, but as not all the contracting parties have endorsed the revisions, the new rules have not replaced the current rules.[266] Contracting parties can start to apply the revised rules on an optional and bilateral basis.[267] These transitional rules do not alter the rights and obligations of

[258] ibid.
[259] ibid.
[260] ibid; Council Decision of 14 April 2011 on the signing, on behalf of the European Union, of the Regional Convention on pan-Euro-Mediterranean preferential rules of origin (2013) OJ 56 L 54/1.
[261] Commission, The pan-Euro-Mediterranean cumulation and the PEM Convention (n 44).
[262] Under such an arrangement, a major market (such as the US or the EU) will negotiate separate and distinct bilateral agreements with other territories (the spokes). Spoke A exports an input to Spoke B, which Spoke B processes further. When Spoke B trades with the hub, it is possible that input from Spoke A may not contribute to the final value of the final good in Spoke B, and thus may not contribute to the value necessary for the good to qualify for origin under the Spoke B-Hub FTA. Hoekman and Kostecki, (n 80) 500.
[263] Commission, The pan-Euro-Mediterranean cumulation and the PEM Convention (n 44).
[264] Hoekman and Kostecki (n 80) 501.
[265] Commission, The pan-Euro-Mediterranean cumulation and the PEM Convention (n 44).
[266] ibid.
[267] ibid.

the contracting parties under the PEM Convention.[268] References to the new rules will be indicated where relevant in further paragraphs.

The United States has maintained a hub-and-spoke approach to rules of origin, but NAFTA and the USMCA, two regional agreements, were and are, significant in their use of rules of origin to implement trade policy objectives within the North American region. During the NAFTA negotiations, the CTH was not considered adequate for politically and industrially strategic goods, and a regional value content (RVC) requirement was added to the CTH requirements, resulting in restrictive and complex product specific rules for 5,000 products.[269] The NAFTA RoO subsequently served as the basis for US bilateral agreements, including those in Latin and Central America, Asia and the Pacific.[270] The USMCA amended the NAFTA RoO in some key areas such as cumulation and exporter declarations and added new provisions on sourcing requirements and labor requirements for automobiles.[271] Given the relatively recentness of the USMCA, much of the literature on RoO references NAFTA. This dissertation will only mention NAFTA when relevant, such as in demonstrating how the USCMA departs from NAFTA in the aspects mentioned above.

Looking at the PEM and the USMCA approaches to RoO provides an opportunity to compare two regional approaches. Focusing on regional trade agreements also is in line with the general shift from multilateral rulemaking to regional and mega-regional regulation of trade. Further, the USMCA represents a recent regional approach to address 21st Century trade issues, like global value chains and digital technology[272] and also introduces some novel elements to the rules of origin analysis, especially with regards to automotive parts.[273]

### I. The Wholly Obtained or Produced Criterion

Generally, the starting point for determining the origin of a good is to ask: (1) was the good wholly obtained or produced in the territory?; (2) if not, where did the last

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[268] ibid.
[269] Inama, *Rules of Origin in International Trade* (n 20) 278, 287-288; Antoni Estevadeordal and Kati Suominen, 'Rules of Origin in Preferential Trading Arrangements: Is All Well with the Spaghetti Bowl in the Americas?' (2005) 5 Economia (Spring) 63, 67, 70-71.
[270] Estevadeordal and Suominen (n 269) 70.
[271] Gantz, 'The United States-Mexico-Canada Agreement' (n 73).
[272] SDG Knowledge Hub, 'New Trade Agreement between US, Mexico, and Canada Enters into Force,'(sdg.iisd.org 2 July 2020) <https://sdg.iisd.org/news/new-trade-agreement-between-us-mexico-and-canada-enters-into-force/> accessed 2 December 2021.
[273] International Trade Administration (USITA), 'Understanding USMCA' (trade.gov) <https://www.trade.gov/usmca-dayone-0> accessed 2 December 2021.

substantial transformation to the good take place?[274] The first step means determining whether the good was wholly grown, produced, or manufactured in the territory. This rule also applies to all the inputs of an assembled product: to qualify for preferential treatment, all inputs must have been wholly grown, produced, or manufactured in the territory.[275]

Although one must look to the RoO in a trade agreement to determine the applicable wholly produced criterion[276], the Kyoto Convention is used below as an example. The provisions which may be relevant to 3D printing are:

> Goods produced wholly in a given country shall be taken as originating in that country. The following only shall be taken to be produced wholly in a given country:
> (a) mineral products extracted from its soil, from its territorial waters or from its sea-bed;
> (b) vegetable products harvested or gathered in that country;
> …
> (f) products obtained by maritime fishing and other products taken from the sea by a vessel of that country;
> …
> (h) products extracted from marine soil or subsoil outside that country's territorial waters, provided that the country has sole rights to work that soil or subsoil;
> (i) scrap and waste from manufacturing and processing operations, and used articles, collected in that country and fit only for the recovery of raw materials;
> (j) goods produced in that country solely from the products referred to in paragraphs (a) to (i) above.[277]

A very simple example is a wood plate for food produced from timber cut in the forest in the territory, carved in a factory within the same territory and treated with a varnish produced in the same territory. If the wood is sent across the border to be carved, the plate is now part of a global supply chain, albeit a simple one, and the wholly produced criterion cannot be applied. As GVCs have lengthened and grown more complex, states rely on the substantial transformation criteria in RoO to determine if a product qualifies for preferential tariff treatment.[278]

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[274] Imagawa and Vermulst (n 108) 604.
[275] van de Heetkamp and Tusveld (193) 83.
[276] Differences of opinion among WTO Members on the wholly obtained criterion and the minimal operations and process which can be performed in another country without losing a good's origin status are some of the reasons for the impasse on the harmonization of preferential rules of origin. Van den Bossche (2008) (n 24) 438; Inama, *Rules of Origin in International Trade* (n 20) 55-59.
[277] Revised Kyoto Convention, Annex K, para 2.
[278] Puccio (n 51) 174.

## II. The Substantial Transformation Criteria: Change of Tariff Heading, Technical Test, and *Ad Valorem* Percentage

If the product is not wholly obtained or produced in one territory, three rules are applied separately or conjointly to determine the territory in which the substantial transformation occurred. The 1973 Kyoto Convention was one of the first multilateral instruments to divide "substantial transformation" into the three criteria: the Change of Tariff Heading, Manufacturing or Processing Operations, and the Ad Valorem Percentage Rule.[279] RoO in PTAs generally follow the parameters of Kyoto Convention, but they are not uniform in the details for the requirements under each of the criteria.

### A. Change of Tariff Heading

Generally, under the CTH criterion, a product undergoes sufficient manufacturing or processing if it falls into a tariff heading different from the heading of the materials.[280] Free trade agreements will specify which tariff classification system is applied, but most likely it will be the HS as most WTO Members are also contracting parties of the HS Convention.[281] The US and EU have created their own classification codes, using the HS code for the first six numbers and then adding additional numbers for heading subdivisions[282] Referring the 2022 HS List available at the WCO website, a wood plate is classified in Chapter 44: Wood and articles of wood; wood charcoal. The next two digits, the subheading, for a wood plate are 19: tableware and kitchenware, of wood. The last two digits are a further subheading: .90 indicates that the good is made of a wood other than bamboo. Thus, the HS code for a wood plate (not of bamboo) for food is: 4419.90.

It is important to note the distinction between the Chapter and the subheading numbers, because in PTAs the CTH rules specify whether the change must occur at the Chapter level, the subheading level, or even the sub-subheading level. Under the

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[279] Inama, *Rules of Origin in International Trade* (n 20) 5.
[280] 1973 Kyoto Convention, Annex D.1 (A).
[281] Van den Bossche (2008) (n 24) 430; WCO, 'What is the Harmonized System (HS)?'(n 209).
[282] van de Heetkamp and Tusveld (n 193) 7. E.g., on its website for importers and exporters, the DG Trade notes that "Eight digits is generally considered to be fully qualified for customs purposes, but some countries may require also 9, 10 or further digits to completely describe the specific good being imported. But the same 8-digit class can represent different products in different countries. For example, 2001.90.30 means 'sweet corn' in the EU-27 classification and 'beans' in the US classification." Commission, 'Access 2Markets: Frequently Asked Questions-What is the Harmonized System' (trade.ec.europa.eu) <https://trade.ec.europa.eu/access-to-markets/en/faqs> accessed 2 December 2021.

product specific rules for the USMCA (Annex 4-B), for an item falling under 4419 (wooden tableware) to obtain origin there must be "a change to heading 4401 through 4421 from any other heading, including another heading within that group" in the territory. If birch wood [HS 4403.91] is imported into the US from a country other than Mexico or Canada and is carved into a plate [4419.90] in Texas, the plate qualifies as a good originating in the territory, because of the change in subheading (03.91 to 19.90). As another example, take a hamburger bun. The HS code for bread is 1905, and the USMCA product specific rules require a change from any other Chapter. If wheat flour grown and ground in Puglia [1001] is imported to the US and is used by an industrial baker in Texas to make the bun [1905], the bun originates in the US, because there has been a change from Chapter 10 to Chapter 19.[283]

While the near universal application of the HS in preferential RoO provides some advantages, the structure of the HS can make it challenging to comply with CTH rules. At first glance, use of the HS nomenclature appears to simplify origin determination: all that is necessary is to see whether the inputs and the final product are in different headings or subheadings in the HS. However, Imagawa and Vermulst note that while an advantage of the CTH rule is its "conceptual simplicity," a draw back "is that it requires in-depth knowledge of the HS, with respect to both the finished products and the raw materials, not only on the part of the exporting country administrators (who are not necessarily customs exports) but also on the part of producers/exporters."[284] Further, the HS was not designed for administering RoO, and thus there are aspects of this system which complicates its use for origin analysis. First, as Mavroidis notes, while the HS "implicitly reflects some sort of value escalation," by starting from agricultural products to complex industrial products like automobiles," it "does not at all, however, explain how changes in the tariff heading occurred."[285] As a result, looking at the HS nomenclature alone may be insufficient to determine if a substantial transformation of the good occurred in the territory of the PTA.[286]

This lacuna allows for both traders and policymakers to take advantage of the HS. Producers who do have knowledge of the HS, and who have the flexibility in their manufacturing systems, could establish processing procedures so that the finished

[283] USMCA, ch 4, annex 4-B: Product-Specific Rules of Origin
[284] Imagawa and Vermulst (n 108) 607-608.
[285] Mavroidis, *The Regulation of International Trade*, vol 1 (n 5) 222
[286] Imagawa and Vermulst (n 108) 608.

product is classified under one heading instead of another, thus meeting the CTH rule.[287] Further, a CTH rule may not necessarily reflect the value created within the territory. For example, assembling goods into a final product may satisfy the CTH rule (the parts are categorized in one HS heading, the final good in another), but the assembly process may be simple, and thus require less labor costs. Thus, use of the HS alone, Imagawa and Vermulst argue, "may therefore not always be an appropriate basis for conferring origin status" and this realization has lead policymakers and trade negotiators to include a device in the CTH rules which can have a protectionist effect, lists of exceptions and also regional content requirements.[288] Thus, the CTH rule, which initially appeared to be a predictable method for determining origin, is in fact, through the design of product-specific rules, complex and trade restrictive.

Exceptions in a CTH rule occur when the drafters want to limit the geographical scope of the inputs that undergo an origin qualifying transformation in the territory. In essence, as long as the necessary heading change occurs, a good can qualify for origin even if the inputs come from outside of the territory. RoO designers can make CTH rules restrictive by requiring that certain inputs originate in the territory.[289] An example of an exception are the product-specific rules for catsup in the NAFTA[290], which has been transferred to the USMCA. Someone in Texas is preparing a hamburger and spreads catsup on the hamburger bun. For catsup [2103.20] to originate within the USCMA territory, there must be a change from any other chapter, except from subheading 2002.90.[291] Under the HS, "Tomatoes prepared or preserved otherwise than by vinegar and acetic acid" fall under Chapter 20, Subheading 02.[292] Subheading 2002 is divided into two further subheadings: 2002.10: Tomatoes, whole or in pieces; 2002.90: Other. For making catsup, "other" signifies tomato paste. Basically, the tomato paste must originate in the USMCA territory if a catsup is to qualify for preferential treatment under the USCMA. So, if a company in Mexico imports tomato paste from Italy, makes the catsup and then tries to export the catsup to Texas,

[287] Hoekman and Kostecki (n 80) 188, 190.
[288] Imagawa and Vermulst (n 108) 608.
[289] ibid.
[290] James (n 99) 268.
[291] USMCA, ch 4, annex 4-B
[292] WCO, HS Nomenclature 2022 'Chapter 20'(wccomd.org) < http://www.wcoomd.org/-/media/wco/public/global/pdf/topics/nomenclature/instruments-and-tools/hs-nomenclature-2022/2022/0420_2022e.pdf?la=en>accessed 7 January 2022. For the full list of the 2022 HS codes, see WCO, HS Nomenclature 2022 Edition (wccomd.org) http://www.wcoomd.org/en/topics/nomenclature/instrument-and-tools/hs-nomenclature-2022-edition/hs-nomenclature-2022-edition.aspx accessed 7 January 2022.

the catsup will not qualify for preferential tariff treatment.[293] Only catsup made from paste or tomato preparations processed in one of the parties of the USMCA qualifies for preferential tariff treatment.[294]

Product-specific CTH rules can also be coupled with RVC requirements to make them even more restrictive. This requires that a certain level of value be created within the territory in addition the change of heading. Hoekman, in 1993, argued that the CTH in fact is a value-added criterion as it implies processing, which is adding value.[295] "The primary difference," he explains, "between the two criteria therefore appears to be that under a CTH: (a) it is less clear what the 'value-added equivalent' is; and (b) there is likely to be a wide variance of these equivalents."[296] According to Hoekman, all substantial transformation criteria impose value-added constraints which discriminate against low-wage economies.[297] Thus, adding a RVC requirement to a CTH rule narrows down the extraterritorial range of processing that can add origin qualifying value to a good.

### B. Technical Test or Specific Manufacturing or Processing Operations

Before discussing the *ad valorem* criterion, a slight detour is necessary to present a second method for determining origin—origin on the basis of specific manufacturing or processing operations performed on the good,[298] also referred to as a "technical test."[299] Under this criterion, a transformation to the materials must occur, but it does not require a change of heading or subheading to occur. While the revised Kyoto Convention no longer includes this method as part of the substantial transformation criteria, states continue to include rules on manufacturing and processing operations.[300]

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[293] Although it may be very tasty, having been made with Italian tomato paste.
[294] This catsup exception is also an example of how preferential RoO create trade distortion and protectionism. Puccio (n 51) 177-178; Kala Krishna, 'Understanding Rules of Origin' (February 2005) NBER Working Paper 11150, 8-9; more generally on protectionist impact of exceptions, see Conconi (n 38) 2335-2365.
[295] Hoekman, 'Rules of Origin for Goods and Services' (n 100) 92.
[296] ibid.
[297] ibid.
[298] Inama, *Rules of Origin in International Trade* (n 20) 6.; Imagawa and Vermulst (n 108) 608; Vivian C Jones and Liana Wong, 'International Trade: Rules of Origin' (2020) *Congressional Research Service Report*, 3 March 2020, 6 < https://crsreports.congress.gov/product/pdf/RL/RL34524/16> accessed 23 October 2021.
[299] Imagawa and Vermulst (n 108) 608.
[300] Stefano Inama and Pramila Crivelli, 'Convergence on the Calculation Methodology for Drafting Rules of Origin in FTAS Using the Ad Valorem Criterion' (2019) 14 Global Trade & Customs J 146, 147 fn. 2. Dinh (n 46) 121. For example, the product specific rules for KORUS for products of

A reason for maintaining the "technical test" is that it allows states flexibility to address the complexities of producing certain products[301]; for example, the highly specific manufacturing and post-production necessary to create tradeable chemical products.[302] This method may also be useful strategically within the context of goods assembled from parts.[303] When parts for an article are classified under the same heading as the finished article, assembling the parts into that article does not result in a change of heading. Yet a state may want to claim that a substantial transformation has nonetheless occurred; i.e., the act of assembly resulted in a new good having new characteristics, so that the good qualifies for preferential treatment.[304]

The specific manufacturing or processing operations criterion also has some drawbacks. The rules could be devised to exclude certain procedures from conferring origin to protect domestic industries from competition from goods imported under preferential rates.[305] Rules designed for political purposes may not necessarily reflect decisionmaking by producers who locate plants in countries based on economic and management objectives.[306] The specific manufacturing or operation processes method could result in more complex rules as the specific operations would need to be listed and also updated as manufacturing operations change due to changes in technology.[307] As Mavroidis notes, the rules based on a technical test or processing "could become unusable if the specified process becomes obsolete."[308] Further, customs officials would need to verify not only that the processes performed in the exporting countries meet the specifications listed in the rules, but also the production processes performed on inputs in third countries meet the rules.[309]

As trade instruments can provide examples of operations that do not confer origin, it is important to examine these provisions in some detail. Annex K of the

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chemicals lists seven types of processes that confer origin. United States - Korea Free Trade Agreement (KORUS) (entered into force 12 March 2012) annex 6-A, pt II, s VI,

[301] Imagawa and Vermulst (n 108) 608.

[302] Customs and Tariff Bureau, 'Outline for Rules of Origin' (July 2017) Japan Ministry of Finance, 3 <https://www.customs.go.jp/roo/english/origin/outline_of_roo.pdf> accessed 2 December 2021.

[303]This would be the situation for baby carriages. Inama, *Rules of Origin in International Trade* (n 20) 39-41.

[304] ibid 40-41.

[305] James (n 99) 268. In 1989, the EEC (in the context of an anti-dumping investigation) found that DRAMS (an integrated semiconductor) assembled in Japanese-owned firms in Europe were disqualified from EC preferences and that origin could only be conferred through the process of diffusion.

[306] ibid 278.

[307] Dinh (46) 121; Imagawa and Vermulst (n 108) 608.

[308] Mavroidis, *The Regulation of International Trade*, vol 1 (n 5) 222.

[309] Imagawa and Vermulst (n 108) 608.

Revised Kyoto Convention states as a recommended practice that operations "which do not contribute or which contribute to only a small extent to the essential characteristics or properties of the goods….should not be regarded as constituting substantial manufacturing or processing."[310] Such operations include packing and repacking, "mixing goods of different origin, provided that the characteristics of the resulting product are not essentially different from the characteristics of goods which have been mixed", and "simple assembly operations." Article 6 of the PEM establishes that "the simple assembly of parts of articles to constitute a complete article or disassembly of products into parts" do not confer origin.[311] Other operations that do not confer origin include "simple painting and polishing operations," "sharpening, simple grinding or simple cutting," and affixing or printing labels and "other like distinguishing signs on products or their packaging."[312] Finally, the Japan US Trade Agreement (2019), defines "simple assembly" as "the fitting together of five or fewer parts all of which are non-originating (excluding fasteners such as screws, bolts, etc.) by bolting, gluing, soldering, or sewing or by other means without more than minor processing."[313] Inama finds a need for a list of minimal processing excluded from conferring origin as it is impossible to list all processes which satisfy a CTH, however, "there are inherent problems in defining notions such as simple assembly."[314] As will be explored in Chapter 4, the definition of terms such as "simple assembly" could have an impact on determining whether certain steps in the production of 3D printed goods are origin conferring processes.

As Mavroidis states, "there is no perfect method," for determining origin and the rules engender complexity and costs in international trade.[315] A trader and a customs official will have to decide whether an operation is a minor process which does not result in the good having new characteristics, or an operation that contributes significantly to the essential characteristics or properties of the goods. Further, they will be required to make this determination for each PTA under which preferential treatment is requested. Hoekman in his 1993 article on RoO wrote that this mélange of rules

[310] Revised Kyoto Convention, Annex K, art 6.
[311] PEM, Title II, art 6(o). The text has not been changed in the Revised PEM rules, however, the text is found in Title II, art 6(p).
[312] PEM, Title II, art 6(c),(i),(l); Revised PEM Title II, art 6(e),(i),(l), no changes to text.
[313] Trade Agreement between the United States of America and Japan (entered into force 1 January 2020), Annex II Tariffs and Tariff-Related Provisions of the US, Product-Specific Rules of Origin, art 19(d).
[314] Inama, *Rules of Origin in International Trade* (n 20) 491.
[315] Mavroidis, *The Regulation of International Trade*, vol 1 (n 5) 222.

results partially from the legal texts and partially from the choice of countries in designing different RoO:

> Whatever specific test is employed by a country, a general goal is to prevent simple assembly operations and cosmetic processing of a product…from conferring origin. However, in practice, it is often quite difficult to distinguish in a consistent and neutral manner transformations that are substantial from those which are not. The vagueness of the Kyoto Convention and the lack of GATT discipline have allowed countries a great deal of discretion…Whatever rule is used, transparency and predictability will be maximized if it is applied uniformly and consistently. In practice, however, few countries apply a uniform rule of origin. Indeed, the plethora of existing rules suggests that many countries are not convinced that a uniform rule is preferable.[316]

The impasse in completing the HWP on non-preferential rules of origin suggests that nearly 30 years later, states have not yet embraced applying uniform rules. Instead, the rules for determining when a substantial transformation has occurred has multiplied since 1993. This has, Mavoridis writes in 2016, "substantially increased transaction costs for international trade."[317] The next method discussed, the *ad valorem* percentage criterion, has developed over the years into complex rule for determining origin and variations of the criterion are not applied uniformly among PTA, though there are some shared general principles, which will be discussed in the next section.

### C. *Ad Valorem* Percentage

This dissertation will provide an overview of how the *ad valorem* percentage criterion is utilized by states and will not go into the particulars of how costs are calculated, value quantified, and percentages set. However, understanding the basic principles of the rules that fall under this criterion allows one to comprehend why the production and trade of parts through the GVCs complicate the determination of the origin of a final product and how RoO can be used as a trade policy instrument that favors a domestic or regional industry.[318] Under the 1973 Kyoto Convention, in determining origin under this criterion, one must consider "the extent of the manufacturing or processing undergone in a country, by reference to the value thereby added to the goods. When this added value equals or exceeds a specified percentage, the goods acquire origin in the country where the manufacturing or processing was

[316] Hoekman, 'Rules of Origin for Goods and Services' (n 100) 85.
[317] Mavroidis, *The Regulation of International Trade*, Vol 1 (n 5) 222.
[318] James (n 99) 278.

carried out."[319] Under this criterion value generally derives from the cost of labor, manufacturing overhead, and materials – it does not derive from intellectual property rights, investments based on predictions of the good's success in the market, and consumer perceptions on the value of the product.[320]

Trade instruments set out the parameters for determining the *ad valorem* percentage. Generally the value of imported materials (inputs) is the first ascertainable price paid for them within the territory.[321] The instrument will establish whether the value of final goods produced is (1) the ex-works price[322], the price of the good when it leaves the factory, which does not include costs of transportation, (2) FOB (Free on Board), in which case transportation costs between the factory and port of exportation is included, or (3) CIF, which includes the costs, insurance, and freight up to the port of entry for importation.[323] Sometimes product specific rules allow origin qualification under either criterion, and sometimes both a CTH and an *ad valorem* percentage are needed, making the rules more restrictive.[324] For example, the SAFTA regional cumulation provisions require (1) that the transaction value of a good be adjusted to a FOB basis when determining whether the local value threshold was met and (2) the good must undergo a CTH at the four digit level.[325] Thus, it is important for traders to look at the rules for each PTA under which they seek preferential tariff treatment to assess whether a good qualifies for origin.

To calculate the *ad valorem* percentage, the value of originating materials must be distinguished from non-originating materials. Using the hamburger bun example above, the flour from Puglia is the non-originating material, but the milk from Texas, the butter from California, and the salt from Mexico are originating materials. If the

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[319] Inama, *Rules of Origin in International Trade* (n 20) 6-7.
[320] Geraets, Carroll, and Willems (n 46) 288.
[321] Revised Kyoto Convention art 5.
[322] Under PEM, Article 1 (f) the "'ex-works price' means the price paid for the product ex works to the manufacturer in the Contracting Party in whose undertaking the last working or processing is carried out, provided the price includes the value of all the materials used, minus any internal taxes which are, or may be, repaid when the product obtained is exported."
[323] ibid; Van de Heetkamp and Tusveld (n 193) 84-85; ASEAN Trade in Goods Agreement (ATIGA) (entered into force 17 May 2010) art 25(b) (c).
[324] Eg, see Hasegawa Jitsuya's comparison of product specific rules for machinery in FTA/EPA partners of Japan. Hasegawa Jitsuya, 'Standardization of Complex and Diversified Preferential Rules of Origin' (2021) 55 J World Trade 545, 556-557.
[325] Inama, *Rules of Origin in International Trade* (n 20) 282; South-Asian Free Trade Area (SAFTA) (signed 6 January 2004, entered into force 1 January 2006), Rules of Determination of Origin of Goods, r 9. See also, Ram Singh and Surendar Singh, 'Do Rules of Origin Extend Disproportionate Trade Gains under SAFTA: A Case Study of Bicycle and Textile Industries' (2021) 16 Global Trade & Customs J 59, 63.

hamburger bun was shipped from the US to Canada, it would qualify for preferential tariff treatment if the ingredients from Texas, California, and Mexico and the costs to operate the mixing stands and oven, and the labor of the baker exceed the value of the flour from Puglia. The price of materials can be influenced by fluctuations in foreign currency and the cost of labor and manufacturing can be impacted by overhead, the number of different types of goods produced with the materials, units produced, machine hours, and floor space.[326] Further, if materials are dual sourced (identical materials from different origin), the manufacturer must either keep the qualifying material completely separate from non-qualifying material, or mix the material and later calculate what percentage of material in the finished product is qualifying material under the PTA.[327] Focusing on the PEM and the USMCA, the next paragraphs will present a very concise overview of the more technical provisions for determining origin.

i. PEM

Annex II of the PEM provides a list of product-specific rules based on the subheadings of the HS, which limit the value of non-originating materials used in PEM originating products.[328] PEM parties must use this list in PTAs among other PEM parties.[329] Article 2 in conjunction with Article 5 stipulates that products incorporating non-originating materials shall be considered as PEM originating products if the non-originating materials have undergone sufficient working or processing as set out in the Annex II (PEM) list.[330] However, Annex II (PEM) also stipulates that for some goods, certain non-originating material may not be used in the manufacture of the product; for example, if the non-originating material is in the same subheading as the finished product or part. In this case, if the total value of the non-originating material which should not be used does not exceed 10% under the current PEM (or 15%, with some exceptions, under the transitional rules) of the ex-works price of the product, that non-originating material will not impact the good's ability to qualify for preferential tariff

[326] Inama, *Rules of Origin in International Trade* (n 20) 296-303; James (n 99) 268.
[327] van de Heetkamp & Tusveld (n 193) 90. For an industry perspective on why a manufacturer may want to source materials from different geographic locations, see Conner Industries, 'Dual Sourcing: Is it a Gamble for Supply Chain Managers?'(connerindustries.com 2020) <https://www.connerindustries.com/dual-sourcing-is-it-a-gamble-for-supply-chain-managers/> accessed 2 December 2021.
[328] Inama, *Rules of Origin in International Trade* (n 20) 243-245.
[329] ibid 243-244; Roberto Soprano, 'Brexit and the EU-UK Free Trade Agreement: Dos and Don'ts When Drafting Rules of Origin' (2019) 18 J Intl Trade L & Policy 96, 101.
[330] PEM, Annex I arts 2 and 5; PEM Transitional Rules, Annex I arts 2 and 4.

treatment.[331] This is known as the Tolerance Rule.[332] For some items, Annex II sets a percentage limit for all non-originating materials, regardless if they fall into a different subheading or chapter heading than the finished good, the transitional rules allow for use of non-originating material even if in the same heading of the product.[333]

For many products, Annex II (PEM) includes alternate methods for determining the qualifying percentage.[334] For example, a design company in Italy produces a scale [HS 8423.10] from both originating and non-originating materials. Under the PEM transitional rules, the scale must under go a CTH – "Manufacture from materials of any heading, except that of the product [Chapter 84] – or meet a percentage limitation – "Manufacture in which the value of all [non-originating] materials used does not exceed 50% of the ex-works price of the product." To conclude this very brief introduction to the PEM, it should be noted that despite the references to values and percentages, neither the PEM nor the transitional rules specify how to calculate the total value of the materials or the percentages indicated in Annex II. On the other hand, equations are found in PTAS entered into by the US.

ii. US Trade Agreements

The US has developed two methods to calculate the regional value content (RVC) of a good, also expressed as a percentage, which determines whether the good qualifies for preferential tariff treatment. There are two methods, the "Transaction Value" method and the "Net Cost" method. The percentage of RVC required under each method varies, and one must look to the product specific lists in a PTA to determine the required percentages. For example, under the USMCA product specific list, Chemical products in Chapter 29 (of the HS) require either 40% RVC under the Transaction Value method or 30% RVC under the Net Cost method; however, for some pharmaceutical products in Chapter 30 the percentages are 60% RVC for the Transaction Value method, and 50% RVC under the Net Cost method.[335] The rules

[331] PEM Annex I art 5(2); PEM Transitional Rules, Annex I art 5. The percentages differ for agricultural and textile products.
[332] van de Heetkamp and Tusveld (n 193) 84; Inama, *Rules of Origin in International Trade* (n 20) 245-246. However, the 10 or 15% tolerance does not allow traders to exceed the maximum percentage of non-originating materials indicated by the product specific rule. PEM Annex I art 5(2)(b); PEM Transitional Rules Annex I art (5)(2); Commission, 'Guidance: Transitional PEM Rules of Origin' (v1.0-16 August 2021), Brussels, 25 August 2021, TAXUD/E4/AM/GD, 16.
[333] Commission, 'Guidance: PEM Transitional Rules' (n 332) 26.
[334] ibid 24-26.
[335] USMCA, Annex 4-B.

may allow manufacturers or importers to choose either method; however, the Net Cost method can be required for goods such automotive goods, footwear, and word processing machines, and intermediate goods (i.e. inputs) for these products.[336] The formulas presented below seem simple; the complexity in determining whether the product meets the RVC threshold derives from calculating the value of the non-originating materials, the value of the originating materials, and excluded costs.[337] The USMCA includes a *de minimis* rule: a good is originating, if the value of all non-originating material that do not undergo a CTH, with certain exceptions, are not more than 10% of the transaction value or the total cost of the good, in addition to any other applicable requirements.[338] If the good is also subject to a RVC requirement, the value of the *de minimis* non-originating material shall be included in the value of all non-originating materials for calculating the RVC.[339]

The formula for the Transaction Value under the USMCA is: RVC = (TV – VNM)/TV x 100. RVC stands for "regional value content", while TV is "transaction value" adjusted to exclude costs incurred in international shipment of the goods, and VNM stands for "value of non-originating material". The instrument specifies that the transaction value is determined according to the WTO's Customs Valuation Agreement (CVA): "the customs value of imported goods shall be the transaction value, that is the price actually paid or payable for the goods when sold for export to the country of importation adjusted in accordance with the provisions of Article 8", with some prohibitions on restrictions on selling the good, on proceeds returning to the seller from subsequent resale of the good, and on the relatedness between the seller and buyer.[340] Under the CVA, the following goods and services "shall be added to the price actually paid or payable for the imported goods," if "supplied directly or indirectly

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[336] Inama, *Rules of Origin in International Trade* (n 20) 288.
[337] Jessica Gladstone and Cintia Aquilar Flores, 'Free trade agreements: compliance with rules of origin and utilization of preferential tariffs' (2017) 23 Intl Trade L & Regulation 113, 113-115.
[338] USMCA art 4.12(1). The exceptions pertain to the alimentary goods and mineral fuels (see Annex 4-A).
[339] ibid art 4.12(2). Other agreements including a *de minimis* rule are: Australia, Chile, Colombia, DR-CAFTA, Panama, Peru, S. Korea and Singapore. Those that do not have a *de minimis* rule are: Bahrain, Morocco, Jordan. USITA, 'FTA Provisions for *De Minimis* Rule' (trade.gov) <https://www.trade.gov/fta-provisions-de-minimis-rule.> accessed 2 December 2021.
[340]USMCA, ch 4 art 4.1. Article 8 of the Customs Valuation Agreement requires that the following costs be added to the price actually paid or payable to the imported goods if they are incurred by the buyer but not included in the price actually paid or payable for the goods: commissions and brokerage fees, costs of containers, cost of packing. Agreement On Implementation Of Article VII Of The General Agreement On Tariffs And Trade 1994 (Customs Valuation Agreement/CVA) (15 April 1994) LT/UR/A-1A/4.

by the buyer free of charge or at reduced cost for use in connection with the production and sale for export of the imported goods": materials, components, and parts incorporated in the goods, tools, and "engineering, development, artwork, design work, plans and sketches, undertaken elsewhere in the country of importation and necessary for the production of the imported goods."[341] Therefore, the Transaction Value method allows the inclusion of a wide range of costs, including services provided to the manufacturer free of charge by the buyer, when determining whether a good meets the RVC threshold.

iii. General Review of the *Ad Valorem* Criterion

RoO under other instruments, such as the ASEAN based agreements and the CTPP for example, provide formulas under the terms "Build-down" or "Build-up" methods or "direct" and "in-direct" methods, which vary per instrument.[342] Generally, these formulas take into consideration the value of the originating materials, the non-originating materials, and value adjusted for shipping cost.[343] Those instruments that do not provide a formula, such as CETA and the PEM, still include a reference to the CVA.[344] This reference to the CVA in trade instruments could have some impact on using the *ad valorem* criterion for 3D printed goods as the costs of engineering and design services for the good must be added to the customs value if the buyer provided such services for free in a different country.[345] If the 3D file used to print the 3D good is provided to the printer by the 3D good buyer for free, then the value of the design of the file would have to be included in the customs value under the CVA.[346] Whether and

[341] CVA, art 8(b). Also included in the price must be royalties and license fees that the buyer must pay as a condition of sale and "the value of any part of the proceeds of any subsequent resale, disposal or use of the imported goods that accrues directly or indirectly to the seller."
[342] Inama and Sim (n 146) 86-92; Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP), incorporating Trans-Pacific Partnership Agreement (TPP) (signed 8 March 2018, partially in force) ch 3 art 3.5.
[343] van de Heetkamp and Tusveld (n 193) 88-89.
[344] For example, under CETA, the "value of non-originating materials "is the customs value of the materials as determined under the Customs Valuation Agreement", and the "customs value" is "the value as determined in accordance with the Customs Valuation Agreement." CETA, Protocol on rules of origin and origin procedures, s A.
[345] Patricio Díaz Gavier and Julio Gaudalupe Báscones, 'On Article 8.1(b)(iv) of the Customs Valuation Agreement: When is the Value of Certain Services Supplied by the Buyer Relevant for Customs Value (i.e. Engineering, Development, Artwork, Design Work, and Plans and Sketches)?'(2014) 9 Global Trade & Customs J 260, 262.
[346] See Case C-509/19, *BMW Bayerische Motorenwerke AG v. Hauptzollamt München* [2020] ECLI:EU:C:2020:694. BMW developed or commissioned the development of software in the EU that provides communications of applications and systems in a vehicle and is required to execute processes carried out by the vehicle's control unit (para 6). The software is made available to manufacturers of the control units free of charge and is subject to contracts between BMW and the manufacturers (para 7). Significantly, the software was installed outside of the EU. BMW then

how to incorporate the value of the 3D file in to the origin determination of the 3D printed good will be discussed in Chapter 4.

If an instrument requires use of the Net Cost method, the person calculating the RVC percentage must identify and subtract certain costs from the total cost of the goods. Under this method, direct labor costs, the costs of materials, and direct overhead costs influence whether the good meets the RVC requirement.[347] The formula in the USMCA is: RVC = (NC – VNM)/NC x 100.[348] The percentage requirement is less under the Transaction Value method, but this does not necessarily mean that the Net Cost method is more favorable for those seeking to meet the RVC threshold.[349] Complications arise in assessing which costs cannot be factored into the Net Cost.[350] For example, the USMCA and CETA provide three options for how to subtract excluded costs to determine the Net Cost.[351] Under these agreements, only the Net Cost method can be used in connection with automobiles and inputs.[352]

To understand how printing an input within the same territory as the final good incorporating that input could be appealing to manufacturers who import inputs and export final products, it is necessary to see why inputs can complicate the origin determination of the final product. An accounting of originating and non-originating materials in each input must be assessed and factored into the ex-works price if using the PEM, or one of the formulas to calculate RVC. If non-originating materials are transformed into an input within the territory, then the trader must determine if this input

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imported the control units with the software and released them for free circulation in the EU, but when indicating the customs value of the controls, BMW did not take into account the costs of the development of the software (paras 8-9). The German Finance court referred to ECJ the question whether the development costs should be included in the transaction value of the imported product (para 11). The ECJ found that Article 71 (b) of the Customs Code applied to this matter, and thus, the value of any good or service supplied directly by the buyer free of charge in connection with the production of the good must be included in the price actually paid or payable (para 14 -17). The Court stated, "It is therefore irrelevant, for the purposes of determining the customs value of the imported goods, that the product to which the value should be added is an intangible asset, such as software. It follows from the wording of that provision, which expressly refers to 'goods' or 'services', that its scope is not limited to tangible assets" (para 18). Article 71 (1)(b) of the Customs Code mirrors Article 8.1 of the CVA.

[347] Jones and Wong (n 298) 8; Under the USMCA, net costs are "total cost minus sales promotion, marketing and after-sales service costs, royalties, shipping and packing costs, and non-allowable interest costs that are included in the total cost." USMCA art 4.1.

[348] USCMA art 4.5.

[349] van de Heetkamp and Tusveld (n 193) 89.

[350] Inama, *Rules of Origin in International Trade* (n 20) 291-292; Inama and Sim (n 146) 89.

[351] USMCA ch 4 art 4.5(8); CETA Protocol on Rules of Origin, s B art 17.

[352] USMCA ch 4 art 10(3)(a); CETA Protocol on Rules of Origin, s B art 17 (for purposes of annual quota allocations for vehicles exported from Canada to the EU).

qualifies for origin status based on whether it met the CTH criterion or if it possess a certain percent of RVC. This leads to the next significant aspect of RoO: cumulation.

## III. Cumulation Provisions: Variations on the *Ad Valorem* Criterion

Cumulation, in very simple terms, means the act of accumulating processing of the good or inputs for the good completed in different locations to qualify for a preferential tariff rate in the final import destination.[353] There three forms: bilateral, diagonal, and full cumulation.[354] An example of bilateral cumulation would be requiring 50% of sufficient processing within the territory of the FTA, but allowing flexibility in where processing occurs as long as it is in one of the Party States: for example, 30% in Party A and 20% in Party B. On the other hand, full cumulation allows for the accumulation of any type of processing completed with the territory even if, for example, processing on input A in Party A was not sufficient to confer A origin to input A before being imported to Party B to be assembled with other inputs.[355] Then, there is diagonal cumulation, which allows for cumulation of value or processing among countries if they have PTAs with identical rules of origin and cumulation provisions.[356] The PEM is a prime example of diagonal cumulation.[357] Other territories use diagonal cumulation[358], but as detailing the aspects of these examples would take us outside the scope of this dissertation, only the PEM will be looked at.

### A. PEM

Under the PEM, the origin of a finished product is based on a system of diagonal cumulation relying on a network of PTAs among 23 Contracting Parties.[359] This concept in turn relies on the absorption, or roll-up principle.[360] Basically, the following

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[353] Mavroidis, *The Regulation of International Trade*, vol 1 (n 5) 229.
[354] ibid.
[355] ibid. Commission, 'Common Provisions' [for preferential origin arrangements] (*ec.europa.eu*) <https://ec.europa.eu/taxation_customs/customs-4/international-affairs/origin-goods/general-aspects-preferential-origin/common-provisions_en> accessed 2 December 2021.
[356] Commission, "Common Provisions" (n 355).
[357] The Commission's guidance on the PEM transitional rules states that "the transitional rules (Article 7) maintain diagonal cumulation for all products under the condition that identical rules of origin are applied between the partners involved in the cumulation. In addition, the transitional rules provide for a generalised full cumulation for all products except textiles and clothing listed in Chapters 50-63" of the HS. Commission, 'Guidance: PEM Transitional Rules' (n 332) 16.
[358] Maria Donner Abreu, 'Preferential rules of origin in regional trade agreements' in Rohini Acharya (ed), *Regional Trade Agreements and The Multilateral Trading System* (CUP 2016) 67-71.
[359] Commission, The pan-Euro-Mediterranean cumulation and the PEM Convention (n 44); Inama, *Rules of Origin in International Trade* (n 20) 266; Donner Abreu (n 358) 66-67.
[360] WCO, 'Comparative Study on Preferential Rules of Origin' (wccomd.org 2017) 78. The study includes a graph on the "roll-up" principle <http://www.wcoomd.org/-

PTAs have been completed with identical terms: A-B, B-C, C-D, A-C, and A-D; all are Members of the PEM. In the first country of manufacture (Country A), the non-originating materials acquire origin status through sufficient working or processing. The completed Input-A is imported into Country B. Input-A qualifies as PEM originating material and is incorporated into Input-B, which is imported to Country C, and incorporated into a machine. This machine is then exported to the country of final destination, Country D. The input made from non-originating materials in Country A can be "rolled-up" with the other originating materials produced in Country B and Country C when determining if the machine qualifies for preferential treatment in Country D.[361] On the other hand, if only minor processing is performed on the non-originating material in Country A, the material retains non-originating status and cannot be rolled-up with originating material produced in Country B and Country C.[362]

The revised PEM allows for full cumulation of most products among all Contracting Parties, with exceptions for textile products.[363] Thus, under Article 7(1), products with non-originating materials are considered as originating in the exporting PEM Party if more than minor processing is carried out on them,[364] sufficient processing is not necessary. If only minor processing is performed on an input, that input can still obtain origin status if the value of processing that input is greater than the originating material (from other Contracting Parties) used to make that input.[365]

Finally, drawback provisions must also be taken into consideration. Some EU trade agreements include "no-drawback provision," which requires that duties are paid on materials imported from third countries at some point during the manufacture of a product, even if the good is reexported from the territory.[366] On the other hand, a

/media/wco/public/global/pdf/topics/origin/instruments-and-tools/reference-material/170130-b_comparative-study-on-pref_roo_master-file_final-20_06_2017.pdf?db=web> accessed 2 December 2021.

[361] van de Heetkamp and Tusveld (n 193) 91.

[362] Inama, *Rules of Origin in International Trade* (n 20) 265-267; For examples and graphs of three types of cumulation, see, International Trade Center, 'Accumulation/Cumulation'(Rules of Origin Facilitator) <https://findrulesoforigin.org/en/glossary?uid=accum&returnto=gloscenter> accessed 2 December 2021.

[363] There is currently in place a system of full cumulation with originating inputs from the EEA and with inputs from Algeria, Morocco, and Tunisia. Commission, 'The pan-Euro-Mediterranean cumulation and the PEM Convention' (n 44).

[364] Under Article 6 of the PEM Transitional Rules, minor processing includes washing, cleaning, simple painting and polishing, sharpening and simple grinding or cutting, affixing lables or distinquishing signs, and under subsection (p), "simple assembly of parts of articles to constitute a complete article or disassembly of products into parts."

[365] PEM Transitional Rules art 7(2).

[366] Commission, 'Common Provisions' (n 355); van de Heetkamp and Tusveld (n 193) 93.

drawback provision exempts imported inputs which are further manufactured and reexported from customs duties in the country of manufacture.[367]. A partial drawback, i.e., a partial refund on tariff duties, for a limited period is allowed by some agreements, for example with the EU-South Korea FTA[368] to reduce an imbalance if a no-drawback rule favors one party significantly.[369] The PEM transitional rules allow drawback-duty for most products, with limitations for textiles.[370] As explained in Chapter 4, the "ink" – the raw materials – used to print a 3D printed product may play a significant role in the origin determination of the good, and reports commissioned by the EU have identified that certain key elements of ink are not originating in the EU.[371] Thus, a drawback rule could impact the EU producers favorably if they wish to import the ink and export the printed goods to PEM Contracting parties. To sum up, for a product manufactured in the PEM territories, origin depends on the applicable cumulation and drawback rules. PEM is not the only instrument that stipulates these various parameters and Maria Donner Abreu's work on rules of origin provides an extensive survey of rules that include diagonal cumulation, full cumulation, as well as tolerance limits.[372] As we will see in the next Chapter, cumulation does not necessarily economicly benefit traders as they are forced to source inputs or materials from within the territory and this can lead to trade diversion.[373]

However, looking at tariff rates at this point will demonstrate why preferential tariffs are, in theory, more beneficial to a trader. Using the European Commission's My

[367] Drawback provisions can lead to tariff circumvention and be an incentive to use third-country materials rather than materials originating under an PTA. Inama, *Rules of Origin in International Trade* (n 20) 251-252. Estevadeordal and Suominen note, drawback schemes tend to provide a cost advantage to producers of final goods for an export market over producers of final goods for domestic market; however, the removal of a drawback scheme could increase the costs of nonoriginating inputs for producers who have benefited from the scheme (n 270) 74.
[368] Free Trade Agreement between the European Union and the Republic of Korea (entered into force 13 December 2015) Rules of Origin, s B, Title IV, art 14.
[369] Inama, *Rules of Origin in International Trade* (n 20) 252; Commission, 'Common Provisions' (n 355).
[370] Commission, 'The pan-Euro-Mediterranean cumulation and the PEM Convention' (n 44). Article 14 of the PEM established a general prohibition of drawback of customs duties. Article 16 of the PEM Transitional Rules establishes that non-originating materials used in the production of products can be subject to drawback of customs duties, except for products falling in HS Chapters 50 to 63.
[371] Commission Executive Agency for Small & Medium-Sized Enterprises, *Identifying current and future application areas, existing industrial value chains and missing competences in the EU, in the area of additive manufacturing (3D printing)* (15 July 2016) 21 https://op.europa.eu/en/publication-detail/-/publication/b85f5e09-7e2b-11e6-b076-01aa75ed71a1 accessed 2 December 2021.
[372] Donner Abreu (n 358) 62-78.
[373] Mavroidis, *The Regulation of International Trade*, vol 1 (n 5) 229.

Trade Assistant calculator[374], we can compare some of the different preferential rates for importing a passenger motor vehicle into the European Union. The EU Common External Tariff for passenger vehicles (non-electric) under HS 8703.50 is 10%. The rate for parts varies from 3% to 4.5% (HS 8708). Under the Economic Partnership Agreement with Japan (2018), to qualify for a 7.5% preferential duty, the total value of the non-originating material must not exceed 45% ex-works price or there must be a 60% RVC; at the beginning of the fourth year after entry of the agreement, these rates change to 50% and 55%. Using the PEM in connection with Protocol 4 (as amended in 2005) of the Euro-Mediterranean Agreement[375], for a car imported from Morocco, non-originating materials must not exceed 40% of the ex-works price to qualify for a 0% preferential duty. Under CETA, the value of the non-originating materials must not exceed 50% of the transaction value or the ex-works price of the product to obtain a 5% preferential duty for completed vehicles; while for parts, there must be a change of heading or a change of sub-heading and a 50% limit of non-originating materials for a 0% duty. Finally, under the Viet Nam FTA, the value must not exceed 45% ex-works. But, under the GSP, the value of non-originating materials must not exceed 70% if the non-originating materials come from a LDC, or 50% if they come from other regional beneficiary countries; the same rules apply for parts.[376]

Attention must be paid by firms wishing to import into the EU when determining where to manufacture the vehicle, from where to import any inputs, and whether the processing of non-originating raw material would satisfy any cumulation requirements. Despite the complexity preferential RoO appear to create for traders, industries as a whole may be reluctant to forgo them. Even though the Trade and Cooperation Agreement (TCA) only allows for bilateral cumulation, the automotive industry in the UK was worried about exiting the EU without some sort of preferential duty in place. The 10% external tariff rate would cost the industry billions in pounds.[377] Prior to the conclusion of the TCA, UK negotiators and Brussels had reached an impasse on the amount of local material in completed vehicles. The average amount of UK local

[374] Commission, My Trade Assistant Tariff Calculator https://trade.ec.europa.eu/access-to-markets/en/content

[375] Council Decision No 2/2005 Of The EU-Morocco Association Council of 18 November 2005 amending Protocol 4 to the Euro-Mediterranean Agreement, concerning the definition of the concept of 'originating products' and methods of administrative cooperation (21.12.2005) OJ L 336.

[376] All results in this paragraph are generated from the My Trade Assistant calculator.

[377] Lisa O'Carroll, 'UK carmakers face higher tariffs as EU rejects component plea' (*The Guardian* 30 Sept. 2020) <https://www.theguardian.com/politics/2020/sep/30/uk-carmakers-face-higher-tariffs-as-eu-rejects-component-plea-brexit> accessed 2 December 2021.

content in UK automobiles in 2018 was 44%; the EU was requiring 60% to qualify for preferential tariff treatment and had refused third-party cumulation of parts.[378] In the TCA, the rules covering passenger automobiles [87.08-87.11] require a CTH or a "MaxNom 50% (EXW)"[379], meaning that the maximum value of non-originating materials must not exceed 50% of the ex-works price of the completed good.[380] The maxiumum amount of non-originating materials for batteries for electric vehicles will descend from 70% to 50% by 2027.[381] As an analysis published under the Europp Blog of the London School of Economics points out, the rules of origin will pose a problem to UK carmakers as the industry transitions to electric vehicles: the batteries, which are not produced in the UK, can make up at least 50% of the total value of the car.[382]

### B. US Trade Agreements

Is determining the origin for inputs any easier under RoO in US agreements? There is no unified US approach to cumulation of origin for inputs, but generally there are similarities among groups of US PTAs.[383] In the first group, a good is deemed originating if the good satisfies the applicable requirements for acquiring origin status (such as one of the substantial transformation criteria). These PTA include Australia, Chile, Columbia, DR-CAFTA, Panama, Peru, Singapore, and South Korea.[384] In the second group, a 35% appraisement method is used. The US-Bahrain FTA states that direct costs of processing operations performed in the territory of one or both of the parties and the values of materials produced in one of the territories may be counted without limitation towards satisfying this 35% requirement.[385] This also applies for FTAs

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[378] ibid.
[379] Trade And Cooperation Agreement Between The European Union And The European Atomic Energy Community, Of The One Part, And The United Kingdom Of Great Britain And Northern Ireland, Of The Other Part, (TCA) (entered into force 1 January 2021) L 444/14, Annex 3: Product Specific Rules of Origin.
[380] TCA, Annex 2, Note 4(c).
[381] TCA, Annex 5: Transitional Product-Specific Rules For Electric Accumulators And Electrified Vehicles.
[382] Bob Hancké and Laurenz Mathei, 'Brexit, Batteries and the Fate of the British Car Industry' (*Europp Blog* 25 January 2021) <https://blogs.lse.ac.uk/europpblog/2021/01/25/brexit-batteries-and-the-fate-of-the-british-car-industry/> accessed 2 December 2021. *See also*, Paola Mariani and Giorgio Sacerdoti, 'Trade in Goods and Level Playing Field' (2021) Working Paper No. 7/2021, DCU Brexit Institute, 6-7 <https://ssrn.com/abstract=3797021> accessed 23 October 2021.
[383] USITA, 'FTA Provisions for Accumulation' (trade.gov) <https ://www.trade.gov/fta-provisions-accumulation> accessed 2 December 2021.
[384] Ibid.
[385] United States – Bahrain Free Trade Agreement (signed 14 September 2004, entered into force 11 January 2006) ch 4 art 4.4.

with Morocco and Oman.[386] Under the FTAs with Israel and Jordan, there is still a 35% domestic content requirement, but only 15% of that can derive from the value of processing operations or materials produced in the other party.[387] Thus, manufacturers and traders wishing their goods to benefit from preferential tariff treatment must study the applicable PTAs closely to be sure that processing and local material requirements are met.

This dissertation will provide a very basic outline of the NAFTA rules on accumulation to comment on the USMCA rules and how they differ. Under NAFTA, a producer could reduce the value of non-originating material in the product of a good by accumulating any regional value added within the NAFTA territory to the non-originating materials incorporated into the final good.[388] However, the non-originating materials had to undergo a CTH within at least one of the NAFTA countries, all other applicable requirements had to be met, and the RVC calculated using the net cost method.[389] Under the USMCA, a good qualifies for origin if the good is produced in the territory, the good meets the definition of an originating good, and all other applicable requirements are met.[390] The production undertaken on non-originating material in the territory "contributes to the originating status of a good regardless of whether that production was sufficient to confer originating status to the material itself."[391] Thus, even if the processing of non-originating material for an input is not sufficient to confer origin status, the value of that processing can be accumulated with the value of the other processing to complete the final good.

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[386] USITA, 'FTA Provisions for Accumulation' (n 383).
[387] Ibid; The Isreal Free Trade Agreement further specifies that '[s]uch materials must in fact be products of the importing Party under the country of origin criteria set forth in this Agreement." United States – Israel Free Trade Agreement (signed 22 April 1985, entered into force 1 September 1985) Annex 3 art 5.
[388] US Customs and Border Protection (CBP), 'Accumulation' (cbp.gov 28 May 2014) <https ://www.cbp.gov/trade/nafta/guide-customs-procedures/other-instances-confer-origin/accumulation> accessed 2 December 2021.
[389] North American Free Trade Agreement (NAFTA) (entered into force 1 January 1994) art 402(5)(e) and 404; CBP, 'Accumulation-Factsheet' CBP Publication No. 1141-0620 <ht tps://www.cbp.gov/sites/default/files/assets/documents/2020-Jun/%2316_Accumulation_USMCA%20Informational%20Fact%20Sheet.pdf> accessed 2 December 2021.
[390] USMCA ch 4 art 4.11.
[391] USMCA ch 4 art 4.11 (3). Article 4.11(2) requires each party to provide that "an originating good or material of one or more of the Parties is considered as originating in the territory of another Party when used as a material in the production of a good in the territory of another Party."

i. USMCA

The approach to inputs for automobiles has also changed from NAFTA to the USMCA. NAFTA had a provision separate from its accumulation provisions for specific inputs for automobiles. For inputs identified in Annex 403.2, the value of the non-originating materials remains non-originating to the time of calculation of the RVC of the completed motor vehicle.[392] Under the USMCA, the RVC of each input must be calculated to determine if a particular part is an originating part; further, a passenger vehicle or light truck is only originating if certain parts are originating in the USMCA territory.[393] The RVC for a completed passenger vehicle net cost method will rise to 75% by January 1, 2023.[394] For core parts for passenger vehicles and light trucks that must be originating parts, the RVC will rise to 75% (net cost) and 85% (transaction value) respectively within three years after entry into force of the agreement.[395] Thus producers of automobiles must verify that processing of non-originating materials in inputs reaches the requisite RVC, otherwise the producers may not be able to satisfy the 60-75% RVC for the entire vehicle. 3D printing of inputs for automobile parts, if adopted throughout the industry, may have an impact on RVC calculations in areas in which the USMCA has innovated in terms of RoO: the sourcing requirements for steel and aluminum and the labor value content.

[392] van de Heetman and Tusveld (n 193) 103; Inama, *Rules of Origin in International Trade* (n 20) 320. Such inputs included components of engines and gear boxes. NAFTA ch 4, Annex 403.2, List of Components and Materials.

[393] These parts include the engine, transmission, body and chassis, axles, suspension system, steering system. There is an exception for the battery. USMCA ch 4, app Provisions Related To The Product-Specific Rules Of Origin For Automotive Goods (Appendix), art 3(7), Regional Value Content for Passenger Vehicles, Light Trucks, and Parts Thereof. Mexico has filed a request for USMCA panel on the basis that the US is taking an unduly strict approach to interpreting the RVC rules and thus finding that Mexican automotive goods, including electic vehicles, fail to qualify for USCMA origin. Anthony Harrup, 'Mexico Requests USMCA Panel to Resolve Dispute Over Auto Rates' *Wall Street Journal* (New York, 6 January 2022) < https://www.wsj.com/articles/mexico-requests-usmca-panel-to-resolve-dispute-over-auto-rules-11641513131> accessed 8 January 2022; Associated Press, 'Mexico Asks USMCA Dispute Resolution Panel on Auto Content' *US News & World Report* (January 6 2022) <https://www.usnews.com/news/business/articles/2022-01-06/mexico-asks-usmca-dispute-resolution-panel-on-auto-content> accessed 8 January 2022.

[394] USMCA ch 4, app Provisions Related To The Product-Specific Rules Of Origin For Automotive Goods, art 3(1).

[395] ibid., art 3(2)(19)-(20). As under NAFTA, producers of automotive goods can average their costs over a month, quarter, or fiscal year when calculating the RVC of an automotive good or can calculate the average of all vehicles in one of the listed categories produced within a fiscal year. ibid art 5.

ii. Deep Trade Provisions in the USMCA RoO Chapter

The USMCA's RoO are an example of a combination of shallow and deep approaches to trade agreements.[396] The requirements to source steel and aluminum from the Parties were designed to redistribute gains in trade from third-party markets to regional markets (i.e. a shallow approach), and to support the automotive, steel, and aluminum manufacturing sectors in Canada, Mexico, and the US (i.e. a deep approach). The US Trade Office created a fact sheet titled, "Rebalancing Trade to Support Manufacturing," and in the first paragraph states, "The new United States-Mexico-Canada Agreement (USMCA) will create more balanced, reciprocal trade that supports high-paying jobs for Americans and grows the North American economies."[397] One method to rebalance trade is requiring that at least 70% of steel and aluminum originate in one of the USMCA territories for vehicles to be deemed USMCA originating.[398] Seven years after entry into force of the USMCA, all steel and aluminum must be sourced in the USCMA except for "metallurgical processes involving the refinement of steel additives."[399] In its Fact Sheet the USTR explains this sourcing requirement by stating that "[t]he United States, Mexico, and Canada have agreed to stronger rules of origin that exceed those of both NAFTA 1.0 and the Trans-Pacific Partnership (TPP), including for autos and automobile parts and other industrial products…The new rules will help ensure that only producers using sufficient and significant North American parts and materials receive preferential tariff benefits."[400].

The other new rule is the labor value content (LVC) rule. For a vehicle to be deemed originating, the producer must demonstrate that a certain percentage of the work done on the vehicle was performed by laborers earning at least $16 per hour.[401] Upon entry into force of the agreement, the rate is 30% and rises to 40% after three years.[402] The rules divide this percentage into specific types of labor: a certain number

[396] Regarding deep and shallow integration, see, Hoekman and Nelson (n 41) 10-11.
[397] Office of the US Trade Representative (USTR), 'United States–Mexico–Canada Trade Fact Sheet: Rebalancing Trade to Support Manufacturing' (ustr.gov) <https://ustr.gov/trade-agreements/free-trade-agreements/united-states-mexico-canada-agreement/fact-sheets/rebalancing> accessed 2 December 2021.
[398] USMCA ch 4, app art 6(1).
[399] Ibid, fn 74 to art (6)(1). Additionally, the sourcing requirements do not apply to "raw materials used in the steel manufacturing process, including steel scrap; iron ore; pig iron; reduced, processed, or pelletized iron ore; or raw alloys." If such raw materials are used to produce steel or aluminum based "ink" for printing 3D goods, this exception may be favorable to those ink producers who must source non-USMCA raw materials.
[400] USTR, 'United States–Mexico–Canada Trade Fact Sheet' (n 397).
[401] USMCA ch 4, app art 7.
[402] ibid art 7(1).

of percentage points must be dedicated to high-wage material and manufacturing expenditure (at least 15 percent and rising to 40), high-wage technology expenditures (no more than 10 percent), and high-wage assembly expenditures (no more than 5 percent).[403] This breakdown into materials, technology, and assembly correlates to the three areas in which 3D printing promises to be disruptive not only in terms of production of goods, but also in origin determination under the substantial transformation criteria. Also interesting from the point of view of 3D printing is that wages for workers involved in R&D and engineering cannot be included in the high-wage material and manufacturing expenditures, but can be included in the technology expenditures.[404] The USTR explains that the high-wage labor requirement will "support better jobs for United States producers and workers by requiring that a significant portion of vehicle content be made with high-wage labor"; ensure that such producers and workers "are able to compete on an even playing field," incentivize investment in new vehicles and parts in the US, and encourage more R&D in the region.[405]

Given the movement of trade agreements towards tying trade policy to domestic policy goals, especially in the context of labor protection[406], the rules of origin in the USMCA could be seen as a prototype for deep rules of origin. This is an interesting trend from the point of view of the MFN principle. Article I:I GATT 1994 requires that:

> [w]ith respect to customs duties and charges of any kind imposed on or in connection with importation or exportation…with respect to all rules and formalities in connection with importation and exportation…any advantage, favour, privilege or immunity granted by any contracting party to any product originating in or destined for any other country shall be accorded immediately and unconditionally to the like product originating in or destined for the territories of all other contracting parties.

Thus any advantage (or disadvantage) must be accorded to all Members unconditionally and the granting of such an advantage cannot discriminate between foreign products based on how the products are made.[407] Regarding the application of the MFN principle in connection with tariffs and labor standards, Hoekman and Kostecki state that "[u]nconditional means 'no strings attached.' For example, a country cannot condition a tariff on exporting countries satisfying a specific labour standard

[403] ibid.
[404] ibid art 7(3) and fn 77.
[405] USTR, 'United States–Mexico–Canada Trade Fact Sheet' (n 397).
[406] Harlan Grant Cohen, 'What is International Trade Law For?' (2019) 113 The American J Intl L 326, 342.
[407] Van den Bossche and Prévost (n 159) 55-57.

(that is, impose a higher rate on countries that do not satisfy whatever criterion is imposed) even if domestic producers are subject to it."[408] However, this perspective changes "if a country offers *preferential* access…this may be conditioned on satisfaction of certain criteria" (italics original)[409] Article 2 of the Annex II of AOR defines preferential RoO as "those laws, regulations and administrative determinations of general application applied by any Member to determine whether goods qualify for preferential treatment under contractual or autonomous trade regimes leading to the *granting of tariff preferences going beyond the application of paragraph 1 of Article 1 GATT 1994*" (my italics). Thus, while specifying a specific labor standard (16$ minimum wage) or source requirement as a condition for an advantage may not comply with Article I:1 GATT 1994, such conditions appear to be permitted under Article 2 of Annex II AOR as the tariff treatment sought is preferential treatment and not MFN treatment. Whether, in practice, the USCMA rules conditioning particular labor use or sources for materials will accomplish the domestic policy goals is yet to be seen, but the rules have raised some debate among industry analysists regarding their efficacy in building a technologically skilled workforce.[410]

To conclude this section on the USMCA, it is suggested that these "new" rules may not necessarily be aligned to "new" manufacturing methods. Researchers are developing vehicles made of parts of light-weight materials that require minimal assembly.[411] On the one hand, this could mean that the 70% steel or aluminum sourcing requirement is not necessarily an issue for such producers as those metals are not the primary metals used in ink.[412] On the other hand, this means that such producers devote the majority of expenditures to sourcing metals which can be found only outside the region. As a result, these new types automobiles may be imported under MFN rates, an occurrence which the Congressional Budget Office predicts will also happen to traditional motor vehicles and parts which do not meet the USMCA's

[408] Hoekman and Kostecki (n 80) 189.
[409] ibid.
[410] William Alan Reinsich, Jack Caporal, Madeleine Waddoups and Nadir Tekarli, 'The Impact of Rules of Origin on Supply Chains: USMCA's Auto Rules as a Case Study' (April 2019) Center for Strategic and International Studies, 27-28 <https://csis-website-prod.s3.amazonaws.com/s3fs-public/publication/190403_Scholl_RulesofOrigin_WEB_v3.pdf> accessed 24 October 2021
[411] Josh Davis, 'The Strati: a 3D-printed electric car that could be built in 24 hours' *The Guardian* (London, 9 December 2014) <https://www.theguardian.com/technology/2014/dec/09/3d-printed-electric-car> accessed 2 December 2021.
[412] Commission, Executive Agency for Small & Medium-Sized Enterprises (n 371) 21.

stricter RoO requirements.[413] While 3D printing and assembly of 3D printing parts will require a skilled workforce, the value creation may shift from the laborer in the factory to the designer sitting at a computer.[414] Further, fewer high-wage workers would be needed to assemble the parts.[415] Thus, 3D printing could throw a wrench in the intention behind the USMCA rules designed to increase manufacturing jobs in the US. Would a 3D printed car meet the requirements under the new rules? Given the special materials used and less labor required, perhaps not.

This example also points to a significant critique of the *ad valorem* criterion: it can discourage efficient manufacturing processes and innovation. Expensive domestic materials and expensive labor-intensive, but not necessarily productive, methods raise the costs expended in the territory in which a good is produced.[416] If it is too costly to purchase domestic materials or use labor-intensive methods, than traders may purchase foreign inputs, use more efficient methods, and trade under the MFN rates. In 1990, Vermulst and Waer, noted that internationally, the "emphasis on value added works to the disadvantage of cost-efficient (e.g. cheap labour) countries…Both internationally and nationally, it promotes inefficiency by punishing innovative and cost-saving production techniques leading to reduced expenses and therefore to a reduced value added."[417] Further, the value added test seems to be inconsistent with the evolution of production processes, as "a producer will presumably aim its research and development efforts particularly at finding means of making the technically complex (and therefore initially most expensive) processes more cost-efficient…A test which focuses on value added rather than on the nature of the production process discourages such rationalization techniques."[418] Twenty-six years later, Mavroidis writes that while, "[t]he 'value added' method is clear" it "could act as a disincentive to use the 'cheapest source of supply.'[419]" As 3D printing is seen as a method for more efficiently producing products using less human involvement it provides a testing-ground to examine how the *ad valorem* rules of origin in existing agreements could

[413] Congressional Budget Office, *Cost Estimate for H.R. 5430* (December 2019) fn c, <https://www.cbo.gov/system/files/2019-12/hr5430.pdf> accessed 24 October 2021.
[414] See Chapter 4, Part IV, Section B.
[415] See Chapter 4, Part IV, Section A(i)(ii).
[416] Imagawa and Vermulst (n 108) 607
[417] Vermulst and Waer (n 6) 95.
[418] ibid.
[419] Mavroidis, *The Regulation of International Trade*, vol 1 (n 5) 222.

constrain traders of 3D goods to choose to trade under MFN rates and to consider how to design *ad valorem* rules to be more responsive to changes manufacturing.

The previous sections have summarized the RoO framework, a complex aspect of international trade. Whether a CTH occurred or whether the Net Cost Method for determining RVC must be used are determinations and calculations made across the world daily. However, once traders have satisfied the substantial transformation criteria and the product specific rules, they must prove that the good originates from the claimed territory.

## IV. Administration of Rules of Origin: Into the Factory and Customs Offices

The goal of the final pages of this Chapter is to give a glimpse of "rules in origin in practice" and demonstrate why producing 3D printed parts may be appealing to traders if it reduces customs paperwork. As will be discussed in more detail in Chapter 4, 3D printing promises to reduce the number of parts in automobiles, engines, bicycles, and other goods. Less parts, should, so it seems, result in less work figuring out whether the final good meets the substantial transformation requirements. However, traders would still have to demonstrate proof of origin and some of the measures which could impact traders of 3D printed goods are presented below.

PTAs include administrative procedures for demonstrating that a good originates in the territory. Therefore, a trader not only has to meet one or more of the substantial transformation criteria, they must also ensure that there is sufficient evidence to support a claim of origin. Additionally, all paperwork must be submitted properly to avoid delays in clearing the goods through customs, in being subject to an audit by the customs authorities, or in being liable for penalties. This process requires the coordination of manufactures, supplies, importers, custom authorities, brokers, lawyers and organizations such as chambers of commerce.[420] As Inama noted in 2009, "the flourishing of free-trade areas (FTAs) Agreements entails the negotiations of rules of origin as well as their administrative requirements with almost lack of multilateral discipline."[421] While disciplining RoO under a multilateralized system has not yet been achieved, there have been some multilateral achievements in facilitating trade since 2009.

[420] van de Heetkemp and Tusveld (n 193) 111-115.
[421] Inama, *Rules of Origin in International Trade* (n 20) 530.

The WTO's Trade Facilitation Agreement (TFA), ratified by two-thirds of Members and entered into force in 2017, sets out measures to simplify paperwork, harmonize custom requirements, and reduce the cost of complying with custom procedures.[422] It encourages the creation of a "single-window" for traders to submit documentation for exportation, importation, transit of goods to authorities and to receive responses from such authorities in a timely manner.[423] By 7 May 2022, the implementation rate of the TFA was 74.8%.[424] Reform of customs procedures in trade agreements and the increased participation in international trade by SMEs suggests that the agreement is succeeding in streamlining customs procedures and removing obstacles to participating in the global market.[425] Further, under Article 1, Members must promptly publish in a non-discriminatory and easily accessible manner, "laws, regulations, and administrative rules of general application relating to rules of origin."[426]

The Information Technology Agreement (ITA) was signed in 1996 and currently has 83 members who must eventually eliminate import duties on a MFN basis on products such as telecommunications equipment, software, scientific instruments, and computers.[427] In 2015, the list of products was expanded (ITA II) to include new generation technology products such as touch screens and GPS navigation equipment.[428] Only 26 participants representing 55 Members agreed to implement the expansion[429] and India and China continue to maintain tariffs on products covered by

[422] WTO, 'Trade facilitation – Cutting red tape at the border' (wto.org) <https://www.wto.org/english/tratop_e/tradfa_e/tradfa_introduction_e.htm> accessed 2 December 2021.
[423] Agreement on Trade Facilitation (TFA), WT/L/940 (entered into force 22 February 2017) art 10.4.1 <http:// docs.wto.org>
[424] WTO, 'Trade Facilitation Database,' (tfadatabase.org 2022) < https://tfadatabase.org/implementation> accessed 7 May 2022.
[425]Nora Neufeld, 'Great Expectations: How the World Trade Organization's Trade Facilitation Agreement Impacts Trade and Trade Cooperation' (2019) 11 Trade, L & Development 11, 29-35.
[426] TFA, art 1.1(e).
[427] WTO, 'Information Technology Agreement – an Explanation' (wto.gov) <https://www.wto.org/english/tratop_e/inftec_e/itaintro_e.htm> accessed 2 December 2021; Committee of Participants on the Expansion of Trade in Information Technology Products, 'Status of Implementation: Note by Secretariat' (25 March 2022) G/IT/1/Rev.59 <https://docs.wto.org> accessed 7 May 2022.
[428] WTO, 'Briefing note: The Expansion of Trade in Information Technology Products (ITA Expansion)' (wto.org 16 December 2015) <https://www.wto.org/english/news_e/news15_e/itabriefingnotes161215_e.pdf> accessed 2 December 2021.
[429] 'Ministerial Declaration on the Expansion of Trade in Information Technology Products' (Nairobi, 16 December 2015) WT/MIN(15)/25 <https://docs.wto.org> accessed 6 January 2022.

ITA I.[430] The WCO has added a classification code for additive manufacturing machines to the 2022 revisions of the HS.[431] It will be interesting to see if WTO Members amend their tariff schedules to include the new code, and subsequently if the ITA will be amended to include these tariff lines. Currently, disputes before the US Customs and Border Patrol (CBP) show that classification of additive manufacturing machines, and thus the tariff duty applied to them, has been based on the material – plastic or metal – that the machine uses for printing.[432]

Traders may consult international organizations other than the WTO for guidance on complying with preferential RoO procedures and trade in goods. The WCO, in addition to the HS and the Kyoto Convention, coordinates with customs authorities in forming regional intelligence liaison offices[433] and programs on addressing and resolving specific issues such as corruption and IPR protection.[434] Finally, the International Certificate of Origin Council of the International Chamber of Commerce (ICC), consisting of officials of national chamber of commerce offices, establishes guidelines for issuing Certificates of Origin by national offices, verifying the authenticity of trade documents, and resolving issues in determining the origin of a product.[435] The ICC prepares positions papers and meets with WTO delegations in Geneva[436], and has also called for less complex and obscure rules of origin.[437]

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[430] WTO, 'WTO Members Discuss Implementation of Information Technology Agreement' (wto.org 30 October 2018) <https://www.wto.org/english/news_e/news18_e/ita_30oct18_e.htm> accessed 2 December 2021.

[431] Additive manufacturing machines have been given subheadings 8485.10 to 8485.90, WCO, HS Nomenclature 2022 – Chapter 84 (wcoomed.org) <http://www.wcoomd.org/-/media/wco/public/global/pdf/topics/nomenclature/instruments-and-tools/hs-nomenclature-2022/2022/1684_2022e.pdf?la=en> accessed 7 January 2022. See also, WCO, 'The WCO has published the HS 2017/HS 2022 Correlation Tables for the Harmonized System' (wcoomd.org 13 November 2020) <http://www.wcoomd.org/en/media/newsroom/2020/november/the-wco-has-published-the-hs-2017-2022.aspx>. All sources accessed 2 December 2021.

[432] CBP Ruling Letter, *The Tariff Classification of a Robo 3D Printer from China* (12 September 2017) NY N289281; CBP Court Decision, *EOS of North America, Inc. v United States* (10 May 2013) Slip Op. 13-59.

[433] WCO, 'RILO: A Unique and United Network' (wcomd.org) < http://www.wcoomd.org/-/media/wco/public/global/pdf/topics/enforcement-and-compliance/tools-and-instruments/rilo/rilo-brochure_en.pdf?db=web> accessed 2 December 2021.

[434] WCO, 'Activities and Programmes' (wcoomd.org) <http://www.wcoomd.org/en/topics/enforcement-and-compliance/activities-and-programmes.aspx> accessed 2 December 2021.

[435] International Chamber of Commerce (ICC), 'International Certificate of Origin (ICO) Council' (iccwbo.org) <https://iccwbo.org/resources-for-business/certificates-of-origin/international-certificate-origin-council/> accessed 2 December 2021; van de Heetkemp and Tusveld (n 91) 21.

[436] Eg, ICC, 'Builidng Business Engagement ahead of the WTO's 12th Ministerial Conference' (iccwbo.org 24 June 2021) <https://iccwbo.org/media-wall/news-speeches/building-business-engagement-ahead-of-the-wtos-12th-ministerial-conference/> accessed 3 January 2022.

[437] ICC, 'Business Recommendations on Rules of Origin in Preferential Trade Agreements' (May 2017) Doc. No. 104-89 <https://cdn.iccwbo.org/content/uploads/sites/3/2017/05/ICC-Policy-Statement-on-rules-of-origin-in-preferential-trade-agreements.pdf > accessed 3 January 2022.

Two important documents are a Certificate of Origin and a Bill of Materials. A Certificate of Origin may be necessary for a trader to benefit from the preferential tariff rate under a PTA.[438] Generally, the exporter provides a Certificate of Origin, issued by the Chamber of Commerce of the exporter's country.[439] For Certificates of Origin for the purpose of PTAs[440], the ICC requires information on the raw materials, direct labor costs, direct overhead costs, and profit.[441] The ICC must prepare the Certificate based on the relevant PTA.[442] If a Certificate of Origin from the exporter is not sufficient to demonstrate reasonable care in proving the origin of a good, the importer should also take efforts to obtain documentation of origin on a consistent basis from the suppliers, a process called solicitation,[443] maintain bookkeeping records, and even visit the suppliers' factories.[444] One of the key changes to the procedural rules on origin verification in the PEM revisions and the USMCA are simplifications to the certification process. Finally, the producer seeking preferential treatment for an item made of subcomponents will need to prepare a Bill of Materials (BOM), which contains a list of the subcomponents, their HS codes, value, and country of origin. This BOM will be used to determine whether the product will qualify for preferential treatment, and if made in advance of assembly, can be used to predict whether a good will qualify by comparing the sources of different inputs.[445]

The PTA will determine what documentation is required.[446] Under the USCMA, either the importer or the exporter can submit a certificate of origin. This certificate "need not follow a prescribed format", but does need to contain "minimum data elements" including identification of the certifier, contact information of the exporter (if identity known), producer and importer (all if different from the certifier), description of the good and HS code, the origin criteria under which the good qualifies, and the period of time requested if the certification covers multiple shipments (up to 12 months).[447] The current PEM require importers or exporters to fill out forms based on whether the

[438] Mavroidis, *The Regulation of International Trade,* vol 1 (n 5) 215.
[439] van de Heetkampa and Tusveld (n 193) 114-115.
[440] ibid 119-120.
[441] ICC, 'Certificates of Origin' (iccwbo.org) , <https://iccwbo.org/resources-for-business/certificates-of-origin/> accessed 2 December 2021.
[442] van de Heetkamp & Tusveld (n 193) 119; ICC, 'Certificates of Origin' (n 441).
[443] van de Heetkamp & Tusveld (n 193) 129.
[444] ibid 185.
[445] ibid 160; Mitchell Grant, 'Bill of Materials (BOM)' (*Investopedia* 30 October 2020) <https://www.investopedia.com/terms/b/bill-of-materials.asp> accessed 2 December 2021.
[446] van de Heetkamp & Tusveld (n 193) 114.
[447] USMCA ch 5 Annex A.

conditions for diagonal cumulation have been fulfilled (EURO-MED) or not (EUR.1),[448] while the transitional rules provide for a single origin declaration (also called EUR.1).[449] Documents that can support a declaration of origin include direct evidence of the processes carried out to obtain the goods, documents proving originating status of materials used, and documents proving the working or processing of materials in or outside the relevant Contracting Party.[450]

In addition to satisfying the substantial transformation criteria and verifying the origin of a good, traders must also comply with "Direct Transportation" or "Direct Consignment" rules. Under a Direct Transportation rule, it may be necessary to ship the good directly from one party to another party; transit through a third-party country may result in the good losing preferential origin status.[451] The PTA will specify what procedures must be followed and evidence showing that the goods remained under supervision of the customs authority, there was no further processing of the goods, and they did not enter the market in country of transit.[452] The PEM transitional rules place requirements on shipment under Article 14, titled 'Non-alternation.' Preferential tariff treatment is applied if the goods meet the substantial transformation criteria and "those products are the same as those exported from the exporting Party."[453] Products may be split into different consignments in a third-party, but it is necessary to demonstrate that no alternation to the goods occurred and they remained under customs supervisions.[454] With regards to direct transport rules in GSPs, Inama wrote in 2009 that the purpose of such rules "is to enable the customs administration of the preference-giving country of importation to be satisfied that the imported products are identical with the products that left the exporting preference-receiving country."[455] However, in a study he conducted with Pramila Crivelli and Jonas Kasteng, published in 2021, direct transport rules in preferential trade agreements between the EU and

[448] Commssion, 'Preferential Trade: Guidance on the Rules of Origin' (ec.europa.eu June 2020) <https://ec.europa.eu/taxation_customs/system/files/2020-06/01_2019_guidance_preferential_origin.pdf> accessed 2 December 2021.
[449] Guidance: PEM Transitional Rules (n 332) 20-22.
[450] PEM art 27.
[451] Eg, USMCA ch 4 art 4.18(1).
[452] Brenton (n 33) 172.
[453] PEM Transitional Rules, Title III 'Territorial Requirements' art 14(1).
[454] ibid art 14(2).
[455] Thus, they were "not manipulated, substituted, further processed, or entered into commerce in any intervening third country." Inama, *Rules of Origin in International Trade* (n 20) 534.

Japan and EU and Switzerland were a factor that led traders to forgo seeking preferential tariff treatment and to trade under MFN rates.[456]

In addition to seeking assistance from international organizations, traders can also look to the rulings of national and regional courts on customs procedures. In the US, decisions regarding international trade and customs duties are made by the Federal Circuit and the Court of International Trade (CIT). The CIT can hear matters related to custom duties throughout the US, decisions by this Court can be appealed to the Federal Circuit, and these decisions can be appealed to the Supreme Court.[457] In Chapter 4, a case before the CIT regarding the 3D files used for printing dental aligners will be discussed. The CIT applies the substantial transformation test developed through case law to determine whether an operation is sufficient to confer origin to a product.[458] Despite this body of case law, and because each matter is fact-intensive, the application of this standard by the court varies for each proceeding.[459]

Nonetheless, these rulings are applied by the US Customs and Border Protection (CBP) to make determinations on whether a product qualifies for preferential treatment under an FTA.[460] When assessing whether an origin qualifying substantial transformation occurred, the CBP "considers the totality of the circumstances and makes such decisions on a case-by-case basis."[461] The primary considerations are "whether such processing renders a product with a new name, character, and use", but also reviewed are "facts on resources expended on product design and development, extent and nature of post-assembly procedures and working skill

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[456] Pramila Crivelli, Stefano Inama and Jonas Kasteng, 'Using Utilization Rates to Identify Rules of Origin Reforms: The Case of EU Free Trade Area Agreements' (2021) EUI Working Papers RCS 2021/21 < https://cadmus.eui.eu/handle/1814/70396> accessed 24 October 2021

[457] US Court of International Trade, 'About the Court' (cit.uscourts.gov) <https://www.cit.uscourts.gov/about-court> accessed 2 December 2021.

[458] Monika Brenner, 'Navigating Rules of Origin in the New Trade Environment' Proceeding of the 20th Judicial Conference of US Court of Int'l Trade (cit.uscourts.gov) <https://www.cit.uscourts.gov/sites/cit/files/MBrenner%20CIT%20Nov182019%20.doc.pdf> accessed 2 December 2021; van de Heetkamp and Tusveld (n 193) 151.

[459] Jeremy Page, 'Determining Origin in a Predetermined World: The Impact of *Energizer Battery*', Proceeding of the 20th Judicial Conference of US Court of Int'l Trade (cit.uscourts.gov), <https://www.cit.uscourts.gov/sites/cit/files/JPage%20CIT%20Conference%20Article.pdf>; Jason M Kenner, 'A Brief Overview of Several Decisions Discussing Substantial Transformation' Proceeding of the 20th Judicial Conference of US Court of Int'l Trade (cit.uscourts.gov), <https://www.cit.uscourts.gov/sites/cit/files/JKenner%20A%20Brief%20Overview%20of%20Several%20Decisions%20Discussing%20Substantial%20Transformation%20final.pdf> all sources accessed 2 December 2021.

[460] Jones and Wong (n 298) 2.

[461] CBP, Ruling Letter, *re: U.S. Government Procurement; Country of Origin of Storage Infrastructure Solution Systems; Substantial Transformation* (July 16, 2015) HQ H59758, printed in (5 August 2015) 49 Customs Bulletin & Decisions 54.

required during the actual manufacturing process."[462] At times, "the determination will be a mixed question of technology and customs law, mostly the latter."[463] Thus, officials at the CBP take into consideration technology when reviewing whether a good qualifies for preferential treatment, and this will be seen in some of the rulings discussed in the next Chapters.

Under the Customs Modernization Act, the burden is on the importer to provide to the CBP, "with reasonable care" documents sufficient to enable the CBP to "properly assess duties on the merchandise…and determine whether any other applicable requirement of law…is met."[464] In its circular to the trade community, the CBP warns that "[a]n importer of record's failure to exercise reasonable care could delay release of the merchandise and, in some cases, could result in the imposition of penalties or, in certain instances, referral for criminal enforcement."[465] Personal penalties range from the domestic value of the merchandise in cases of fraud to two times the loss of duties in cases of negligence and to four times the loss in duties for gross negligence.[466] Inama notes that while such a system of burden of proof requires the importer to obtain information from exporters or manufacturers, this "ability however may be dependent on business realities related to the trade volumes and the number of transactions between the importer and the exporter…Additionally, a firm may be reluctant to provide the necessary paperwork to preserve confidential trade secrets and other information that it does not want to make public."[467] The USMCA changes to the certificate of origin releases some of this pressure from the importers. Reducing the number of parts of final good may also reduce some of this risk, and may thus be an incentive to use 3D printing to produce goods.

While the EU is a customs union, the national customs offices implement customs legislation, including the legislation on preferential rules of origin.[468] For

[462] ibid 54-55.
[463] ibid 55.
[464] Customs Modernization Act, 19 U.S.C. §1484(a)(1)(B).
[465] CBP, 'What Every Member of the Trade Community Should Know: Reasonable Care' (cbp.gov September 2017) 3 <https://www.cbp.gov/sites/default/files/assets/documents/2018-Mar/icprescare2017revision.pdf> accessed 2 December 2021.
[466] Tariff Act of 1930, 19 U.S.C. §1592; CBP, 'What Every Member of the Trade Community Should Know About : Customs Administrative Enforcement Process : Fines, Penalties, Forfeitures and Liquidated Damages' (cbp.gov February 2004) 28 <ht tps://www.cbp.gov/sites/default/files/documents/icp052_3.pdf> accessed 2 December 2021.
[467] Inama, *Rules of Origin in International Trade* (n 20) 539.
[468] Commission, 'EU Customs strategy' (ec.europa.eu) <https://ec.europa.eu/taxation_customs/customs-4/eu-customs-strategy_en?> accessed 2 December 2021.

example, the Italian national customs office (ADM – L'Agenzia delle accise, dogane e monopoli) administers customs duties as well as issues administrative decisions, such as binding information on origin (BOI, IVO in Italian).[469] Each Member State must also apply penalties for failure to comply with customs legislation, including pecuniary penalties, that are "effective, proportionate and dissuasive."[470] With the revisions to the Union Customs Code the EU aims to modernize customs procedures and enhance cooperation between the national customs offices.[471] National courts also refer disputes to the European Court of Justice, and decisions by the Court have led to legislative changes.[472]

## V. Conclusion

As seen in this Chapter there is much work and not a little risk involved in claiming that a good qualifies for preferential treatment under an PTA. Such activity is made by companies, large and small, worldwide on a daily basis. Preferential RoO aim to ensure that only the chosen goods are granted the reward of preferential treatment.[473] Yet many companies forgo seeking preferential treatment under an FTA because of the lack of organizational and financial resources to obtain from suppliers the information required to prove the origin of various inputs and to comply with multiple rules under multiple PTAs.[474]

Thus, if 3D printing parts and assembling final goods from those parts may lead to avoiding this paperwork and risk, 3D printing may have its appeal for manufacturers. Instead of importing a part and relying on the supplier to provide verification of its materials, assessing whether there will be enough originating materials, and determining whether the firm has the resources to document all of this – why not simply print the part in the same territory, if not on the same factory floor,

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[469] Agenzia delle accise, dogane e monopoli, 'I.V.O. Binding Information on Origin' (adm.gov.it) <https://www.adm.gov.it/portale/en/-informazioni-vincolanti-in-materia-di-origine> accessed 2 December 2021.
[470] Regulation (EC) No 952/2013) of the European Parliament and of the Council of 9 October 2013 laying down the Union Customs Code (recast) (partially entered into force on 1 May 2016) OJ L 269, art 42 (1).
[471] Commission, 'Union Customs Code' (ec.europa.eu) < https://ec.europa.eu/taxation_customs/customs-4/union-customs-code_en> accessed 3 January 2022.
[472] van de Heetkamp & Tusveld (n 193) 150; Commission, 'Infringements & Case Law" (ec.europea.eu) < https://ec.europa.eu/taxation_customs/infringements_en> accessed 2 December 2021.
[473] Inama, *Rules of Origin in International Trade* (n 20) 531, Puccio (n 51) 174.
[474] van de Heetkamp & Tusveld (n 193) 177-181; Mavroidis & Vermulst (n 20) 9.

as where the final good is assembled? Surely this will save all of those RoO headaches and ensure that the finished product has enough domestic content to qualify for preferential treatment? That is to be explored in Chapter 4. However, before examining how 3D printing could disrupt origin determination under the current rules, the critiques of legal scholars and economists on the disruptive effect of RoO on trade will be discussed in the next Chapter. For many of these trade analysts, RoO are not just rules for determining the origin of a good, they are also rules that do not create a level playing-field between large and small traders.

## Chapter 3

## Exploring Legal and Economic Critiques of Preferential Rules of Origin and Positioning These Rule in a Framework for Digital Trade

In the previous Chapter, the fundamentals of the design of preferential RoO were presented to understand these rules as legal instruments. Towards the end of the Chapter, the practical application of the rules were discussed to introduce procedures to comply with domestic or regional customs requirements, legal duties such as burden of proof requirements, and, simply put, a lot of paperwork which not all firms are equipped to confront. However, this is the environment that traders must operate in. Chapter 3 examines this situation by presenting arguments that contend that RoO are not entirely predictable, are untransparent, and do not provide a level playing field for all participants as not all have the resources to comply with them. Thus, the question arises, how do RoO fit into the narrative for justifying the international trade law system, i.e., it provides a legal framework in which all states have an opportunity to develop and prosper through trade.

This Chapter will explore how RoO fit into that traditional framework and how well they would fit into new frameworks being proposed for a 21st Century deep, or less shallow, regulation of trade and for the data-driven economy. As Hoekman and Nelson propose, 21st Century agreements go beyond reciprocal promises to lower tariffs and other duties towards "creating an institutional environment supportive of global economic activity in a post-industrial world" and this "global program requires institutions that contribute to the political legitimacy of the global market."[475] Grant Cohen also explores a new framework that is supportive of national political goals such as labor or environmental standards. However, he emphasizes that this system still requires "notions of efficiency, transparency, and even-handedness that undergird and guide trade regulation today" and that can be provided for by the WTO and international agreements.[476] Yet, the studies on RoO referenced in this Chapter suggest that RoO as currently designed do not instill "efficiency, transparency, and even-handedness" into the trading environment. Finally, if in the data-driven economy trade there should be no hierarchy of rules, as Shaffer proposes[477], RoO, which discriminate goods for

[475] Hoekman and Nelson (n 41) 9.
[476] Grant Cohen (n 406) 339.
[477] Gregory Shaffer, 'Trade Law in a Data-Driven Economy: The Need for Modesty and Resilience' (2021) 20 World Trade Rev. 259, 271, 273.

preferential treatment under a trade agreement, do not, as currently written, seem like the best tool for regulating digital trade.

However, this thesis proposes that there is still a possibility that RoO could be a productive and positive legal instrument in a 21ST Century trade framework. There will still be a need for rules, because technology could make the trade playing field more uneven. 3D printing, though still an emerging form of manufacturing, shows this. A paper by Rashmi Banga, Senior Economic Affairs Officer of UNCTAD raises concerns that 3D printing could undercut much of the benefits arising from tariff preferences in GSPs if digital transmissions are not taxed. A manufacturer from a developed countries will be able to take advantage of 3D printing by printing shoes in a 3D printing hub in the territory and thus avoid paying import customs duties.[478] On the other hand, A. Andrenelli and J. López González of the OECD argue that 3D printing manufacturing is still far from replacing traditional manufacturing, and taxing digital transmissions will only raise more barriers to trade.[479] However, neither report approaches the subject of identifying the origin of the digital transmission, which may be relevant if a state is going to tax digital transmissions. Thus, rules of origin will be necessary in some capacity in regulating the data-driven economy. Before exploring how identifying the origin of a 3D printed good could be achieved, the end of this Chapter focuses on an important first step, locating the position of a 3D file under trade law, i.e. is the file a good or a service.

This Chapter is structured along three main parameters: assessing how well preferential RoO fit into the traditional framework of an international trade law system which "increases the size of the pie" for all; exploring whether RoO can or should become "deeper" instruments of trade; and finally, the initial steps into examining how RoO could identify the origin of 3D printed goods as well as generally situating RoO in the regulation of the data-driven economy.

## I. Rules of Origin: Unpredictable and Not Very Transparent Rules of the Game

If predictability, legitimacy, and efficiency are necessary for an international legal regime for trade, then finding a place for RoO within this legal framework can be challenging. On the one hand, the resistance to harmonization of non-preferential rules

[478] Banga (n 48) 30-31.
[479] A Andrenelli and J López González, 'Electronic Transmissions and International Trade - Shedding New Light on the Moratorium Debate' (n 67) 20

of origin brings to light the difficulties in creating a multilateral body of law on origin determination, but the AOR at least recognizes, though the third preamble that "clear and predictable rules of origin and their application facilitate the flow of international trade" and desires to ensure that "rules of origin are prepared and applied in an impartial, transparent, predictable, consistent and neutral manner." The agreement does not touch upon the harmonization of preferential RoO, and for various reasons Members have not drafted and implemented consistent preferential RoO. It could be argued that the industrial reality of states and the density of the HS code, for example, does necessitate allocating a certain level of detail and attention to particular products over others.[480] If raising livestock and processing meat is not a key industry for Party A, but Party B may be significantly worse off if shoes are imported from a third party, then it may be reasonable for A and B to develop more detailed RoO for shoes and not include a restrictive rule for meat. In other words, variance among preferential RoO may have some benefits.[481]

Differences in RoOs due to the different industries and level of development of each trading partner (along with any political rationales) nonetheless impact the reputation of the international trade law system as promoting liberalization, development, and with more recent agreements, a certain quality of life and environmental standards. Inama, in writing about the various applications of non-preferential RoO, raises some concerns that can also be directed to preferential RoO, "…the application of origin rules may have various unexpected and unintended implications in a number of areas. If these areas are multiplied for the number of products-specific rules and the various possible origin outcomes the result of such combination is likely to be of the order of infinite and to a certain extent unpredictable."[482] The high volume of PTAs each with unique RoO[483], has consequences not just for traders, but for international law. According to Moise Hirsch, certainty and predictability "of rules of law are vital to the development and expansion

[480] Jitsuya (n 324) 560.
[481] Hennie Erasmus, Frank Flatters, and Robert Kirk, 'Rules of Origin as Tools of Development? Some Lessons from SADC,' in Olivier Cadot, Antoni Estevadeordal, Akiko Suwa-Eisenmann, and Theirry Verdier (eds), *The Origin of Goods: Rules of Origin in Regional Trade Agreements* (OUP 2006) 288-289.
[482] Inama, *The Rules of Origin in International Trade* (n 20) 102-103.
[483] Antoni Estevadeordal, Jeremy Harris, and Kati Suominen, 'Multilateralising Preferential Rules of Origin around the World' (2009) IDB Working Paper Series, #IDB-WP-I37 <https://publications.iadb.org/publications/english/document/Multilateralising-Preferential-Rules-of-Origin-around-the-World.pdf> accessed 23 October 2021.

of the international economic system…Although international trade rules are inevitably influenced to a certain degree by foreign and domestic policies, the unrestrained politicization of ROOs (and particularly in the implementation stage) is bound to undermine certainty in the international economic system."[484] Further, different RoO designed to achieve different political goals, "is likely to weaken predictability for producers and traders, destabilize trading relations, and hinder long-term development of international trade."[485] For this reason, reducing the political involvement in the creation and implementation of RoO may help improve the practice and regulation of international trade. To do this however, it is necessary to understand why RoO are susceptible to political interference.

First, there are some positive aspects about political involvement in RoOs. Regional agreements, such as the PEM, with cumulation provisions can potentially establish some harmony between two nations which were once contentious or even belligerent.[486] RoO can contribute to developing regional value chains through rules requiring a certain amount of local inputs or labor in the region.[487] Finally, cumulation could take the sting out of some of the more restrictive RoO, as according to Hirsch, "establishing a cumulation agreement between several parties provides a significant incentive for producers located in those parties' territories to cooperate and reap the benefits of cumulation in their trade with third parties."[488] Thus, a sprinkle of political activity may benefit preferential RoO; the problem is that politicians and industry lobbyists are eager participants in the drafting and implementation of preferential RoO.

One key reason why political attention has turned to restrictive RoO is the gradual reduction of tariff barriers as Member States meet their GATT commitments.[489] As discussed in Chapter 1, local content requirements for obtaining a benefit from a Member State are prohibited under the TRIMS and SCM agreements.[490] States have turned to RoO to bolster the domestic economy by drafting complex rules requiring goods to have a certain percentage of local content, thus imposing a non-tariff barrier to trade.[491] Procedural requirements also can hinder trade. While the TCA preserved

[484] Hirsch, 'The Politics of Rules of Origin' (n 28) 330.
[485] ibid.
[486] ibid 324.
[487] Singh and Singh (n 325) 62.
[488] Hirsch, 'The Politics of Rules of Origin' (n 28) 323.
[489] ibid 329; Erasmus, Flatters and Kirk (n 481) 289.
[490] See Chapter 1, Part IV.
[491] James (n 99) 275-280; Rhoni Acharya, 'Regional trade agreements: recent developments,' in Rhoni Acharya (ed), *Regional Trade Agreements and the Multilateral Trading System* (CUP 2016) 13.

the no-duty rate for goods that qualify for origin under the TCA[492], Mariani and Sacerdoti point out that the agreement has a collateral side effect of unleashing paperwork upon traders who must now prove that their products qualify for preferential treatment.[493] Thus, as the authors argue, a political decision to preserve a trading relationship by keeping tariff rates low may be made hampered by the practicalities of trying to comply with the rules and customs procedures.[494]

Governments understandably wish to support and promote the development of an industry and provide jobs for their workforces, but problems arise when RoO are designed to the detriment of third-party importers of final products or intermediate products.[495] As Hirsch explains, restrictive RoO are intended to "'compensate' local manufacturers for the losses expected to arise following the implementation of trade liberalization toward the contracting parties" by incentivizing local producers to "to employ factors of production originating in the territories of the contracting states, at the expense of foreign suppliers."[496] The more restrictive a rule is in requiring local or regional content, the more incentive, so the theory would suggest, a local producer has in using local or regional materials and labor. The section below on the economic critique of RoO presents studies finding that increasing the restrictiveness of the rules does not necessarily result in increasing the use of local or regional material or labor.

Although writing about the drafting of non-preferential RoO for the purposes of AD or countervailing measures, Inama's work can still be relevant to preferential RoO as he argues that non-preferential RoO are drafted to obtain or retain origin for certain goods.[497] These objectives differ according to the different strategic goals of industry lobbyists.[498] If, for example, dyeing fabric is a sensitive industry in Country A, it may want dyeing to confer origin so as to "obtain" origin of the final product.[499] On the other hand, if painting of bicycle frames is a significant industry, Country A may claim that dyeing fabrics is a simple operation which does not confer origin, but draft a rule claiming that painting of bicycle frames confers origin.[500] As Puccio points out, the

[492] Commission, 'EU-UK: A New Relationship' (www.ec.europa.eu) <https://ec.europa.eu/taxation_customs/united-kingdom_en> accessed 5 January 2022.
[493] Mariani and Sacerdoti (n 382) 3.
[494] ibid.
[495] Hirsch, 'The Politics of Rules of Origin' (n 28) 323.
[496] ibid 326-327.
[497] Inama, *The Rules of Origin in International Trade* (n 20) 103-104.
[498] ibid 103.
[499] ibid.
[500] ibid 104. Inama reports that this can occur in the case of agroprocessing and foodstuffs.

product-specific rules in RoO have "always been linked to industry interests," and, depending on how they are written, can increase competitiveness of the production of local inputs vis-à-vis imported inputs for final goods exported to other markets or decrease market liberalization.[501] However, she argues that "reciprocal PTAs consistent with WTO rules should indeed respect requirements with respect to the extent of their internal liberalisation (trade creation potential) and their effect on external trade (trade barriers towards third countries)."[502] Yet, policymakers may also want to pay attention to the effect on rules on traders within the PTA territory.

The political tinkering with RoO creates information asymmetry between major stakeholders and small businesses and consumers of retail products. The text of the PEM or USMCA is accessible on the internet, so one can, depending on one's access to the internet, find them; understanding them is another matter. Hirsch argues that the language of RoO is a form of veiled protectionism as "their level of complexity often requires special expertise to assess their impact upon a particular sector of the economy. Practically, ROOs and their economic impact are not comprehensible to most citizens, journalists, and policymakers…Still, the likely implications of new ROOs are well known to experts within the interested industrial sectors, and also to the policymakers who prescribe them."[503] I.M. Destler provides some insight behind the political drive towards complex rules of origin in the US in the early 1990s. Industries that favored protectionism, such as the automobile and textile industries, "abandoned a strategy of opposition to all new international trade agreements and…looked for ways to gain advantage within these agreements."[504] As the 90s progressed, there was a general erosion of bipartisan consensus on trade, and industries seeking specific protections began to pressure politicians to insert protectionist measures in PTAs, such as in the RoO.[505] As trade policymakers and drafters sought to carve out benefits for specific industries in RoO, the rules grew more technical to favor those industries that had strong lobbying activities.[506] As a result, the politics of RoO tend "to be asymmetric: those who benefit directly are deeply engaged, while others affected only marginally

[501] Puccio (n 51) 180.
[502] ibid.
[503] Hirsch, 'The Politics of Rules of Origin' (n 28) 328-329.
[504] IM (Mac) Destler, 'Rules of Origin and U.S. trade policy' in Olivier Cadot, Antoni Estevadeordal, Akiko Suwa-Eisenmann, and Theirry Verdier (eds), *The Origin of Goods: Rules of Origin in Regional Trade Agreements* (OUP 2006) 178.
[505] ibid 178-179.
[506] ibid.

tend to stay on the sidelines. And while, by their very nature, they tilt the balance of advantage in FTA agreements away from producers in the partner nation, these foreign producers typically find restrictive RoOs a tolerable price to pay for assured, preferential overall access to the US market."[507] Issues of lack of transparency, political tinkering, and asymmetric information also arise in the context of non-US RoO, such as the SADC and SAFTA, which will be discussed in the next part.

Finally, questions on the WTO legality of preferential RoO and the fact that Annex II in the AOR provides guidelines could diminish the legitimacy of these rules as legal instruments. Hirsch argues that "the lack of an effective legal regime" makes RoOs more susceptible to being utilized for political aims.[508] As the scope of the AOR "is considerably limited and some of its important rules are vague…the existing global ROOs regime does not effectively curb the political use of ROOs."[509] According to Destler advocates of RoOs claim they "have legitimacy because, in their basic form, they address a clear apparent problem of enforcing the rules of the FTA…For the most part, however, the RoO debate has been among specialists – it has largely escaped public notice – and WTO scrutiny."[510] Thus, RoO, a widely used means for regulating trade is unpredictable and nontransparent, questionably legal under the GATT, and unexamined by the DSB. This places RoO at odds against narratives justifying trade liberalization, which, Grant Cohen points out: "the rules and institutions of international trade lower the likelihood of trade wars by ensuring predictability, fostering transparency, promoting cooperation and consultations, and encouraging rule-based dispute settlement".[511] This is problematic, because RoO are trade measures that traders and custom officials deal with on a daily basis.

The inflated metaphor of the "spaghetti bowl" has been applied generally to the interconnecting tangle of preferential regional and bilateral trade agreements. The originator of the term (or at least a vocal user of it), the economist and international trade critic, Jagdish Bhagwati[512], in 1995 identified RoOs as one of the factors

[507] Ibid 179.
[508] Hirsch, 'The Politics of Rules of Origin' (n 28) 329.
[509] ibid.
[510] Destler (n 504) 184.
[511] Grant Cohen (n 406) 331.
[512] For Bhagwati's explanation of how he coined the phrase "spaghetti bowl" in terms of trade, see Jagdish Bhagwati, *Termites in the Trading System: How Preferential Agreements Undermine Free Trade* (OUP 2008) 63.

contributing to the "clutter[ing] up of trade."[513] Thirteen years later in his book, *Termites in the Trading System*, Baghwati criticized both the choice to base trade policy on preferential tariffs as well the decision to draft complex product-specific rules of origin:

> In nearly all FTAs worldwide, the rules of origin vary by product. The reason, of course, is that while trade is being freed in these products for imports from member countries, the ability to exploit this opportunity is being undercut by imposing cost-raising rules of origin as required by the specific products. In short, the rules of origin may be described as "made to measure": they vary as necessary to provide an offset to the freeing of trade. They take away with one hand what they give with the other.[514]

Finally, he argues that such costs result in trade distortion because resources are expended in trying to understand the rules and then trying to benefit from them.[515] Thus, Baghwati identifies elements about RoOs that impact their effectiveness as a legal instrument: their susceptibility to political interference and their complexity, which generates costs and ultimately distorts trade.

Puccio, and Inama and Sim, in their examinations of RoOs also discuss the trade distorting aspects of the proliferation of RoOs. Puccio directly refers to Baghwati and the "spaghetti bowl" in her work on the role of preferential RoOs within the WTO system.[516] She finds that "two consequences flow from systemic concerns" arising from the tangle of preferential RoOs.[517] Difficulty in obtaining origin for various inputs under various PTAs results in producers "simply forgo[ing] preferential treatment, [thus] reducing trade creation from the multiple PTAs, concluded by a country."[518] On the other hand, some producers could strategically take advantage of PTAs by "learning and implementing the preferential rules of origin within the PTA that represents their most important consumer market, with higher trade diversion created by such a PTA."[519] As a result, trade diversion and lesser trade creation will occur if some traders forgo preferential treatment and others take advantage of the PTAs.[520]

Inama and Sim examine agreements between ASEAN and other countries. Even though some RoOs in the PTAs may share some "commonalities…such as the

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[513] Jagdish Bhagwati, 'US Trade Policy: The Infatuation with FTAS' (1995) Columbia U Discussion Paper Series No. 726, April, 4 <https://academiccommons.columbia.edu/doi/10.7916/D8CN7BFM> accessed 23 October 2021.
[514] Bhagwati, *Termites in the Trading System* (n 512) 68-69.
[515] ibid 69.
[516] Puccio (n 51) 179.
[517] ibid 179.
[518] ibid 179-180.
[519] ibid 180.
[520] ibid.

use of an RVC or a CTC [Change in Tariff Classification], the details of such methodologies differ."[521] As a result, the FTAs provide "rather confusing and overlapping sets of RoOs. If compliance with a given set of RoOS is a cost for a firm, the multiplicity of RoOs also entails a multiplicity of costs."[522] The consequence is the need for firms to develop two accounting systems: one for determining whether the requirements for preferential origin status under the various FTAs are met and one for complying with domestic legal requirements. Inama and Sim find that SMEs do not commonly have the resources or expertise to set up a parallel accounting system and that the willingness to adopt such a system "depends on the volume of exports eligible for preferential treatment under the FTA, the share of such exports in total sales, and the cost involved. In the end, the expenditure incurred in operating a parallel accounting system may outweigh the benefit of preferential rates under an FTA."[523] Thus, the costs of trading under multiple FTAs contributes to reducing "the value of trade liberalization and trade effects expected from FTAs."[524]

Hasegawa Jitsuya in an article from 2021 provides another perspective on the trade implications of the high number of preferential RoO in existence. It is necessary to distinguish the diversity of the "content of the rules" from the "diversity of the ways of expressing the rules."[525] The "content of the rules", or the "concrete meaning of the rules," focuses on whether a production process confers origin on the good, for example whether plating of steel is sufficient processing [526] Preferential RoO in different agreements may vary in whether plating is origin conferring processing.[527] This diversity in content results from the different political and commercial objectives of the parties, and Jitsuya argues that "[w]ithout this diversity, the conclusion of FTAs/EPAs would not be possible."[528] This sovereignty in the ability to design rules has been a fundamental aspect of preferential RoO, as noted during the Uruguay Round Negotiations.[529] Jitsuya points out, however, that "it is also necessary to distinguish content diversity from diversity created by employing different 'ways of expressing the rules' to the same 'content of the rules'; which also leads to complex

[521] Inama and Sim (n 146) 87.
[522] ibid 87.
[523] ibid 88.
[524] ibid.
[525] Jitsuya (n 324) 547.
[526] ibid 547, fn. 2.
[527] ibid 547.
[528] ibid 560.
[529] See Chapter 1, notes 126 -134.

and divergent RoO."[530] For example, hub-and-spoke RTAS may have similar approach to whether a good must undergo a CTH and meet a value added percentage. However, as the language, percentages, and formulas differ among agreements, a trader must decipher how to comply with the rules in Agreement A and those in Agreement B, although both confer origin on a good as long as there was a CTH and local value added.[531] Jitsuya proposes that while the diversity of the content of the rules is due to the different policy objectives of the parties to agreements, policymakers, trade officers, and scholars should focus on ways to simplify and standardize the expression of the rules so that traders can understand the concrete meaning behind the rule, i.e. what is or is not sufficient processing of a good.[532]

The impact the tangle of RoOs has on trade creation has also come to the attention of policymakers in the United States and the EU. In their report for the Members and Committees of U.S. Congress in 2020, Vivian C. Jones and Liana Wong make a reference to Baghwati's "spaghetti bowl" to illustrate the inefficiency of the current proliferation of preferential RoOS.[533] They indicate that the "key challenges of constructing ROO in preferential trading relationships are twofold: finding the balance between effectiveness [in preventing trade deflection] and the efficiency of ROO, and simplifying and making ROO more transparent."[534] They suggest that traders importing products under the MFN rate "may become more common under the USMCA," due to the complexity of the agreement as well as the costs, such as "higher administrative expenses and shifting supply chains to meet ROOs requirements."[535] Further, the Congressional Budget Office predicts that traders will import under the MFN rate due to the higher compliance costs of the agreement.[536] The importance of transparency and simplicity of RoOs was also emphasized in a report by the European Commission in 2015 called "Trade for all." It noted that while the "the EU has the widest range of FTAS in the world, the challenge is now to ensure that they make a difference for all."[537] This need arises, in part, from the RoOs in those agreements. Due to the

[530] Jitsuya (n 324) 560.
[531] ibid 560-563.
[532] ibid 563-564.
[533] Jones and Wong (n 298) 10.
[534] ibid.
[535] ibid 11.
[536] Congressional Budget Office (n 413) fn c.
[537] Commission, 'Trade for all: Towards a More Responsible Trade and Investment Policy'(Publications Office of the Eur Union 2015) 15 <https://trade.ec.europa.eu/doclib/docs/2015/october/tradoc_153846.pdf> accessed 23 October 2021.

underutilization of preferential tariffs, the Commission recognizes that it "should tackle issues like complex rules of origin and customs procedures, as well as insufficient information and support."[538] It will do this by "striv[ing] for simplicity and consistency of rules of origin and provide user-friendly information on trade opportunities. This is particularly important for SMEs."[539]

While simplicity and consistency of RoOs is important for SMEs, such elements are important for all firms trading internationally. A study by EY [formally known as Ernst Young] in 2016, based on interviews with officials at major national and multinational corporations, such as General Motors, Nike, Microsoft, and the Walt Disney company, found that ""33% [of the participants] reported managing 5 to 10 preferential agreements, and 33% reported managing more than 10 different preferential agreements."[540] Further, about a third of the participants allocated "resources to third parties to assist in obtaining certifications and qualification analyses."[541] On the other hand, Gladstone and Aguilar Flores argue that as SMEs are more likely to devote resources on the quality and price of their products rather than customs compliance procedures, they "may find it more difficult to compete for market share in the overall FTA zone and may be deterred, in general, from participating in international markets altogether."[542] Over the next two Chapters, this dissertation will explore whether the shift from traditional to advanced manufacturing (including additive manufacturing) presents an opportunity for redesigning RoOs that are more aligned with modern trade practices, and also more transparent and supportive of trade by large and small companies. The next part, however, will shift focus to the economic analysis of RoOs as the work in this field provides some important insights on where the trade distorting effects of RoO occur.

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[538] ibid.
[539] ibid.
[540] William M Methenitis and Kristine Price Dozier, 'Making sense of a world in motion – a global trade perspective' (2016) EY Global Trade Symposium Report, 10 <http://www.goingglobalskills.com/pdfs/making-sense-of-a-world-in-motion.pdf> accessed 23 October 2021. The EY report of 2018, again based on participation of major corporations, stressed the need for the harmonization of customs rules to facilitate trade. J Michael Heldebrand, Sharon A Martin, Robert Smith, 'Is trade the disrupter or the disrupted?' (2018) EY Global Trade Symposium Report, 19-23 <https://assets.ey.com/content/dam/ey-sites/ey-com/en_gl/topics/global-trade/global-trade-pdfs/1808-2835224_Global_Trade_Symposium_report_012125-18Gbl.pdf> accessed 23 October 2021.
[541] ibid.
[542] Gladstone and Flores (n 337) 114. These authors, also referring to the "spaghetti bowl," find that "multiple RoO arising from overlapping agreements add another layer of complexity businesses need to navigate" and make an appeal to governments to consider the interconnections of RoO to other FTAs when designing them, 114-115.

## II. Economic Perspective: With Preferential Rules of Origin, Some States Have a Bigger Piece of the Pie

Since at least the early 1980s, economists have studied how RoO, in particular preferential RoO, function as a non-tariff barriers to trade, and how the lack of transparency and political involvement in designing and implementing RoO has generated trade distorting effects and protectionism. As the years progressed, some economists and trade analysts began to question whether RoO achieve their purported goals: preventing trade deflection and increasing manufacturing activity in the parties to a preferential agreement. This section will briefly introduce the work of some economists on RoO as it is one field of trade law which is intricately linked with economic analysis.

For an introduction to some of economic perspectives on RoO, the introduction to the book *The Origin of Goods: Rules of Origin in Regional Trade Agreements*, published in 2006, is suggested.[543] The editors succinctly present the work of Gene Grossman (1981) on content protection schemes (local content percentages, domestic value added requirements) and how the success of the policy goals behind such schemes are impacted by the production of intermediate and final goods.[544] The editors then examine work by Kala Krishna and Anne Kreuger, two economists who have extensively studied RoO. The introduction also includes a summary of the empirical work by Antoni Estevadeordal and Kati Souminen resulting in an index on the restrictiveness of RoO. The editors conclude with summaries of the chapters in the book, several of which are referred to in this dissertation. More empirical literature, as well as literature on the political economy determinants of RoO, the effects of discriminatory trade policies on third countries, and GVCs, is found in the review of the literature in Paola Conconi, Manuel García-Santana, Laura Puccio and Roberto Venturini, "From Final Goods to Inputs: The Protectionist Effect of Rules of Origin."[545]

A study by Estevadeordal, Suominen, and Jeremy Harris of the Inter-American Development Bank examines the restrictiveness of preferential RoO. Restrictiveness raises "undue barriers to trade between RTA members and non-members," while

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[543] Olivier Cadot, Antoni Estevadeordal, Akiko Suwa-Eisenmann and Theirry Verdier, 'Introduction', in Olivier Cadot, Antoni Estevadeordal, Akiko Suwa-Eisenmann and Theirry Verdier (eds), *The Origin of Goods: Rules of Origin in Regional Trade Agreements* (OUP 2006) 1-17.
[544] ibid 3-7; Gene M Grossman, 'The Theory of Domestic Content Protection and Content Preference' (1981) 96 QJ of Economics 583.
[545] Conconi (n 38) 2339-2340.

divergence in RoO "increase the transactions costs for countries and companies dealing on two or more RTA fronts simultaneously."[546] Regarding restrictiveness, the "observed" restrictiveness are the CTH, local value added, cumulation, and de minimis rules in the text.[547] The "effective" or "real" restrictiveness is "the extent that" rules limit:

> both the input and geographical pools, thus increasing the cost of production by requiring firms to use higher-cost regional inputs…This is the sense of restrictiveness that matters economically, both for the degree of liberalization achieved within a RTA and for the degree of impact on third parties. As such, it arbitrates the degree to which a producer can globalise production without foregoing the preferential access in an RTA.[548]

On the other hand, rules in a PTA with the US or the EU, which have a high degree of observed restrictiveness, are not necessarily effectively restrictive due to the large geographic pool for sourcing inputs.[549] PTAs joining two developing countries or a developing country with a larger economy are more likely to be effectively restrictive, and thus, have a greater impact on the utilization of preferential tariff treatment.[550] One of the changes 3D printing could bring to origin determination under a set of RoO is limiting the geographic pool of originating materials if raw materials are not produced in the partner countries; thus the rules become restrictive.

Conconi, García-Santana, Puccio, and Venturini examine how the restrictiveness of preferential RoO in NAFTA distorts international trade in intermediate goods and protects NAFTA manufacturers of intermediate parts.[551] They focused on the production of trousers in Mexico, because Mexico's bargaining power in the NAFTA negotiations was weaker than Canada and the US and the CTH rule for trousers and sourcing rules for inputs (i.e. cotton yarn, fabrics) were particularly restrictive.[552] Their estimates indicated that the NAFTA RoO decreased the growth rate of imports from third countries relative to NAFTA partners significantly and "in the absence of RoO, Mexican imports of these goods from third countries relative to NAFTA partners would have been 45 percent higher."[553] The authors draw from this result two main conclusions: (1) RoO should be analyzed to understand their implications on GVCs and trade in intermediate inputs within regions (i.e. Europe, North America); and (2)

[546] Estevadeordal, Harris, and Suominen (n 483) 22.
[547] ibid 30.
[548] ibid.
[549] ibid 31-32.
[550] ibid 32.
[551] Conconi (n 38) 2338.
[552] ibid 2342, 2344.
[553] ibid 2362.

RoO generate protectionist effects "by substantially increasing the level of protection faced by non-members" and as a result RoO violate GATT Article XXIV.[554] The legality of RoO under GATT Article XXIV will be looked at further in the next part.

One indication that preferential RoO are overly restrictive or complex is the underutilization of preferences, such as low tariff rates, by traders in the territory of the RTA. However, quantifying the utilization rate of preferential RoO is not an easy task as data on the use of these rules are not widely available.[555] Studies by Maria Donner Abreu on the utilization of preferences provided by RTAs involving the EU, the US, China, Panama, and LAIA (Latin American Integration Association) from 2010-2013 and Inama on GSPs between 1994 -2001 both identify generally the lack of knowledge of a preference scheme or complications in producing the required paperwork as reasons for the underutilization of the rates.[556] Pramila Crivelli, Stefano Inama, and Jonas Kasteng studied the utilization rates of preferential rules of origin between 2009 and 2013 for EU Free Trade Area Agreements and also the low utilization rates in specific sectors. Reasons for the denial of preferential treatment could be: insufficient documentary evidence on the origin of the good or on compliance with administrative requirements, low preferential margins, and other factors such as duty rebate schemes or drawback provisions.[557] However, the authors find from a review of the literature and empirical studies on this topic that non-compliance with the substantial transformation rules or failure to comply with administrative requirements are significant reasons for the non-utilization of trade preferences.[558]

Relying on preferential RoO to limit which traders can benefit from preferences can be problematic. A study by Ram Singh and Surendar Singh suggests that when trade deflection is profitable, preferential RoO may have a reduced effect in preventing deflection if domestic manufacturing in the preferential territory is inefficient. SAFTA provides cumulation rules for finished bicycles and garments: when importing final goods into India, the regional value added requirement for producers in Bangladesh and Sri Lanka is 20% if the parts originate under SAFTA, or 30% if the parts originate

[554] ibid 2362-2363.
[555] Donner Abreu (n 358) 79.
[556] ibid 80; Stefano Inama, Trade Preferences and the World Trade Organization Negotiations on Market Access: Battling for Compensation of Erosion GSP, ACP, and Other Trade Preferences or Assessing and Improving Their Utilization and Value by Addressing Rules of Origin and Graduation? (2003) 37 J World Trade 959, 970.
[557] Crivelli, Inama, Kasteng (n 456) 3.
[558] ibid 3-4.

from third parties.[559] Indian bicycle part manufacturers found that a high number of finished bicycles were made in the SAFTA territory from inputs sourced from outside the territory, namely China.[560] As bicycle assembly is a standardized process, firms know which expensive parts need to be sourced locally to meet the 30% threshold and which inexpensive parts can be sourced from China. [561] Decisions by firms in Bangladesh and Sri Lanka to source Chinese inputs are also motivated by the fact that India is not a competitive producer of these inputs, because of transportation costs, "inadequate economies of scale, trade supply chain and trade infrastructure-related issues."[562] Trade deflection is not simply a matter of rerouting parts and reassembling parts to take advantage of preferential rules of origin of PTA, but is also an indicator of the well-being of the PTA's parties' domestic industries.

Preferential RoO also impact intermediate and final goods producers differently. Hoekman in his article on RoO from 1993 cautions policymakers to not overextend the scope of the rules by protecting certain producers of intermediate parts at the expense of final good producers in different areas of the territory.[563] If the RoO raise the costs of documenting origin significantly, they become non-tariff barriers, and "if they are sufficiently costly to satisfy, the tariff equivalent of the rule of origin may even exceed the tariff that applied before the implementation of the preferential trade arrangement."[564] During the 1990s, the drafters of the SADC RoO adopted a product specific list regime, a change which, as Inama stated in 2009, made these rules "an example of the most restrictive and business-unfriendly set of rules of origin."[565] Hennie Erasmus, Frank Flatters, and Robert Kirk find that the rules were made more restrictive partially to protect the South African market from final goods produced in the other territories made from cheap inputs from third parties.[566] The more restrictive CTH designed to protect South Africa was likely to be harmful to the development of

[559] Singh and Singh (n 325) 70. The study also looked a similar practice of sourcing Chinese yarn.
[560] ibid 63.
[561] ibid 66, 70.
[562] ibid.
[563] Hoekman, 'Rules of Origin for Goods and Services' (n 100) 91.
[564] ibid.
[565] Inama, *The Rules of Origin in International Trade* (n 20) 474. The implementation of the SADC started in 2000. 'The SADC Free Trade Area' (*Mauritius Trade Easy*, Ministry of Foreign Affairs, Regional Integration and Intl Trade of Mauritius) <https://www.mauritiustrade.mu/en/trade-agreements/sadc> accessed 24 October 2021.
[566]Erasmus, Flatters and Kirk (n 482) 280-283.

industries in the other territories: flexibility in sourcing parts from within or without the region was a significant factor that contributed to the growth of these markets.[567]

This brief introduction to the economics literature on RoO presents some theoretical and empirical studies that support concerns raised by legal scholars: preferential RoO are not efficient, they can be utilized for protectionist purposes, they advantage intermediate part producers over final goods producers and SMEs. Some of the studies bring into question whether preventing trade deflection is a sound justification for restrictive RoO. Based on these studies, preferential RoO go against the traditional normative principle that trade liberalization "lifts all boats."[568] Several of the authors mentioned in this part, in addition to pointing out the flaws in the system, also provide potential changes. Their suggestions will be discussed briefly in the next part and a more extensive analysis on revising rules of origin, also taking into consideration the digital trade environment and advanced manufacturing, such as 3D printing, will be discussed in Chapter 5.

## III. How Do You Solve a Problem Like Preferential Rules of Origin?

Proposals to correct the inefficiencies of preferential RoO and protectionist tendencies range from getting rid of them altogether to keeping them, but vastly simplifying them. Given the lengthy RoO chapters in recent agreements such as the TCA, the USMCA, and CPTPP, policymakers seem not to have taken up these proposals. Mavroidis and Vermulst base their critique on some of the authors mentioned in the previous part. First, non-preferential rules can perform the function of identifying origin of goods for preferential tariff treatment and there is no need for a second set of rules.[569] Secondly, the studies of the economists show that preferential rules add to the cost of trade and have not granted advantages to developing countries; thus, they are not preferential in practice.[570] Finally, as discussed in more detail in Chapter 1, it is questionable whether the rules are legal under Article XXIV:5 and Article XXIV:8.

In 2014, Puccio proposed that the restrictiveness of preferential rules should be proportional to the MFN tariff rates. This would help ensure that preferential RoO do

[567] ibid.
[568] Grant Cohen (n 406) 326.
[569] Mavroidis and Vermulst (n 20) 6-7.
[570] ibid 10-11.

not become more trade restrictive than necessary to prevent trade deflection and thus be legal under Article XXIV:5 and Article XXIV:8.[571] Her proposal requires establishing a new single protocol, which, however, would not be a harmonized set of rules. Instead, "[t]he same origin protocol would apply to exports desiring preferential treatment from all FTAs concluded by the country. The creation of a single protocol would avoid differentiating the rules according to the commercial interests in the single FTA."[572] The EU would apply the same rule, to all of the States to which it has an FTA, for a particular good that would be proportionate to its MFN applied tariff level.[573] Ideally, the maximum level of restrictiveness for preferential RoO would be decided at the WTO.

The suggestion of a multilateral approach to preferential RoO has also been raised by economists. Estevadeordal, Souminen, and Harris are contrary to harmonization of the rules, because it could increase the effective restrictiveness of RoO: if harmonized rules prohibit the use of non-originating materials, this will impact RTAs with small geographic cumulation zones disproportionately over those with larger zones.[574] A multilateral approach could correct some of the inefficiencies of the RoO found in numerous FTAs. They propose setting a cap on the complexity and restrictiveness of RoO at a multilateral level, such as limiting the range of RoO options (like the calculations for determining value added), to ensure relative similarity among qualifying production methods in sectors across export markets.[575] Another option is for RTAs to " 'bind' their rules of origin at existing levels of restrictiveness and then negotiate reductions of these bindings under further negotiations."[576] Olivier Cadot and Jaime de Melo also propose a multilateral approach to bring preferential rules under the aegis of the WTO. However, this requires moving "along three dimensions: harmonization [at the trading bloc level], simplification, and relaxation."[577]

Flexible and relaxed rules are likely to benefit traders in developing countries and SMEs. Erasmus, Flatters and Kirk are against harmonization and argue that preferential RoO should be radically reformed by going "back to the basics" so that their only function is to authentic goods and so that they cannot be used for

[571] Puccio (n 51) 198. Puccio was an author along with Conconi on the article, published in 2018, regarding the protectionist effect of the NAFTA RoO.
[572] Puccio (n 51 )198.
[573] ibid 198-199.
[574] Estevadeordal, Suominen and Harris (n 483) 50.
[575] ibid. The cap would have to be set relatively high given the variety of methods in existing RTAS.
[576] ibid.
[577] Olivier Cadot and Jaime de Melo, 'Why OECD Countries Should Reform Rules of Origin' (2008) 23 The World Bank Research Observer 77, 98.

protectionist uses.[578] Dan Ciurnek and Dirk Bienen propose eliminating the costs of complying with preferential RoO for SME by establishing a regime in which there is a presumption of origin for small shipments or shipments worth less than a threshold amount.[579] Small traders could benefit from the rules without being burdened by compliance procedures. However, some paperwork would still be required to ensure that this alternative is not used for fraud or circumvention.[580]

As 3D printing promises to simplify production of goods and reduce inputs, and thus the need to trace origin of multiple parts, one can wonder whether 3D printing will facilitate the simplification of rules of origin. On the other hand, these proposals are based on traditional manufacturing methods, and 3D printing brings new challenges that could complicate the application of these types of rules. 3D printing is used for small batch manufacturing, thus, a large company, which could afford the administrative costs of complying with rules of origin, could take advantage of the small shipment presumption of origin. In addition to simplification and flexibility of preferential RoO, the competitiveness of the markets and how goods are produced must still be taken into consideration. Revising RoO to prevent protectionist uses is not just a legal drafting exercise; it requires an examination of how trade is actually conducted and, possibly, encouraging policymakers to make regulatory reforms in the areas of competition or labor. However, whether preferential RoO should also take on regulatory functions is another question, which will be discussed in the next part.

## IV. Should There Be Next-Generation Rules of Origin?

One could wonder to what extent preferential RoO would fit into a trade regime including trade-plus objectives. In his article, "Retooling Trade Agreements for Social Inclusion," Shaffer argues that the purpose of trade agreements is more than just liberalizing trade, but instead "should be viewed as four-fold: first, to create a basic framework or rules for ongoing cooperation, planning, and deliberation; second, to enhance standards of living; third, to address the externalities of domestic measures on each other" and fourthly to provide for an independent dispute resolution system.[581]

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[578] Erasmus, Flatters and Kirk (n 481) 292.
[579] Dan Ciuriak and Derk Bienen, 'Overcoming Low Preference Utilization in Preferential Trade Agreements: Presumption of Origin for Small Shipments' (2014) Trade & Development Discussion Paper No. 02/2014, bkp Development Research and Consulting, 19 < https://www.bkp-development.com/index.php/publications-2-en/discussion-papers/331-discussion-paper-2014-2>.
[580] ibid 21.
[581] Gregory Shaffer, 'Retooling Trade Agreements for Social Inclusion' (2019) U Illinois L Rev 1, 5.

Looking at the works referenced in the previous parts, it seems that preferential RoO do not meet these four principles entirely: the rules are not quite successful in promoting cooperation among parties; they may enhance standards of living, but not for all parties; they can create negative externalities on third parties to PTAs; Annex II of AOR is a declaration giving states sovereignty in designing and applying the rules, but the approach of the DSB in resolving disputes under the declaration is still an unknown. Schaffer also argues that trade agreements should be assessed, "in terms of their distributional effects and their implications for social inclusion and social stability. Trade offers considerable opportunities that otherwise would not exist, especially for those in countries with small domestic markets that lack capital and require advanced technology."[582] We have seen in that RoO can in fact limit some of the opportunities to small domestic markets offered by globalization and have distributional effects that favor developed countries that already play a role in influencing international trade policy. However, designing or implementing preferential RoO can also be linked to sensitive social issues.

The origin given to a product can impact a consumer's perception on the quality and essence of the product. A pair of shoes made in China may be deemed to be of a certain level of quality and desirability to a consumer in Europe who prefers to buy goods produced in the EU. The origin of a good can suggest that the good was produced according to certain labor or environmental standards. A change in the country of origin implicates a change in the mark of origin of a product (Made in ___), which can also impact a consumer's decision to buy a product.[583] Inama writes:

> Environmental or humanitarian concerns may influence consumer choices toward products from countries that are recognized as respecting human rights, labor laws, or environmental treaties. Although the globalization of production has rendered outdated the notion that a product is wholly produced and obtained in a particular country, consumers may still identify certain quality products with specific geographical regions or countries.[584]

Therefore, rules can be designed to protect the reputation of goods that are identified as originating in a certain country or region. Inama gives the example of Colombian coffee roasters who raised objections on the harmonization of non-preferential RoO. They opposed allowing roasting or decaffeinating to be origin conferring processes as

[582] ibid 7.
[583] Inama, *The Rules of Origin in International Trade* (n 20) 106.
[584] ibid 106 -107.

this would mean that Colombian coffee beans roasted in the US and EU would be marketed as US and EU products. According to Inama, in the eyes of the Colombian delegation, this "could severely diminish the image value and marketing potential of Colombian coffee as a quality product with a distinct character and taste."[585] Thus, RoO are linked to issues that are traditionally beyond the WTO's scope, such as labor law and environmental law.

Concerns about using RoO to address labor or environmental issues were raised by Erasmus, Flatters and Kirk in 2006. The authors report that justifications for the design of the Protocol Rules of Origin for SADC were based on enhancing economic development in the region by protecting local industries[586] and "have included consumer and industrial safety, environmental protection, and preventing the dumping of foreign goods in regional markets. Liberalization of regional trade; it has been claimed, might impose new threats in these areas."[587] Even if there is such a threat, "[i]n each case there also exist a wide range of instruments that should be more suitable, more effective and have less costly side effects than Rules of Origin."[588] The design and implementation of normal regulatory tools should be improved, because "[t]he use of restrictive Rules of Origin would be a much less effective (often completely ineffective) and more costly alternative."[589]

Over 10 years later, Hoekman and Nelson, Shaffer, and Grant Cohen, who explore how trade law should support and interact with domestic regulation on labor and the environment, have not put forth proposals that reference RoO to achieve this goal. Whatever the reason for not including RoO, the works by these authors suggest that it may not be necessary to use RoO as means to achieve a regulatory objective. According to Grant Cohen an international law system should grant labor and environmental policymakers more of a role in trade dispute settlement and allow states some flexibility in designing measures based on their level of liberalization.[590] Schaffer addresses the inclusion of labor clauses in trade agreements, and argues that "[t]hey can be used by protectionist interests in advanced industrial economics to block developing country imports, in turn harming workers."[591] He recommends a third-party

[585] ibid 104.
[586] Erasmus, Flatters and Kirk (n 481) 267.
[587] ibid 268.
[588] ibid.
[589] ibid.
[590] Grant Cohen (n 406) 340-344.
[591] Shaffer, 'Retooling Trade Agreements for Social Inclusion' (n 581) 26.

neutral review to commitments that benefit the domestic labor of the parties.[592] Hoekman and Nelson find that trade agreements should be designed to limit negative spillovers, and international regulatory cooperation should be pursued at the plurilateral level.[593]

However, when policymakers influenced by NGOs and domestic industry lobbysists seek deep-integration of labor or environmental regulation in trade policy instruments, risks of negative spillovers can arise. Hoekman and Koestecki argue that "[e]conomic forces favouring global norms include…the fact that particular issue involves a global externality and requires concerted action (for example, ozone depletion)."[594] They find that RoO is one area of trade law where economics favors international harmonization of the rules.[595] However, "differences in national preferences, or absence of cross-border spillovers call for diversity in rules," and one such area where diversity in the rules should exist is labour market regulation and standards.[596] A uniform standard may not reflect the preferences of the population upon which the standard is imposed, nor will it necessarily improve the labor-related issues that the home market wishes to resolve through trade policy.[597] Trade restrictions that raise the cost of labor in the foreign market raise the costs of imports, and as domestic firms must allocate more resources to purchasing imports, less resources may be allocated to workers, whether in the form of lay-offs or increased automation of production.[598]

The USCMA attempts to impose uniformity on national differences in wages through the Labor Value Content (LVC) provisions in the rules of origin chapter.[599] Adding a deep provision intended to regulate a national practice, such as labor policy, may increase costs in production of goods, because of the complexity of the rules. Gantz proposes that due to the tracing requirements, costs will increase for firms, but they will eventually develop competence in minimizing such costs.[600] However, as Reinsich, Caporal, Waddoups, and Tekarli describe it, automakers will likely have to

[592] ibid.
[593] Hoekman and Nelson (n 41) 22-23.
[594] Hoekman and Kostecki (n 80) 585.
[595] ibid 586.
[596] ibid.
[597] ibid 626.
[598] ibid.
[599] Gantz, 'The United States-Mexico-Canada Agreement' (n 73) 3-5. See also, Gantz 'North America's Shifting Supply Chains' (n 42) 15-17.
[600] Gantz, 'The United States-Mexico-Canada Agreement' (n 73) 4.

make a decision on relocating production based on whether they choose to pay the 16$ wage or whether they move more production to Mexico and pay MFN rates when trading with the US or Canada.[601] William Powers and Ricky Ubee of the US International Trade Commission (USITC) examine studies by the USITC and the Center for Automotive Research that try to estimate how the USMCA rules will change the production of automotives.[602] While both studies have limitations in terms of data and scope, they demonstrate that producers may prefer to pay the MFN rates, and there are indications that the rules could result in higher vehicle prices, lower sales and production in the US, a decline in employment in the automotive sector, and an increase in sourcing of non-USMCA parts.[603] The Congressional Budget Office (CBO) of the United States predicts that the increased restrictiveness of the USMCA rules of origin will lead to a decline in the use of preferential tariffs. However, the CBO did find a silver lining: the increased use of MFN rates would raise tariff revenue for the US.[604] Regarding Mexico, it is possible that the Mexican government will be influenced to raise the wage rate to meet 16$ per hour,[605] but there is still 25% window for content that does meet the RVC rules and the 16$ rate.[606] So, it is also possible that Mexico will continue to source non-originating material and produce parts at low wages and provide that 25% of content without a significant change in its labor policy.[607]

While a pioneer in crafting a deep-RoO regime by adding a trade-plus item, labor, into origin determination, the utilization rate of the USCMA RoO could be an indicator of its success as a model for other deep-RoO agreements. If there is significant underutilization of USMCA preference tariff rates, then this means that the RoO may not be effective at making manufacturers pay workers a certain wage. On the other hand, five years from now, we may find that indeed rules requiring a certain level of LVC improved labor conditions for workers in the USMCA region. It is still too early to reach a conclusion about the impact of the RoO in the USMCA; however, those policymakers and trade lawyers wishing to merge domestic regulation with trade law

[601] Reinsich and others (n 410) 21.
[602] William Powers and Ricky Ubee, 'A Comprehensive Comparison of Rules of Origin in U.S. Trade Agreements,' (2020) Economic Working Papers Series 2020-05-D, U.S. Intl Trade Commission, 16-17 <https://www.usitc.gov/publications/332/working_papers/powers_ubee_comprehensive_analysis_of_us_roo_2020-05-20_compliant.pdf> accessed 24 October 2021.
[603] ibid 16-18.
[604] Congressional Budget Office (n 413) fn c.
[605] Gantz, 'The United States-Mexico-Canada Agreement' (n 73) 3.
[606] ibid 5.
[607] ibid.

may want to think carefully about using RoO to correct any risks to domestic labor or environmental conditions.

As businesses produce and consumers request more “green” and socially conscious goods, should trade rules, such as RoO also adapt? On the one hand, identifying the origin of a good may not be enough for socially and environmentally conscious trade. Rules should also verify that products were made with sustainable processes or eco-friendly materials. Perhaps this means adding a new criterion in addition to the three substantial criteria: sustainable and protects fair labor standards. There are however several responses to such a proposal. First, there are other legal instruments that perform such a function such as standards, regulations, and other measures that fall under the administrative umbrellas of environmental, labor, and health ministries. Next, preferential RoO already are complex and traders do not always have the resources to figure out and comply with the procedural requirements. Adding another layer, “a socially and ecologically” conscious layer, to the RoO determination could be burdensome to traders. Thus, should policymakers draft such rules, they should also consider setting aside resources for technical assistance. One big factor to consider is how inclusive the design of such socially and ecologically conscious rules would be. A rather pessimistic view is that politicians and industry lobbyists could strategically take advantage of such concerns to design rules through non-transparent negotiations that appear to protect environmental or labor standards, but which effectively function to protect certain industries. A more practical view is that adding “conscious” rules would require the collaboration of groups that support such initiatives with customs and trade officials, and it may be difficult to reach a compromise that both sustains “conscious” policy goals with trade goals, while also developing rules that perform a discriminatory function and are not overly complex.

Yet, perhaps it is still possible to keep rules as rather shallow trade instruments that nonetheless sustain traders that want to produce and sell goods that are eco-conscious and made with fair labor standards. Technology is a tool for innovation, both in producing products more efficiently and thus with less waste, and also alleviating humans from certain labor-intensive activity. Access to telecommunication technologies has allowed SMEs the potential to enter the global market. Certainly, technology is not the answer for all trade problems, but it can be utilized by producers to create the type of products that socially conscious consumers are seeking and governments wish to promote. Yet, these green/fair labor products may have difficulty

reaching foreign markets due to preferential RoO which were not designed to support trade in such products. One the one hand, this may be unintentional: technology and technical manufacturing processes may have developed after the rules were designed. On the other hand, this could be a greater and more general issue in designing rules: if they are too specific and too technical in terms of the product-specific rules of origin, they can "freeze" rules of origin analysis to a particular moment in time. A rule requiring a specific CTH or *ad valorem* percentage may not adequately reflect manufacturing processes after a few years.

One of the concerns raised by automotive makers was that the USMCA rules would require them to divert funds from developing and manufacturing technological inputs of automobiles and devote more resources to maintaining manufacturing practices to meet the very specific rules for vehicles. Manufacturers in other industries could face similar restraints if it is necessary for them to trade under preferential rates. Digitalization may be the key for not only innovating and creating greener and safer products, but also for being more competitive in the current trade environment. 3D printing is seen as a technology that could allow firms to produce products with less waste and a skilled workforce, which could naturally lead to better labor standards. However, producers of "socially conscious" 3D printed products will still face the task of assigning origin to the good when seeking preferential tariff treatment. This leads us to the last part of this Chapter: can RoO be applied to digital products, and more generally, what role should RoO play in an international trade law system that regulates digital trade, including trade in 3D digital files?

## V. The Role of Rules of Origin in Digital Trade

When examining recent trade agreements, like the USMCA and the TCA, questions emerge on how digital technology could impact the discriminatory function of preferential RoO and the application of the substantial transformation criteria. The TCA includes provisions intended to promote the manufacturing and trade of electronic vehicles, but the increasing rate of local content requirements may have a negative impact on such manufacturing because the batteries, which are not produced by the parties, can constitute up to 50% of the cost.[608] The USMCA's requirements on labor value content require a higher level of value created by high-wage manufacturing over

[608] Hancké and Mathei (n 382).

high-wage technology expenditures, though some industry groups claim that design is where a significant amount of value is created.[609] As Hoekman and Nelson proposed, deep 21st Century agreements should be drafted not only by trade specialists and politicians, but also with the participation of international businesses and consumers.[610] Will industries involved in digital trade or using digital technology for manufacturing have a voice in designing RoO for a data-driven economy?

A data-driven economy requires reconceptualizing the role and design of trade agreements. Schaffer finds that "traditional trade agreements are not optimal for regulatory agreements," and they "need to be viewed as part of a broader ecology of governance of the new data-driven economy, which creates links between different rule-making and monitoring bodies at different levels of social organization."[611] Further, "there should be *no single system of hierarchical rules* [italics original]. In a "world of radical uncertainty and different preferences…[a] diversity of regulatory approaches provides greater resilience against the systemic risks posed when single systems fail."[612] It could be possible to derive from these statements that RoO would not be optimal instruments for addressing challenges arising from digital trade: RoO are gatekeepers – their primary legal justification is that they discriminate goods qualifying for preferential tariff treatment from those that do not, and thus establish a form a hierarchy. However, it is not advisable, on the other hand to keep RoO separate from the data-driven economy and this can be demonstrated through 3D printing.

The impact of 3D printing on trade is at the center of a debate on whether the WTO's moratorium on custom duties to electronic transmissions should be lifted. Rashmi Banga, Senior Economic Affairs Officer of UNCTAD, raises concerns that 3D printing for mass producing will negatively impact industrialization in developing countries that do not have the financial or technical resources to establish additive manufacturing at a widespread scale.[613] The growth of electronic transmissions (currently untaxable) supports the growth of 3D printing,[614] and this:

> can also jeopardize two decades of negotiated tariffs on industrial products under the Uruguay Round. 3D printers and electronic transmissions of CAD files can be used to 'print' manufactured products in any country, irrespective of the protection given by the governments to the sectors in the developing countries

[609] USMCA app to ch 4, ar t 7; Reinsich and others (n 410) 27-28.
[610] Hoekman and Nelson (n 41) 19.
[611] Shaffer, 'Trade Law in a Data-Driven Economy' (n 477) 271.
[612] ibid.
[613] Banga (n 47) 30.
[614] ibid.

> through their custom duty regime…If [the] Moratorium on custom duties on ET [electronic transmissions] is made permanent, then in the future the policy space to address the above challenges will be severely limited.[615]

Without applying a tax or tariff regime on electronic transmissions, developing nations will become less competitive than developed nations in international trade and domestic producers will be at a disadvantaged vis-à-vis foreign producers who print in the domestic territory. On the other hand, Andrenelli and López González (authors of an OECD Trade Policy Paper) advocate for keeping the Moratorium permanent as the lack of tariffs means that consumers pay less for goods and reduces barriers to trade.[616] The authors state that while 3D printing could potentially exacerbate the effects of the Moratorium, 3D printing may not have much influence on trade for at least a decade as the adoption of 3D technology is slow, the scope of products that can be produced is limited, and 3D printing can actually promote cross-border trade, such as in final products (hearing aids) or in raw material.[617]

What these authors do not mention are RoO. If electronic transmissions are taxed, an origin determination could ultimately have an impact on who must pay any tariff or tax treatment on digital transmissions. Banga questions whether trade in digital files should be regulated under GATT or the GATS and whether printing products constitutes cross-border trade.[618] These issues will be considered further below. However, the authors of each report did not take the analysis to the next step. If tariffs are to be applied to electronic transmission, will they be applied on the basis of the origin of the 3D file? Thus, this would require determining the origin of the file. It is here that we can see why a discussion of RoO needs to be incorporated into the greater debate of how digital trade should be regulated and under what type of framework WTO members, government policymakers, and industries wish to govern the data-driven economy.

The RoO in digital trade has started to be questioned. Dylan Gareats, Colleen Carroll and Arnoud R. Willems propose redesigning the rules to incorporate the value of design and R&D into an *ad valorem* criterion for determining the origin of a product.[619] Their article will be examined in more detail in the next Chapter. While the

[615] ibid 31.
[616] Andrenelli and López González (n 67) (2019) 6-7.
[617] ibid 19-21.
[618] Banga (n 48) 30-31.
[619] Geraets, Carroll, and Willems (n 46).

literature on international trade law has started to assess 3D printing's impact on trade, very little work has been done on 3D printing and rules of origin, a statement acknowledged by scholars at a webinar for the Digital Trade & Data Governance Hub moderated by Susan Aaronson. One of the speakers, Ziyang Fan, is a co-author of 3D Printing: A Guide for Decision Makers, a study on 3D printing and trade, which nonetheless, briefly addresses rules of origin. Two studies were conducted and written by the Swedish National Board of Trade, "Trade Regulation in a 3D Printed World" (2016) and "Rules of Origin for the 21st Century" (2020). In both reports, the Swedish National Board of Trade concludes that while 3D printing challenges traditional methods of producing goods, an entirely new approach to rules of origin is not needed.[620] Duy Dinh has also looked into determining the origin of a 3D product. However, the work of these authors on 3D printing on RoO are several paragraphs to a few pages at most in length. A goal of this dissertation is to expand their initial steps to demonstrate that a more comprehensive review of RoO in the era of digital trade should be considered by policymakers and lawyers and to provide some suggestions on how to design rules that are more predictable and enhance the legitimacy of international trade law to liberalize trade while promoting development.

However, to start this analysis, it is necessary to understand whether a 3D file is a good or a service, and this implies not only an examination on the classifications of digital products, but also a quick introduction to rules of origin for services. For if the 3D file is a service, we need to understand how to determine the origin of a service. We will start with this investigation and conclude with the analysis on classification.

### A. Rules of Origin for Services and Where to Find Them

Rules for determining the origin of services do exist; one just has to know where to find them. Early in negotiations of the AOR, Members, such as Japan and the EC, pressed to exclude services from the AOR on the basis that it should focus on goods and that rules of origin for services "might be dealt with in another forum."[621] While there is no WTO instrument for rules of origin for services like the AOR, scholars

[620] Fan, Sotelo, and Sundareswaran (n 47); National Board of Trade, 'Trade Regulation in a 3D Printed World' (n 47) 28; National Board of Trade – Sweden, 'Rules of Origin in the 21st Century' (2020) Kommerskollegium 15 <https://www.kommerskollegium.se/globalassets/publikationer/rapporter/2020/rules-of-origin-in-the-21st-century.pdf> accessed 24 October 2021.
[621] Negotiating Group on Non-Tariff Measures, 'Meeting of 14-15 February 1990' (n 126) para 17-18.

studying services have identified several provisions in the GATS that serve an origin identifying function.[622] This dissertation will briefly introduce the rules related to the origin for services, as this investigation has been performed by Americo Zampetti and Pierre Suavé[623], and Duy Dinh.[624] This section lays a groundwork for a greater discussion in the next Chapter of whether it is possible, or recommendable, to include the origin of the 3D file in the origin analysis of a 3D printed good. This introduction mainly refers to the work of Zampetti and Suavé and Richard Baldwin[625], as Dinh's work on RoO for services will be referenced in more detail in the next Chapter.

There are some key differences between rules of origin for goods and for services that must be identified at the outset. How services are provided internationally impacts what type of trade measures can be applied to services. Guzman and Pauwelyn note that "border measures in general, and ad valorem tariffs in particular, are often difficult to apply to trade in services for the simple reason that customs agents in many instances will not be able to observe the service as it 'passes the frontier.'"[626] The agents will only be able to observe the human providers crossing the border, and as the service is provided within the borders, any resulting duties from such provision are no longer within the jurisdiction of the customs authorities.[627] Thus, domestic agencies take a more active role in controlling the trade of services by both domestic and foreign service providers through regulations.[628] Even though these measures may be applied behind the frontier, there may still be some preferential treatment available to foreign service suppliers under a PTA. In that case, Zampetti and Sauvé point out "the need to determine the origin of services and of service providers arises as soon as an international agreement providing for differential treatment between parties and non-parties is entered into."[629]

Zampetti and Sauvé[630], as well as Dinh[631] find that determining the origin of a service under the GATS requires a reading of the definitions found in Article XXVIII with the four modes of supply indicated in Article I:2. The key definitions in Article

[622] Petros C Mavroidis, *The Regulation of International Trade*, vol 3 (n 66) 300.
[623] Zampetti and Sauvé (n 52) 114-146.
[624] Dinh (n 46).
[625] Baldwin (n 53) 3
[626] Guzman and Pauwelyn (n 13) 594.
[627] ibid.
[628] ibid 596.
[629] Zampetti and Sauvé (n 52) 118.
[630] ibid 140-142.
[631] Dinh (n 46) 36.

XXVIII are “service of another Member”, “service supplier”, and “juridical person of another Member.” Focusing on the elements of these definitions most relevant to 3D printing, a “service of another Member” is a service which is supplied “from or in the territory of that other Member” or “in the case of the supply of a service through commercial presence or through the presence of natural persons, by a service supplier of that other Member.”[632] A “service supplier” is “any person that supplies a service.”[633] A “person” can be a natural person or a juridical person. A “juridical person” is any legal entity validly constituted under the applicable law, and a “juridical person of another Member” is one that is “constituted or otherwise organized under the law of that other Member, and is engaged in substantive business operations in the territory of that Member or any other Member.”[634] How would this translate to 3D printing? The cross-border transmission of the 3D file is arguably (this will be explained further below) a service, supplied by a service supplier, who could be a company or an individual. If the file is sent to a third-party printing facility and printed, that facility is providing a service by means of a commercial presence. Thus, supplying services in the context of 3D printing touches upon several modes of supply.

Origin is determined based on the mode of the service. Mode 1 services are supplied “from the territory of one Member into the territory of any other Member.”[635] Mode 2 services are supplied “in the territory of one Member to the service consumer of any other Member.”[636] Mode 3 services are supplied “by a service supplier of one Member, through commercial presence in the territory of any other Member.”[637] Finally, Mode 4 services are supplied “by a service supplier of one Member, through presence of natural persons of a Member in the territory of any other Member.”[638] According to Zampetti and Sauvé, for Mode 1 and 2 services, “the territory from which a service is supplied to the consumer confers origin… even if such a territory is that of the last (and potentially less significant) stage in a multicountry production process or that from

[632] General Agreement on Trade in Services (GATS)(15 April 1994) LT/UR/A-1B/S/1 art XXVIII f(i)(ii) <http://docsonline.wto.org> accessed 7 January 2022.
[633] GATS art XXVIII(g)
[634] GATS art XXVIII(l)(m)(i). If the service is supplied through commercial presence, the juridical person must be owned “by persons of a Member if more than 50 per cent of the equity interest in it is beneficially owned by persons of that Member; or it must be controlled “by persons of a Member if such persons have the power to name a majority of its directors or otherwise to legally direct its actions.” GATS art XXVIII(m)(ii).
[635] GATS art I:2(a).
[636] GATS art I:2(b).
[637] GATS art I(c).
[638] GATS art I:2(d).

which the service is only retailed."[639] For Modes 3 and 4, Zampetti and Sauvé explain that "the origin of a service is identical to the nationality of the service supplier that provides that particular service."[640] Therefore, for services related to 3D printing, it will be necessary to identify under which Mode the service is being provided in order to identify their origin.

As more trade in services takes place in GVCs, Mavroidis suggests that it will be difficult to determine the origin of a service. In his examination of rules of origin for services, he proposes that Article XXVIII GATS, by listing the definitions of a natural person of another Member and a juridical person, reproduces "the most frequently encountered bases for attributing origin in the realm of services (namely, nationality and seat of incorporation)."[641] Regarding Zampetti and Sauvé's work on Article XXVIII in the context of the four modes of supply, Mavroidis finds that their "opinion has a lot of merit, even though, precisely because of the emergence of GVCs, defining origin in mode 1 might often prove to be a quixotic test because a service might be sent from country A but might have benefited from inputs in C and D."[642] Mavoridis also notes that domestic law determines nationality for legal persons, businesses, and individuals.[643] The next Chapter will examine in more detail how these factors – GVCs and determining the nationality of the service provider – could impact the origin determination of the 3D file as service input of the 3D printed final product.

Whether a service qualifies for preferential treatment under an agreement depends on the service provider. As James notes, identifying the service supplier is complicated by differences in determining, from a legal standpoint, where a corporation or business is incorporated, and where that service originates geographically.[644] An example where uncertainty in defining who is the supplier of a particular service can have an impact on regulation of trade in services is the application of Article V:6 GATS, which concerns economic integration agreements. Subsection 6 provides:

> A service supplier of any other Member that is a juridical person constituted under the laws of a party to an [economic integration] agreement…shall be entitled to treatment granted under such agreement, provided that it engages in

[639] Zampetti and Sauvé (n 52) 140-141. This last point is explored in more detail by Dinh in his book on RoO for services, and his arguments that the rules may not reflect the economic origin of services will be discussed in the next chapter in the context of determining the origin of a 3D file.
[640] Zampetti and Sauvé (n 52) 141.
[641] Mavroidis, *The Regulation of International Trade*, vol 3 (n 66) 300-301.
[642] ibid 301.
[643] ibid.
[644] James (n 99) 287.

substantive business operations in the territory of the parties to such agreement.[645]

On the one hand, this provision appears to expand the scope of preferential treatment. Zampetti and Suavé find that Article V:6 "is tantamount to saying that a service provider incorporated in a country member to a preferential agreement, even if owned or controlled by nationals of a (WTO Member) third party, such as a subsidiary, will have to be treated in an identical way as a service provider of any of the preferential agreement's signatories…The only requirement being that such juridical person engages in substantial business operation in any of the parties."[646] However, such identical treatment available to third-parties can be limited or precluded by rules for determining the origin of services in the PTA.

At this point, we begin to find some similarities for rules of origin for services with rules of origins for goods: both can be more or less restrictive according to political policy goals. With services, policy objectives can include promoting groups of service suppliers, skill development of established suppliers, or attracting foreign direct investment (FDI).[647] However, the restrictiveness of rules of origin for services has an impact on the costs and the efficiency in the trade of services.[648] Liberal rules of origin in a PTA, which still require that foreign companies do not merely establish shell companies, can encourage investment in the territory by third-party providers.[649] Yet, such an open market may also lead to a disinterest in negotiating a PTA as well as reduce any bargaining power a PTA member may have with respect to third-parties.[650] Zampetti and Suavé find that proponents "of more restrictive Rules of Origin may be expected to arise in the case of regional agreements that link countries with marked differences in levels of openness towards services trade or foreign direct investment."[651] Restricting the benefits of the PTA to parties could have an negative impact on the supply of services if it protects firms from more efficient foreign suppliers.[652] On the other hand, Zampetti and Sauvé argue that more efficient firms

[645] GATS art V:6.
[646] Zampetti and Sauvé (n 52)142.
[647] Carsten Fink and Deunden Nikomborirak, 'Rules of origin in services: A case study of five ASEAN countries' in Marion Panizzon, Nicole Pohl, and Pierre Sauvé (eds), *GATS and the Regulation of International Trade in Services* (CUP 2008) 118.
[648] Zampetti and Sauvé (n 52) 123-124.
[649] ibid.
[650] ibid 124.
[651] ibid 124-125.
[652] ibid 125.

can enter the market through acquisition of local firms, and nascent firms, by being protected from foreign competition, have time to improve how they supply services.[653] However, the effectiveness of rules on the origin of services in liberalizing or restricting trade is limited by a significant factor: identifying the origin of the service.

The actual trading environment for services complicates the drafting and application of rules of origin for policymaking purposes. One major issue is that a digital service, such as a 3D file, can be created in multiple countries before being transmitted to a customer. According to Zampetti and Sauvé, while the GATS may provide an "approach of conferring as origin the country from which or in which the service is supplied or the country of nationality of the service supplier" this approach, though relatively simple, "may prove unsuited to the evolving reality of technologically sophisticated services that are increasingly traded electronically and made up of inputs sourced from various locations."[654] Further, as James states, rules of origin are also subject to the "spaghetti-bowl problem."[655] As Members become parties of multiple PTAs with different approaches to rules for identifying service suppliers and liberalization of services, administration of the rules may grow difficult and service suppliers will be faced with costs when determining whether trade in a particular service qualifies for preferential treatment under the agreement.[656]

Richard Baldwin also identifies two other major factors which limit the possibility for writing rules of origin for deep trade agreements: "the difficulties of determining the nationality of 21st century companies" and "the public-good nature of regulatory reform."[657] Regarding the first point, policymakers, understanding that it is hard to trace where and when the value of a service was added, may design rules centered on the legal nationality of the service provider rather than the economic origin of the service. However, this reduces the discriminatory function of preferential rules of origin, as "they are easy to get around…if [for example] the rule of origin in the Japan- Malaysia EPA provides access only to banks registered in Japan or Malaysia, the rule encompasses all the US and European banks that have affiliates incorporated in Tokyo."[658] According to Baldwin, deep trade agreements ultimately do not have the same textual or political

[653] ibid 126.
[654] ibid 143.
[655] James (n 99) 287.
[656] ibid.
[657] Baldwin (n 53) 15.
[658] ibid 16.

objective as rules of origins: “many but not all deeper provisions tend to act as general liberalisations rather than discriminatory liberalisations because it is difficult or impossible to write rules of origin for them that exclude third nations. The deep reasons are the difficulties in establishing the nationality of modern corporations and of services as well as the public-good nature of the many regulatory reforms in deep RTAs.”[659] Therefore, if rules of origin for services also do not fit well into a trade framework integrating trade law and regulatory objectives, could they at least be incorporated into a framework for the data-driven economy which seeks to balance digital trade liberalization with protecting and promoting development?

Trying to find a place of rules of origin in such a framework requires a consideration of two debates: should a new mode be created, the Mode 5, and should there be a hybridization of goods and services under a WTO framework. As more and more services become embedded in goods, for example, a smart speaker, Dinh, Shin-Yi Peng[660], and Lucian Cernat and Zornitsa Kutlina-Dimitrova[661] propose categorizing these types of services under a “Mode 5” for services. Dinh argues that for goods with Mode 5 service components, the origin determination of the good will require determining the origin of the service embedded within it.[662] As the service input (the 3D file) is a significant part of the additive manufacturing process, a similar need may arise: to accurately understand where a 3D product comes from, one must take into consideration the origin of the service input.

Next, the debate on the hybridization of a goods-services legal regime focuses on whether the current rules are sufficient to regulate digital trade as the range of digital products varies from electronic transmissions, to products once sold in tangible forms (such as books), to goods-embodying services. The main starting point is the issue of classification: how do we define a digital product, is it a good, service, something in-between? This means exploring how the act of classifying the digital product correlates with the WTO texts and principles developed through WTO jurisprudence.

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[659] ibid.
[660] Shin-yi Peng, ‘A New Trade Regime for the Servitization of Manufacturing: Rethinking the Goods-Services Dichotomy’ (2020) 54 J World Trade 718.
[661] Lucian Cernat and Zornitsa Kutlina-Dimitrova, ‘Thinking in a Box: A “Mode 5” Approach to Service Trade’ (2014) 48 J World Trade 1109.
[662] Dinh (n 46) 131.

B. Is a 3D File a Good or a Service, or Both?

Before exploring the classification of digital products further, it is necessary to consider the role of classification within the framework of international trade law. Classification is not simply an exercise of dividing products into lists, but, as Smith and Woods, argue, is also an exercise of maintaining the legitimacy of international rules.[663] Nations create a boundary between goods and services based on domestic regulatory objectives. This is a politically sensitive decision, and this boundary line differs from state to state. As such, classification at a national level "may undermine the legitimacy" of an international lawmaking organization, such as the WTO.[664] At an international level, classifying goods and services is something more than just categorizing products, it also is "a matter of maintaining a single policy imperative within the international regulatory framework."[665] Classification, and the legitimacy that it entails for the international trade law system, thus will likely be a key element of any new framework regulating trade. Under Shaffer's proposal for a data-driven economy[666], perhaps a more flexible approach to goods and service classification would make the international trade law system more resilient to changes However, this may not assist in making the application of trade laws more predictable to traders. Within the scope of rules of origin, questions about whether a product is a good or service compounds the complexity of this process, and thus, could consequently raise the cost of trade.

The 3D printing industry, still an emerging form of manufacturing, may be impacted by multilateral or plurilateral decisions on how to classify digital products. Several scholars use 3D files as an example of digital trade that does not easily fit within the GATT or GATS silos. R.S. Neeraj, Joshua P. Meltzer, and Schaffer refer to 3D printing in articles focusing on barriers to the transmission of data flow and regulating cross border transmissions. Meltzer[667] and Schaffer[668] refer to 3D printing

[663] Fiona Smith and Lorna Woods, 'A Distinction without a Difference: Exploring the Boundary between Goods and Services in the World Trade Organization and the European Union' (2005) 12 Columbia J Eur L 1, 4-5. They refer to Zampetti's work on legitimacy, which finds that interpretation of such laws "is not only driven by the underlying rationale of the rule drafters, but also by the need to ensure the continued legitimacy of the rules themselves." Referring to Americo B Zampetti, 'Democratic Legitimacy in the World Trade Organization: The Justice Dimension'(2003) 37 J World Trade 105, 107.
[664] Smith and Woods (n 663) 5.
[665] ibid.
[666] Shaffer, 'Trade Law in a Data-Driven Economy' (n 477) 271.
[667] Joshua P Meltzer, "Governing Digital Trade," (2019) 18 World Trade Rev (2Supp) s35.
[668] Shaffer, 'Trade Law in a Data-Driven Economy' (n 477) 263.

in one sentence, while Neeraj[669] devotes two paragraphs to 3D printing. Sauvé[670] and Peng each refer to 3D printing in one sentence in their articles on whether there should be a hybridization of GATT and GATS for digital trade.[671] While barriers to transmission of data, regulating digital trade, and the goods/services dichotomy are relevant to the regulation of the international transmission of 3D files, these articles do not address identifying the origin of the 3D printed good and the role of the 3D file as an input in the production process of the good. While rules of origin are not mentioned in these articles, we can still refer to such articles as classification would be the start of the process of identifying the origin of a digital transmission,[672] such as a 3D file.

i. Transmission of 3D Files and E-Commerce

The first step is to determine whether a 3D file electronically transmitted across a border is a product of e-commerce. The term e-commerce is molded by diplomats and politicians for political or regulatory purposes, in particular for controlling the cross-border flow of data.[673] As Peng notes, the WTO E-Commerce Work Programme attempted to distinguish when a transaction falls under the GATS or GATTS, but eventually defined "electronic commerce" as "the production, distribution, marketing, sale or delivery of goods or services, by electronic means"[674] to avoid the goods-services dichotomy.[675] Another linguistic element is that e-commerce is often referred to as "digital trade" in trade instruments.

While e-commerce may invoke the retail behemoths like Amazon and Alibaba, digital trade suggests a broader category of products accessible only through digital technology or incorporating digital technology.[676] For example, Recital 8 of the EU E-Commerce directive, states "The objective of this Directive is to create a legal framework to ensure the free movement of information society services between

[669] R S Neeraj, 'Trade Rules for the Digital Economy: Charting New Waters at the WTO' (2018) 18 World Trade Rev (2Supp) s126.
[670] Pierre Suavé, 'To Fuse, Not to Fuse, or Simply Confuse? Assessing the Case for Normative Convergence Between Goods and Services Trade Law' (2019) 22 J Intl Economic L 356.
[671] Peng (n 660) 704.
[672] Farrokh Farrokhina and Cameron Richards, 'E-Commerce Products Under the World Trade Organization Agreements: Goods, Services, Both or Neither?' (2016) 50 J World Trade 793, 800-801.
[673] See eg, Susan Ariel Aaronson and Patrick Leblond, 'Another Digital Divide: The Rise of Data Realms and its Implications for the WTO' (2018) 21 J Intl Economic L 245.
[674] WTO, 'Electronic Commerce' (wto.org) <https://www.wto.org/english/thewto_e/minist_e/mc11_e/briefing_notes_e/bfecom_e.htm> accessed 24 October 2021.
[675] Peng (n 660 )718.
[676] Neeraj (n 669) s123.

Member States…"[677] While, under Recital 18, "information society services" in addition to the selling of goods online, "also include services consisting of the transmission of information via a communication network."[678] CETA states "electronic commerce means commerce conducted through telecommunications, alone or in conjunction with other information and communication technologies."[679] The TCA also has no definitions for "e-Commerce" or "digital trade," but states that the objective of the Digital Trade Title is to "facilitate digital trade, to address unjustified barriers to trade enabled by electronic means and to ensure an open, secure and trustworthy online environment for businesses and consumers".[680] However, it does state that "Electronic transmissions shall be considered as the supply of a service within the meaning of Title II [Services and investment]."[681] Thus, for the electronic transmission of a 3D file to fall under the category of e-commerce in EU legal instruments, it is likely necessary to classify it as a service.

The US Department of Trade considers digital trade to be a "broad concept, capturing not just the sale of consumer products on the Internet and the supply of online services, but also data flows that enable *global value chains*, services that enable *smart manufacturing*, and myriad other platforms and applications"[my italics].[682] Chapter 19 of the USMCA defines a "digital product" as "a computer program, text, video, image, sound recording, or other product that is digitally encoded, produced for commercial sale or distribution, and that can be transmitted electronically."[683] In a footnote, the Agreement clarifies that "This definition should not be understood to reflect a Party's view that digital products are a good or are a service."[684] Peng argues that with this footnote, "difficulties related to differences in treatment between goods and services are managed in the context" of the Digital Trade Chapter, and that "[s]uch an approach, to a large extent, relieves pressure from the

[677] Council Directive 2000/31/EC of 8 June 2000 on certain legal aspects of information society services, in particular electronic commerce, in the Internal Market (Directive on electronic commerce) [2000] OJ L178/1.
[678] ibid.
[679] CETA ch 16 art 16. 1.
[680] TCA Heading I, Title III ch 1 art 196
[681] ibid art. 203(1) A "'service' means any service in any sector except services supplied in the exercise of governmental authority." (Heading I, Title II, art 124 (o). Further, the TCA prohibits imposing custom duties on electronic transmissions (Heading 1, Title III, ch 3 art 203(2)).
[682] USTR, 'Key Barriers to Digital Trade' (USTR.gov 31 March 2017) <https://ustr.gov/about-us/policy-offices/press-office/fact-sheets/2017/march/key-barriers-digital-trade> accessed 24 October 2021.
[683] USMCA, ch 19, art 19.1. The definition of "digital product" does not include "digitized representation of financial instruments, including money."
[684] USMCA, ch 19, art 19.1, fn 1.

debates about the classification issues in the digital age."[685] Under the USMCA's Digital Trade Chapter, a 3D file would at least be a digital product, but whether it is a good or service would be determined under a different chapter or instrument.

### ii. Classification of Goods and Services — Is a New Hybrid Category Necessary?

Until some hybridized regime for digital products is established, it will be necessary to find a way to categorize 3D files under the GATT or GATS to proceed with the origin analysis of 3D printed products. Smith and Wood approach determining whether a product is a good or a service through Article 31(a) of the VCLT, which instructs that the terms of a treaty shall be interpreted "in good faith in accordance with the ordinary meaning to be given to the terms of the treaty in their context and in the light of its object and purpose."[686] The Appellate Body has found the DSU to allow application of the Vienna Convention to interpret WTO rules.[687] Using the work of Smith and Woods on defining goods and services allows us to identify some challenges in determining whether 3D files should be classified as goods or services for purposes of origin determination.

In reviewing the Oxford English Dictionary definitions for the ordinary meaning of goods and services, Woods and Smith derive two adjectives that indicate that a product is a good, "tangibility" and "tradability."[688] A product must have material form, i.e. tangibility, and there must also be a transfer of physical ownership of the product, i.e. tradability.[689] When examining the terms "goods" and "services" in context, such a view becomes problematic as it "neglects the role of political imperatives which may influence the product's categorization."[690] Different interpretations (based on different motivations) on which aspect of the good is the tangible element can lead to conflicting classification systems.[691] As classification is a matter of national policy, it is necessary for the WTO to formulate a "coherent policy on classification based on objective criteria

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[685] Peng (n 660) 716-717.
[686] Smith and Woods (n 663) 40; VCLT art 31(1).
[687] Smith and Woods (n 663) 40; Understanding on Rules and Procedures Governing the Settlement of Disputes (DSU) (15 April 1994) LT/UR/A-2/DS/U/1 art 3(2) http://docsonline.wto.org accessed 7January 2022.
[688] Smith and Woods (n 663) 41.
[689] ibid 44. The authors find this dichotomy (goods are tangible and tradeable, services are not) reflected in the work of economists (namely Bhagwati). Smith and Woods, citing Jagdish Bhagwati, 'Economic Perspectives on Trade in Professional Services' (1986) U Chicago Legal Forum 45.
[690] Smith and Woods (n 663) 47.
[691] ibid.

which reflects the goals of the organization itself" if such international classification is to replace one founded on national policy imperatives.[692]. Relying on "tangibility" and "tradability" as the key determining factors raises some complications when one looking at borderline products[693] such as may be the case with hybrid products or 3D printed goods.

The WTO's DSB has also addressed, though not in the context of RoO, whether a "good" must be a tradeable item. Under Article 1.1(a)(1)(iii) of the SCM Agreement, a subsidy shall be deemed to exist if, "there is a financial contribution by a government or any public body within the territory of a Member (referred to in this Agreement as 'government'), i.e. where: a government provides goods or services other than general infrastructure, or purchases goods."[694] The Panel found in *US-Softwood Lumber (III)* that while "goods" in Article 1.1(a)(1)(iii) "includes tradeable products, there is no reason to limit its meaning to only such products," and when goods are provided by the government, nothing in the provision suggests that "the goods in question need to be tradeable products with a potential or actual tariff line."[695] The Appellate Body (AB) found in *US-Softwood Lumber IV*, that when interpreting the English word "goods," the dictionary meaning of "tangible and moveable property" was a starting point of the interpretation, but when looking at the ordinary meaning of the words "biens" and "bienes", the concept of goods includes immoveable property, and thus "goods" should be interpreted broadly to mean tangible property and possessions.[696] The AB, then found that Article 1.1(a)(1)(iii) "does not preclude that there may be 'goods' in the sense of Article 1.1(a)(1)(iii) that are not actually 'imported' or traded."[697] However, the AB made it clear that " '[g]oods in Article 1.1(a)(1)(iii) of the SCM Agreement and 'products' in Article II of the GATT 1994 are different words that need not necessarily bear the same meanings in the different contexts in which they are used," and thus it was not necessary for "goods" under the SCM Agreement to be tradeable and capable of having a tariff classification.[698] As the design and administration of preferential RoO

[692] ibid 49.
[693] Ibid 44-45.
[694] SCM Agreement art 1.1(a)(1)(iii) .
[695] Report of the Panel, *United States – Preliminary Determinations with Respect to Certain Softwood Lumber from Canada* (*US-Softwood Lumber (III)*) (27 September 2002) WT/DS236/R, paras 7.23, 7.27-28.
[696] Report of the Appellate Body, *United States – Final Countervailing Duty Determination with Respect to Certain Softwood Lumber from Canada* (*US-Softwood Lumber IV*) (19 January 2004) AB-2003-6, WT/DS257/AB/R, paras 58-59.
[697] ibid para 62.
[698] Ibid para 63-61.

are intrinsically linked to tariff lines, it may be challenging to argue that the non-necessity of tradability under the SCM agreement could be extended to RoO provisions that apply to goods.

It could also be argued that for new hybrid-products, there must be some element which is tangible and tradable for it to be considered a good. However, in *Canada-Renewable Energy*, the AB found that the language of "purchases goods" in Article 1.1(a)(1)(iii), also encompasses the purchase of electricity. [699] Electricity does have a HS classification, and, while R.S. Neeraj does not reference the finding in *Canada-Renewable Energy*, he argues that the "flow of data constitutes a good." [700]As electricity, "essentially the flow of electrons" falls under HS 2716.00, and "for the purpose of WTO law, electricity comes under the purview of GATT," there is "no reason to treat the flow of data any differently from that of the flow of electricity for the purposes of classification under international trade law."[701] As the next Chapter will suggest, there are some complications when applying the CTH criterion using data in the form of a digital file. It could be questioned if changing from the heading for electricity to the heading for a finished bicycle frame by downloading a file into an additive manufacturing machine and instructing it to print is the type of transformation the drafters of product-specific RoO rules had in mind when designing the rules.

Farrokhina and Richards note in their review of discussions at the WTO by Members on the good-services dichotomy, that some Members argue that GATT could be applied to digital products as there is no language specifying that GATT applies to tangible goods, while other Members argue that there are no tariff lines for digital products and thus it is impossible to apply GATT.[702] James Munro points out that while there is no specified tangibility requirement, a key limitation for applying GATT to digital products is that ownership of many digital products are not transferred to the consumer upon purchase.[703] When a consumer purchases a license to use software or a movie file, he does not possess the right to resell or transfer that file to another party. Munro's

[699] Reports of the Appellate Body, *Canada-Certain Measures Affecting The Renewable Energy Generation Sector & Canada – Measures Relating to the Feed-In Tariff Program* (*Canada-Renewable Energy*) (6 May 2013) 3AB-2013-1, WT/DS412/AB/R; WT/DS426/AB/R paras 5.127-128; See Matsushita (n 22) 312-313.
[700] Neeraj (n 669) s128.
[701] ibid.
[702] Farrokhina and Richards (n 672) 801-802.
[703] James Munro, 'Pushing the Boundaries of "Products" and "Goods" under GATT 1994: An Analysis of the Coverage of New and Unorthodox Articles of Commerce' (2013) 47 J World Trade 1323, 1347-1349.

analysis of the words “good” and “products” in GATT suggests that these terms apply to products whose ownership is assigned rather than licensed upon a commercial transaction, and thus GATT applies to goods whose property rights are transferred upon transfer of the good.[704] This distinction would be relevant to 3D files that are licensed by the company that designs the files to a manufacturer across a border, who is either part of the vertical supply chain or independent from the company creating the file. There has been no change in ownership of the 3D file, thus, the file does not fall under GATT. Who would own the 3D printed good, the company that licensed the 3D file or the manufacturer which printed it, is an interesting legal question, but is a topic beyond the scope of this dissertation.

iii. Classifying the 3D File

While it is possible to debate whether a 3D printed part that derives from a 3D file downloaded in a printing machine is an example of the hybridization of goods-services, this dissertation takes the position that 3D files are services. The fact that the 3D file (the electronic transmission) is intangible suggests that the file falls into the category of services (until there is such a hybridized regime). However, Neeraj believes that “a legal question that arises with regard to classification of 3D printed products is whether the CAD file can be classified as a good or service.”[705] He proposes that 3D printing will redefine GVC for two reasons. First “a variety of products can be manufactured using 3D printing…Secondly, a major proportion of the value of 3D manufactured goods will be captured in designing and generating the CAD file which is the electronic blue print of the final manufactured product.”[706] Neeraj does not provide an definite answer to his question, but refers to a US Federal Circuit Court case in which a dental aligner company, ClearCorrect, sought an injunction on the transmission of files (data) from abroad on the basis that dental aligners printed in the US from such files would infringe ClearCorrect’s patent rights. The legal question in this matter was whether the International Trade Commission (ITC), a federal and quasi-judicial agency that analyzes trade issues, had jurisdiction to issue the injunction in this instance and whether the Customs and Border Protection (CBP) can regulate the

[704] ibid.
[705] Neeraj (n 669) s126.
[706] ibid. Further to the discussion above regarding how much processing occurs during the printing process, Neeraj also states that “Once the CAD file is generated, the actual printing simply requires the manufacturer to have a 3D printer and the required material for printing.”

transmission of data. The Court ruled that while the CBP can regulate, the ITC has jurisdiction over articles of commerce, and "articles" means "material things," and "electronic transmissions" are not "material things."[707] Neeraj concludes by stating the "implications of this ruling are hard to miss: there is a growing incidence of servicification of manufactured products and in the future it will be difficult to reason against this blurring of boundaries between goods and services."[708] In the future, such legal blurring of boundaries may occur. However, until such a time, the *ClearCorrect* decision, while having no legal impact on WTO law, nonetheless coincides with the WTO's jurisprudence in considering goods under GATT to be material items.

The AB has identified intangibility as an element of a service. In *US -Measures Affecting Trade in Large Civil Aircraft*, also a dispute under the SCM Agreement, the AB found that "it may be difficult to separate goods from services, for instance, where services are an input or processing step in the production of goods."[709] However, the AB did attempt to distinguish goods from services, by stating that "'Goods' are tangible items. They are often contrasted against 'services', which are intangible…As opposed to goods, typical features of services include their immaterial, invisible, intangible, and non-storable, and transitory nature."[710] Whether a particular measure at issue could fall under GATT 1994 and GATS, the AB specified in *EC-Bananas* that such measures include those "that involve a service relating to particular good or a service supplied in conjunction with a particular good," but "whether a certain measure affecting the supply of a service related to a particular good is scrutinized under the GATT 1994 or the GATS, or both, is a matter that can only be determined on a case-by-case basis."[711] This is not quite the same issue with RoO, as we are not determining whether GATS or GATT apply to RoO in an FTA. Preferential rules applying goods will be assessed under the AOR Agreement, Annex II. However, we do need to understand whether a digital file is a service to apply GATS provisions on origin to 3D files. As 3D files are intangible and immaterial when transmitted electronically, they could be considered

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[707] *ClearCorrect Operating v. International Trade Commission*, 810 F. 3d 1283, Court of Appeals, Federal Circuit 2015; Matthew Rimmer, 'ClearCorrect: Intellectual Property, 3D Printing, and the Future of Trade' (2019) 23 Gonzaga J Intl L 55, 66-68.
[708] Neeraj (n 669) s126.
[709] Appellate Body Report, *United States – Measures Affecting Trade in Large Civil Aircraft* (*Second Complaint*), WT/DS353/AB/R (12 March 2012, adopted 23 March 2012) para 619 fn 1295.
[710] ibid. *See* Peng (n 660) 707-709, for further discussion on WTO case law on regulating digital trade. However, footnote 64 of Peng's article states that the quotes from *Large Civil Aircraft* come from paragraph 1295, while the quotes are found in footnote 1295 of paragraph 16 of the decision.
[711] Appellate Body Report, *European Communities - Regime for the Importation, Sale and Distribution of Bananas* (9 September 1997, adopted 25 September 1997) WT/DS27/AB/R, para 221.

services. On the other hand, they are not transitory in nature. As many digital products can be stored and used multiple times, it could be questioned whether digital products should be categorized as services,[712] but this is also a debate that extends beyond the focus of this dissertation.

If we consider 3D files to be services, the next step is to determine whether GATS applies to digital services. Ines Willemyns argues that GATS "remains the relevant framework for digital services," although none of the legal provisions "expressly regulate digital services."[713] Her article on classifying digital services under GATS is grounded on the principle that GATS is technologically neutral , and "some of the GATS' general obligations apply to digital services, regardless of their specific classification."[714] Thus, general provisions such as determining the origin of a service, which are not dependent on the specific commitments undertaken by Members, could apply to digitally enabled or digitally transmitted services, such as 3D files.[715] She concludes that "truly new services are rare, if they exist at all. Most digital services are services that have existed for many years, but can now be supplied in a different way, through the internet, boiling down to the transmission and processing of data."[716] When considered in this light, the 3D file is a digital version of a very old service – the design of a blueprint to construct an object or a structure. The creation and transmission of a 3D file for the purposes of constructing a tangible item could be classified generally as a service under the GATS and thus the origin provisions of GATS discussed above could apply to 3D files.

An author who has looked into the categorization of 3D files under GATT or GATS is Sam Fleuter. He ultimately concludes that 3D files should be treated as services under GATS. The goal of his article, "The Role of Digital Products under the WTO: A New Framework for GATT and GATS Classification," is not "to decide whether

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[712] *See* Farrohkina and Richards (n 672) 810. Sam Fleuter, 'The Role of Digital Products under the WTO: A New Framework for GATT and GATS Classification' (2016) 17 Chicago J Intl L 153, 165-166.
[713] Ines Willemyns, 'GATS Classification of Digital Services – *Does "The Cloud" Have a Silver Lining?*' (2019) 53 J World Trade 59, 72-73.
[714] ibid 63.
[715] Willemyns does not discussed 3D printing or rules of origin in her article.
[716] ibid 79-80. She also adds that whether "digital products constitute goods or services, it should be recalled that the GATS applies to measures affecting the supply of services. Whether a supplier is, *in abstracto*, dealing with a good or a service is of relatively little importance, rather the focus should be on whether the measures of Members are regulating the trade of goods or the behaviour of service supplies in their supply of a service. I therefore submit that the theoretical discussion on the term 'digital services' should not be accorded under weight. The assessment of whether the GATT or GATS applies will always be done on a case-by-case basis." ibid 80.

CAD files should be treated as goods or services merely so WTO members will know how to treat them as imports," but rather "to use WTO treatment of additive manufacturing as a bellwether for the legal treatment of other new technologies as they arise."[717] Fleuter examines whether a CAD file is a good or service by referring to the four-part test in *EC-Abestos* for determining if two products are alike for purposes of tariff or tax treatment.[718] He first hypothesizes that under this likeness test a "3D rendering should be treated the same as the finished product that it is used to produce. In the ClearCorrect case, for example, an easy solution would be to treat the CAD files holding the design for the clea[r] dental aligners the same as the clear dental aligners themselves."[719] However, a CAD file for a dental aligner is unique and the printed product is unique: the CAD file results from the scan of a person's mouth; only that person can use the tangible dental aligner. Thus, "a company importing a CAD file then 3D printing its dental aligners would face the same international trade restrictions as a company importing the dental aligners themselves…treating ClearCorrect's CAD files as goods would not create a problem of inconsistency [in GATT treatment] because ClearCorrect imports one CAD file for every one dental aligner that it prints."[720]

For products other than unique products like dental aligners, subjecting the CAD file to a tariff or tax, but not applying any duties to goods printed from that file in the territory does not result in like treatment with traditionally manufactured goods under the GATT.[721] The importer of the CAD file only has to pay one duty when importing the file, but can print 100 widgets in the territory without having to pay any duties on those widgets. The importer of 100 traditionally manufactured like-widgets must pay duties for 100 widgets. Whether 3D printed products can be deemed like traditionally manufactured products is a complex question given the physical and chemical differences between the materials used in traditionally manufacturing and the

[717] Fleuter (n 712)161.
[718] ibid 166-167. The factors are for determining likeness under GATT art III(4): the physical properties of the products, the end uses of the products in the market, the consumer's tastes and habits concerning the products, and tariff classification, Appellate Body Report, *European Communities – Measures Affecting Asbestos and Asbestos-Containing Products* (12 March 2001, adopted 5 April 2001) WT/DS135/AB/R paras 142-146. Matsushita (n 22) 196-200 for an overview of the history of the interpretation of "likeness" in Article III of GATT and GATT 1994, the AB's guidance on determining likeness under the four criteria, as well as references to GATT and WTO disputes concerning that article.
[719] Fleuter (n 712) 167.
[720] ibid 168.
[721] ibid.

materials used in 3D printing.[722] However, before beginning a GATT Article I or III analysis of 3D printed products and traditionally manufactured products, it is first still necessary to identify the origin of the 3D printed product.

Fleuter next compares the CAD file to blueprints. A printed blueprint is a set of instructions.[723] Likewise, a designer using CAD software programs can render a design of a good which then is converted into a file that provides instructions for the production of that good.[724] However, Fleuter notes that with blueprint, a service must be rendered in order for the good to materialize from those instructions.[725] CAD files for 3D printing can be downloaded into the printing machine, and this differentiates the CAD file from blueprints for purposes of trade policy objectives:

> a country that wants to protect against the importation of services under GATS but is open to freer trade under GATT would not have to worry about the importation of a blueprint because another service (construction) must be purchased before the blueprint turns to a good [a house]. A CAD file, on the other hand, only needs a 3D printer to turn it into a good, and operating a 3D printer does not create domestic jobs like constructing a building would.[726]

This last sentence points to a paradox of looking to 3D printing for reshoring manufacturing and job creation. However, we can conclude that while blueprints and 3D CAD files are similar, they are not perfect substitutes when comparing the treatment of 3D printed goods to traditionally manufactured goods under WTO Law.

While Fleuter does not specifically state that generating a CAD file is a service, the act of designing as a type of service is regulated under GATS. The Agreement defines services as including "any service in any sector except services supplied in the exercise of governmental authority."[727] The WTO has categorized the act of designing architectural and engineering blueprints as a service.[728] The Swedish National Board of Trade stated in its report on 3D printing that "3DP can involve a number of different services activities, including (a) designing and engineering computer-aided design

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[722] National Board of Trade, 'Trade Regulation in a 3D Printed World' (n 47) 28-29.
[723] Fleuter (n 712) 168. Fleuter focuses on the printed blueprint. It could be argued that blueprints are similar to 3D files as both can be transmitted electronically internationally. An automobile designer in Europe may send a file of the blueprint of the interior of a car to engineers in a production facility in North Carolina, who then print the blueprint, rather than sending the blueprint rolled up in tube across the Atlantic Ocean.
[724] Ibid 168.
[725] ibid.
[726] ibid.
[727] GATS art I(3)(b).
[728] WTO, 'Architectural and Engineering Services' (wto.org) < https://www.wto.org/english/tratop_e/serv_e/architecture_e/architecture_e.htm> accessed 24 October 2021.

(CAD) files…"and "[t]hese activities are regulated under the General Agreement on Trade in Services (GATS)."[729] In his book on Rules of Origin for services, Dinh identifies the designer of a CAD file as a service provider.[730]

In light of the arguments above and the creation and use of 3D files, this dissertation will consider 3D files to be services in examining how preferential RoO impact the origin determination of a 3D printed good. Thus, the design of the 3D file is a service, and it is a service input in the production of a 3D printed good. We are stepping away from the exercise of deciding if the 3D file (the digital code) is a good or service or understanding whether measures impacting trade in 3D files are consistent under GATT or GATS. As Neeraj and Fleuter alluded to, the value of a 3D file comes from the design of the file, and these aspects, the design process and its value, would be key elements for a rules of origin analysis. As 3D files can be designed through GVCs of services, it may be challenging to place a value on the final service product, thus complicating the application of the CTH or *ad valorem* percentage criterion. However, such friction in a rules of origin analysis also allow us to consider whether and how rules can be designed and any weak points that are at risk for protectionist intervention.

## VI. Conclusion

This chapter has both looked to the present and to the future of preferential RoO. It is challenging to place these rules within an international trade law framework that seeks to utilize transparency, predictability, and even-handedness in regulating trade to liberalize trade and promote development. Rather, looking at how rules are designed has revealed that they are susceptible to capture by groups with protectionist aims that construct the rules to protect domestic industries. Studies by economists have demonstrated that traders are potentially deterred from trading in foreign markets because of the complexity of the rules. Even the legality of the rules is questionable under the WTO. However, the fact remains that preferential RoO are included in PTAs and they may continue to be used by states as legal tools. The question then becomes: what do we do with preferential RoO? One approach is to find ways to make major adjustments to the technical and procedural elements of the rules. This will be discussed in more detail in Chapter 5. Another suggestion could be to make the rules

[729] National Board of Trade, 'Trade Regulation in a 3D Printed World' (n 47) 24.
[730] Dinh (n 46) 20.

“deeper” by also requiring that certain environmental or labor standards are met in the production of goods to qualify for a preferential tariff rate. This however, raises some challenges at legal and practical levels and may not help in the simplification of the rules. Further this approach is at risk to being subverted by politicians and industries that use such socially conscious initiatives to maintain protection of domestic industries. Thus, this dissertation proposes that some of the challenges, concerns, and hopes for preferential RoO can be addressed by examining the rules in the context of technology and manufacturing. Technological innovation, such as 3D printing, has allowed manufacturing to be more geographically diverse, efficient, and socially conscious.

A RoO system that supports digitalized manufacturing could allow RoO to find a place within an international trade law framework based on liberalizing trade and promoting development. However, this also means understanding what is digital trade generally and how rules of origin will still be necessary in a data-driven trade law framework. The first step of this analysis was looking at rules of origin for services in general. The next step was to determine if a 3D file could be a service. The final step was to place this digital service as a service falling under the GATS rules of origin.

It may be possible to design RoO so that they can provide a predictable trading environment and support digital trade. However, first it is necessary to understand where the current rules are ‘out-of-sync” slightly for products whose significant value is created in the design stage. Understanding these points of friction can give us some ideas on how to modify the rules. The issue of classification, and its links to sovereignty, was dealt with at the end of this chapter as it is the first step towards determining the origin of a 3D printed good, in addition to being a significant legal question for the design of a framework for governing a data-driven economy. At this point we are ready to delve deeper into additive manufacturing and examine how it will complicate the origin determination process.

## Chapter 4

## Preferential Rules of Origin in the Context of 3D Printing

This chapter will apply existing RoO regimes for goods and services to 3D printed products. Undergoing this process identifies issues in origin determination that may arise with regards to 3D printed products and other goods produced with manufacturing processes that have a significant digital technological component.

This approach also provides an opportunity to think about some underlying issues on the interpretation and application of RoO for both goods and services. First, it brings into question the perspective that a good's value lies in the manufacturing stage or in the raw materials used to make the good. Is it time for scholars, trade specialists, and customs offices to take into more consideration the value of research, design, and innovation when determining the origin of a good? Yet, this leads the analysis away from tangible material and physical labor to the intangible – ideas, creativity, data files – and into the realm of services. The scholarship referenced in the last Chapter on RoO for services and services classification indicates that the trade community is still questioning how to regulate services offered through digital technology. While the GATS provides a framework for determining the origin of services, modern services complicate the analysis by being an accumulation of activity from multiple territories and multiple producers.

By determining the origin of the tangible 3D printed product, we can achieve several analytical steps. First, we can identify the points where a RoO determination for goods based on traditional manufacturing processes is out of synch with additive manufacturing. Second, we can delve into the debate on whether service inputs, such as design and development, should have individual roles in conferring origin to final goods (the costs for such services can be included in direct overhead costs under the *ad valorem* method).

For this chapter, the service input is the digital file which is downloaded into the printing machine and which provides the instructions to the machine on manufacture the good. As some trade and 3D industry analysists claim that most of the value of the additive manufacturing process lies in the file[731], this could complicate regional value

[731] Lucas S Osborn, *3D Printing and Intellectual Property* (CUP 2019) 17; Neeraj (n 669) s126; Ana Nordberg and Jens Schovsbo, "EU Design Law and 3D Printing: Finding the Right Balance in a New E-Ecosystem' in Rosa Maria Ballardini, Marcus Norrgård, Jouni Partanen (eds), *3D Printing,*

content calculations if the value of the file is taken into consideration as an input in the determination of origin of the good.

Determining the origin of a service input for a 3DP good leads to an uneasy alliance between RoO for goods and RoO for services. Trade experts and economists emphasize the rise of the importance of "servicification" of manufacturing and the increasing role of services as key inputs in GVCs as part of the fourth industrial revolution.[732] But, if we start to consider a service input like a digital file as the crucial input of a tangible product, this requires linking the origin determination of a good to the origin determination of a service. In fact, if the file is the input with the highest economic value, and we continue to use economic origin as a basis for origin determination, it could be argued that the origin of the final good is dependent on the origin of the service. Given that the determination of origin of services is a complex process for digital transmissions, such linking of RoO of Goods to RoO of Services adds to the complexity already inherent in the origin determination for goods consisting of multiple tangible inputs.

By observing in this Chapter how 3D printing complicates origin analysis and could lead to a linkage between RoO for goods with RoO for services, we can then consider how RoO function as a legal tool. The next Chapter will examine whether there is a need for a new hybrid approach which unites goods and services under one legal framework; or, whether it is possible to continue to use instruments which differentiate between goods and services, and instead what is required is a new approach to interpretation of these instruments so that they better function in promoting liberalization and globalization.

Before continuing with this Chapter, it should be noted that the analysis proceeds on a few assumptions. First, that the Moratorium on eCommerce persists, and thus, there are no tariffs or taxes on digital transmissions. Second, there are no restrictions to the transmission of digital files between states. While both issues are in fact more complicated and rich in debate, discussing these issues in depth would lead us away from the main argument of this Chapter, which is determining the origin of the printed 3D product. The Chapter will begin with an analysis of origin determination of

*Intellectual Property and Innovation: Insights from Law and Technology* (WoltersKluwer 2017) 281; Gebhardt, Kessler and Thurn (n 78) 71-72.

[732] Peng (n 660) 699-726; Dinh (n 46) 5-6, 66-67; Patrick Low, "The Role of Services in Global Value Chains," in Deborah K Elms and Patrick Low (eds), *Global Value Chains in a Changing World* (WTO Publications 2013) 61-81.

a 3D printed good with the Wholly Produced Criterion. Next the chapter will examine origin determination under the Substantial Transformation Criteria. First, the Change of Tariff Heading (CTH) criterion will be looked at and issues of whether printing is a form of simple processing and simple assembly will be discussed. Next, the Chapter will present whether a digital file can undergo a substantial transformation under the CTH. Finding it challenging to combine the CTH for goods with an origin determination for services, the Chapter will proceed to examine how the origin of the service could be factored into the *ad valorem* approach. While this approach could provide a means for factoring the service input into the origin determination several key issues remain including how to value the 3D file and how to identify the source of the file.

## I. The Likelihood That a 3D Printed Product Would Be Wholly Produced in a PTA Territory

As discussed in previous Chapters, RoO for goods are generally divided in trade instruments into two main categories: origin is determined based on whether the good is (i) wholly produced or obtained in the territory or (ii) whether the good has undergone a substantial transformation in the territory. Thus, as a first step, we need to consider if origin can be conferred on a 3D printed product on the basis of being wholly obtained in the territory. Under the PEM and USCMA, a good is wholly obtained if it is produced exclusively from products specified in the rules. These products include minerals, plant matter, animal products, fish or shellfish, and scrap material.[733] If all the raw materials of the ink are sourced in the territory and the good is printed in the territory, then it seems possible that the 3D printed good is wholly produed in the territory. However, this means that a predominate factor in determining origin is the source of the materials. This requires thinking about what constitutes ink for 3D printers and where such material is likely to be found.

Biological material such as plant matter used for steaks which supposedly cook and taste like beef[734] and plastic or metal derivatives used for inputs for automobiles, airplanes, and other machinery call into question whether a 3D printed good can be wholly obtained in a territory. A “traditional” steak is wholly obtained in Switzerland if

[733] PEM app I art 4; The transitional rules include a specific definition of aquaculture. Commission, “Guidance: Transitional PEM Rules of Origin” (n 332) 10; USMCA art 4.3.
[734] Gareth Rubin, ‘How do you like your beef…old-style cow or 3D-printed?’*The Guardian* (10 November 2019) <https://www.theguardian.com/technology/2019/nov/10/3d-printed-meat-european-restaurant-menus-environment> accessed 24 October 2021.

the cow is born, raised, and butchered in Switzerland.[735] A 3D printed steak is made from an ink consisting of pea and rice proteins and seaweed.[736] A company in Switzerland wanting to print steaks will have to source seaweed that is farm-grown in Switzerland or import the seaweed, which may grow along the shores of a country outside of the EFTA territory. Thus, another criterion will likely be used to determine the origin of 3D printed products whose traditional counterparts are wholly obtained or produced product in the territory. Most 3D printers for products for industrial purposes use ink which are proprietary composites of resins[737], nylon powders (including glass, carbon or aluminum)[738], plastic filaments[739], and metal powders or wires.[740] Further, the 3D printing machine vendors design the machines to use specific composites and require that the ink be sourced from the same vendor or from a certified provider.[741] Thus, the territory of the maker of the ink must also be taken into consideration along with the territory of all the raw materials used to create that ink.

The fact that the ink for a 3D printed product is a mixture of various materials which may be sourced from various territories may result in the divergence of two policy goals: increase manufacturing jobs and increase exports qualifying for preferential treatment. Although US and EU policymakers promote the adoption of 3D printing as a means to reshore manufacturing jobs,[742] a good produced with 3D printing machines may not qualify as having EU or US origin. The political goal of manufacturing goods on the "home" territory may be achieved, but the additional goal of increasing the production of "national" or "regional" products would not be achieved when looking at the RoO. For example, two major suppliers of ink for 3D printing solutions, Solvay and

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[735] Inama, *Rules of Origin in International Trade* (n 20) 29-30, 55-57.
[736] Agnieszka de Sousa, 'A Realistic Steak is Fake Meat's Holy Grail' (*Bloomberg Business* 22 November 2019) https://www.bloomberg.com/news/articles/2019-11-22/fake-meat-companies-are-racing-to-3d-print-steaks accessed 24 October 2021
[737] Tuomi, Chekurov and Partnanen (n 2) 8.
[738] ibid 11.
[739] ibid 21.
[740] ibid 25.
[741] Iñigo Flores Ituarte, Siavash H Khajavi and Mika Salmi, 'Current and Future Business Models for 3D Printing Applications,' in Rosa Maria Ballardini, Marcus Norrgård, Jouni Partanen (eds), *3D Printing, Intellectual Property, and Innovation: Insights from Law and Technology* (WoltersKluwer 2017) 47-48; Gebhardt, Kessler, and Thurn (n 78) 72.
[742] Opinion of the European Economic and Social Committee, 'Living tomorrow. 3D printing — a tool to empower the European economy' (own-initiative opinion) (2015/C 332/05) C 332/36, 8 October 2015; The White House, 'President Obama Launches Advanced Manufacturing Partnership' (*Obama White House* 4 June 2011) < https://obamawhitehouse.archives.gov/the-press-office/2011/06/24/president-obama-launches-advanced-manufacturing-partnership> accessed 24 October 2021; 'America Makes' (Americamakes.us) <https://www.americamakes.us/about/> accessed 24 October 2021.

Sandvik, are multi-national organizations with manufacturing facilities worldwide.[743] Even if Solvay Italia supplies the polymer filaments to a factory outside of Milan which prints gears for automobiles, all of the chemicals used to create the filaments may not have been produced in Italy or within the EU.[744] A criteria other than the wholly produced criteria is required for the printed gear to have EU origin under the PEM.

Finally, we must think about the role of the 3D file if the file is considered an origin conferring service. We could say that the 3D printed product consists of two inputs – the intangible 3D file and the tangible ink. If the 3D file is designed in France and downloaded in the factory in Milan and printed with 100% Italian ink, the product will still qualify as a product originating in the PEM territory. However, if the 3D file is designed in and transmitted from Japan to the printer in Milan, the product is no longer wholly produced in the EU and does not qualify for PEM origin under the wholly produced criterion.

The international journeys of digital files for the printing of dental aligners and hearing aids provides a glimpse into how the adoption of additive manufacturing by other industries could result in goods that do not meet the wholly produced criteria if the 3D file is an origin conferring input of the product. The dental aligner[745] and hearing aid industries[746] were early adopters of additive manufacturing at a widespread scale for consumer medical products. Align Technology, based in the United States, has been producing "invisible" dental aligners since at least 1998 and has been

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[743] 'About Solvay' (solvay.com) < https://www.solvay.com/en/our-company> accessed 24 October 2021; 'About Us' (home.sandvik) <https://www.home.sandvik/en/about-us/> accessed 24 October 2021.

[744] 'Solvay in Italia' (solvay.it) <https://www.solvay.it/it/solvay-in/index.html> accessed 24 October 2021; 'Additive Manufacturing Solutions' (solvay.com) < https://www.solvay.com/en/chemical-categories/specialty-polymers/additive-manufacturing> accessed 24 October 2021; The USITA reports that the additive manufacturing market in Italy is estimated to be $500million - $1 billion and is used in the automotive, aerospace, biomedical and fashion and design industries. USITA, 'Italy – Country Commercial Guide: Advanced Manufacturing' (trade.gov 28 October 2021) < https://www.trade.gov/country-commercial-guides/italy-advanced-manufacturing> accessed 8 January 2022.

[745] Structo, 'Part I: The Birth of Clear Aligners' (*Structo3D* 18 July 2017) <https://www.structo3d.com/blogs/blog/part-1-the-birth-of-clear-aligners> accessed 24 October 2021; Align Technology, 'Align Technology Announces Plans to Assume Operations From Its Manufacturing Services Provider,' (Align Technology Investor Release 22 December 2008) <http://investor.aligntech.com/static-files/de067378-b820-409a-ba5a-fa79087f2fb6> accessed 24 October 2021.

[746] Ana Lucia Abeliansky, Immaculada Martínez-Zarsoso and Klaus Prettner, '3D Printing, International Trade, and FDI' (2020) 85 *Economic Modelling* 298, 301; "3D Printing Technology for Improved Hearing," (Sonova.com 2020) <https://www.sonova.com/en/story/innovation/3d-printing-technology-improved-hearing> accessed 24 October 2021.

manufacturing its clear aligners in Mexico since 2000.[747] Dentists and orthodontists around the world scan patients' mouths and send the digital files to be modelled at Align Technologies facilities in Costa Rica.[748] The completed digital models are then sent to Mexico for printing and distribution. Similarly, in the hearing aid industry, Sonova has been using 3D printing to mass produce custom-made hearing aids since 2001.[749] Practitioners scan silicone impressions of the ear canal (still made by hand) and further processing is done digitally.[750] Once the hearing aid shell is complete, Sonova reports that "the file with the three-dimensional structure is stored in a central database and transmitted to the 3D printers at the production site,"[751] which are located in Latin America, North America, Asia, and Oceania.[752] These examples demonstrate that business leaders using 3D printing to transform an industry may not choose to concentrate all stages of production in one territory, but instead, break up the production process in various territories. This global aspect of mass customization is one reason why the World Economic Forum in its White Paper on 3D printing critically questions whether 3D printing will "foster a trend towards 'reshoring,' or bringing production back to regions where the products were originally designed and manufactured but later moved to lower-costs regions."[753]

Factoring the 3D file as a service input when determining origin based on the wholly produced criterion reveals the complications that can result when linking the origin of services to the origin of goods produced by additive manufacturing. However, even with traditional manufacturing, the wholly produced criteria is not frequently applied to products that consist of several parts. Instead, the change of tariff classification criteria or the value-added criteria are usually used.[754]

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[747] Align Technology Investor Release (2008) (n 746).
[748] Align Technology, 'Align Technology Expands Operations in Costa Rica with New Facilities to Support Continued Long-Term Growth,' (Align Technology Investor Release 25 July 2018) <http://investor.aligntech.com/news-releases/news-release-details/align-technology-expands-operations-costa-rica-new-facilities> accessed 24 October 2021.
[749] Sonova, '3D Printing Technology for Improved Hearing' (n 746).
[750] ibid.
[751] ibid.
[752] Abeliansky, Martínez-Zarsoso and Prettner (n 746) 301.
[753] Fan, Sotelo and Sundareswaran (n 47) 13
[754] Inama, *Rules of Origin in International Trade* (n 20) 90-102.

## II. From Ink to Printed Product: Printing May Result in a Change of Tariff Heading, but Is It Sufficient Processing to Qualify for Origin?

At first glance, the CTH seems like a suitable method for determining the origin of a 3D printed good. The purpose behind the CTH is to ensure that a certain amount of processing of the good occurs in the territory of the PTA.[755] Putting polymer filaments produced in Country Y into a 3D printing machine in Country X, hitting the "print" button, and hours later finding a gear for an automobile in the bed of the printer seems like there has been sufficient processing in Country X. The polymer filament would be classified in HS Chapter 39 and the finished gear or piston for a motor vehicle in Chapter 87.[756] Lucas S. Osborn in his book on 3D printing and intellectual property law refers to a 3D printing method called Stereolithography (SLA), which "uses ultraviolet light to cure (harden) successive layers of a liquid photopolymer." [757] He states that "[w]atching this process can be somewhat surreal because the part slowly arises from a vat of liquid goo."[758] Indeed, that seems like a perfect example of a substantial transformation.

Yet, a few scholars examining RoO in the context of 3D printing differ in their initial assessments of whether the CTH is suitable for determining the origin of 3D printed products. With regards to the CTH, the Swedish National Board of Trade wrote in one of its reports on 3D printing that applying the CTH criterion may be more viable than the *ad valorem* criterion, because it "establishes substantial transformation when a product is turned into another product, classified differently according the HS. Translated into 3DP terms, CTC [change in tariff heading] would be fulfilled when the "ink" (classified in one specific HS-code) is printed into a product (classified in a different HS-code from the "ink")."[759] The National Board of Trade does not explore the use of the CTH further, but concludes at the end of the section on RoO that while an entirely new approach is not needed, "the RoO can still incorporate" changes to the way 3D printing changes the production of goods and that "probably certain amendments and a broader scope based on the challenges [3D printing brings to determining origin] are needed."[760]

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[755] Van de Heetkamp and Tusveld (n 193) 83. See also Chapter 2, Part II, Section A.
[756] WCO, 'HS Nomenclature 2022' (n 292).
[757] Osborn (n 731) 34.
[758] ibid.
[759] National Board of Trade, 'Trade Regulation in a 3D Printed World' (n 47) 27-28.
[760] ibid 28.

On the other hand, the study conducted by Ziyang Fan, Jimena Soleto, and Venkataraman Sundareswaran calls into question the use of the CTH on the basis that it may be difficult to determine whether the last substantial transformation takes place "at the design stage or at the time of printing."[761] The authors then argue that with 3D printing, the CTH would not function as a discriminatory method for determining origin:

> Virtually any 3D-printed product would qualify for a change in product classification, as it would have been transformed from a filament or other raw material to a different product, thus following a different classification under the HS Code. As such, any product feasible of being 3D-printed could qualify for reduced tariff or no tariff under a PTA if its RoO were based solely on a change in product classification.[762]

As the CTH criteria loses its discriminatory function, the rules would allow for a type of transshipment from third-party territories into the territory of one of RTA parties.[763] For example, Countries X and Y have an FTA with a tariff rate for automobile gears at 5%. Country Z is a third party. Producer Y in Country Y prefers the gears produced by Company Z. However, Producer Y must pay a 10% tariff when importing gears from Country Z. To circumvent the 10% tariff, Company Z designs Z-3DGEAR in Country Z, but prints Z-3DGEAR in Country X, where it is cheap to print, at a printing lab. The raw materials come from Country Z. As Z-3DGEAR is printed in Country X, under the CTH, and assuming printing is not simple processing, Z-3DGEAR now originates in Country X and can be imported into Country Y under the 5% preferential rate.[764] On the other hand, a gear traditionally manufactured in Country Z is still subject to the 10% tariff. If printing Z-3DGEAR in Country X and shipping Z-3DGEAR to Country Y is cheaper than paying the 10% tariff, Company Z has an incentive to stop producing its gears in Country Z and instead print the gears in Country X, thus, also competing with traditional gear manufacturers in Country X for Producer Y's business.

Questioning whether the last substantial transformation takes place at the time of printing leads to the greater question of what type of processing is printing in the context of RoO. The general goal of the substantial transformation criteria, as Bernard

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[761] Fan, Sotelo and Sundareswaran (n 47) 14.
[762] ibid.
[763] One of the justifications for preferential RoO is that they are discriminatory and prevent trade deflection. Puccio (n 51) 174.
[764] If the Customs and Border Protection determines that printing was just for purpose of circumventing, the good becomes non qualifying for origin under USMCA. "Non-Qualifying Operations: Each Party shall provide that a good shall not be considered to be an originating good merely by reason of…a production or pricing practice in respect of which it may be demonstrated, on the basis of a preponderance of evidence, that the object was to circumvent this Chapter." USMCA art 4.19.

Hoekman puts it, "is to prevent simple assembly operations and cosmetic processing of a product (such as packaging) from conferring origin."[765] Preferential RoO require a certain level of processing of the good to occur in the territory. For example, in PEM, the word "sufficient" is used: products produced with non-originating materials qualify for origin status if the non-originating materials have "undergone sufficient working or processing in that Contracting Party."[766] The emphasis is on sufficient – it is not any processing whatsoever.[767] The level of processing required may be specified in the annexes of the Rules of Origin chapter[768] or the chapter may also specify what does not constitute sufficient processing.[769] Thus, it is not simply a question of whether there was a transformation and where it last occurred, but as Laura Puccio states, "the concept of substantial transformation under preferential rules of origin rigidly defines which are the minimum requirements to obtain the PTA origin."[770] Thus, a further analysis is needed of whether printing a part or the assembly of printed parts meets the minimum requirements of processing under the PTA. Putting plastic filaments in a 3D printing machine and printing a gear likely results in a change of tariff heading. However, is this sufficient processing in the territory to confer origin on the gear?

### A. Is Printing and Post-Processing Sufficient Processing?

Simple processing and simple assembly are those, in the words of the Kyoto Agreement, "which do not contribute or which contribute to only a small extent to the essential characteristics or properties of the goods."[771] Therefore, we need to consider to what extent the act of printing contributes towards the essential characteristic or properties of the printed good. Operations which do not confer origin are, under the PEM, simple painting, polishing, "washing, cleaning; removal of dust, oxide, oil, paint or other coverings."[772] 3D printed parts require post-printing processing.[773] According to Osborn, these processes are:

> removing supports, curing (baking in an oven), and smoothing (to smooth the edge of interfaces of each printed layer). Post-printing treatments are relatively

[765] Hoekman, 'Rules of Origin for Goods and Services' (n 100) 85.
[766] PEM, app I art (2)(1)(b). This distinction is preserved in the PEM Transitional Rules, app I art 4.
[767] Van de Heetkamp and Tusveld (n 193) 95.
[768] For example, in the PEM see Annex II, in the USCMA see Annex 4-B.
[769] See PEM app I, title II art 6(c),(i),(l).
[770] Puccio (n 51)176.
[771] Revised Kyoto Convention, Specific Annex K ch 1(6).
[772] PEM app I, title II art 6(e)(l)(c).
[773] Flores Ituarte, Khajavi and Salmi (n 741) 50.

> inexpensive and are not generally considered a big impediment for specialized products, but they can be more substantial in the context of mass production.[774]

Tuomi, Chekurov and Partnanen report that products printed through the Stereolithography process must be "submerged in a chemical bath to remove excess resin and then placed in an ultraviolet oven to cure it further."[775] Metal parts made through the binder jetting process are printed from a mixture of plastic and metal powers, and then "sintered to remove the plastic" to leave "an empty metal matrix" which is "subsequently infiltrated with bronze or similar metal."[776] On the other hand, the material extrusion method, which extrudes melted material from a single nozzle, is one of the most commonly used methods for 3D desktop printers or low-cost 3D printing.[777] The post-processing entails submerging "the part in an ultrasonic bath to remove the water-soluble support material."[778] Another type of extrusion technology used for industrial printers, fused layer modeling (FDM), builds parts (for eyeglass frames, for example) by feeding plastic cord through a nozzle, the plastic melts, and a second nozzle extrudes support material in a different type of plastic; this process is repeated and each layer fuses to the other by means of the heat of the previous layer.[779] In post-processing the supports can be removed manually or with a bath, and as Gebhardt, Kessler, and Thurn note, the polishing of the part "requires manual working skills and needs time, and results in high surface quality and surprisingly good results."[780] All of these processes are washing, cleaning, and removing of coverings. Thus, under the PEM, to be sufficient processing, 3D post-processing must be more than simple polishing, painting, or washing.

Under the ASEAN-Korea FTA, the post-processing for the Stereolithography and binder jetting methods could possibly be considered a processing that confers origin status. Rule 8, "Non-Qualifying Operations" states that a good does not obtain origin status in the territory of the Parties if "the following operations are undertaken exclusively by itself or in combination in the territory of that Party…Simple[4] washing, cleaning, removal of dust, oxide, oil, paint or other coverings."[781] Footnote 4 clarifies

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[774] Osborn (n 732) 23.
[775] Tuomi, Chekurov and Partnanen (n 2) 7; See also Gebhardt, Kessler, and Thurn (n 78) 50.
[776] Tuomi, Chekurov and Partnanen (n 2) 15.
[777] ibid 21.
[778] ibid 22.
[779] Gebhardt, Kessler, and Thurn (n 78) 50-51
[780] ibid 52.
[781] ASEAN-Korea Free Trade Area (AKFTA)(entered into force June 2007) Annex 3 (Rules of Origin) r 8.

that "'simple' generally describes an activity which does not need special skills, machines, apparatus or equipment especially produced or installed for carrying out the activity."[782] In the case of Stereolithography post-processing, a proprietary post-processing kit may be included with the purchase of the printer or can be sold separately by the printer manufacturer.[783]

Therefore, a case could be argued that the post-processing of 3D printed parts made through the Stereolitography or binder jetting methods are not simple operations and could contribute towards the essential characteristics of the final good. On the other hand, the most common lowcost 3D printing method, mechanical extrusion, only requires an ultrasonic bath, which are widely available and can even be purchased for less than 100 Euros and are used to clean various items such as laboratory equipment and sunglasses.[784] Thus, post-processing of a printed good made under this method would likely be considered insufficient processing for conferring origin status. In sum, the post-processing of 3D printed goods may or may not be "sufficient" processing. This presents the possibility that the current rules regarding sufficient and insufficient processing will have to be interpreted with some understanding of how the post-processing of 3D printed goods differs from post-processing in traditional manufacturing operations. However, a more complicated issues lies with the "printing" part of the additive manufacturing process. How much processing occurs when one instructs the machine to print with a click of the mouse?

Referring to the US – Japan Agreement, the act of printing by itself may not qualify as origin conferring processing. The Agreement defines "simple assembly" as "the fitting together of five or fewer parts all of which are non-originating (excluding fasteners such as screws, bolts, etc.) by bolting, gluing, soldering, or sewing or by other means without more than minor processing.[785] 3D printing machines are complex technological instruments which require specialized equipment and laser optics to melt the "ink" and print the good.[786] However, the factor under examination is not the complexity of the machine. If one categorizes 3D printing as a form of "bolting, gluing,

[782] AKFTA Annex 3 r 8 fn 4; van de Heetkamp & Tusveld (n 193) 95.
[783] FormLabs, 'Post-elaborazione' (formlabs.com) <https://formlabs.com/it/negozio/post-processing/> accessed 24 October 2021.
[784] 'Results for 'Ultrasonic Bath' (amazon.com) <https://www.amazon.com/Ultrasonic-Bath/s?k=Ultrasonic+Bath> accessed 24 October 2021.
[785] US-Japan Trade Agreement, Annex II Tariffs and Tariff-Related Provisions of the US, Product-Specific Rules of Origin art 19 (d).
[786] Tuomi, Chekurov and Partnanen (n 2) 3-4.

soldering" or "fitting" together by means of melting and layering liquid substance over a period of time, then, at least under the U.S.- Japan Agreement, it could be argued that 3D printing is a form of minor processing.

The scholarly literature on 3D printing does not provide a clear answer to this question as it is referred to both as a form of manufacturing requiring special skill and as a form of producing that a hobbyist can do with a desktop printer. For example, Iñigo Flores Ituarte, Siavash H. Khajavi and Mika Salmi in their chapter "Current and Future Business Models for 3D Printing Applications" for the book *3D Printing, Intellectual Property and Innovation: Insights from Law and Technology*, state that 3D printing requires a "high level of competence and knowledge to be able to utilize the technology as well as its related digital systems."[787] Yet in the same paragraph, they also state that "[s]tartup companies are also teaching children to 3D model with their hands, reducing the learning curve on technical drawing and 3D modelling" and present a picture of 5 year old child sitting before a laptop computer and a desktop 3D printing machine.[788] With regards to the printing of prosthetics, Osborn in his book on 3D printing and intellectual property law, states:

> The accessibility of the technology to relatively unskilled workers has given rise to a worldwide, open source network of people who seek to provide 3D printed prosthetics to everyone in need, regardless of income. The technology is accessible enough that teenagers are using it to make prosthetics for others.[789]

However, he also states that "3D printing is not currently easy for nonexperts…Although many people can and have taught themselves the skills, and free tools are widely available to help interested people learn, the process still takes time and effort."[790] .

The above quotes demonstrate that it is not easy to definitively state whether the actual printing part of the 3D good production is sufficient to confer origin, nor is it entirely clear how much skilled technical work is required to process a 3D printed good. Companies have set up printing services like a copier service. The customer sends the company the 3D file with specifics about how many goods they want printed and where

[787] Flores Ituarte, Khajavi and Salmi (n 741) 41.
[788] ibid 41-42.
[789] Osborn (n 731) 16.
[790] ibid 25.

the goods should be sent, and the company prints and ships the goods.[791] This type of print-on-demand business model calls into question how much origin-conferring processing is actually done to these products. Gebhardt, Kessler, and Thurn note that although intensive training is need for operating industrial printers, "[m]anual handling has to be eliminated or at least reduced to a minimum…The operation is free of human interaction. Parallel operation of multiple machines operated by one operator is possible."[792] Thus, printing implies a lot of processing by machines, but not by humans. If one argues that printing is sufficient processing, the origin of a product could be determined simply by where a print-shop is located, and thus producers would need to be attentive as to the locations where they sub-contract printing operations. Further, is the level of processing performed by engineers at Boeing when printing components for a spacecraft any greater than the level of processing performed by a college student printing dental aligners with a university printer?[793] How would custom officials assess this? What type of evidence would be required to demonstrate sufficient processing occurred. These are administrative questions that may need to be asked when seeking origin certificates for 3D printed goods. To conclude this analysis on assembly, we must consider two further elements of 3D printing: (1) it can reduce or eliminate the need for "tooling" and thus reduce or eliminate a step in the production process; and (2) 3D printing reduces the number of parts to be assembled to form the final good.

The use of digital technology and CAD files in manufacturing predates the invention of 3D printing. CNC (Computer Numerical Control) manufacturing is a form of subtractive manufacturing. It is less adaptable than 3D printing in manufacturing complex parts in certain materials such as plastics, and it is more labor intensive.[794] CNC technology dates back to at least the 1940s and was in widespread use by the

[791] 3D printing orders can be sent to UPS stores in the US, Mohammad E Arbabian and Michael R Wagner, 'The Impact of 3D Printing on Manufacturer-Retailer Supply Chains,' (2020) 285 Eur J Operational Research 538, 539; Osborn (n 731) 24; Flores Ituarte, Khajavi and Salmi (n 741) 52-55.
[792] Gebhardt, Kessler, and Thurn (n 78) 28-29.
[793] Osborn (n 732) 25; Hope King, 'College student 3D prints his own braces' (CNN.com 16 March 2016) <https://money.cnn.com/2016/03/16/technology/homemade-invisalign/> accessed 24 October 2021; Richard Aston, '3D Printing Done Right' (*Innovation Q*) <https://www.boeing.com/features/innovation-quarterly/nov2017/feature-thought-leadership-3d-printing.page> accessed 24 October 2021.
[794] Alkaios Bournias Varotsis,'3D printing vs. CNC machining' (*3D Hubs*), <https://www.3dhubs.com/knowledge-base/3d-printing-vs-cnc-machining/> accessed 24 October 2021.

1980s[795], when the first patents for 3D printing technology were filed.[796] A CNC machine consists of multiple tools and a computer. A CAD file is downloaded and programs the automation of the tools to remove material and to shape the good.[797] While both CNC and 3D printing machines rely on digital files to operate, there are some differences between the two types of manufacturing that can impact the decision to use one method or the other. 3D printing is preferable if a low volume order or a single item is needed, and in this situation it is faster and relatively cheaper than CNC.[798] On the other hand, for mass orders for products that are not intricate or geometrically complex, CNC manufacturing can achieve economies of scale and thus be more cost efficient.[799]

The differences between CNC manufacturing or 3D printing also relate to the extent of processing performed under each method. CNC manufacturing requires humans to set up the machine and the tools in the machines prior to processing; it is this set-up calibration which incurs the most cost of production.[800] The operator must affix the material "directly into the machine, onto machinery spindles, or into machine vises or similar workholding devices, and" attach "the required tooling, such as drill bits and end mills, to the proper machine components."[801] Alkaios Bournias Varotsis in an article for 3D Hub compares the workflows of 3D printing and CNC manufacturing. With CNC, "[t]he manufacturing process is labor intensive, as the [material] has to be manually set up in the machine. After machining, the components are ready for use or post-processing."[802] While with 3D printing, "the machine operator first prepares the digital file (chooses orientation and adds support) and then sends it to the machine, where it is printed with little human intervention."[803]

This question of how much human intervention is needed to print goods leads back to the legal issue of what level of processing occurs during 3D printing. If "little

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[795] Goli Mohammadi, 'The History of CNC Machining, Part I & 2' (*Bantam Tools*) < https://medium.com/cnc-life/history-of-cnc-machining-part-1-2a4b290d994d> < https://medium.com/cnc-life/history-of-cnc-machining-part-2-the-evolution-from-nc-to-cnc-4b9fe1653536> both accessed 24 October 2021.
[796] Tuomi, Chekurov and Partnanen (n 2) 2.
[797] 'Understanding CNC Machining' (*Thomas Publishing Company*) <https://www.thomasnet.com/articles/custom-manufacturing-fabricating/understanding-cnc-machining/> accessed 24 October 2021.
[798] Bournias Varotsis (n 794); Gebhardt, Kessler, and Thurn (n 78) 142.
[799] Flores Ituarte, Khajavi and Salmi (n 741) 36; Gebhardt, Kessler, and Thurn (n 78) 138-139, 143.
[800] Flores Ituarte, Khajavi and Salmi (n 741) 36.
[801] 'Understanding CNC Machining' (n 797).
[802] Bournias Varotsis (n 795).
[803] ibid.

human intervention" is involved in the printing stage of 3D printing, then compared to CNC manufacturing, it is questionable whether 3D printing qualifies as "sufficient" processing under the PEM. Compared to CNC machines consisting of bits, drills, mills, and other components that must be calibrated by humans, relying on the 3D printer manufacturer's software to calibrate the machine and clicking print with a mouse to initiate printing seems like minor processing.[804] On the other hand, 3D printing may not be categorized as "simple" processing under agreements such as the ASEAN-Korea FTA, which qualifies "simple" processing as not requiring special skills or machines, because operating industrial and complex 3D printers requires training. Finally, according to Bournias Vartosis, post-processing "is the most labor-intensive aspect of the 3D printing manufacturing workflow."[805] However, some determination on whether post-processing done to 3D printed goods is "sufficient" processing or is another form of simple washing, painting, or baking would still be necessary.

One non-preferential RoO WTO dispute can perhaps serve as an example of how rules on processing may disrupt expected or desired origin determinations. The requests for consultations referenced in Chapter 1, *US-Measures Affecting Textiles and Apparel Products*, originate in part from changes to US rules that required more processing steps to be completed on silk products in Europe if the silk did not originate in the country in which the processing was performed.[806] This rule impacted the Italian silk apparel industry, such as scarves and ties, as under the rules, a scarf could no longer bear the label "Made in Italy," but "Made in China" if the silk was sourced from China, and had to bear the label "Designed in Italy" or "Crafted in Italy".[807] Under the new rules there was not sufficient processing performed in Italy on the raw material (silk) such that the final product underwent a sufficient transformation to qualify for Italian origin. The Italian perspective was that the sewing and processing to the silk done in the Italian factories and artisanal boutiques were in fact skilled processing and

[804] Gebhardt, Kessler, and Thurn (n 78) 72-74.
[805] Bournias Varotsis (n 794).
[806] *US – Measures Affecting Textiles and Apparel Products*, Request for Consultations by the EC; *US-Measures Affecting Textiles and Apparel Products*, Notification of Mutually-Agreed Solution; *US – Measures Affecting Textiles and Apparel Products (II)*, Request for Consultations by the EC; *United States- Measures Affecting Textiles and Apparel Products (II)*, Notification of Mutually Agreed Solution (31 July 2000) WT/DS151/10. See Chapter 1, notes 113 - 114
[807] Committee on Ways and Means – US House of Representatives, 'Overview and Compilation of U.S. Trade Statues' (2003 edn, US Government Printing Office June 2003), 75-76.

being unable to use the label "Made in Italy" would impair trade with the US.[808] In its Request for Consultations, the EC argued that the additional processing requirements did not respect Article 2 of the AOR which prohibits use of rules of origin as instruments to pursue trade objectives directly or indirectly or to create restrictions or disruptions on international trade, and that as a result of the rules, EC producers were losing access to the US market because the silk goods no longer originated in Europe.[809] The US agreed to exempt silk scarves and silk finished products from the changes to the rules of origin, and such products do not have to be labeled as "Made in China", but could qualify for EC origin if two or more specified processes occurred to the silk fabric in the EU.[810]

While this dispute regards non-preferential RoO, it does demonstrate how the recategorization of sufficient processing can disrupt the intended origin of a product, and how this could disrupt trade of a product if such intended origin is a marketable aspect of the product. We can then think about this issue in the context of 3D printing. If the traditionally manufactured good requires three steps of sufficient processing, then a rule in a FTA between A and B that requires two steps of sufficient processing in the territory A for origin qualification would result in the product having A origin. However, some producers, wishing to innovate or be more efficient, print the product using materials from territory C and use only two sufficient processing steps, However, if one of these processing steps (printing) is considered simple processing by territory A, the good does not qualify for origin, and instead is given C origin based on the origin of the ink. Thus, it becomes critical for the producers and customs officials to understand whether "printing" is simple or sufficient processing. For the producers, they may have an unpleasant surprise, like the scarf producers in Italy, of finding out that their goods no longer originate in territory A, and this could impede their ability to trade their products (still made with skill and quality) in territory B. At this point it is apparent that trying to apply a small portion of the language in RoO to determine the origin of a 3D printed good leads to a legal riddle whose key perhaps lies in defining the terms "sufficient", "minor," and "simple" in connection with a specific technology.

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[808] John Tagliabue, 'Italian Silk Industry Upset by a New U.S. Trade Law' *New York Times* (New York, 10 April 1997) Section D p 4 <https://www.nytimes.com/1997/04/10/business/italian-silk-industry-upset-by-a-new-us-trade-law.html> accessed 6 January 2022.
[809] *US – Measures Affecting Textiles and Apparel Products,* Request for Consultations by the EC, 1-2; *US – Measures Affecting Textiles and Apparel Products (II)*, Request for Consultations by the EC, 1-2.
[810] *US- Measures Affecting Textiles and Apparel Products (II)*, Notification of Mutually Agreed Solution, 2-3; Committee on Ways and Means 'Overview and Compilation of U.S. Trade Statues' (n 808) 75-76.

### B. 3D Printing: Fewer Parts to Assemble, but Is Assembly Simple?

Another challenging legal puzzle that 3D printing brings in terms of the CTH criterion is the promise of 3D printing to reduce the number of components of a finished good. 3D printing can reduce the number of parts required for goods which currently require multiple components sourced from multiple territories, such as engines for aircraft and motor vehicles.[811] For example, GE Aviation reduced the number of parts in a turbopop engine from 855 (sourced from different contractors) to twelve (printed by one manufacturer).[812] A prototype for a printable electric car, Strati, reduced the number of parts from 25,000 to forty-nine.[813] Further, objects that have ball bearings or multiple rotating gears can be printed in one printing session (single-pass print jobs).[814] Osborn states that these types of "print jobs eliminate the need to assemble parts, saving time and obviating the need for assembly expertise."[815]

If we eliminate expertise required for the assembly, then the assembly of a good constituted from 3D printed parts could qualify as a form of simple assembly. For example, under the ASEAN-Korean FTA, simple assembly is: "an activity which does not need special skills, machines, apparatus or equipment especially produced or installed for carrying out the activity."[816] Further, if the number of parts are reduced to five or less (such as for a bicycle frame)[817], and the ink is non-originating material, then assembly of the good would also be categorized as simple assembly under the US-Japan Agreement, which defines "simple assembly" as:

> the fitting together of *five or fewer parts* [my emphasis] all of which are non-originating (excluding fasteners such as screws, bolts, etc.) by bolting, gluing, soldering, or sewing or by other means without more than minor processing.[818]

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[811] Kati Suominen, *Revolutionizing World Trade: How Disruptive Technologies Open Opportunities for All* (Stanford UP 2019) 21.
[812] 'Additive Manufacturing: Aviation and Aerospace Industry' (*GE Additive*) <https://www.ge.com/additive/additive-manufacturing/industries/aviation-aerospace> accessed 24 October 2021.
[813] Davis (n 411).
[814] Osborn (n 731) 10.
[815] ibid.
[816] AKFTA, Annex 3 (Rules of Origin) fn 4; van de Heetkamp and Tusveld (n 193) 95.
[817] Aysha M., 'The List of Bicycles Made with 3D Printing Technologies,' (*3D Natives* 22 September 2020) <https://www.3dnatives.com/en/ranking-3d-printed-bikes-220920204/#!> accessed 24 October 2021.
[818] US-Japan Trade Agreement, Annex II Tariffs and Tariff-Related Provisions of the US, Product-Specific Rules of Origin art 19 (d).

Therefore, goods which may have qualified for origin under the CTH criterion under traditional manufacturing methods through the assembly of multiple parts (i.e. sufficient processing), may no longer qualify for origin under that criterion when made by additive manufacturing: printing significantly reduces the number of parts necessary for a good and may reduce or eliminate any special skill to assemble those parts.

These last paragraphs have led us into linguistic, technical, and legal knots regarding the application of the CTH criterion to determine the origin of a 3D printed good. At first glance, it appears an adept method: material categorized in one heading is transformed into a printed good categorized in another heading. However, this could mean that nearly all 3D printed goods would be able to gain origin status with this method.[819] The CTH criterion meets its legal function under a preferential RoO regime when it discriminates between qualifying and non-qualifying goods. A criterion, when applied to 3D printed goods and which allows nearly all goods to qualify for origin, is not discriminatory. Rules limiting simple assembly or processing operations from conferring origin aim to ensure that the CTH criterion maintains its discriminatory function by requiring a certain level of processing to occur in the territory.[820] Thus, it is necessary to identify in the production of 3D goods what steps are "sufficient processing" to continue to apply the CTH criterion as method for determining origin. Finally, the promises of 3D printing to reduce the number of components of a final good from hundreds to under a dozen and to eliminate assembly expertise could relegate the assembly of 3D printed goods into the category of "simple assembly." To continue to use the CTH criterion and preserve its discriminatory function, it will be necessary to somehow qualify the assembly of fewer parts as assembly still requiring a high level of processing.

### C. Application of the Technical Test and Preliminary Conclusions

If 3D printing reduces the time, labor, money, and processing required to manufacture a good, as a consequence it also removes elements (time, labor, skill, processing) of manufacturing that make the CTH criterion an appropriate method for assessing whether a substantial transformation has occurred in the territory and whether the good qualifies for origin and preferential treatment. At this point, it is also necessary to refer to the "working process" or "technical test" criterion mentioned briefly

[819] Fan, Sotelo and Sundareswaran (n 47) 14.
[820] Hoekman, 'Rules of Origin for Goods and Services' (n 100) 85.

in Chapter 2. The same concerns arise: in order for a technical working process to confer origin, it must be more than simple processing and assembly, and if 3D printing is simple processing, it would not pass the technical test/working process criterion. Further, rules based on one type of manufacturing processing that does not require the same technological system (digital and mechanical) as 3D printing may not be applicable to determining the origin of the 3D printed goods. Thus, 3D printing also complicates the use of the "working process or operations" criterion to determine the origin of 3D printed goods.

We can derive the following possible choices regarding the use of the CTH or "working process or operations" criteria to determining the origin of 3D printed goods.

1. Apply CTH rules based only on heading or subheading changes: the "ink" is in one heading, the "good" in another, a substantial transformation has occurred. However, this means that nearly all printed goods undergo a substantial transformation, and thus the method is not very discriminatory.
2. Categorize 3D printing as a form of simple assembly: By removing or significantly removing human time, labor, and processing required to manufacture a good, 3D printing is basically a form of simple assembly. Even though a change of heading has occurred, there has not been sufficient processing of the good to undergo a substantial transformation in the territory to qualify for preferential origin status.
3. Attempt to qualify what is "simple" and "not simple" in 3D printing: This requires different sets of legal and technical definitions of "simple" for traditional manufacturing methods and additive manufacturing methods. Further, it requires differentiating "simple" based on various 3D printing methods and post-production processing.

Manufacturers who adopt additive manufacturing could try to influence what level of processing confers origin through lobbying.[821] Inama's concerns regarding traditional manufacturing are also applicable to additive manufacturing: "countries may be interested in 'obtaining' origin even if the amount of working and processing is minimal," and conversely, "a country may have an interest in 'retaining' origin even if the exported product is processed in a third country before being sold to consumers."[822] A country, for political or strategic reasons, could claim that printing and post-processing confer origin, and thus retain origin even when the good is sent to another country for assembly; or a country could claim that printing and post-processing are not sufficient processing, and obtain origin when that good is sent to the country for assembly. If 3D

[821] Inama, *Rules of Origin in International Trade* (n 20) 103.
[822] ibid 104.

printing becomes a widespread manufacturing process, it may simplify manufacturing, but it may not simplify origin determination.

We can begin to examine more thoroughly the role of the 3D file in determining the origin of a 3D printed good. As discussed in the last chapter, under an analysis of the GATT and GATS, a 3D file is likely a service. However, the question is greater than whether rules on origin for services can be applied to 3D files. If the 3D file is the input with the most value, how will that change the origin analysis of the final good in relation to the tangible inputs. If, as Dinh proposes, smart manufacturing requires acknowledging the role of service inputs, and thus the origin of those inputs, how does one proceed with the origin analysis for the final product? To begin this analysis, a question that must be addressed is whether it is possible to apply the "substantial transformation" criteria to determining the origin of a 3D file.

### III. Determining the Origin of a 3D Printed Good under CTH with Service and Tangible Inputs

As a preliminary step, it is necessary to recall some fundamental distinctions between RoO for services and RoO for goods. For Dinh, an important difference is that under the GATS framework the origin of a service is determined by the legal nationality of the service supplier, while under the RoO regime for goods, the location where the most economic value was created is a key determinant of origin.[823] Further, Dinh notes that the RoO provided by GATS is not designed for services that are "inputs for production in GVC or as outputs obtained from internationally sourced inputs," nor does GATS consider services that are supplied after various stages of activity in different locations.[824] As "technology has materially changed the way services are produced and supplied" this poses "more challenges on the origin determination of services" and "the GATS approach fails to keep pace with the evolution of trade and production in the age of servicification."[825] One such example of this servicification are the proposed Mode 5 services which include the design, engineering, and R&D as inputs in the production chain of a good and contribute to its value.[826] Dinh finds that the 3D file downloaded into a printing machine would fall under this Mode 5 category.[827] However,

[823]Dinh (n 46) 98-99.
[824] ibid 137.
[825] ibid.
[826] ibid.
[827] Ibid 31-33.

if the value and origin of Mode 5 services are factored into the origin determination of goods for purposes of preferential tariffs, defects in the GATS approach to RoO to services will not make "it possible to determine the origin of goods precisely" and thus, "a reform of RoO for goods would not only involve the consideration of services inputs, but also calls for efforts to improve ROO for services."[828] This dissertation does not propose to examine how to improve RoO for services, but will incorporate reforming RoO for services into a greater exploration of how lawmakers could approach designing RoO chapters in trade law instruments in the next chapter. The issue of the applicability of the GATS framework to origin determination of Mode 5 services is raised to show that appending a RoO analysis for services to a RoO analysis for goods is not a simple equation of two RoO analyses, but generates some nuances that must be worked through in order to come to a final origin determination of a 3D printed good.

Scholars disagree on whether it is possible to apply the "substantial transformation" criteria to services. Dinh proposes that as more and more products become hybrids of goods and services, the "common characteristics between goods and services may permit an importation of RoO for goods into the field of services trade to facilitate a 'product-based' approach."[829] However, this may mean reconsidering the meaning of the word "transformation" in the context of RoO. Hoekman in his article on the RoO for goods and services, concluded that the substantial transformation test and change in tariff heading criteria are "not workable in the services context."[830] Presuming that a service does not exist before it is sold, "most trade in services will be 'substantial transformations' of whatever inputs are used."[831] Likewise, the insufficient information regarding the production of services and their non-storeability also makes it difficult to assess whether and when any change occurred.[832] Zampetti and Sauvé, in 2006, also asserted that the substantial transformation test and the change of tariff heading criteria cannot function for services.[833]

Dinh's response is that first, these scholars incorrectly identify the CTH criterion as distinct from substantial transformation rather than considering the CTH as a subset of the substantial transformation criteria.[834] "Substantial transformation" in the context

[828] ibid 138.
[829] ibid 145.
[830] Hoekman, 'Rules of Origin for Goods and Services' (n 100) 89.
[831] ibid.
[832] ibid.
[833] Zampetti and Sauvé (n 52) 119; Dinh (n 46) 146.
[834] Dinh (n 46) 147.

of RoO for goods, points to the creation of economic value rather than simply a change in the state of being; for example, simple assembly or minimal operations do not satisfy a "substantial transformation" test although the assembly of parts results in the existence of completed good.[835] If one considers the activity of the creation of the service from the perspective of generating economic value, it is not impossible to apply a form of the substantial transformation test to services: the origin of the service is where the last significant economic activity occurred.[836] As Dinh states this cannot be a simple "copy-paste" procedure of RoO for goods to RoO for services and that some adaption is required.[837] We can identify through an origin analysis of a 3D printed good whether it is feasible to apply a criterion similar to the CTH to a service input.

### A. Differences between Classification of Services under GATS and Classification of Goods under the HS

Although the service classification system under GATS serves a "comparable role to the HS", as Matsushita state,[838] it is not interchangeable in its framework and purpose to a tariff classifications system for goods, such as the HS Code.[839] Under the GATS, each Member's Schedule of Commitments which identifies the commitments the Member is willing to undertake with regards to specific service sectors, and the Sectorial Classification List are based on the Central Product Classification system overseen by the United Nations Statistical Commission.[840] In a Member's schedule, the services are categorized under 12 broad categories of sectors and then under subcategories; however, a service may not be categorized in more than one sector or subsector.[841] "Horizontal" commitments on limitations or undertakings apply to all of the sectors listed in the schedule.[842] The Member also indicates any limitations on market access or national treatment of a particular service sector based on the mode of supply of the service ("Vertical" commitments).[843] Such commitments are the results

[835] ibid 148.
[836] ibid 149.
[837] ibid.
[838] Matsushita (n 22) 561.
[839]Smith and Woods (n 663)16-18.
[840] WTO, 'Guide to reading the GATS schedules of specific commitments and the list of article II (MFN) exemptions' (wto.org)< https://www.wto.org/english/tratop_e/serv_e/guide1_e.htm> accessed 24 October 24 The Sectorial Classification List and the 1993 Guidelines are "supplementary means of interpretation" under VCLT art 32(a). Matsushita (n 22) 561.
[841] Matsushita (n 22) 560-561.
[842] WTO, 'Guide to reading the GATS schedule of specific commitments' (n 840)
[843] ibid.

of negotiations among Members to reduce or eliminate barriers to market access.[844] However, many Members maintain significant limitations to market access in service sectors.[845] The GATS schedules of specific commitments are based on a positive list: service sectors that are not listed in a Member's schedule are not liberalized and are not subject to the specific commitments listed in the schedule.[846] Further, Members can indicate which sectors are subject to MFN exemptions.[847] As a result, the schedules, as Matsushita, note "contain legal obligations and establish corresponding rights."[848] Finally, a Member may modify a commitment after 3 years of its entry into force, provided that the Member enters into negotiations on compensatory adjustment with any Members whose benefits are being modified.[849]

On the other hand, the classification of goods serves distinct purposes both at the level of the WTO and at the level of a Member's custom office. Similar to the GATS, under the GATT tariff levels are determined through negotiations, whether through a multilateral round of negotiations under the principle of reciprocity, or through specific undertakings such as the Information Technology Agreement.[850] The Schedule of Concessions that each WTO Member enters into upon accession to the WTO is based on the HS.[851] This schedule identifies the bound tariff rate that each Member agrees to uphold: the Member will not raise tariffs above this rate.[852] The Member may choose to lower this MFN tariff rate; however, states may be cautious not to lower the rate to the level of any preferential tariffs in a PTA, as this would diminish the margin of preferences granted to PTA partners.[853] Some members, such as OECD states, have indicated bound tariffs for nearly all heading lines, at low rates, while developing countries tend to bind tariffs for fewer heading lines and with higher rates.[854] A Member's preferential duty rates found in PTAs, however, are not included in the

[844] Van den Bossche and Zdouc (n 9) 521-523.
[845] Dinh (n 46) 21.
[846] Matsushita (n 22) 586; Willemyns (n 713) 64.
[847] WTO, "Guide to reading the GATS schedule of specific commitments" (n 840)
[848] Matsushita (n 22) 586.
[849] GATS art XXI.
[850] van den Bossche and Zdouc (n 9) 424-436.
[851] *World Tariff Profiles 2020* (WTO, ITC & UNCTAD 2020) 3 <https://www.wto.org/english/res_e/booksp_e/tariff_profiles20_e.pdf> accessed 24 October 2021; Matsushita (n 22) 226.
[852] WTO, 'What is a WTO Schedule' (*Goods Schedules e-Library*) <https://goods-schedules.wto.org/what-is-a-wto-schedule> accessed 24 October 2021
[853] Matsushita (n 22) 510.
[854] *World Tariff Profiles 2020* (n 851) 2; Matsushita (n 22) 224.

Schedule of Concessions.[855] If a good does not appear in the Schedule of Concessions, the Member is still required to comply with the GATT national treatment and MFN obligations with respect to trade of that good. A Member can modify or withdraw a concession through negotiations with other Members, but under certain conditions and restrictions.[856] On the other hand, a Member's Schedule of Concessions is changed frequently: 1) whenever a new Member accedes to the WTO, 2) whenever the HS code is updated, and 3) after sectorial negotiations, such as those for the ITA.[857]

While the HS nomenclature and the UN nomenclature provide systems for classifying goods and services (respectively), new digital products require traders, trade lawyers, and trade policymakers to determine what classification system to use, which is an act of interpretation.[858] Smith and Woods argue (in the general context of WTO law), that the decision of which classification methodology to use impacts which WTO law applies, but it is a decision that in fact "is removed from the WTO."[859] The WCO and the UN "might classify products using economic criteria broadly defined, but they operate outside the scope of the WTO and may not take the WTO's broader trade liberalization goals into consideration."[860] The issue of Member sovereignty also arises "as they make the decision whether to include a product in their GATT and/or GATS schedules in the first instance" and a Member may choose to classify a product which could be a good or service under one of the methodologies on the basis of a domestic political consideration.[861]

The AB has determined that a boundary exists between GATT and GATS measures, but it has not established definitive rules on how to draw the boundary line. The decision is made on a case-by-case basis and the Member must explain and provide evidence supporting that the measure affects trade in goods or in services.[862] If no dispute is raised, then the classification decision of the Members or international

[855] Matsushita (n 22) 225.
[856] van den Bossche and Zdouc (n 9) 447-450.
[857] WTO, 'Schedules of Concessions,' (WTO.org) <https://www.wto.org/english/tratop_e/schedules_e/goods_schedules_e.htm> accessed 24 October 2021.
[858] Smith and Woods (n 663)18.
[859] Ibid 18-19.
[860] ibid 19.
[861] ibid. Smith and Woods note that this is a problem with audiovisual products and products traded online.
[862] Matsushita (n 22) 559-60, 566, referencing, AB Report, *EC - Bananas*, para 221. See Chapter 3, note 712.

organizations is not in question.[863] However, taking away the classification decision from a Member during a dispute, Smith and Woods argue, "in circumstances where it does not wish to make a commitment in a specific service sector undermines its sovereignty over decisions it had not ceded to the WTO."[864]

The two points raised by Woods and Smith resonate with the points raised in Chapter 1 regarding Annex II of AOR on preferential RoO. The WCO's classification nomenclature is nearly always the nomenclature used in product specific rules; thus, preferential RoO are linked to a system that is independent of the WTOs principles and goals. The AOR, by only providing guidelines for preferential RoO, allows Members sovereignty in designing them. Deciding whether a product is a good and is subject to a preferential tariff is an act of classification, an act over which Members retain a significant degree of sovereignty. Thus, by relying on the principle of classification methodology, which as Woods and Smith state is removed from the WTO, preferential RoOs become even more removed from the scope of the WTO. As the next Chapter will show, trying to bring RoOs within the multilateral system and designing ROOs that apply to both goods and services will entail a reexaminination of the tenacity of Members' sovereignty on rules of origin.

Ines Willemyns identifies three elements to consider "when analysing a GATS-consistent approach to services classification."[865] Looking at these three elements, it is possible to highlight the distinction between services classification and goods classification under the HS system. First, "GATS classification is based upon the outputs provided by service suppliers. Footnote 9 to the GATS excludes input services from the market access obligation in Article XVI GATS."[866] Rules of origin using the CTH based on the HS look at the inputs involved in the production of the good: has an input undergone enough processing in the territory to result in a product categorized in a different heading or subheading.[867]

Secondly, according to Willemyns, with its decision in *China- Audiovisuals*, "the Appellate Body opened the door to an evolutionary interpretation of Members' commitments" and this "entails the classification of supposedly new digital services within subsectors classically containing (equivalent) offline services, even where they

[863] Smith and Woods (n 663) 22.
[864] ibid.
[865] Willemyns (n 713) 68.
[866] ibid.
[867] Dinh (n 46) 118.

were not yet widely digitally traded at the moment of scheduling."[868] The AB in *China-Audiovisuals* found that China's GATS Schedule included sound recording services distributed over the internet, although at the time the Schedule was concluded, the term "distribution" was intended to mean distribution through tangible items such as CDs.[869] According to the AB, the terms in the GATS schedule were "sufficiently generic" and what they could be applied to "may change over time."[870] Limiting their meaning to the time when the Schedule was adopted would mean that "very similar or identically worded commitments" in the Schedules of different Members "could be given different meanings" depending on the date of adoption or the date of a Member's ascension to the treaty.[871] This would "undermine the predictability, security, and clarity of the GATS."[872] Pauwelyn, Guzman, and Hillman note that the AB was able to reach this decision because it based "its textual and contextual interpretation of the words in [the phrase 'sound recording distribution services'], rather than with reference to broader criteria of 'services' and 'goods.'"[873] Willemyns acknowledges the scholarly debate as to whether *China-Audiovisuals* allows for covering new services in existing commitments, and whether digital services are in fact a new breed of service or "merely the 'digitised' versions of already existing services."[874]

On the other hand, there is no similar evolutionary interpretation of the HS code. The HS code is updated every 5 years by WCO, which takes into consideration requests from the private sector to incorporate new products into the code.[875] For example, as there was no HS code for additive manufacturing machines, CECIMO, an industry group, coordinated with the European Commission in proposing to WCO a new code for these machines; WCO accepted the proposal and a code was included in the 2022 revisions.[876] This updating of the HS nomenclature is also significant in that

[868] Willemyns (n 713) 68- 69.
[869] Appellate Body Report*, China – Measures Affecting Trading Rights and Distribution Services for Certain Publications and Audiovisual Entertainment Products* (21 December 2009) WT/DS363/AB/R paras 338-372, 386-397.
[870] ibid para 396.
[871] ibid para 397.
[872] ibid.
[873] Pauwelyn, Guzman, Hillman (n 219) 694.
[874] Willemyns (n 713) 69.
[875] WCO, 'Amending the HS' (wcoomd.org) <http://www.wcoomd.org/en/topics/nomenclature/activities-and-programmes/amending_hs.aspx> accessed 24 October 2021.
[876] CECIMO, 'Press Release: CECIMO Appreciates the Approval of a New Product Nomenclature Standard for Additive Manufacturing Machines' (cecimo.eu 25 April 2019) <https://www.cecimo.eu/news/press-release-cecimo-appreciates-the-approval-of-a-new-product-nomenclature-standard-for-additive-manufacturing-machines/> accessed 24 October 2021. CECIMO is the European Association of the Machine Tool Industries and related Manufacturing Technologies.

it helps to avoid WTO members from taking reclassification initiatives independently that may violate Articles II:3 and II:5, which prohibits reclassification that impairs the value of any of the concessions in the Schedule of Commitments.[877] For example, by reclassifying goods, Members could place like goods in different headings; thus, previously "like" products could be given discriminatory treatment without violating GATT Article I on the basis that they are no longer under the same HS heading.[878] If no new HS is created for a new product, Members could strategically classify the product with existing products based on certain characteristics and this could result in impeding market access to certain Members or nullify a trade concession.[879]

Thirdly, Willemyns proposes that an "integrated approach" in classifying services within the GATS should be applied, "not distinguishing the production of the service from its distribution" as "the GATS defines the supply of a service as including its production, distribution, marketing, sale, and delivery of a service."[880] Under the application of the HS for custom duties and under its application by WTO Members in tariff schedules, how a finished good is imported or exported or how an input is distributed to a manufacturer has no influence on the determination of the heading or sub-heading that the good or input falls under. As van de Heetkamp and Tusveld write, a classification system for goods "is in almost all instances based on product characteristics, with end use being a decisive element in a few cases."[881]

Thus, there are some fundamental differences between the approach to classifying services using the GATS framework and the approach to classifying goods under the HS which complicate incorporating the origin of a service input into the origin analysis for a 3D printed good under the CTH criterion. As the first step in determining the origin of the 3D file is determining what type of service it is, some classification system for services is required. However, the GATS classification system and the HS do not have the same objectives in identifying a product and where it is should be categorized within the system. Thus, while the GATS classification system can be used to classify a service input, when combined with an origin analysis of the tangible inputs under the HS nomenclature, a truly hybrid origin analysis results, a legal Minotaur with the head of GATS and the body of the HS.

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[877] Matsushita (n 22) 230.
[878] ibid.
[879] ibid.
[880] Willemyns (n 713) 69.
[881] Van de Heetkamp and Tusveld (n 193) 7.

### B. Do 3D Files Undergo Substantial Processing or a Substantial Transformation?

Yet, rather than progressing down that legal puzzle at this moment, let us look at some other aspects that demonstrate why it will be difficult to apply the CTH criterion to determine the origin of 3D printed good when considering the 3D file as a manufacturing input. First, we must assume (1) the creation of a 3D file as a particular type of service that is covered by the GATS and (2) we have been able to determine the origin of this service on the basis of its supplier or on the basis of where the most economic value was created. More simply put, the creation of the 3D file is a service and the origin of this service has been identified in some manner. The next step is to consider whether processing that occurs to the file is like the processing of a good that triggers a change of tariff heading of sub-heading under the product-specific rules of a PTA.

First, the 3D file for a 3D printed good is something intangible that nonetheless is preserved as a file. In other words, the service is not transitory, but persists as a file that is transmitted and then downloaded into the 3D printing machine. Is the step of going from the 3D file creation to the downloading of the file into the machine a substantial transformation? This is where the concept of processing plays a role. Dinh generally cautions against thinking of substantial transformation as a "simple 'before versus after'" change.[882]

Yet, it could be arguable that the creation of the 3D file is like a harvesting a raw coffee bean that has potential to be transformed into a decaffeinated or roasted coffee bean. It is not universally accepted that roasting or decaffeinated coffee confers origin on the coffee bean based on where such roasting or decaffeination takes place.[883] However, at least in the US[884] such processing is sufficient to confer origin. Thus, it could be argued that a 3D file is similar to a coffee bean: the file that has the potential to be a 3D good (i.e. raw bean) transforms into the realization of a 3D good (roasted bean) by means of printing. Thus, a trader who obtains a file from another country could still claim that sufficient processing of the 3D file occurred by the act of printing the good. However, beyond requiring international lawmakers, custom officials, and

[882] Dinh (n 46) 148.
[883] Inama, *Rules of Origin in International Trade* (n 20) 30-32.
[884] CBP, *Notice of Issuance of Final Determination Concerning Roasted Coffee* (21 November 2017) 82 Federal Register 55387, 55387-55388.

traders to compare digital code transmissions to roasting of coffee, this examples also show how that trying to integrate a service input into the CTH or operating process would complicate origin determination, an already complex process, and move RoO farther from of being legal instrument which ensures a predictable trading environment.

Another way to think about this issue is when going from a digital blueprint to printed parts is there a CTH capable of being a substantial transformation under the CTH criteria? This would require treating data as a form of electricity (as Neeraj proposes)[885] and thus classifying the 3D file under the HS code for electricity. Downloading the file, which instructs the machine to operate, and later obtaining a printed part seems like a transformation. However, when we think about this from the perspective of a printed blueprint, the acceptability of this argument begins to weaken. Under the HS, hand drawn originals or photocopies of "plans for drawings for architectural, engineering, industrial, commercial, topographical or similar purposes", fall under heading 4906. "Other printed matter," which could potentially include paper copies of blueprints created with a CAD program, fall under 4911. Under PEM sufficient processing occurs for baby carriages and parts thereof (8715) when there is "manufacture from materials of any heading except that of the product, and in which the value of all the materials does not exceed 40% of the ex-works price of the product".[886] Would the act of looking at the CAD printout and comprehending how to manually calibrate a machine to pour metal constitute a CTH? However, this would suggest that human thought is sufficient processing; this is not the type of processing that the HS is designed to capture. There is no tariff line (yet) for human or AI thought processing. Thus, it is questionable whether downloading a digital blueprint into a machine which, using computer reasoning, imparts instructions to print a good is substantial transformation under the CTH criterion.[887]

At this point, we have entered a legal labyrinth and the best way to exit is to direct our focus on whether a service input can be factored into an *ad valorem* origin

[885] Neeraj (n 669) s128.
[886] PEM Annex II, Product Specific Rule, ch 87, heading 8715.
[887] Neeraj (n 660) s128 proposes that as "electricity, which is essentially the flow of electrons, falls under the Harmonized System of Tariff Nomenclature (HS 2716.00) and, for the purpose of WTO law, electricity comes under the purview of GATT" there is "no reason to treat the flow of data differently from that of the flow of electricity for the purposes of classification under international trade law)." However, that does not mean that going from HS 2716.00 to a baby carriage part (HS 8715 ) is also a substantial transformation under the CTH criterion. Electricity is used to power the CNC machines that make the part, electricity itself does not in some manner transform into the part. Thus, we can apply the same reasoning to data in the context of 3D printing. Even if data is the flow of electrons, data itself does not transform into the 3D printed good which would be classified under the HS.

analysis. First, we will examine the practice of determining the value of a good considering only the tangible inputs in the context of the printing and processing process. Next, we will consider factoring in the value of the design of the 3D file in the origin determination. However, this will require understanding how much value a 3D file has, a practice which is not considered in much detail in trade law research, but is looked at in the field of intellectual property research. Upon having an idea of the value a 3D file could have, we can then try to integrate it into the origin determination for a 3D printed good. Yet, this will lead us to a conclusion similar to that reached regarding the CTH criterion: even if it is possible to add the value of a service input to the value of the inputs traditionally used to determine origin, is that a practice that creates a more or less predictable trading environment?

### IV. *Ad Valorem* Criterion: Which Input Has the Most Value and Where Is It Created?

As discussed in Chapter 2, the *ad valorem* approach is used to determine whether a good meets the regional value content requirement (RVC) or the value added (VA) threshold indicated in a PTA. An RVC or an VA threshold percentage is sometimes included as an additional requirement to a CTH for a particular good identified in a RoO Chapter's product-specific list. In determining this percentage, the value or the raw materials will likely always be included.[888] This requires distinguishing the value of the non-originating materials from the value of domestic or regional materials.[889] However, a PTA will not always specify how to determine the value of a particular material. The PEM[890], USMCA, and CETA for example indicate that the "value of the materials" is the "customs value" as determined under the Customs Valuation Agreement (CVA).[891] As the Agreement distinguishes materials from "engineering, development, artwork, design work, plans and sketches", this likely excludes factoring in the value of a CAD file into the total value of materials. The ex-works price or transaction value (if using the CVA as a basis for determining the overall value of the product) requires the importer to identify the price paid or payable to the

[888] Van de Heetkamp and Tuveld (n 193) 84.
[889] ibid 87-88.
[890] PEM app I, title I, art 1 (definitions).
[891] CVA, art 8(1)(b). Agreements, such as PEM may identify materials that are not included in the determination of origin such as the energy or fuel expended to produce the product, the plant and equipment, machines and tools used, and "goods which neither enter into the final composition of the product nor are intended to do so." PEM app I, title II, art 10 (Neutral Elements).

producer.[892] This price incorporates fixed costs, such as the rent or mortgage for the factory, insurance, maintenance, interest paid for capital goods used in production of the good, and direct overhead costs, and any rental costs or operation costs required to use a particular machine or a particular space in a factory for production of the specific good.[893] The price payable can also incorporate the costs of research and design expenditures, such as salaries or wages, related to the product if including such costs is part of the ordinary course of trade.[894] Thus, it may be possible to include costs related to the design of 3D file, such as the wages of the designers, in this category. If an instrument requires that origin determination is made using the net cost method, sales promotion, marketing, and after sales services are not included in the calculation.[895] Determining whether a good meets the RVC requirement or VA threshold is a complex process. For the purposes of comparing the origin of a 3D printed good with that of traditionally manufactured good using an *ad valorem* criterion, we will look at this from a high level and not delve into the weeds of cumulation.

### A. Value of Traditional Manufacturing Inputs: Materials, Labor, and Direct Overhead

The following inputs are significant for the *ad valorem* criterion as they are included in whether the transaction value or net cost method is used: the raw material that is processed (value of materials), human labor that produces the good (direct labor), and the costs to operate the factory in which the good is produced (direct overhead).[896] Looking at these three inputs suggests that when the *ad valorem* criterion is applied to a 3D printed good, the origin may differ from when the criterion is applied to a similar good produced though traditional manufacturing.

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[892] PEM app I, title I art 1 (definitions).
[893] Van de Heetkamp and Tuveld (n 193) 85 -87; Inama, *Rules of Origin in International Trade* (n 20) 297-300; Will Kenton, 'Direct Costs' (*Investopedia* 27 June 2020) <https://www.investopedia.com/terms/d/directcost.asp> accessed 24 October 2021.
[894] Van de Heetkamp and Tuveld (n 193) 86; Ian Forrester and Omar E Odarda, 'The Agreement on Customs Valuation' in Patrick F J Macrory, Arthur Edmond Appleton and Michael G Plummer (eds), *World Trade Organization: Legal, Economic and Political Analysis* (Springer 2005) 538, 549.
[895] The USMCA requires the Net Cost method to determine the RVC for motor vehicles. For information on the differences between calculating the RVC using the Transaction Value and the Net Cost methods, see Chapter 2, notes 335-352. When determining the annual quota of exports of motor vehicles from Canada to the EU, sufficient production on the non-originating materials must be determined. This is satisfied when "production in which the value of all non-originating materials used does not exceed: (a) 70 per cent of the transaction value or ex-works price of the product; or (b) 80 per cent of the net cost of the product. CETA requires the Net Cost method to determine the quota allocation." CETA, Protocol on Rules of Origin and Origin Procedure, Table D. 1.
[896] *See* eg, USMCA art 4.5, and definition for "total cost"

i. Value of Materials and Ink

Let us start with the value of materials. As discussed earlier, much of the raw material, "ink", for 3D printed goods are proprietary mixes of plastics or metals. The value of any non-originating material is the customs value, i.e., the price payable or paid for the goods when sold or imported.[897] Thus to determine the value of "ink" for purposes of tariff treatment, the producer must assess the value of any non-originating materials, the value of any originating materials, manufacturing costs, and any transportation costs. Plastic resins and mixes of metal for professional use (not amateur desk top printers) are costly to produce as (1) the materials are rare or (2) created by specific providers for use with locked-in machines.[898] Thus, the ink will likely be a significant input of the total value of the 3D printed good.[899]

A key factor is the where the material is sourced. In a report produced for the EU Commission's Executive Agency for SMEs, the researchers identified that aluminum, titanium, and magnesium were critical material for ink.[900] While the EU is a producer of aluminum, there is no significant production of magnesium or titanium in the EU.[901] Russia, China, Japan, and Kazakhstan are producers of titanium[902] and Russia, China, Kazakhstan, the US, Brazil, Israel, and Turkey are producers of magnesium.[903] As the EU Commission promotes 3D printing to reshore manufacturing, let us consider what impact the sources of these metals may have on

[897] *See* eg, CETA, Protocol on Rules of Origin and Origin Procedure, s A, "value of non-originating material".
[898] Leo Gregurić, "How Much do 3D Printing Materials Cost?" (all3dp.com 11 February 2019) <https://all3dp.com/2/how-much-do-3d-printer-materials-cost/> accessed 24 October 2021; Flores Ituarte, Khajavi and Salmi (n 741) 48; Gebhardt, Kessler and Thurn (n 78) 172.
In its opinion on the use of 3D printing to increase manufacturing in the EU, the European Economic and Social Committee was critical of the lock-in distribution method for ink-printers, as it requires the use of expensive raw materials, limits supply, and decreases incentives for businesses to develop new materials. Eur Economic & Social Committee, 'Living Tomorrow. 3D printing' (n 742) para. 3.2.3.
[899] National Board of Trade, 'Trade Regulation in a 3D Printed World' (n 47) 27.
[900] Duchêne and others (n 254) 21.
[901] ibid. This continues to be the case 5 years after the report. Europe is not a primary producer of titanium and magnesium. A report for the Executive Agency for SME of the Commission notes, 'The strengths of Europe in metal 3D printing are therefore dependent on materials that are sourced outside of Europe.' There is a potential for Europe to produce recycled aluminum metal for 3D printing. D Kretz and E Van de Velde, *Advanced Technologies for Industry - Product Watch: 3D Printing of Hybrid Components*, Report for the Commission Executive Agency for Small & Medium-sized Enterprises (Publications Office Eur Union 2021) 20, <https://data.europa.eu/doi/10.2826/581451> accessed 8 May 2022.
[902] Ike Brannon, 'Titanium Production's Perilous U.S. Future' (*Forbes* 29 April 2019) <https://www.forbes.com/sites/ikebrannon/2019/04/29/titanium-productions-perilous-u-s-future/?sh=652a00776a72> accessed 24 October 2021.
[903] International Magnesium Association, 'About Magnesium' (intlmag.org) <https://www.intlmag.org/page/basics_about_mg_ima> accessed 8 January 2022.

an origin determination of a product printed in the EU. With respect to titanium, these source countries are not members of the PEM. Thus, even if the metal powder is produced in the EU, if the value of the raw metal exceeds any value incurred processing the metal, then the metal-powder is a costly non-originating material. If there are no original materials incorporated into the powder, then all of the ink, and thus, all of the value of the material, is non-originating value. On the other hand, if the metal powder incorporates magnesium to a significant extent sourced from Israel and Turkey, the powder may qualify as a PEM originating material. Identifying the geographical source of the material and its value may become further complex if firms, such as Ford and Nissan have begun to do, re-use spent 3D powder for printing parts to make 3D printing a more sustainable form of manufacturing.[904]

This example demonstrates two aspects that point to the complexity of determining the origin of a 3D printed product: 1) under bilateral agreements (not including Russia, China, Japan, Kazakhstan) there is a likelihood that metal powder may be a non-originating material with a high value unless the powder is produced in one of the member territories and production of the powder has a relatively higher cost than the metal; 2) under regional trade agreements, there is a greater possibility that the powder or a resin mix can qualify as originating material, provided that one of the countries are a main source for the main ingredient of the powder or mix; 3) determining the origin of 3D ink, a mixture of plastics and metals from various countries and territories, will add more complications in determining the origin of a 3D printed product.

This exercise also demonstrates the impact that 3D printing could have on the effective restrictedness of a set of preferential RoO. As discussed in Chapter 3, Estevadeordal, Souminen, and Harris argue that the geographic pool from which a manufacturer can source inputs has an impact on the restrictiveness of the RoO. Even though the rules as written may not appear overly restrictive, if the geographic pool is small (such as a bilateral agreement between two nations with a certain amount of natural resources), it is harder to satisfy rules requiring a certain amount of local material (LVC).[905] In the case of 3D printing, if the geographic pool established by the PTA includes several countries, this increases the likelihood that one of the metals will be local material, and a trader seeking to import 3D printed goods to other PTA states

[904] David Greenfield, 'Ford and Nissan Use HP 3D Printing to Address Production Sustainability,' (May 2021) Automotion World 20-22.
[905] Estevadeordal, Harris, and Suominen (n 483) 30-32.

may not find any increased effective restrictiveness of the rules. On the other hand under a small geographic pool, a trader may find that he has to source the materials from third-parties, thus, reducing the percentage of local content incorporated into the 3D printed good. However, even if the trader can meet LVC, the rules may still be more effectively restrictive for 3D printing, because 3D printing also reduces the amount local labor required to produce the good.

ii. Labor Value – How Much Human Work Does It Take to Produce a 3D Good?

3D printing analysts portend the reduction of labor in the production stage, processing stage, and assembly stage. While training the workforce to operate 3D printers and post-processing equipment will take time, funding, and effort[906], once such training is complete, the time and effort to produce a 3D good is expected to be less than the labor required to produce traditionally manufactured goods.[907] This returns to the question of whether there is sufficient processing during the printing and post-processing process so as to be a "substantial transformation" under a value-added method. Fan, Sotelo, and Sundareswaran in their report for the World Economic Forum, raise the question: "Is the click of a button triggering the printing equivalent to traditional production processes, from a value-added perspective? Is the value addition derived from printing enough to consider the product as originating in that country, and thus eligible for preferential market treatment?"[908]

Further, RoO may eventually need to take into account how much artificial intelligence (AI) contributes to the value creation of the 3D printed product. As Grant Cohen reports, "automation may be a bigger structural threat to labor than trade" and AI will require states to redefine how they provide for the welfare of workers.[909] This threat to labor could arise in the context of additive manufacturing. While the EU and the US see 3D printing as a means to increase manufacturing jobs, 3D printer manufacturers and users of the technology, however, look towards AI to reduce the human labor component of the processing and post-processing procedures in 3D

[906] Osborn (n 731) 25; Eur Economic & Social Committee, 'Living Tomorrow. 3D printing' (n 742) para 3.4.
[907] Flores Ituarte, Khajavi and Salmi (n 741) 36-37, 57; Abeliansky, Martínez-Zarsoso and Prettner (n 746) 289.
[908] Fan, Sotelo and Sundareswaran (n 47) 14, 15.
[909] Grant Cohen (n 406) 342.

printing.[910] As Flores Ituarte, Khajavi, and Salmi write "[m]ore and more of these kinds of solutions will open up new markets for 3D printing in high scale manufacturing."[911] Thus, as the extent of human labor in processing diminishes, the role the value of labor plays in determining origin also diminishes. The simplification of production, processing, and assembly praised by industrialists and scholars in the context of 3D printing has a different outlook from the perspective of RoO within the context of deeper trade instruments that incorporate provisions meant to protect labor. A low level of human labor in 3D printing is an example of how developments in technology can increase efficiency in manufacturing. Traders and producers may choose such efficiency over meeting preferential tariff rate requirements and trade under the MFN rates, or choose to focus on foreign markets that do not have RoO with labor provisions.

iii. Direct Overhead Costs and New Business Models for 3D Printing

Finally, 3D printing may generate less direct overhead costs than traditional manufacturing. One of the main limitations for a widespread adoption of 3D printing is the cost of the machines and the limited range of suppliers, although the prices are gradually decreasing and more vendors are entering the market.[912] 3D printing promises to reduce the unit cost of producing a good because less waste is produced and it is easier to customize or modify the production of the good than in traditional manufacturing.[913] Further, the current practice in the 3D printing industry of Fablabs or using third-party providers to print the good rather than purchasing a machine also has an impact on reducing the direct overhead of producing the 3D printed good. A manufacturer may assign the task of printing to a retailer in order to produce the goods closer to the local market and save on transportation costs.[914] A manufacturer may also seek out a third-party company that rents the excess capacity of its machines to be closer to a geographical market or to avoid purchasing machines or rental space for housing such machines.[915] This suggests two things: 1) direct overhead costs may be

[910] Flores Ituarte, Khajavi and Salmi (n 742) 59. 3D Systems developed a printer with a robotic arm, Michael Molitch-Hou, "3D Systems Displays Mass Additive Manufacturing Bot at AMUG," (engineering.com 4 April 2016) <https://www.engineering.com/story/3d-systems-displays-mass-additive-manufacturing-bot-at-amug> accessed 25 October 2021.
[911] Flores Ituarte, Khajavi and Salmi (n 741) 59.
[912] ibid 49; Abeliansky, Martínez-Zarsoso and Prettner (n 746) 289.
[913] Flores Ituarte, Khajavi and Salmi (n 741) 36-37, 58; Abeliansky, Martínez-Zarsoso and Prettner (n 746) 289.
[914] Arbabian and Wagner (n 791) 539.
[915] Flores Ituarte, Khajavi and Salmi (n 741) 58.

less than traditional manufacturing direct overhead costs, if manufacturers using 3D printing seek out the printing method that is most efficient; and 2) the geographical location of where a good is printed may be a strategic, firm decision based on how close the printing venue is to the market the manufacturer wishes to reach. This last point may not have an impact on the origin of the good for purposes of preferential tariff treatment if the good is sold in the local market of the printer. However, if the manufacturer wishes to export that good to a foreign market, such strategic decisions may have an impact on whether the good qualifies for preferential tariff treatment when the value of direct overhead is compared to the value of other inputs.

In conclusion, as 3D printing promises to reduce labor and direct overhead costs to operate machinery, but as the costs of ink will likely continue to be high given the complexity of the materials, the value of materials could be more influential in determining where the value of the good is created. The Swedish Board of Trade in its report on 3D printing proposed that under the *ad valorem* method:

> 3DP shifts where value is added…directly related to the exclusivity and complexity of the ink is its cost, which in turn impacts the VA calculation. The actual 3DP production process is simpler compared to traditional manufacturing. Since the production process is less time consuming and less costly, in terms of value added, this will likely lead to a shift in focus towards the input material.[916]

Reshoring of manufacturing by 3D printing without adopting or increasing the domestic or regional production of ink, may result in the production of printed goods in the territory that have an origin based on the origin of the ink. If the ink's origin is a territory not part of the PTA that the manufacturer wishes to take advantage of, then the manufacturer will be required to pay MFN tariffs or the tariff rate under the PTA between the Member from which the ink originates and the Member into which the good is imported. Yet, if the 3D file and any research and engineering conducted for developing the 3D printed product are included as part of the price payable under direct costs, this may result in origin being designated on the basis of where such costs occurred.

As will be discussed in the next section, trade scholars who have examined 3D printing suggest that the greatest value in a 3D printed good may not lie in the printing process. Fan, Sotelo, and Sundareswaran state that if most of the value of a 3DP good comes from the design of the 3D file, then "consideration should be given to whether

[916] National Board of Trade, 'Trade Regulation in a 3D Printed World' (n 47) 27.

RoO based on a change in product classification might underestimate the value addition embedded in the design of the file, while possibly overestimating the value addition coming from the 3DP process itself."[917] If it is true that most value comes from the 3D file, this requires us to take two steps before incorporating the value of the file into the *ad valorem* analysis for determining the origin of the good: 1) assign some sort of quantifiable value to the file, and 2) identify the origin of that file. While the trade law literature is mostly silent on determining the monetary value of the file, the intellectual property law field provides some starting points for understanding why the 3D file may be the most valuable input in 3D printing.

### B. Value of the 3D File

An IP right is an intangible asset that can be assigned a monetary value. IP rights include copyright, patents, trademarks, designs, and trade secrets. While scholarship in this field is still exploring what type of IP right a 3D file is[918], there are some general aspects about IP rights as an asset that could allow us to think of the 3D file as an asset with a potential monetary value. According to the World Intellectual Property Office (WIPO), "The value of an IP asset essentially comes from the right the owner of that asset has to exclude competitors from using it. For an IP asset to have a quantifiable value it should: generate a measurable amount of economic benefits to its owner/user; and enhance the value of other assets with which it is associated."[919] Such value "can be derived through: direct exploitation of the IP by integrating it within the product; sale or licensing of the IP to a third party; and other means, such as raising barriers to entry or reducing the threat of substitutes."[920] The value can be calculated by estimating the economic income the IP right is expected to generate, the price paid to transfer ownership a similar IP right, or the cost of a similar or identical IP asset.[921]

It is important to note that this valuation is not intended to quantify how much economic value is generated in the creation of the IP right; we are not calculating the cost of labor, materials, and direct overhead that went into drawing the figure, or

[917] Fan, Sotelo and Sundareswaran (n 47) 14.
[918] ibid 16-18; Mikko Antikainen and Daniël Jongsma, 'The Art of CAD: Copyrightability of Digital Design Files' in Rosa Maria Ballardini, Marcus Norrgård, Jouni Partanen (eds), *3D Printing, Intellectual Property and Innovation: Insights from Law and Technology* (WoltersKluwer 2017) 257-274; Nordberg and Schovsbo (n 731) 275-302.
[919] World Intellectual Property Office, 'Valuing Intellectual Property Assets' (WIPO.int), <https://www.wipo.int/sme/en/value_ip_assets/> accessed 25 October 2021.
[920] ibid.
[921] ibid.

designing the software, or inventing the patentable subject matter. Further, the particular design technology determines how much human effort goes into the creation of the file. Designing a 3D file using software programs such as CAD is relatively less labor intensive than using a 3D scanner to create a 3D file of an existing object.[922] In their article on the impact of 3D printing on EU design law, Ana Nordberg and Jens Schovsbo, state that "Creating a CAD file can be as easy as taking a picture and using an app on a mobile phone.[923]" However, the user must still clean up the file or fill in missing information, which requires skill and effort.[924] Thus, IP valuation is not a perfect paragon to the type of value quantified in RVC or Value Added Thresholds for goods.

If trade scholars and industry analysists identify the 3D file as the most valuable aspect of 3D printing, we need to understand in what way the file is a valuable asset. If a highly-paid GE engineer designs a file for printing the part of an engine of a plane, one could claim that the value of the file is equivalent to how much the engineer was paid. On the other hand, a designer at an SME who is paid a fraction of a GE engineer's wages, could design a 3D file for a particular innovative product. Is this file worth less because the designer is paid less? What if this innovative product becomes a highly-sought after product, one that people will be willing to pay above market rate for? IP valuation allows us to understand that the value of an intangible asset resides in its ability to generate income (or in the income it has already generated) by the utilization of that asset. A 3D file's worth can be derived by integrating it within the production chain of a product, by selling or licensing the file to a third party who then downloads the file and prints the good, or by reducing competition (for example, the file for a lightweight bicycle made of printed parts that has a particular innovative function that makes these bicycles impossible to reproduce without the file). Osborn states that once 3D printing becomes widespread, "digital objects will have almost as much value as tangible objects, and in some ways will embody more value….owning the digital file is in many ways as good as owning the tangible object. In one important way, it is better: one can print as many copies of the tangible object as desired."[925] It is not exactly clear if this is the type of value trade analysts are thinking of when making references to the value of a 3D file, such as in comments by Neeraj: "a major proportion of the value of

[922] Antikainen and Jognsma (n 918) 260-261.
[923] Nordberg and Schovsbo (n 731) 298.
[924] Antikainen and Jognsma (n 918) 261; Osborn (n 731) 37.
[925] Osborn (n 731) 17.

3D manufactured goods will be captured in designing and generating the CAD file."[926] Yet, the value of a 3D file can be associated with how much potential income it can generate by being the set of instructions used to print multiple goods or to customize a certain good for multiple consumers.[927]

In the traditional manufacturing sector, IP rights owners generally grant an exclusive or other type of license with limitations to manufacturers not only to keep a close watch over who is using the IP right, but also to protect against any product liability claims that could arise from use of the product incorporating the IP. This is especially relevant for trademarks, which represent a certain level of standard of quality,[928] and designs which provide the patterns for the products.[929] Thus for IP right owners who have worked with traditional manufacturers in industries such as the automotive, aerospace, and medical products industries, these IP right owners may continue to closely control which additive manufacturers use 3D files to print products with trademarks by granting licenses which indemnify or limit any liability for defective products.[930]

In this scenario, it would be relatively imaginable, given a close relationship between the IP right owner and the manufacturer, to determine the economic value of the 3D file because the IP right owner could receive accounting reports from the manufacturers. If, and this will be discussed below, it is possible to identify the origin of the 3D file, then by using the economic value identified for the 3D file using IP valuation processes, it may be possible to designate the 3D file as a distinct origin conferring input which contributes value to the finished product under an *ad valorem* formula.

Yet, 3D files are not considered by all industry participants to be an asset that must be exclusive to one owner, and this could impact a 3D file's value. In sectors focused on products for individual consumers, the 3D printing industry is one of

[926] Neeraj (n 669) s126.
[927] Norberg and Schovsbo (n 731) 281.
[928] Conrad Weinmann, 'Trademark Licensors and Product Liability Claims - A European Perspective' (2005) The Trademark Reporter 1394.
[929] For a design to be granted intellectual property protection, it must be ornamental and not necessary for the product to function. Fan, Sotelo and Sundareswaran (n 47) 16. However, this ornamental part may be designed to contribute to the overall safety and functioning of the product. William A. Dreier, "A Question of Liability: Who's to Blame When Products Developed by Licensees Cause Unforeseen…?", reprinted from (2000) New Jersey LJ April 3 <https://norrismclaughlin.com/articles/category/a-question-of-liability-whos-to-blame-when-products-developed-by-licensees-cause-unforeseen> accessed 25 October 2021.
[930] Valentina Nieß and Susanne Wende, 'Intellectual Property and Product Liability Challenges in Three-Dimensional Printing' (2017) 6 IEEE Consumer Electronics Magazine October 128, 128 – 129.

knowledge-sharing and file-sharing.[931] Platforms such as Thingiverse provide downloadable 3D files that can be modified, reshared with platform users, and then printed by various users.[932] Individuals wishing to customize a certain product can modify the file or go to a 3D printing shop, select the materials available at the shop or provide their own materials, and print the good.[933] Embracing the sharing-culture will require a reassessment of determining the economic value of IP rights in the 3D file. If multiple, potentially unknown persons will be printing an unknown quantity of goods, with or without modifications, even if a license is required to download the file, the IP owner would have to keep track of all of the licensees and then follow up with them to find out how many goods were printed and what was ultimately done with the goods. If this process is complicated and time-consuming, and if the number of licensees and printed goods is a constantly changing quantity, it may be challenging to determine the economic value of the 3D file, and thus, the value for purposes of customs duties.

This uncertainty in estimating the economic value of the 3D file as an IP asset demonstrates that such a similar uncertainty will arise when attempting to determine the economic value of the 3D file for tariff purposes. In an article regarding the impact of a digital border tax on the adoption of 3D printing, Jimena Sotelo and Venkataraman Sundareswaran raise some challenges on assessing the value of 3D files. The first step is to determine whether the 3D file is a good or a service. If the files are considered a service and as "services are rarely, if ever taxed at the border…the possibility of applying custom duties will depend on commitments made under the General Agreement on Trade in Services."[934] As this article is only an overview of 3D printing written for the 2020 Annual Meeting of the World Economic Forum, the authors do not go into more detail regarding the GATS. As discussed above, such an approach would still require figuring out where to place 3D files in the services listed in the Schedules of

[931] Nordberg and Schovsbo (n 731) 300-301.
[932] Flores Ituarte, Khajavi and Salmi (n 741) 43.
[933] ibid 53. Due to malleability of 3D files, some IP legal practitioners are beginning to advise IP rights owners to develop IP enforcement strategies that take advantage of these aspects of additive manufacturing, not only to protect IP rights, but also to protect public safety. Elizabeth Ferrill and E Robert Yoches, 'IP Law and 3D Printing: Designers Can Work Around Lack of Cover,' (*Wired*) <https://www.wired.com/insights/2013/09/ip-law-and-3d-printing-designers-can-work-around-lack-of-cover/> accessed 25 October 2021; Justin E Pierce, 'IP Strategies for the Rise of 3D Printing' (Venable LLP 14 April 2015) <https://www.venable.com/insights/publications/2015/04/ip-strategies-for-the-rise-of-3d-printing> accessed 25 October 2021.
[934] Jimena Sotelo and Venkataraman Sundareswaran, 'Would a Digital Border Tax Slow Down Adoption of 3D printing?' (*World Economic Forum* 08 January 2020) <https://www.weforum.org/agenda/2020/01/would-a-digital-border-tax-slow-down-adoption-of-3d-printing/> accessed 25 October 2021.

Specific Commitments. However, if the 3D files are goods, it "may prove hard" to apply the WTO Customs Valuation Agreement's transaction value to determine the customs value of the files. This is because software "is typically not subject to a sale transaction but rather to a licensing agreement for its use. Payments for software may be made by subscriptions, periodic payments or other means, rather than through a one-time payment at the time of sale."[935] Further, the "value of 3DP files could be even harder to define as it will depend on the subsequent number of printings in the destination market. Unlimited number of prints could be made from a single 3DP file."[936] Thus, the authors propose applying a VAT or sales tax rather than custom duties to 3DP files.[937] The challenges raised by these authors tie directly to the challenges 3D printing poses to an *ad valorem* criterion factoring in the value of the 3D file as an input and not as an element of the overall direct costs or price of the product.

The complications 3D printing will bring to IP valuation and the challenges discussed in the paragraph above suggest that determining the economic value of the 3D file input is complex. If the value of service inputs are to be factored into the origin determination, an origin must be assigned to the service input, and this means deciding whether to continue using the GATS framework. Dinh writes that although "the WTO does not provide specific and explicit rules on cross-border transfer of data [i.e. a 3D file], commitments with Mode 1 are expected to gain importance since data flows may well be governed by this mode of supply. Thus, once 3DP becomes mainstream, it may be the case that the provision of services via Mode 1 will become more crucial, and the need to identify the origin of services supplied via this Mode will increase."[938] However, this means identifying who is the provider of the service and pinpointing a specific geographical location from which that service was provided.

### C. Hybridization of RoO: In Search of the Origin of the Service Input

Dinh, Zampetti and Sauvé point out that GATS RoO were designed primarily to address discrete services, which are supplied by one provider based in one country to one customer as a final end product.[939] Further, GATS V:6 in referring to FTAs liberalizing trade in services specifies that such agreements applies to service suppliers

[935] ibid.
[936] ibid.
[937] ibid.
[938] Dinh (n 46) 110.
[939] ibid 107-111; Zampetti and Sauvé (n 52) 143.

that engage in substantive business operations (SBO) in the territory of the parties.[940] Thus, the GATS framework favors a concentrated business model: a centralized location of operation with a unitary and discrete type of service. As Latrille's survey on PTAs reveals, the majority use the GATS terminology in connection with provisions related to the RoOs for services.[941] However, this may mean that the provisions on determining origin in existing agreements is not in-synch with the creation and trade of services in the digital trading environment. Just as GVC and their fragmentation of the physical processing of goods complicates origin determination of goods, GVCs for services also complicate the origin determination for services under the GATS framework.[942]

Dinh questions whether the GATS-based model of origin based on the territory of the legal supplier is still relevant in the era of hybrid products and GVC for services inputs.[943] If value is created at multiple points during the creation of a digital product, such as a 3D file, assigning origin to the legal supplier may not adequately identify where the greatest economic value of the service is created. Thus, "in various cases the ROO for services in the GATS identify a country of origin which does not make a significant contribution to the service as such, or even does not have any real economic link with the services at hand."[944] For Dinh, this means that if some sort of "substantial transformation" criteria is to be applied to service inputs, such as 3D files, in order to determine the origin of a good incorporating service inputs, "it is crucial to build rules different from the current ones that focus more on [the economic value of] services and not on suppliers."[945] Instead of attaching the GATS RoO supplier-approach to the RoO for goods, he calls for designing an integrated RoO regime over the long term and improving the current RoO for GATS in the short term by clarifying GATS definitions such as service supplier and ownership, as well as ensuring the compliance of PTAs with GATS requirements.[946] However, even if some goods-services RoO is a long-term goal, it is necessary to start considering the implications of including the value of

[940] GATS art V(6).
[941] Pierre Latrille, 'Services Rules in Regional Trade Agreements: How Diverse or Creative are They Compared to the Multilateral Rules?' in Rhoni Acharya (ed), *Regional Trade Agreements and the Multilateral Trading System* (CUP 2016) 446.
[942] Zampetti and Sauvé (n 52) 143.
[943] Dinh (n 46) 108-111.
[944] ibid 149.
[945] ibid.
[946] ibid 158-161.

service inputs into the origin determination of a good and whether some action should be taken in the near future with regards to redesigning RoO.

First, we must start with the assumption that 3D file is the most significant input in terms of value of a 3D printed good and this value can be quantified. As discussed above, there is some possibility that the value of the 3D printed could be incorporated into an *ad valorem* analysis as part of the direct overhead costs or other costs. The ASEAN TIGA RoO state that the costs of research, development, design, and engineering can be incorporated into the direct overhead cost when calculating whether the good meets the 40% RVC under the direct method.[947] Therefore, under such a RoO regime, the value of the research, development, and design of the 3D file could be included in determining whether the 3D printed good meets a certain level of RVC. However, it must be noted that not all ASEAN TIGA-based FTAs clearly state what constitutes direct overhead costs.[948]

In their article, "Reconciling Rules of Origin and Global Value Chains: The Case for Reform," Geraets, Carroll, and Willems argue that RoO for goods should be redesigned to incorporate the value of services in determining origin as service inputs contribute significantly more value to the final product. They use the Apple iPhone 4 as an example, citing studies by Kraemer, Linden, and Dedrick which calculated that the manufacturing of the phone in China adds only 1.8% to the final value of the phone, and most of the value resides in designing the software and user interface of the phone.[949] Geraets, Carroll, and Willems argue that design, R&D, marketing, and

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[947] ASEAN TIGA ch 3 arts 29(1) and arts 29 (2)(d); Dinh (n 46) 132-133.

[948] Inama and Sim (n 146) 87-89; The ASEAN-Australia-New Zealand Free Trade Agreement (entered into force January 2010) ch 3, art 5, states that "overhead costs" can be included in the direct formula, but simply defines overhead cost as the "total overhead expense" (art 5 (c)); The ASEAN-India Free Trade Agreement (entered into force 1 January 2010) (Annex 2 r 4) states that direct overhead costs can be included in the direct method, but does not define direct overhead costs; the AKFTA (Annex 3 r 4) allows using the direct overhead costs in the build-up method, but likewise does not define direct overhead costs; and the Regional Comprehensive Economic Partnership (signed 15 November 2020)(ch 3 art 3.5) also allows for a Direct/Build Up formula including direct overhead costs, but defines direct overhead cost as "the total overhead expense."

[949]Geraets, Carroll, and Willems (n 46) 295; J Dedrick, K L Kraemer and G Linden, 'Who Profits from Innovation in Global Value Chains?: A Study of the iPod and Notebook PCs,(2010) 19 Industrial & Corporate Change 81. A study by Gary Gereffi and Joonkoo Lee found that for the iPhone 4, which had a final factory price of $194.04, in terms of value added, $80.05 was created in South Korea, which supplied the display panels and memory chips, and only $6.54 of value came from assembly in China. Thus, in terms of the iPhone 4, the largest portion of the US trade deficit "incurred not with China, but via indirect exports from Korea and other high-value component suppliers." Gary Gereffi and Joonkoo Lee, 'Why the World Suddenly Cares about Global Supply Chains,' (2012) 48 J Supply Chain Management 24, 27.

3D printing is not currently applied with much frequency in electronics, due to technical restraints (Osborn (n 731) 23), but the iPhone example suggests that those policymakers who look to 3D printing

transport should be considered value-adding steps in the production process [instead of including costs of such services in the direct overhead costs], as the "value added at these steps generally exceeds the value of the production or assembly activities."[950] A new approach to RoO is needed "in which the value added during these stages of the production process is taken into account in the origin determination."[951] They propose adding language in PTAs such as a good is originating where "more than 50% of the final value of the good, as determined by the customs value, has been added in the territory of one of the parties, taking into account the following stages of the production process: research and development, artwork, design, intellectual property, manufacturing, marketing…"[952] If the design, development, and IP rights in the 3D file are more significant than any value created by the production and post-processing of the good and the "ink" that is used to make it, then, such language would allow for the value of the 3D file to play a key role in determining the origin of the 3D printed good.

Dinh also encourages revising the RoO system on the basis that "ROO for goods may fail to precisely identify the origin of goods even if they have taken 'Mode 5' services into account," and thus fail to maintain the economic rationale behind the RoO system.[953] In this instance, Dinh places 3D printing as an example of this failure if RoO do not include the value of imported service inputs. [954] Dinh cites Gaerets, Carroll, and Willems when stating that the "new generation of ROO may need to focus on the contribution of each country in the production of goods and services over GVCs. Otherwise, ROO will skew trade statistics as 'the relative share of raw materials, R&D, intellectual property, and marketing are not factored into the total value of the product.'"[955] Dinh advocates that reform of RoO for goods should take into account the role of Mode 5 services in the production of the good and also provide a solution for determining the origin of those services.[956]

Dinh and Gaerets, Carroll, and Willems acknowledge that choosing origin based on economic value creation of the service input could result in a change in the origin

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as a means to reshore manufacturing jobs may want to consider (1) reshoring design and technology development and (2) designing rules of origin that factor in the value of design and innovation.

[950] Geraets, Carroll, and Willems (n 46) 299-300.

[951] ibid.

[952] ibid 301. The authors acknowledge that this would mean interpreting the CVA to provide for services in the determination of customs value.

[953] Dinh (n 46)133.

[954] ibid 133-134.

[955] ibid 134-135, citing Geraets, Carroll, and Willems (n 46) 296.

[956] Dinh (n 46)138.

of the final product. Dinh explores how applying the "substantial transformation" test could also change the origin of a service. If a subsidiary or branch in Country A is more active than the parent company headquartered in County B in creating and providing a service, then Country A is the origin as a substantial transformation of the service occurred in Country A.[957] Gaerets, Carroll, and Willems use the example of a Nike T-shirt.[958] Under a RoO, the T-shirt originates in Bangladesh. However, if design and marketing are taken into account, then the T-shirt would originate in the US and any custom duties would be determined on the basis that the T-shirt is a US T-shirt despite being manufactured in Bangladesh.[959]

Identifying the origin of a service based on where economic value can be as complicated as determining the value of a good assembled from tangible inputs sourced globally. While proponents of reform such as Dinh may advocate for determining the origin of services based on economic origin, it may be more feasible to use the current GATS framework of assigning origin to the territory where the supplier is legally based. A RoO system based on the legal origin of the service supplier may be more appealing from a political perspective: if the current RoO system for goods skews unduly towards the location of manufacturing, adding the service input valuation could skew the value in favor of the service suppliers, who choose to be legally located in a different territory for strategic and fiscal reasons.[960] Further, as Hoekman and Nelson point out, when constructing "a global production structure, an essential part of such a strategy is to apply proprietary technology (product, process and managerial) to a corporate strategy involving a complex mix of exporting, direct investment and arm's length contracting (here as part of the overall production process, not the final exchange of a product)."[961] The focus is not so much on the free exchange of commodities, but rather an environment in which services and intermediate inputs "can be exchanged efficiently and securely."[962] While firms "still have an interest in traditional trade policy disciplines," they are more interested in a trade environment "with good protection of property rights, reliable communication, and consistent,

[957] ibid 154-155.
[958] Geraets, Carroll, and Willems (n 46) 302.
[959] ibid.
[960] Soprano (n 329) 103.
[961] Hoekman and Nelson (n 41) 5.
[962] ibid.

market-conforming regulatory environments."[963] As has been discussed earlier, the administration of RoOs generally needs improvement in clarity and communication.

Identifying the origin based on where the most economic value of the 3D file is created may be further complicated by whether the file is licensed to an outside firm or distributed to subsidiaries. The promises of additive manufacturing of more efficient manufacturing relies on the assumption that the final goods can be printed close to the customer or to a small regional market. 3D printing, if adopted on a widespread basis would, on the one hand, create multiple "value shops" such as consultancy, engineering, and R&D services in addition the physical structure in which the good is printed.[964] Economically, the value that confers origin would be created in one of those "shops." Yet, firms may still underreport the quantity of value created by these shops so that the origin of the service continues to be the geographical territory in which the supplier has its legal seat.

A US Customs ruling on the origin of dental aligners provides an example of how origin can be a strategic firm decision. Align (the owners of the Invasalign brand and technology) is headquartered in the United States.[965] Scans of a patient's teeth created by a dentist or orthodontist in the US, are sent to Pakistan and transformed into a series of digital models as required for the treatment of the patient. Files of the digital models are then sent to Mexico where they are printed into the plastic models. Align requested a ruling letter from the Commercial Rulings division of the CBP which could be submitted with the printed plastic models upon importation in to the US. Align asked that the CBP determine that the plastic models originated in Mexico (under the NAFTA RoO) so that upon importation into the US the models were subject to certain preferential NAFTA marking requirements. The National Commodity Import Specialist found that the applicable CTH occurred when the plastic sheets (non-originating to Mexico) were printed into the models of the teeth, and so the models originated in Mexico. Thus, the director of Commercial Rulings found that the NAFTA marking requirements could be applied to the models upon importation into the US.[966]

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[963] ibid.

[964] Sébastien Miroudot and Charles Cadestin, 'Services in Global Value Chains: From Inputs to Value-Creating Activities' (2017) OECD Trade Policy Papers No. 197, 28,< https://www.oecd-ilibrary.org/trade/services-in-global-value-chains_465f0d8b-en> accessed 25 October 2021. The authors take the notion of "value shop" from the work of C Stabell and Ø Fjeldstad 'Configuring Value for Competitive Advantage: On Chains, Shops, and Networks' (1998) 19 Strategic Management J 413.

[965] CBP, Ruling Letter, *Re: Country of Origin Marking of Orthodontic 'Aligners'* (1 March 2001) HQ 562012, MAR-05 RR:CR:SM 562012 BLS.

[966] ibid.

This example demonstrates that firms may not always be interested in having a product's origin be based on where the most work to the 3D file is created. We could imagine a RoO system which factors in the value of service inputs into an *ad valorem* criteria. Align may not report Pakistan as the location where most of the value is created, even though most of the work on the 3D files is done there. Instead, using the RoO system proposed by Gaerets, Carroll, and Willems, Align may argue that most of the R&D, engineering, marketing, and innovation is done in the US. Thus, the finished product, the printed models, originate in the US, although the models are designed in Pakistan and actually printed in Mexico.

This reasoning could be applied to other industries interested in 3D printing and suggests that origin could be strategically concentrated in certain countries. Gaerets, Carroll, and Willems suggest that if R&D and other services are factored into RoO:

> it is likely that more products would be found to originate in one of the developed economies (EU, USA, Japan). Developed countries would thus have to forgo custom duties on many products…imported products from non-partner countries would be of far greater value and thus be subject to higher custom duties, retaining origin's importance, and potentially offsetting budgetary consequences…reduced custom duties [for products of developed countries] on many products could lower consumer prices and stimulate demand.[967]

The impact this type of RoO regime would have on development goals of the WTO and national political objectives will be discussed in the next Chapter. Basically, shifting the origin conferring value from traditional manufacturing inputs to service inputs could result in shifting the origin of a good to territories that have significant and strong service sectors, especially in the field of R&D and digital design.

It would be necessary to examine the corporate structure of firms providing 3D design services. The decisions of multinational companies to locate design and R&D services in different countries is motivated not only by the available workforce, but also by economic benefits.[968] Firms providing digital products internationally establish legal seats or head operating offices in territories to benefit from favorable tax or legal environments.[969] Companies which may have manufacturing establishments in certain countries may choose to select the headquarter territory as the country of origin if able to factor in the value of service inputs. As Miroudot and Cadestin report in their study

[967] Geraets, Carroll, and Willems (n 46) 301-302.
[968] Soprano (n 329) 103.
[969] Petros C Mavroidis, 'And You Put the Load Right on Me: Digital Taxes, Tax Discrimination, and Trade in Services' (2020) 12 Trade, L & Development 75, 78-79.

on services in GVCs, "[h]eadquarter economies, for example, have a higher share of employment in headquarter services that are in-house by definition….Luxembourg, Switzerland, Germany, or the Netherlands have a higher share of manufacturing employment in services," than for example, the Czech Republic, Slovak Republic, Hungary, or Turkey.[970] The authors find that in terms of value created by labor costs, "jobs associated to service support functions are generally more high-skill and account for a larger share of the labour compensation. The fact that companies spend more on such jobs is an indication of the productivity and additional income they expect out of the servicification."[971] Producing outsourced services also generates value, as those services are quantified by the firms in the countries in study as too costly to produce in-house.[972] On the one hand, a company developing a 3D file, which outsources the final design of the file to another company in another country, may wish to "retain" origin of the file by claiming that the outsourced design work does not add a sufficient level of value to the file. On the other hand, if the company wants the 3D file to originate in the country in which the outsourcing design occurs, it could claim that significant value was created in the outsourced country, and thus "obtain" origin for that file in that country. As further modification or downloading of the 3D file into printers may implicate use of IP licenses, firms may also need to conciliate the origin of the file with the territory in which it prefers to be taxed on revenues deriving from IP rights and assets connected to 3D files.[973]

The RoO regime proposed by Geraets, Carroll, and Willems could impact whether 3D printed goods would qualify for EU origin if the value of the services is the most significant value input. In 2015, the EU was concerned that it did not have a significant level of 3D file design capability and that innovative firms were being

[970] Miroudot and Cadestin (n 964) 19; See also Catherine Barnard with Jukka Snell, 'Free Movement of Legal Persons and the Provision of Services,' in Catharine Barnard and Steve Peers (eds), *European Union Law* (3rd edn, OUP 2020) 438.
[971] Miroudot and Cadestin (n 964) 19.
[972] ibid. The countries included: Austria, Belgium, Brazil, Bulgaria, Canada, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, India, Ireland, Italy, Korea, Latvia, Lithuania, Luxembourg, Mexico, Netherlands, Poland, Romania, Slovak Republic, Slovenia, Spain, United Kingdom, United States.
[973] For example, Google transferred its intellectual property holdings from Ireland to the US after closing its "double Irish" tax loophole subsequent to changes in the US tax law implemented by the Trump Administration. Richard Waters, 'Google to end use of 'double Irish' as tax loophole set to close' *Financial Times* (London, 1 January 2020) < https://www.ft.com/content/991f11ae-2c51-11ea-bc77-65e4aa615551> accessed 25 October 2021.

acquired by non-EU companies.[974] Under Geraets, Caroll, and Willems's RoO regime, most of the value of a 3D printed good, even if printed in the EU, would reside outside of the EU and thus the product would not qualify as an EU originating product. On the other hand, if other types of services are factored into the value creation, then a company which has its legal seat in Ireland or Luxembourg could argue that due to corporate structure, the location of certain personnel, or communication patterns, the majority of the value is created in the legal headquarters in Ireland or Luxembourg.[975]

This would be a strategic use of the SBOs language under the GATS RoO framework. A company could argue that even though design work on a file is done in Pakistan, the SBOs of the supplier are in Ireland, and therefore benefit under CETA preferential rates when importing to Canada (provided it can demonstrate that it has an effective and continuous link with Ireland).[976] Further, under the E-commerce Directive, the establishment of a service provider "involves the actual pursuit of an economic activity through a fixed establishment for an indefinite period."[977] A company could argue that a designer in a third-party country to the PEM is only temporarily hired to design or work on a file; the "actual pursuit of economic activity" is conducted in a headquarters or other fixed office with SBO within the PEM territory (which includes the EU), and thus, the value of the file could be cumulated with any value created by

[974] Eur Economic & Social Committee, 'Living Tomorrow. 3D printing' (n 742) para 3.2.6. Six years later the report on 3D printing for the Commission's Executive Agency for SME noted that training and skill acquisition continues to be a challenge for adopting 3D printing manufacturing in the EU. Kretz and Van de Velde (n 901) 21.

[975]Council Directive 2000/31/EC of 8 June 2000 (Directive on Electronic Commerce) Recital 19: "The place at which a service provider is established should be determined in conformity with the case-law of the Court of Justice according to which the concept of establishment involves the actual pursuit of an economic activity through a fixed establishment for an indefinite period; this requirement is also fulfilled where a company is constituted for a given period; the place of establishment of a company providing services via an Internet website is not the place at which the technology supporting its website is located or the place at which its website is accessible but the place where it pursues its economic activity; in cases where a provider has several places of establishment it is important to determine from which place of establishment the service concerned is provided; in cases where it is difficult to determine from which of several places of establishment a given service is provided, this is the place where the provider has the centre of his activities relating to this particular service."

[976] Answer given by Ms. Malmström on behalf of the European Commission (14 November 2018) E-004978/2018 < https://www.europarl.europa.eu/doceo/document/E-8-2018-004978-ASW_EN.html> accessed 25 October 2021 "The term 'substantive business operations' is a well-known concept used in Articles V(6) and XXVIII(m) of the World Trade Organisation (WTO) General Agreement on Trade in Services… The Commission considers, as is also stated in the context of the Commission Declaration on the meaning of the term 'substantial business activities' in Article 8.1 of the Comprehensive Economic Trade Agreement (CETA), that a corporation established in the territory of our trading partner could benefit from the agreement only where it can establish that it has substantive business activities in the foreign territory having an effective and continuous link with the trading partners' economy, in the sense of establishment as applied under the EU Treaty."

[977] Directive on Electronic Commerce, Recital 19.

other inputs created in other PEM states. As a result, not only will importers and custom officials need to verify the source of the "ink" and quantify the labor hours and direct overhead expenditures for printing the good, they will need to provide evidence that the value generated by the service inputs does in fact originate in Ireland. This would further complicate the already complex origin certification process if the 3D file design is done in multiple territories: each step of the design would need to be assigned an origin, and each the value of each step would need to be quantified and compared with the value generated in the country for which the firm is seeking preferential tariff treatment for the final printed product.

Firms operating in the EU market would have to take into consideration whether they are providing a service covered by the Directive on Electronic Commerce and Services Directive[978], whether they are providing services regulated by another EU or national instrument, or whether, due to printing activity, they are in fact goods producers. *Asociación Profesional Élite Taxi v. Uber Systems Spain SL*, an ECJ decision suggests that lawmakers and courts are considering whether a service provider is providing just an information service.[979] The Spanish taxi association argued that Uber's activity in Spain could be classified as unfair practices under its competition laws, which require licenses and authorizations to commercially transport passengers.[980] The Court was asked to determine if the application service (the digital service) provided by Uber is in fact a service in the field of transport, which is out of the scope of the Services Directive.[981] This would then bring the service under Article 58, paragraph 1 of the TFEU[982], thus allowing Spanish courts to decide if Uber should be subject to the same regulations as taxi operators.[983] The Court found that without the Uber app and that Uber exercises control over the conditions of the drivers and the fares, drivers would not be led to provide transport services and the passengers would not use such services.[984] As a result, the app (digital service) formed an integral part of an overall service, transport, and could not be classified as an information society

[978] Directive 2006/123/EC of the European Parliament and the Council of 12 December 2006 on services in the internal market (Services Directive) [2006] OJ L376/36.
[979] Case C-434/15, *Asociación Profesional Élite Taxi v. Uber Systems Spain SL* [2017] ECLI:EU:C:2017:364
[980] Ibid para 14-15.
[981] Ibid para 42.
[982] Consolidated versions of the Treaty on European Union and the Treaty on the Functioning of the European Union (TFEU) [2012] OJ C 326, 1, art 58(1).
[983] *Asociación Profesional Élite Taxi v Uber,* paras 44, 47.
[984] ibid para 39.

service.[985] Consequently, the digital service (app) is excluded from the scope of the Services Directive and the Directive on Electronic Commerce and could be subject to national regulations.[986]

While 3D printing files are not transport services, they can be used to produce medical products.[987] Healthcare services are also excluded from the Services Directive[988] and application of the Directive on Electronic Commerce must not be prejudicial to the level of protection for public health at the Union and national level, and Members States may take measures to derogate from Article 3(2) for the protection of public health.[989] Thus, a 3D file design company that connects hospitals or medical services providers with 3D manufacturers or transmits files to 3D printers in the medical facility, could potentially be seen as providing a medical service, and thus, the 3D file could be subject to Union and national regulations on health. If the 3D file producer exercises control over how the product is printed, how many copies are printed, training of the printer operator, and use of the products, it could possibly be argued that the 3D file producer is also the producer of the medical equipment and thus subject to additional regulations. Firms may be hesitant to single out the 3D file as an independent origin conferring input if declaring the 3D file as an input on a customs form may lead into an investigation on whether they are providing services that are subject to additional regulations. Rather, such firms may want to bundle up the costs of service designs in the direct manufacturing costs of printing the good. On the other hand, national and EU regulators may want to keep an eye on 3D file providers and monitor whether they are just providing an information service or whether the creation and transmission of a 3D file is part of the provision of another type of service or a product that requires a certain level of safety controls.

Further, the Directive on Electronic Commerce and Services Directive apply to services provided by service providers established in the EU.[990] Therefore, 3D file producers (service providers) established outside the EU would not be eligible for the protections offered by the Service Directive or the Directive on Electronic Commerce.

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[985] ibid para 40.
[986] Ibid para 50.
[987] Duchêne and others (n 254) 52-54, 61-64.
[988] Services Directive, preamble 22.
[989] Directive on Electronic Commerce, preamble 11, art 1(3), art 3(2), art 3(4). Art 3(2) prohibits Member States from restricting "the freedom to provide information society services from another Member State."
[990] Electronic Commerce Directive, art 3(1), Services Directive, preamble 16.

This would be an incentive for 3D file producers to argue that the 3D file design and transmission services are provided by firm established in the EU. One industry where this type of strategic value placement could be applied is the automotive industry, which already has an intricate relationship with RoO. Companies like BMW are using 3D printing technology and machines to print spare and replacement parts closer to a particular market.[991] For example, we can imagine that Mercedes-Benz has a 3D printing facility in Germany to print replacement parts for older models. Under traditional RoO, the value of the ink for those parts may be more significant than the labor or overhead costs expended to print those parts. Thus, if the ink is non-originating material, it is likely that the part would not qualify for EU origin.

If Mercedes-Benz begins to produce an innovative electric car for the mass market which has a reduced number of parts, and most of those parts are printed parts, then the fact that the non-originating ink has significant value could impact the origin of the car under an *ad valorem* criterion (recall that simple assembly does not create origin conferring value). Thus, Mercedes-Benz would want to incorporate the value of any R&D and 3D file design into the RoO analysis if the majority of the value created by these services occurs within the EU. Then, Mercedes-Benz could select a particular legal office, headquarters, or other type of office to justify that the value of the 3D files is created in the EU. Another industry which could also strategically locate value creation for 3D files, and thus the 3D printed goods, is the aerospace industry as companies such as GE are using 3D printing technology to print parts for engines.

## V. Conclusion

This chapter started with applying the wholly produced criterion and the three substantial transformation criteria to determine the origin of a 3D printed good. At the end, we have arrived at some "deep" trade issues in addition to perceiving how well traditional trade tools function in regulating trade in a data-driven economy. The CTH and the *ad valorem* criterion with traditional manufacturing methods function to discriminate which goods have undergone sufficient processing in the territory. However, when these criteria are applied without any modifications to a 3D printed

[991] Vincent Bonneau and others, 'The disruptive nature of 3D printing' (2017) Digital Transformation Monitor January, 3 <https://ati.ec.europa.eu/sites/default/files/2020-07/The%20disruptive%20nature%20of%203D%20printing%20%20%28v1%29.pdf> accessed 25 October 2021.

good, one finds that the CTH criterion may no longer have a discriminatory function as all 3D printed goods undergo a change of heading when they go from ink to printed item. Further, using the *ad valorem* method, the value created from the production of a 3D printed good appears to be weighted in the raw materials, rather than in the printing, post-processing, and assembly. This could potentially offset the political goals behind including labor value content requirements in RoO, such as those in the USMCA, which aim to increase the value of labor in goods production. Yet, some scholars would argue that current rules do not indicate the true origin of a good as the greatest value and processing done to the good occurs when the 3D file is designed.

Therefore, is it necessary to design a new RoO framework in which the origin of the 3D file is incorporated into the analysis of the 3D printed good? This chapter presented the legal and technical challenges to such an approach. The GATS framework is not commensurate with RoO framework developed in the AOR, the Kyoto Convention, numerous PTAs for several reasons. The GATS classification system has a different intention and purpose from the HS nomenclature which forms the basis of product specific lists in PTAs, especially since the AB has allowed for an evolutionary interpretation of services classification, while the HS is designed to discourage such an interpretation of classifying goods. Further, GATS provisions for Mode 1 services (which would apply to cross-border transmissions of 3D files) locate origin within the territory of the service supplier, which is not always where the most economic value of the service is created. Whereas, under the RoO framework for goods, the geographical location where the most economic value is created is the origin of the good. Thus, adding an origin determination for services to the origin determination of a 3D printed good may be an uneasy alliance. In terms of creating a more predictable and transparent trading system, this hybrid may not assist in reducing the paperwork and resource expenditure for firms seeking preferential tariff treatment. There could be opportunities for large firms or Member states to lobby for “retaining” or “obtaining” origin of the 3D file based on where the firms have substantial business operations.

However, we should continue to explore whether there can be some redesign of rules of origin. As the last pages of this Chapter demonstrated, if under traditional manufacturing methods a good originates in Bangladesh, but under a RoO system that incorporates 3D file design the good originates in the US, one can see how rules have an impact on the perception of where trade is created and who are the producers of products. Although 3D printing has some ways to go before it is a widespread form of

manufacturing, perhaps we should consider Banga's concerns about the impact of 3D printing on the industries of countries that do not have advanced technological infrastructure and training programs.[992] Shaffer also warns that while the free flow of data (like a 3D file) can enhance efficiency and welfare gains, it can also "exacerbate inequality in ways that can threaten social stability and international cooperation."[993] While regulation of data flows:

> should reside predominantly at the national level, which is most democratically legitimate…trade agreements can facilitate governments' ability to address social inclusion policies. At a minimum, trade agreements should not directly or indirectly constrain governments from adopting necessary policies domestically. They must accommodate (and not foreclose) mechanisms that enable states to address labor and other social concerns.[994]

Neither Banga nor Shaffer refer to preferential RoO, but this Chapter has demonstrated that when applied to determine the origin of data flows, they can potentially exacerbate inequality or hamper mechanisms for addressing labor and social concerns. If a trader in Bangladesh now finds that he or she has a factory full of US goods, they might not be able to take advantage of a non-reciprocal preferential tariff rate under a GSP as the goods do not "originate" in Bangladesh. This would then offset the intended goal of the non-reciprocal preferential tariffs, which is to foster development by a reduced tariffs upon importation into the preference giving country.

Finally, if a hybridized regime RoO is created, it will certainly add more paperwork to customs procedures as traders will also have to determine the origin of the service. As Ciuriak and Bienen reported, the costs to comply with procedures for determining whether a product qualifies for preferential treatment discourages SMEs and first-time traders from entering international trade [995] Inama and Sim found that for those traders wishing to trade under ASEAN FTAs, two accounting systems were needed: one for assessing whether preferential tariff treatment was met under the FTAs and one for assessing whether domestic regulatory requirements could be met.[996] Traders would now have to keep a triple accounting system: one for origin determination for services, one for the "goods" portion of the 3D printed product, and one for domestic requirements. The next chapter will explore whether it is possible to

[992] Banga (n 48) 30-31.
[993] Shaffer, 'Trade Law in a Data-Driven Economy' (n 477) 279.
[994] ibid 280.
[995] Ciuriak and Bienen (n 579) 14
[996] Inama and Sim (n 146) 87.

design RoO for 3D printed goods and other goods with a significant service input that are not unwieldy and that for states to achieve some domestic policy goals without creating additional restrictions to international trade.

## Chapter 5

## Designing Preferential Rules of Origin for Advanced Manufactured Products: An Opportunity to Modernize Perspectives on Preferential Rules

Preferential rules of origin are a technical element of trade law, but they serve an important role in the practice of trade. While economists may determine whether a preferential margin rate of 5% instead of 3% can increase utilization rates, legal scholars explore how preferential rules function within traditional legal frameworks for trade as well as within modern, deeper frameworks. Addressing preferential RoO in the context of advanced manufacturing allows an understanding of where the rules are wobbly in their functionality. For example, the emphasis in the *ad valorem* criterion on labor and manufacturing overhead may mean an underreporting of value creation in the design and engineering stages of production, and thus origin is assigned to the territory in which most of the value is not created. The use of the CTH criterion raises questions on what HS code a printed product or input falls into and whether a CTH is a sufficient transformation to confer origin. Additionally, the changes to manufacturing and to GVCs that 3D printing and advanced manufacturing can bring also provides an opportunity to consider the simplification of cumulation rules and direct transport rules.

Considering rules of origin in the context of 3D printing also allows us to examine arguments on linking goods and services origin determinations and to identify some possible issue points. Emphasis is given to the value of the 3D file and the creation of digital design file by some of the scholars referenced in this dissertation.[997] However, questions remain as to the implications, both at the level of international trade law and at the level of customs administration, of linking the origin analysis of the file to the origin analysis of a good. This chapter suggests that linking rules of origin to service origin determinations and e-commerce regulation may not be an easy fit. Identifying the areas of friction presents an opportunity to consider the merits of a hybridized goods-services regime and the role of preferential RoO in the digital trade environment.

Finally, looking at the rules in the context of 3D printing allows us to consider topics that underly current debates on international trade law: state sovereignty and the move from multilateralism to plurilateralism. Exploring how protectionist, or just inefficient, application of current rules to 3D products and how the design of new rules

[997] See Chapter 4, notes 925 - 927.

could reproduce some of the unsavory elements of preferential RoO presents the opportunity to consider whether it is time for plurilateral oversight of such rules. In fact, Mavroidis argues that while 3D printing is still a growing form of manufacturing, the WTO should be exploring how to determine the origin of 3D printed products:

> The fact that it will be some time before 3D printing can be fully utilized on a wide commercial scale does not mean that similar questions should be like sleeping dogs that can lie a few yards outside the WTO headquarters, and are handled only at the moment when they start to bark. The WTO can become attractive only if it shows the capacity to address similar concerns preemptively, and not only ex post facto (which might be too late).[998]

This chapter explores whether it is possible to craft a WTO instrument on preferential RoO for advanced manufactured products (RoO Instrument) by looking at the development of the Information Technology Agreement (ITA) and the Trade Facilitation Agreement (TFA), both plurilateral agreements. Additionally, an examination of Nairobi Ministerial Decision on preferential Roo for LDCs seven years after its completion provides an opportunity to see how Members may respond to another RoO Instrument.

The success of any RoO Instrument would require the willingness of Members to concede a little bit of sovereignty on designing rules. Studies on the complexity of the rules and utilization rates suggest that the rules have become unwieldy. Some guidance at an international level would allow parties of PTAs to design rules that perform a discriminatory function, but are not overly restrictive. This means that both the WTO and its members should consider modernizing the perspective that preferential RoO lie beyond the aegis of the WTO. As Professor Jackson commented:

> In the context of international law, based heavily on nation-state sovereignty and supremacy ideas, governments and societies consenting to become members of such institutions must do so with the realization that the institutional structures will not be frozen in time, and that such consent will inevitably bring surprises.[999]

Technological means to produce goods are not frozen in time; they change and the practice of trade thus adapts. As such, if institutional organizations remain frozen in regulating trade based on one type of manufacturing due to reluctance or resistance from Members to modernize, the value and the benefits that the organization can bring to trade may become overshadowed by perceptions that the organization is "outdated." The possibility that the WTO can change its approach to regulating rules of origin

[998] Mavroidis, *The Regulation of International Trade*, vol 3 (n 66) 242-243.
[999] Jackson (n 76) 31.

should not be a surprise to its Members as the need to find solutions to the design and implementation of preferential RoO is shared by scholars and by Members. This means, however, that the WTO must adapt as an institution and Members should also re-examine what it means to have sovereignty over preferential RoO design in a technologically advanced, highly connected digitalized trading environment.

This Chapter ties together the various discussions on rules of origin presented throughout this dissertation. The questions on the legality of the rules under the WTO agreements presented in Chapter 1 are reexamined. Modest recommendations based on the technical aspects of the rules discussed in Chapter 2 are proposed. Further modest suggestions on how to make the rules more efficient and user-friendly are proposed based on the work of the economists presented in Chapter 3. A deeper examination of how to link rules of origin for goods to rules for services and e-commerce regulation is discussed based on the exploration of origin determination for 3D printed products in Chapter 4.

The Chapter returns in Part 1 to the arguments referred to earlier on the economic costs of preferential RoO, and then presents a summary of the trade policy concerns and the need to simplify rules both substantively and procedurally. Part 2 explores how to design rules that include the origin of 3D file input or a different type of digital file input without reliance on a hybridization of the goods-services regime. Part 3 examines how RoO for 3D printed goods could be connected to, but not dependent on, a WTO agreement on e-commerce regulation. Part 4 presents a proposal for a WTO Instrument on RoO for Advanced Manufactured goods. Part 5 examines how the WTO Secretariat and the Committee on the Rules of Origin can tap into the resources of the organization to provide assistance to the trade community in designing and complying with RoO for advanced manufactured products. However, as RoO are mainly found in PTAs, Part 6 provides some recommendations for making the rules beneficial tools for traders and reducing overly discriminatory elements for trade in advanced manufactured goods and for trade in general. Part 7 offers some conclusions on the Chapter.

## I. Rules of Origin for 3D Printed Goods and Other Advanced Manufactured Goods: Economic and Trade Policy Concerns

Exploring how to design RoO for 3D printed goods is not just an exercise for identifying the origin of goods incorporating a digital service input, it is also an

opportunity to reexamine issues that beset preferential RoO in RTAs. These issues may be transferred to rules designed for 3D printed goods and goods incorporating digital services if not recognized and addressed by lawmakers and policy makers. They could also impact origin determination of 3D printed products that are traded under existing rules. This Part will briefly summarize the arguments raised by the legal and economic scholars regarding preferential RoO for traditional manufactured products and then demonstrate where these concerns are linked to goods produced with advanced manufacturing methods, such as 3D printing.

Fissures within the preferential RoO system are the lack of transparency in the drafting and implementation of the rules and the trade distortive effects resulting from the compliance or the inability or unwillingness to comply with the rules. While some political tinkering may be inevitable in the design of trade laws, legal scholars point to the high level of lobbying and involvement of politicians in the design of these rules.[1000] In exchange for agreeing to open domestic markets to foreign products and inputs, industry groups and politicians seek to benefit by the design of rules that will protect or bolster domestic markets even though foreign goods may enter the market under a preferential tariff rate.[1001] This is achieved through rules that are obtuse, not generally made known to the public for comment and criticism, and for which, Hirsch argues, there is no accountability mechanism.[1002] Using the RoO chapter in trade agreements to obtain political domestic objectives may not necessarily benefit the domestic industry. Rules designed to favor traditional manufacturing, such as *ad valorem* percentage rules or regional value content rules, clash with use of new technologies to reduce labor costs and to make and source parts where it is most efficient.[1003] Studies on the potential impact of the USMCA on the US automotive industry note that automotive makers may feel constrained to choose between investing in traditional manufacturing so that the parts or cars qualify under the rules or investing in new advanced techniques and trading under the MFN rates.[1004]

Scholars generally identify the complex design of the rules as a source of economic inefficiency.[1005] In addition to untangling the "spaghetti bowl" of RTAs,

[1000] See Chapter 3, notes 484, 491-496.
[1001] See Chapter 3, notes 504 - 507.
[1002] Hirsch, 'The Politics of Rules of Origin' (n 28) 328.
[1003] See Chapter 2, notes 416 - 418.
[1004] Reinsich and others (n 410) 21; Congressional Budget Office (n 413) fn c; Powers and Ubee (n 602) 16–17.
[1005] See Chapter 3, Part II.

traders and customs officials must decipher the formulas, exceptions, sub-exceptions, and product-specific instructions in RoO chapters. MSMEs in both developed and developing countries may not have the legal or financial resources to obtain assistance on determining whether a good made of multiple parts qualifies for preferential treatment under a RTA. As a result, some traders forgo seeking the preferential tariff rate and instead trade under the MFN rates. Further, the rules can be designed to favor certain industries or practices while not promoting practices that are efficient like sourcing inputs from outside the territory (e.g. SADC)[1006] or attempting to regain losses from inefficient manufacturing by means of restrictive rules (e.g. SAFTA).[1007]

The adoption of additive manufacturing in Asian and African countries indicates that developing rules of origin for 3D products to bolster domestic advanced manufacturing may not just interest governments in Europe and North America.[1008] For example, GE has initiated advanced manufacturing hubs and training programs in Nigeria[1009], and the Ministry of Electronics and Information Technology in India produced a paper with recommendations for the use of additive manufacturing to "augment India's efforts to position itself as the Manufacturing Hub of the world," as well as increase the goods "Made in India."[1010] India has argued against a permanent moratorium on duties on electronic transmissions on the basis that it needs to support its developing digital manufacturing and trade sectors by limiting the entry of digital products from third countries.[1011]

As noted in Chapter 4, a printed good may not necessarily have the same origin as a good produced under traditional manufacturing methods. Some scholars suggest that 3D printed goods will be distributed within the domestic market and thus GATT rules on goods do not apply, but the question of how to determine origin still remains open.[1012] However, the hearing aid and dental aligner industries have demonstrated

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[1006] Erasmus, Flatters, and Kirk (n 481) 280–282; Inama, *Rules of Origin in International Trade* (n 20) 471.
[1007] Singh and Singh (n 325) 69–71.
[1008] Richard A D'Aveni, 'How 3-D Printing Can Jumpstart Developing Economies' (*Forbes* 19 March 2019) <https://www.forbes.com/sites/richarddaveni/2019/03/19/how-3d-printing-can-jumpstart-developing-economies/?sh=12bcfedd4400> accessed 2 November 2021.
[1009] GE, 'GE Nigeria launches e-learning portal at Lagos Garage Week 2018' (n 69).
[1010] Ministry of Electronics and Information Technology (n 69) 3, 5
[1011] Communication from India and South Africa (10 March 2020) WTO Work Programme on Electronic Commerce <wto.documents.org> accessed 29 October 2021.
[1012] This argument has an interesting lineage. In 2017, A report conducted by researchers at ING estimated that 3D printing has the potential to eliminate 40% of world trade by 2040. Raoul Leering '3D Printing: a threat to global trade' (think.ing.com 28 September 2017) <https://think.ing.com/reports/3d-printing-a-threat-to-global-trade/>.

that 3D manufacturers print and ship 3D printed goods all over the world,[1013] and it is possible that other industries will import and export 3D printed goods. Thus, a 3D printing industry may hire lobbyists to influence politicians to design rules to support their domestic market position. Suppose that a Moroccan manufacturer prints and assembles components of a dashboard and a company in Germany wishes to import the semi-completed vehicles for final assembly taking advantage of the PEM diagonal cumulation possibilities between Morocco and the EU.[1014] Under the transitional PEM product specific rules for accessories for automobiles, the value of the non-originating material for a dashboard must not exceed 50% of ex-works price[1015] of the product.[1016] Thus, if the value of the non-originating material in the ink used to print the dashboard is worth more than 50% of the total value (including labor value and overhead value), then the dashboard does not qualify as originating under the PEM. At this point, policymakers in Germany, wanting to bolster domestic final assembly automotive

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This statistic was referred to in a brief article for the WTO's World Trade 2018 report by Patrik Tingvall and Magnus Rentzhog on 3D printing. These scholars stated that "WTO rules on goods do not apply if there is no cross-border trade. Tariffs and trade facilitation are obvious examples." Instead, more emphasis will be placed on the GATS, and "[f]or rules of origin, proof of origin must be shown in different ways." Tingvall and Rentzhog, 'Is the WTO 3D printing-ready?' (2018) Word Trade Rep p 158, <https://www.wto.org/english/res_e/publications_e/opinionpiece_by_patrik_tingvall_and_magnus_rentzhog_e.pdf>.

The authors hold senior positions at the Swedish National Board of Trade, which produced the report, "Trade Regulation in a 3D Printed World," in 2016. That report expands upon why GATT rules do not apply to 3D printed goods if there is no crossborder trade. However, with regards to RoO, the National Board of Trade examines origin determination of 3D printed goods using the three substantial transformation criteria. National Board of Trade, 'Trade Regulation in a 3D Printed World' (n 46) 28. Finally, Mavroidis, references Tingvall and Rentzhog and also references the statistic that 3D printing could reduce world trade by 40%. He also states GATT does not apply to 3D printed goods, because "there is no-cross border trade involved when it comes to 3D printing" and the wonders, "[s]hould 3D printing be considered a service?" However, he, too, wonders, "what is the origin of goods produced?...[t]hese questions need to be answered." Mavroidis, *The Regulation of International Trade*, vol 3 (n 66) 242.

In 2021, ING published another report in which it re-forecasted the impact of 3D printing on trade. Instead of eliminating 40% of trade by 2040, that the downward effect on trade will be around 3% to 4%, and the manufacturing share of 3D products will be 5%. Raoul Leering, '3D Printing is a Threat to World Trade but Its Impact is Still Limited' (think.ing.com 5 August 2021) <https://think.ing.com/articles/the-threat-for-world-trade-is-limited-for-now/> All websites in this footnote accessed 2 November 2021.

[1013] Freund, Mulabdic and Ruta (n 68); Fan, Sotelo and Sundareswaran (n 47) 13.

[1014] For a list of countries to which diagonal cumulation applies, see Commission, 'Notice concerning the application of the Regional Convention on pan-Euro-Mediterranean preferential rules of origin or the protocols on rules of origin providing for diagonal cumulation between Contracting Parties to this Convention," (30 March 2020) OJ 2020/C 322/03, tables 1,2, and 3.

[1015] The ex-works price is the "price paid for the product ex works to the manufacturer in the Contracting Party in whose undertaking the last working or processing is carried out, provided the price includes the value of all the materials used, minus any internal taxes which are, or may be, repaid when the product obtained is exported." Transitional PEM app 1 art 1(f).

[1016] Transitional PEM Annex II, Product Specific Rules, HS code 8708.

plants, may encourage customs officials in Morocco and Germany to interpret "assembly" to ensure that printing a product is not "simple assembly" which confers no or minimal value, but is sufficient processing that produces value that exceeds the value of any non-originating material in the ink.

To expand this example on a broader level, the possibility for 3D printing to shift the origin of a good due to changes in how value is created also presents an opportunity for lawmakers and politicians to design rules that favor or protect a domestic industry, and to do so with closed-door negotiations and technically complex formulas, calculations, and provisions — the same problems that underly the current RoO regime for traditional manufacturing. Therefore, the design of rules for 3D printed products, or the redesign of existing rules to encompass advanced manufacturing techniques more generally, should, ideally, be conducted to ensure transparency in the process and with some restraints on use of these rules for protectionist purposes.

Next, the resources saved in printing a good should not be expended in trying to determine whether the good qualifies for preferential treatment. Designing rules, both substantive and procedural, for advanced manufactured products could be an opportunity for simplifying preferential RoO. There should be a careful balance. As Inama states, rules that are ambiguous leave "too much space to interpretation and little guidance" to the customs officials and private industry actors that must implement the rules.[1017] On the other hand, overcrowding the RoO chapter with definitions, product-specific lists, Annexes, and formulas is also dissatisfactory, because it creates confusion on interpreting the various textual elements of the chapter in relation to each other.[1018] What is necessary are "clear and predictable rules, easy to implement and administer."[1019] The following Parts explore in more detail how to develop instruments, such as plurilateral agreements and RTAs, that could include clearer rules for determining the origin of 3D printed goods and other advanced manufactured goods.

Economic scholars propose that newly designed rules should be more receptive to the level of economic development and geographical size of those who trade under them.[1020] The dental aligner industry has demonstrated that the design work and

[1017] Inama, *Rules of Origin in International Trade* (n 20) 459-60.
[1018] ibid 468.
[1019] ibid.
[1020] See Chapter 3, notes 574-580.

printing of aligners occur in Pakistan, Costa Rica, and Mexico.[1021] It is possible that entrepreneurs or government funded manufacturing facilities in developing countries could turn their attention to printing and exporting goods. Designing procedural rules for 3D printed goods having some flexibility based on the size and economic status of the producer could be taken into consideration. As Ciuriak and Bienen suggest, there could be different "tracks": large companies trading with large scale shipments should comply with the complete origin certification process, while MSME's trading with small scale shipments or under a certain monetary level should be granted a presumption of origin (with safeguards to prevent the circumvention of anti-dumping measures).[1022] Such a system could be beneficial for producers of 3D goods, as 3D printing is used for small batch manufacturing.[1023] Thus, a RoO regime that allows for the 3D printed goods of MSMEs to qualify for origin without requiring the MSMEs to complete complex certification processes could jumpstart not only trade in 3D printed goods and the use of advanced manufacturing skills for MSMES, but also the acquirement of computer design skills which could be applied to other industries.

Preferential RoO should be examined with more attention because the facility for these rules to become tools of domestic interests ties into the greater discussion of the purpose of the international trade law system as providing a framework for liberalization of trade and whose legitimacy in part derives from the transparency of the decision making process.[1024] Advanced manufacturing techniques such as 3D printing can expand the participation of developing countries and MSMEs in international trade. However, such potential may be limited if some of the unsavory elements of preferential RoO persist, because the rules are unchanged or protectionist measures are integrated into the design of any new rules. New types of inputs, new final goods, and new methods for producing products present an opportunity for examining how preferential RoO function as legal instruments and whether changes should be made so that utilization rates increase. However, an investigation into advanced

[1021] See Chapter 4, notes 745-748; *ClearCorrect Operating v International Trade Commission* (n 707). Mexico was categorized by the UN as a developing nation in its report, *World Economic Situation and Prospects as of mid-2021* (United Nations 2021) <https://www.un.org/development/desa/dpad/wp-content/uploads/sites/45/publication/WESP2021_UPDATE.pdf> accessed 2 November 2021. Although Mexico is one of the 15 largest economies in the world, it suffers from systematic poor economic growth and poverty reduction. 'The World Bank in Mexico' (Worldbank.org 6 October 2021) <https://www.worldbank.org/en/country/mexico/overview> accessed 2 November 2021.

[1022] Ciuriak and Bienen (n 599) 18-21.

[1023] Gebhardt, Kessler, and Thurn (n 78) 152-154.

[1024] Shaffer, 'Retooling Trade Agreements for Social Inclusion' (n 581) 339.

manufacturing also requires considering the role of the 3D file in both the creation of the final good and its contribution to the overall value of the final good. Even if it is possible to include the 3D file as an independent origin conferring input in the origin determination analysis, scholars and policymakers should carefully consider how to designs such rules, and whether such rules should be linked to e-commerce provisions in WTO instruments and PTAs.

## II. Modernizing Preferential RoO: Linking Origin Determination of the 3D File to the Origin of the 3D Printed Good

Identifying and incorporating the origin of the digital file into the origin analysis of the 3D printed good requires looking at the approaches to RoO in the GATS, Annex II of the AOR, and in RTAs and finding points where these instruments can interconnect. This part revisits these approaches, but also focuses on some of the technical implications of a combined rules of origin regime, and finally links the principle objective of preferential RoO, their discriminatory function, with the principle of sovereignty in the era of the international trade of advanced manufactured goods.

This dissertation proposes that the design of RoO should not be dependent on the hybridization of the GATT and GATS or upon the existence of a Mode 5 for services. Firstly, hybridization is still a debate by legal scholars[1025], and while the WTO's 2019 World Trade Report recognizes that "new processes, like 3D printing, result in products that are difficult to classify as either goods or services and are instead a hybrid of the two," Members have yet to start formal discussions on hybridization.[1026] Regarding Mode 5 services, Cernat and Kutlina-Dimitrova's characterization of Mode 5 would suggest that 3D printing relies on Mode 5 services as "services covered under 'mode 5' represent a subset of 'servicification', i.e., those services which form part of the value of the good before it is exported…Several 'mode 5' services such as design, R&D, architectural and engineering services are high-value added and intrinsically linked to technology."[1027] Even if a Mode 5 is established, Duy argues, value created by such services would not be captured by the current RoO regime; thus, the "need to find proper solutions to handle the task of determining the origin of these services."[1028] While services required for producing 3D printed goods and other advanced

[1025] See Sauvé (n 670) and Farrokhina and Richards (n 672).
[1026] WTO, *World Trade Report 2019: The Future of Services Trade* (WTO Publications 2019) 16.
[1027] Cernat and Kutlina-Dimitrova (n 661) 1116.
[1028] Dinh (n 46) 135-134.

manufactured products could fall into a Mode 5 category, finding solutions for RoO could also be independent from the discourse on hybridization and Mode 5 services.

### A. Technical Considerations for RoO for Advanced Manufactured Products

A fruitful focus of energy, in the short run, may be designing rules keeping in mind how customs officials determine origin. A printed bicycle frame is assembled into a bicycle that is powered by pedaling, but which also includes a smart speaker. The customs official looking at the HS, the preferential RoO, and the Tariff Schedule, would wonder what is this product, a bicycle or a smart-speaker? There is (as of yet) no heading or sub-heading for "smart bike."[1029] How do customs official assess whether the 3D file for the bicycle or the R&D for the smart-speaker qualifies as origin conferring value? This brings up questions as to whether it is preferable for customs officials to interpret instruments like the HS and RTAs for technologically advanced products which do not easily fit into preexisting product lines, or to wait until the HS headings or subheadings and rules are updated.

The greater issue for combining the origin of services and goods inputs is the risk of augmenting the complexity of the rules. Finding the origin of the digital file and the origin of the printed good are challenging as separate tasks: combining them together perhaps will make the exercise so daunting as to deter traders from seeking preferential tariff rates. As the number of goods having a significant service input in terms of the overall value of the good, such as a 3D file[1030], increases, the case grows, some scholars argue, for including the origin of the file into the origin analysis of the tangible good.[1031] Yet, how would customs offices interpret such rules? Although Inama focuses on developing countries, his remark should be kept in mind for any RoO negotiations: a factor making negotiations difficult at times is that "customs administrations do not play significant roles during the negotiations on the substantive

[1029] The HS code for a non-stationary, non-motorized bike is 8712 and an motorized bike is 8711. A CBP ruling in 2019 classified the Sony Smart Wireless Speaker with Built-in Voice Assistant as HS 8518.22: heading 8518"Microphones and stands therefor; loudspeakers, whether or not mounted in their enclosures…audio-frequency electric amplifiers; electric sound amplifier sets; parts thereof" and subheading .22 "Multiple loudspeakers, mounted in the same enclosure." CBP, Ruling Letter '*The Tariff Classification of a Smart Speaker from China'* (16 October 2019) N306364.
A search for "bicycle computer" using the United States Census Bureau HS search engine, came up with HS code 9028 which covers revolution counters and pedometers. 'Schedule B Search Engine' (*United States Census Bureau*) <https://uscensus.prod.3ceonline.com/#!#current-question-pos> accessed 2 November 2021.
[1030] Neeraj (n 699) s125.
[1031] Dinh (n 46) 134-135; Geraets, Carroll, and Willems (n 46) 300-302.

aspects of rules of origin" and instead the substantive rules "are negotiated among trade officials with inputs, in some cases, from the private sector."[1032] However, he also notes that customs officials showed "little interest…until recently [2009] on the substantive aspects of the rules and how to shape and draft product-specific rules of origin."[1033] Inama warns that the technical quality of substantive rules should not be overshadowed in negotiations by political goals or private sector objectives. For RoO instruments for 3D printed goods or goods having a digital file as a service input the drafters should focus on rules for the substantial transformation criteria. This could be achieved with collaborating with experts at the WCO and the national customs offices. This would mean politicians, industry representatives, and customs representatives working together to understand the role of the 3D file in 3D printing and how to determine its origin.

Next we explore whether it is necessary to include the origin of the 3D file as a potentially origin conferring input of the 3D printed product. This also means understanding how much value is created in the 3D file and comparing it to the other components for which value can be given: materials, labor, and direct overhead. As Dinh notes, the GATS rules of origin regime is based on the legal origin of the service provider, not where the economic value is created for the service.[1034] However, the location of the legal seat of the company could have been chosen for taxation and corporate strategic reasons. For example, GE is incorporated in New York State.[1035] If GE establishes a branch to print goods in Nairobi, several questions arise: (1) do the goods originate in Nairobi based on value created in printing and post-processing?; (2) if the file was designed in Nairobi, is Kenya the country of origin, or is the US, given that it is GE's legal seat?, and (3) would GE prefer that the goods come from Kenya in order to benefit from a GSP or a RTA to which the US is not a party, but Kenya is a party?

Given these factors, the design of rules incorporating the digital file as an input could potentially become industrial and political strategic tools which could lead to

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[1032] Inama, *Rules of Origin in International Trade* (n 20) 471. He notes that this is potentially "one of the reasons for the poor technical quality of the substantive rules of origin in both AFTA and ACFTA." (Association of Southeast Asian Nations (ASEAN) FTA (AFTA) and ASEAN-China FTA (ACFTA).
[1033] Inama, *Rules of Origin in International Trade* (n 20) 471.
[1034] Dinh (n 46) 111-112.
[1035] 'Certificate of Incorporation' (GE.com 2019) fn 1, <https://www.ge.com/sites/default/files/GE_Certificate_of_Incorporation_Effective_December_9_2019.pdf> accessed 3 November 2021.

further questions on international trade law's role in providing an evenhanded framework for trade. To minimize the potentially trade distortive impact of incorporating the service input into the origin analysis some limitations on the application of rules to promote domestic industries, or some exceptions for small traders may need to be inserted into the rules. For example, rules that in effect favor 3D file creation countries may mean that traders in countries that print and post-process goods may find it more challenging to trade under the preferential rate of the RTA. This may have been an intended political choice by one of the parties or an unintended consequence. To minimize negative effects, the rules could provide for options, such as under the *ad valorem* method: the origin is where the input is created with the highest value relative to the other inputs (favoring parties with a stronger 3D file design industry), or where the cumulation of the value of the materials, processing, and direct costs in a territory is higher than the 3D file (favoring parties with a stronger manufacturing industry). Alternative methods for qualifying for origin in RoO has already been established (as seen in PEM and USCMA) for traditional manufacturing methods and could be applied to rules for advanced manufactured products.

Likewise for GSPs, flexible provisions could achieve two objectives: the country can still trade under the preferential rate and improve its manufacturing industry by adopting technologically advanced methods of production. If a country wants to adopt 3D printing, but does not yet have the capability to design 3D files within the country, it may import files designed by third parties, which may have high economic value. To prevent the high-value third party file input from disqualifying the finished good from the preferential rate under the GSP, the preference-granting country could design rules that allow the preference-receiving country to assign more value to the 3D manufacturing process. On the other hand, designing rules that include the 3D file as an input, but in effect favor traditional manufacturing methods, may negatively impact developing countries or mid-level countries that are focusing on improving the design industry. The Invisalign production chain provides examples of origin designated on where printing occurs: design work is done in Pakistan and Costa Rica, the printing in Mexico, and the product qualifies for origin in Mexico under a CTH.[1036] For another

[1036] CBP, Ruling Letter, *Re: Country of Origin Marking of Orthodontic 'Aligners'* (n 965); Align Technology, 'Align Technology Expands Operations in Costa Rica with New Facilities to Support Continued Long-Term Growth' (n 749)
[1036] CBP, Ruling Letter, Re: Country of Origin Marking of Orthodontic 'Aligners' (n 965).

type of product, a European printer/trader may want to base origin of the final good on the file creation in Pakistan to take advantage of preferential rates under a bilateral agreement between Pakistan and the country to which the European printer wishes to export the printed part. Therefore, it would be in the interest of both the developed country producer and the Pakistani designer to have rules for 3D printed goods which give precedence to the economic value of the designing process.

We can identify the following initial conclusions. First, it is recommendable not to design multilateral harmonized rules of origin for products with digital service inputs. The rate of technical skill acquirement in 3D designing and printing is uneven in developed and developed countries and within industries.[1037] Critical to the design of rules is the transparency and balance of the negotiation process: developed economies like the US and the EU are increasingly becoming global service providers while also investing political and financial resources in supporting domestic manufacturing. Heavyweight industries like the automotive and the aerospace industries, as well as HP[1038], are adopting 3D printing. This means that industries and politicians in countries like Japan, which have a strong exports in automotives[1039], but are building the 3D printing industry through collaborations with non-Japanese firms[1040], may push for rules that confer origin on parts printed in Japan to allow it to maintain its position in terms of global trade of vehicles. Lobbying and political pressure could induce negotiators to favor rules that strategically confer origin on certain products from certain countries, but are trade distortive due to the high costs of compliance or simply being out-of-synch with how goods are produced and traded by MSMEs. The need to alleviate this potential risk provides support for a plurilateral instrument negotiated under the aegis of the WTO, however, not as a harmonized set of rules. Finally, harmonized rules may offset some political and "deeper" trade goals

[1037] Arbabian and Wagner (n 791) 538-539; Freund, Mulabdic, and Ruta (n 68) 3.
[1038] '3D Printing Solutions: Let's Manufacture Possibilities' (hp.com 2021) <https://www.hp.com/us-en/printers/3d-printers.html> accessed 3 November 2021.
[1039] 'Japanese Foreign Trade in Figures' (santadartrade.com July 2021), <https://santandertrade.com/en/portal/analyse-markets/japan/foreign-trade-in-figures?url_de_la_page=%2Fen%2Fportal%2Fanalyse-markets%2Fjapan%2Fforeign-trade-in-figures&&actualiser_id_banque=oui&id_banque=0&memoriser_choix=memoriser> accessed 3 November 2021.
[1040] USITA, 'Japan Additive Manufacturing and 3D Printing' (trade.gov 15 June 2020) <https://www.trade.gov/market-intelligence/japan-additive-manufacturing-and-3d-printing > accessed 3 November; Davide Sher, 'Japanese additive manufacturing is rising' (*3D Printing Media Network* 7 December 2020) <https://www.3dprintingmedia.network/japanese-additive-manufacturing-is-rising/> accessed 3 November 2021.

that may be behind the decision of Members to enter into a RTA such as the technological advancement of local and small industries, closer business relations between the parties, and the use of additive manufacturing to phase out manufacturing that is unsustainable and harmful for the environment.[1041]

### B. Determining the Value of 3D File

We must consider the legal implications given that rules of origin for services are regulated by the GATS. As Dinh has argued, a rules of origin regime for services based on the economic origin of the service input may allow for an integrated goods-services origin determination as origin determination for goods is determined by where the most economic value is created.[1042] However, as Zampetti and Suavé as well as Baldwin have noted, services are created through global value chains,[1043] and thus an economic approach for determining the origin of a service would require identifying the value for each input in that chain and may prove an additional burden on trade.[1044] It may be challenging to trace drafts of 3D files transmitted among office branches or among contractors in different countries and also identity the value at each stage. Policymakers would need to consider whether and how to cumulate value created in different countries. The rules would have to include procedures for obtaining a certificate of origin of the service and custom offices would have to review and verify evidence of origin. Would such evidence be the same required for goods: invoices, purchase orders, or affidavits listing the contributions of each designer? Further, some 3D files are created as part of the opensource/sharing economy and made available for little or no cost. A free digital file does not necessarily reflect the economic value of time spent designing it, so how does one assign this file a value when considered an input in determining origin of the final good? Tracing the economic origin of an intangible item transmitted across the globe in addition to the economic origin of the tangible inputs of a good could bring the rules further away from scholarly and policy goals of simplifying the rules to encourage trade under preferential rates.

It could be argued that the GATS regime of rules of origin based on the legal origin of the service provider may be relatively simpler in comparison to an economic

[1041] Fan, Sotelo, and Sundareswaran (n 47) 18.
[1042] Dinh (n 46) 133-134, 140-142.
[1043] Zampetti and Sauvé (n 52) 143; Baldwin (n 53) 15
[1044] Dinh (n 46) 140.

based regime. However, some complications arise. First, firms may have strategic reasons for being legally based in one country and outsourcing design work to branches or contractors in a different country. Further, with the rise of smart working, designers can make 3D files and transfer them through remote servers to other designers or the main office in another part of the world. This factor may also complicate an economic based origin (is value added by a designer working for an hour from a beach chair in Jamaica the same as the value added by designer in a skyscraper in New York?). However, it also suggests that claiming that a file originated from the legal seat of a company does not entirely acknowledge the global aspect of production of the file. A benefit of basing origin on legal status is that there are domestic and regional regulations and private law cases on business establishment and substantive business operations that can be consulted if a question arises as to which entity is the producer of the file and where this entity is located.[1045] Dinh suggests that a more feasible short-term goal would be the clarification of terms, such as ownership, control, residence and SBO, in the GATS, while scholars develop a new framework for rules of origin for services.[1046] This short-term approach could also function for determining the origin of 3D files while research on the economic origin of digital products and more development in the additive manufacturing industry proceeds.

Next, the GATS Schedules of Commitments and the GATT Schedules of Concessions were designed with different objectives on preventing trade distortion and encouraging trade liberalization. The level of liberalization of a Member's Schedule of Concessions may not be equivalent to the level in its Schedule of Commitments. A possible clash could arise: using the HS code one determines that the 3D printed good is eligible for a very low preferential tariff rate. However, consulting the GATS schedule of Commitments, first identifying the category the 3D file falls under, and then, the level of liberalization for that particular service, one may determine that the same country has not liberalized its design services to the same extent that it has liberalized trade in the type of good that is 3D printed. Thus, if the 3D file is the input with the most significant value of the final product, policymakers and customs administrations may determine that the 3D printed good should not be granted the preferential tariff rate, because allowing such 3D products which include 3D file design service inputs under

[1045] Mavroidis, *The Regulation of International Trade*, vol 3 (n 66) 301; Barnard with Snell (n 970) 471, 475-477.
[1046] Dinh (n 45) 159.

the lower rate would expose the design service industry to competition and allow for a higher level of liberalization in design services than intended in the GATS schedule.

Focusing more on the technical aspects of the rules, how would a rule incorporate the value of file design into the value-added formulas. Definitions for the terms in the value-added formula, such as what costs can be included or excluded in the assessment, are set out in RoO chapters. Costs related to design services can be included in the category of direct cost[1047] and the ASEAN TIGA specifically references "research, development, design, and engineering" as part of direct costs.[1048] RoO for goods produce a certain level of uncertainty, but it is an uncertainty that the trade community has come to expect and has developed means for addressing at the level of customs administrations, private enterprises that assist traders with paperwork, and through organizations like the ICC. Additionally, there are customs rulings and trade court decisions that traders and officials can consult on how to handle a particular matter. Adding the valuation of design work as an originating input into the origin assessment will require practitioners, customs officials, and trade assistance industries to adapt, which could be beneficial in the long run, but this would inject a further element of uncertainty into the system in the short term. From the point of view of the trader and the customs officials, there is another requirement to trace the origin of an input, which adds not only an economic cost, but also a legal risk. EU and US customs administrations require traders to be responsible for the accuracy of the documents they submit; good faith reliance on the statements of subcontractors and third party suppliers is not sufficient to avoid penalties if customs officials determine that there was false information in the supporting documents and statements.[1049] The trader will have to verify the chain of the design creation in addition to verifying the source of the materials and the labor performed. This is another reason why, for the time being, using the legal origin of the provider of the design may be more functional for a rules of origin regime that includes a service as an origin determining input. However, it would still be necessary for that owner to assign a value to the 3D design service.

[1047] Edwin A Vermulst, 'Rules of Origin as Commercial Policy Instruments – Revisited' (1992) 26 J World Trade 61, 66; Van de Heetkamp and Tusveld (n 193) 86; Agreement between New Zealand and Singapore on a Closer Economic Partnership (CEP agreement 2000) (signed 14 November 2000, entered into force 1 January 2001) Annex I, s 2, art 6.
[1048] ASEAN TIGA ch 3 art 29 (2)(d).
[1049] See Chapter 2, notes 464-470.

This value of 3D file could be subjective. A handcrafted necklace made with raw materials by a micro-enterprise in a developing country takes time to create as the materials must be processed and the beading is intricate. This necklace would have a relatively high labor value. It would also perhaps have a “deeper” value as it is an example of a MSME participating in international trade while preserving traditional, culturally significant manufacturing methods. Thus, its “worth” in a deep trade perspective could be high, even though the materials are not expensive. Now, this micro-enterprise has designed a 3D file for parts of the necklace, prints the parts using plastic resins, and assembles those parts with hand-made parts from traditional materials. She can make and sell more necklaces; it would seem that this micro-enterprise is better off. The likelihood that the trader could export the necklaces under preferential rules that do not include a service input may be reduced, because assembling fewer pieces of the necklace could be classified as “simple assembly,” and the costs of labor have been reduced relative to the costs of the plastic materials, which do not originate in the territory. If the rules allow for the value of the service input to be taken into consideration for origin determination, the micro-enterprise must prove that when the value of the 3D file is added to the value of labor and any originating materials, then most of value creation occured in the territory. If she has just started 3D design, she may have expended hours creating the design which would have taken a trained designer an hour to create. Is the design of the micro-enterprise more valuable because it took more time to design? Or, is it less valuable given that a skilled designer would be able to produce a similar design in less time? In that situation, should we assign more value to the 3D design because the trader is a start-up who has adopted additive manufacturing technology and by allowing the trader to trade under the preferential rate, we can encourage her to remain in trade and to continue to promote her cultural heritage? While such a subjective assessment may satisfy the deeper provisions of a trade agreement, how would customs offices, which rely on documents supported by accounting principles, audits, and valuation formulas, assess the “deeper” value created by making the necklace with 3D printed parts.

This part took the proposal of Dinh and Gaerets, Carroll, and Willems, to include the value of the service input in origin determination of the final good a few steps further into both the technical and policy implications of designing preferential RoO that incorporate services inputs. From the “shallow” perspective, complications arise when designing the rules to include the service inputs: the GATS Schedules of Commitments

and GATT Schedules of Concessions, the AOR Annex II, and the GATS provisions relating to origin of a service were not negotiated for a hybrid system. A mixed rules of origin regime may require a new round of reciprocal exchanges of benefits. This is not impossible: where there is a political will, there is a way. If the industry grows significantly, industry lobbyists, customs officials, and customs organizations may begin to pressure policymakers and lawmakers to design such rules. The aim of the proceeding paragraphs was to highlight where some of the issues that underly RoO for traditional manufacturing (protectionism, lack of transparency, complexity) could arise in the context for rules for advanced manufacturing techniques. Further, these paragraphs also linked such a proposal to the greater discussion in trade law on the inclusion of deeper provisions in trade agreements.

New rules could be designed in a shallow manner, based on reciprocal exchanges and technical expertise, but they may not correlate with some other objectives in a PTA such as promoting new technological means of production, labor safety, or environmental sustainability. As Erasmus, Flatters, and Kirk argue, RoO chapters are not necessarily the place to insert a deep agenda.[1050] The USMCA is an example of where a deep rule for allegedly ensuring workers a decent wage coupled with percentage requirements for materials sourced in the territory creates a potential either/or situation for automotive makers – either a producer invests time and costs to comply with the rules or it invests the time and costs into R&D and training skilled technicians and consequently pays MFN rates.[1051] However, if policymakers, lawmakers, governments, lobbyists, and industry actors are going to expend efforts into designing a new rules regime, it is an opportunity to design rules that are more receptive to a modernizing trade law framework. One of the elements of this modern framework, e-commerce regulation, does have a connection to rules of origin. However, this thesis proposes that rules of origin for products with digital inputs should not be dependent on the WTO e-commerce negotiations, as the regulation of electronic transmissions is contested by the Members and there may never be consensus on this issue.

[1050] Erasmus, Flatters, and Kirk (n 481) 268.
[1051] See this Chapter note 1004.

## III. RoO: Connected to, but Not Dependent on, E-Commerce Regulation

The WTO's moratorium on custom duties for electronic transmissions has persisted since 1998[1052], and recent digital commerce chapters in FTAs and agreements dedicated to digital commerce include provisions on withholding custom duties on electronic transmissions.[1053] However, a study for UNCTAD reports that several developing countries, such as Cambodia, Rwanda, Uganda, and Togo, could be potential adopters of advanced manufacturing and criticize the Joint Statement Initiative (JSI) by Members of the WTO for not giving enough focus on to how to design rules beneficial for countries that have yet to develop e-commerce and additive manufacturing markets.[1054] These countries argue that a permanent moratorium distorts trade by allowing foreign digital goods to enter the markets duty-free, thus depriving these countries of revenue and stunting the growth of local entrepreneurs and MSEMEs.[1055] Negotiations on the JSI are also dedicated to the regulation of data. Measures that block the transmission of data or require that data be stored on local servers would impact the transmission of a 3D file, and could ultimately influence a company to design and transmit files in certain countries.

Linking the design of rules of origin for a product with a digital file input in a textual and substantive manner to the outcomes of the JSI risks two factors. First, it would link the rules to a regulatory focused agreement[1056] whose connection to the GATT or GATS schedules is not yet clear. Would the JSI spur Members to update their schedules to include tariff lines for products with digital inputs? Would product-specific rules of origin in PTAs be updated to add a new CTH or *ad valorem* percentage

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[1052] 'WTO Members Agree to Extend E-commerce Non-violation Moratoriums' (wto.org 10 December 2019) <https://www.wto.org/english/news_e/news19_e/gc_10dec19_e.htm> accessed 3 November 2021; The moratorium was to be revisited at the 12th Ministerial Conference, scheduled for Nov. 30 – Dec. 3, 2021, which was postponed due to the pandemic. Work Programme on Electronic Commerce, 'General Council Decision' (adopted 10 December 2019) WT/L/1079 <https://docs.wto.org> accessed 29 October 2021.

[1053] Eg, USMCA ch 19 art 19.3(1); CPTPP ch 14 art 14.3; TCA Heading I, Title III, ch 3 art 203(2); Mark Wu, 'Digital Trade-Related Provisions in Regional Trade Agreements: Existing Models and Lessons for the Multilateral Trade System' (2017) RTA Exchange (ICTSD and IDB), 11-13.

[1054] Pamela Coke Hamilton and Shamika N Sirmimanne (supervisors), 'What is at Stake for Developing Countries in Trade Negotiations on e-Commerce?: The Case of the Joint Statement Initiative' (2021) UNCTAD: Division on Intl Trade & Commodities & Division on Technology & Logistics, 35 <https://unctad.org/system/files/official-document/ditctncd2020d5_en.pdf> accessed on 29 October 2021.

[1055] ibid 9-11, 33-34. See also, Susan Ariel Aaronson and Thomas Struett, 'Data is Divisive: A History of Public Communications on E-commerce, 1998 – 2020' (2020) CIGI Papers No. 247, 17, 19 -20, <https://www.jstor.org/stable/resrep27511> accessed 3 November 2021.

[1056] Shaffer, 'Trade Law in a Data-Driven Economy (n 477) 273-275.

requirement for this new tariff line? For example, in 2018 Indonesia established a new tariff line for digital goods, but with a 0% rate. The Tariff line is 99.01 – Software and other digital goods transmitted electronically, and includes subheading 9901.90.00 – Other software and digital goods.[1057] At the WTO Ministerial Conference in 2017, Indonesia submitted a statement arguing that "the moratorium shall not apply to electronically transmitted goods and services…the extension of the moratorium applies only to the electronic transmissions and not to products or contents which are submitted electronically."[1058] India and South Africa, referencing this statement, submitted a statement to the WTO arguing not only should digital content be excluded from the moratorium, but also cautioned against extending the moratorium to cover services.[1059] For "[i]f services are also included, such an interpretation would mean that WTO Members are agreeing to a completely duty-free trading environment, in other words, a fully liberalised digital economy."[1060] Thus, there is a potential of never having a resolution on electronic transmissions to refer to in RoO chapters or instruments. Among territories with a developed e-commerce market, such as China, the EU, and US, opinions on regulating data transmission and storage differ and no agreement has yet been reached on these topics.[1061] At this time, the Members of the JSI have agreed to clean articles on unsolicited commercial messages, electronic signatures and authentication, e-contracts, open government data and consumer protection.[1062]

At this point, we can consider the relation of RoO to provisions regulating e-commerce in trade agreements. Should rules on determining the origin of an electronic

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[1057] Ministry of Finance Regulation No. 17/PMK.010/2018 on the Second Amendment of Regulation No. 6/PMK.010/2017 on Stipulation of Goods Classification System and Import Duty on Imported Goods ("Regulation 17"). 'Indonesia Tax Information' (Deloitte 30 April 2018) 4 <https://www2.deloitte.com/content/dam/Deloitte/id/Documents/tax/id-tax-info-apr2018.pdf> accessed 29 October 2021. An internet search did not reveal information on whether a tariff rate has been applied. The English version of Indonesia's Ministry of Finance website did not provide updates on an increase in the tariff rate. 'Regulations Updates' (*Ministry of Finance, Republic of Indonesia*) <https://www.kemenkeu.go.id/en/publications/regulation-updates/> accessed 29 October 2021.
The World Integrated Trade Solution does not include tariff information after 2018 for Indonesia. 'Indonesia Tariff Schedule' (*WITS*).
<https://wits.worldbank.org/tariff/trains/en/country/IDN/year/LTST/pagenumber/1/pageSize/100> accessed 29 October 2021.

[1058] 'Statement by Indonesia: Facilitator's Consultation on Electronic Commerce, MC11 declaration, and other relevant plenary sessions', delivered on 13 December (20 December 2017) WT/MIN(17)/68 <wto.documents.org> accessed 29 October 2021.

[1059] 'Communication from India and South Africa' [WTO Work Programme on eCommerce] (n 1011).

[1060] ibid para 5.1.

[1061] Aaronson and Struett (n 1055) 16-17; Aaronson and Leblond (n 673) 245-272.

[1062] 'E-commerce talks: two "foundational" articles cleaned; development issues discussed' (WTO.org 13 September 2021) <https://www.wto.org/english/news_e/news21_e/jsec_12sep21_e.htm> accessed 29 October 2021.

transmission be included in chapters or sections dedicated to e-commerce? There is some argument in favor of this: such rules on identifying the origin of data may assist lawmakers, policymakers and dispute settlement bodies in understanding whether one a party allegedly violates one of the provisions in the e-commerce chapter. However adding such rules to an e-commerce chapter risks bogging down the e-commerce chapters with technical rules not related to the free flow of data and protecting access to digital markets. Therefore, there is also a good case for including rules on determining the origin of data within a RoO chapter in trade agreements.

Even if there is no multilateral resolution on customs duties for electronic transmissions, the prohibitions against duties in recent agreements brings into question whether the origin of a 3D file or a file for manufacturing should play a role in the origin determination process—it may lead to imposing a duty where none was intended. For example, the origin of a 3D printed good is determined using an *ad valorem* formula that includes the value of the 3D file. While being designed, the file is transmitted to several parties of the PTA and is finally transmitted to the Party where the file is downloaded into the printer. After assessing the value of the printing, post-processing, and direct costs, it is determined that the element with the most value is the 3D file, and the origin of the good is the origin of the 3D file (whether determined by legal seat of the owner or by the location where the most economic origin was created). The tariff rate for the finished 3D printed good is now a country from which the digital file was transmitted. Even though in the PTA the e-commerce chapter requires no duties on electronic transmissions, under the RoO chapter, a duty would be effectively placed on an electronic transmission, because the origin of the good, and thus the tariff duty rate, is based on the 3D file which must be electronically transmitted (if not sent in the mail on a thumb-drive).

Analysts and policymakers should also consider how to design such rules in terms of cumulation of value. A PTA exists for Country A, Country B, and Country C. There are no custom duties on electronic transmissions, but a 5% preferential rate on bicycle parts is imposed. The rule is an *ad valorem* rule in which origin is determined by where the most value was created. Country A produces a 3D file of a bicycle frame and sends it to Country B for printing and processing; no tariff is assessed on the file. The frame is imported into Country C. The customs office in Country C must then decide how to assess tariff duties: (1) does Country C allow the bicycle frame to enter duty free because the highest value element is a digital file, which is electronically

transmitted, and thus, should not be subject to custom duties, (2) or is the value of the digital file cumulated with the other value created in processing the bicycle frame in Country B and thus, a 5% tariff is applied on a finished product originating in Country B; or, (3) is origin assigned to Country A, as that is where the most value was created, but even though there are no customs duties on the electronic transmission of the 3D file, a duty is still applied to the tangible product produced from the file, and a 5% rate between Country A and Country C? If the last two scenarios occur, this may give an incentive for producers in Country C to seek domestic 3D file producers and printers, diverting trade in 3D files away from Country A and Country B. Further, if Country A sends files to Country B for printing of bicycle frames, then the 0% duty on electronic transmissions may benefit traders in Country A and producers in Country B who have adopted advanced manufacturing, but may disadvantage producers who still use traditional manufacturing techniques as now there is a new source of domestic competition for traditionally manufactured parts (although this may be considered as a positive push to innovate and adopt new technologies).

This example points to two significant issues with including the 3D file in the origin analysis, the first being that it will require synthesizing two different frameworks for trade: a lighter-touch approach to e-commerce with a very heavy-handed approach to rules of origin. For example, the digital trade chapter in the USMCA is 10 pages long with one annex of one page[1063], the Rules of Origin chapter is 14 pages, however the annexes on exceptions, the product specific rules, an appendix on product specific rules for automotive goods, and tables of automotive parts total to 256 additional pages.[1064]

Secondly, as Shaffer states, a new digital trade agreement should accommodate "regulatory flexibility" as well as "the interface and interoperability of different regulatory systems that reflect varying national practices and preferences."[1065] At the level of EU PTAs, Jan A. Micallef finds that while the parties proclaim interest in regulating the transmission of data, they are cautious in establishing obligations in provisions on e-commerce, and instead rely on review clauses, freedom to adopt and

[1063] USMCA ch 19.
[1064] USMCA ch 14. This ratio is also reflected in CETA. The chapter on electronic commerce has 2 pages, the Protocol on Rules of Origin and Origin Procedures, 206 pages. CETA ch 16 (Electronic Commerce) and Protocol on Rules of Origin & Origin Procedure.
[1065] Shaffer, 'Trade Law in a Data-Driven Economy' (n 477) 273.

maintain safeguards, and general agreements to cooperate on data regulation.[1066] Wu notes that provisions on digital in other regions tend to fluctuate between being broad or narrow in scope.[1067]

In contrast, preferential RoO are intricate on purpose so that non-originating goods are not granted preferential rates. Rules of Origin in PTAs are negotiated as reciprocal (in theory) arrangements: Country A agrees to Rate 1 for product X in exchange for Country B agreeing to Rate 2 for product Y. This exchange is based on the condition that each party can withdraw a commitment if the other party does not adhere to its reciprocal commitment.[1068] There is a risk that a including the 3D file in the origin analysis will lead traders to circumvent rules that were negotiated for specific strategic purposes. Country A, which has a strong domestic bicycle parts industry, may agree to lower its tariff rate for bicycle parts to 5% in exchange for Country B, which has a strong kitchen appliances industry, lowering its tariff rate for dishwashers. Both countries agree to 0% duties on electronic transmissions. The MFN rate for bicycle frames is 15%. Country A produces a 3D file, sends the file to Country C, and there are no duties on electronic transmissions. Country C is not part of the PTA with Country A and Country B. The trader in Country C exports the printed bicycle frames to Country B, claiming on the certificate of origin that the frames originate from Country A, because the highest value created was in Country A (on the basis of 3D file), and thus a 5% tariff should be applied, instead of the 15% MFN rate. Country C is able to take advantage of the Country A-B FTA without having to liberalize its domestic dishwasher or bicycle industries to the same extent of Country A or Country B and can protect Country C domestic industries.

Thus, when examining the implications of including the digital file in the origin analysis, policymakers, lawyers, and lobbyists should consider the relation of the RoO chapter to provisions banning custom duties on electronic transmissions or to negotiated tariff rates for certain key products. Basing the origin of a finished good on the origin of a 3D file could impinge upon the rate of liberalization negotiators are willing to agree to. If the product originates on the basis of the 3D file, and a 0% rate is applied, this may satisfy policymakers who want few restrictions on e-commerce trade, however

[1066] Jan A Micallef, 'Digital Trade in EU FTAs: Are EU FTAs Allowing Cross Border Digital Trade to Reach Its Full Potential?' (2019) 53 J World Trade 855, 867-869; See also Wu (n 1053) 7-9.
[1067] Wu (n 1053) 6-9.
[1068] Hoekman and Nelson (n 41) 12.

it may dissatisfy negotiators focusing on industries that are cautious about liberalizing trade in finished products. On the other hand, determining that the final good originates in a territory because the 3D file originates there and then assigning the tariff rate from the tariff line of the finished good printed is effectively applying a duty on the basis of an electronic transmission. This suggests that policymakers that want the 3D file be part of the origin analysis of the good should communicate with those drafting e-commerce chapters as there could be conflicting provisions within the same agreement on applying preferential tariff rates to goods whose origin is based on the digital file and no tariffs on electronic transmissions.

While scholars proposing that e-commerce is one area where domestic regulatory bodies should be allowed to participate in the international trade law system given their effectiveness in addressing market failures and the impact of standards and procedures on voters (and thus, traders),[1069] preferential RoO, on the other hand, establish a procedural foundation for customs officials to process vast quantities of goods daily. RoO chapters include rules on verification of origin, tracing requirements and forms that must be filled out. A rules of origin regime that includes the digital file as an input would need to consider how to design procedural rules. Ideally, this new drafting activity would not add complex procedures that in practice impose high costs on traders. Finally, the drafters should keep in mind that local customs offices will need to be trained in assessing the origin of the electronic transmission.[1070] While traders may seek guidance directly from the trade offices or their representatives in the commercial service, international organizations like WCO and ICC have roles in the daily practice of clearing goods through customs. Such organizations would likewise be involved in interpreting rules on the origin of a digital service and providing guidance. Finally, the private market of companies offering trade assistance would be tasked with understanding where and how such rules fit into the RoO system established by prior RTAs and instruments and how to clear 3D printed products through customs offices.

These are issues that are not raised in e-commerce chapters, because the purpose of those chapters is to regulate the flow and trade of data. However, expanding RoO to include the digital file input as a potentially conferring origin input

[1069] ibid 10,14.
[1070] In general, training would be beneficial in making the administration of rules of origin at the levels of customs more efficient. Estevadeordal and Suominen (n 270) 90.

brings trade of such files into the ambit of procedural and administrative aspects of origin determination. It is quite possible that someone may request the electronic transmission of a 3D file from a foreign designer and then never print anything. In that case, it could be argued that the trade is a solely regulated by e-commerce measures. However, when a 3D file is designed for the purpose of being printed, such as a part for a GE appliance or Mercedes-Benz vehicle, and this part is incorporated into a finished product which is then exported, it may become necessary to distinguish the regulation of the trade of the 3D file under the e-commerce provisions from the application of the rules in RoO chapter to the same 3D file, if the digital file also has the potential to have an origin conferring function.

This section has assessed where rules of origin for a 3D file would intersect with a WTO instrument on e-commerce and data, as well as with provisions in e-commerce chapters in trade agreements. As the discussion in Chapter 3 explored, it is likely that a 3D file transmitted by means of digital technology is an article of e-commerce, and thus will be subject to regulations in e-commerce chapters or stand-alone digital trade agreements. This dissertation proposes that if rules of origin for digital services like 3D files are included within existing Rules of Origin chapters in RTAs or plurilateral instruments, or added as annexes, there should be some sensitivity to provisions on e-commerce so that complying with or enforcing the provisions of one chapter does not lead to a conflict with the objectives and rights established in the other chapter

Part III took the proposal that goods should be granted origin based on where they are designed several steps closer towards exploring, from a legal perspective, how such a rules of origin regime would fit within the WTO framework, RTAs, and the practice of customs administration. The next part explores how and to what capacity the WTO could be involved in negotiating an Instrument on RoO for goods with digital file inputs and assisting Members and traders in understanding RoO.

## IV. Presenting a Proposal for a WTO Instrument on Preferential RoO for Advanced Manufactured Goods

Designing rules of origin for goods with service inputs like 3D printed goods presents an opportunity for reconsidering the role of the WTO in providing a legal framework for preferential rules of origin. According to Hoekman and Inama, “preferential rules of origin are argued to fall outside of the ambit of the WTO,” because in the case of non-reciprocal trade agreements, the rules are determined by the

preference-granting countries.[1071] In the case of PTAs there is "tacit consensus that WTO members should be free to define their own RoO to determine if a product is eligible for the tariff preference – i.e. there is acceptance of policy space for this dimension of the implementation of PTAs."[1072] This policy space could be established by Annex II of the AOR, a declaration which requires Members to ensure that the rules are clearly defined, but includes no obligations or references to ensuring that the rules do not cause trade distortions. Annex II grants the Members much sovereignty in their design of the rules. As the stalled negotiations on the HWP for non-preferential rules of origin suggest, Members may be reluctant to cede sovereignty in a politically sensitive area of trade policy in exchange for a multilateral regulation of preferential RoO, even if such an approach may ultimately make the system more evenhanded and less susceptible to influence by domestic protectionary interests. A WTO instrument on preferential RoO nonetheless is still worth considering, especially as changes advanced manufacturing can bring to goods production can lead to changes in conducting and regulating trade: reshoring, a shift from labor-intensive to automotive production, a shift from natural to synthetic materials for production, as well as a reliance on certain mineral and metals for inputs such as the ink in 3D printing.

### A. Initial Considerations

As an initial step into this discussion, let us review some proposals by legal scholars and economists in situating preferential rules of origin within the WTO, an exercise that seems as if one is trying to fit a square peg into a round hole. The title of the article by Mavroidis and Vermulst, "The Case for Dropping Preferential Rules of Origin," neatly presents their perspective. Their reasoning on the legality of rules of origin is discussed in more detail in Chapter 3. In sum, they argue that as the MFN rules of origin "can serve as the vehicle to ascertain origin of goods, and based on this decision, to grant preferential treatment to goods originating in beneficiary countries,"[1073] a second set of rules, preferential rules, "are not functionally necessary."[1074] However, the authors suggest that MFN rules would perform this task, "especially so if the HWP, which aims at simplifying the existing rules, were to

[1071] Hoekman and Inama (n 16) 6.
[1072] ibid.
[1073] Mavroidis and Vermulst (n 20) 1.
[1074] ibid 10.

eventually succeed."[1075] With regards to harmonization, Hoekman and Kostecki propose that it would help prevent the use of rules as a non-tariff barrier and suggest that Members use the non-preferential rules under the Kyoto Protocol instead of the preferential rules found in PTAs.[1076]

Scholars also point to MFN rules and tariff rates as potentially replacing or reducing the protectionist impact of preferential RoO. Hoekman and Koestecki suggest that if the MFN rates were lowered to zero, there would be no need for rules of origin at all.[1077] Destler finds that one way to "mute the impact" of restrictive rules for politically sensitive products like automobile parts and textiles is through an overall reduction of the MFN tariff rates, though this would not be an "easy task politically."[1078] On the other hand, Clemens Boonekamp suggests that parties to RTAs "might consider extending their tariff preferences on a non-discriminatory basis in the case of products where the MFN rates are already low, say at a 'nuisance' level, thus both obviating the need for rules of origin on those products and enhancing competition."[1079] Finally, Puccio proposes that the restrictiveness of preferential RoO should be proportional to MFN tariff rates[1080] and this would "require the establishment of a single protocol of preferential rules of origin not per FTA but per partner," thus, "[t]he same origin protocol would apply to exports desiring preferential treatment from all FTA concluded by the country."[1081] The level of restrictiveness would "ideally" be decided at the WTO level.[1082] While the removal of preferential RoO would perhaps reduce the number of rules traders must interact with, there is still the question of how under MFN rules the origin of a 3D printed good would be determined. Lawmakers and policymakers would be confronted with the task of determining whether and to what

[1075] ibid 6.
[1076] Hoekman and Kostecki (n 80) 487-488.
[1077] ibid 488.
[1078] Destler (n 504) 187. Destler proposes applying Article XXIV of GATTT to curtail the use of RoO to raise barriers to trade to Members not a party to the RTA. He suggests new rules that would limit the content of RoOs, "like allow just 'one rule for all products,' such as 'a certain percentage of value added.'" p 186. Hirsch proposes applying Article XXIV (5)(b) to "curb politically motivated ROOs." Hirsch, 'The Politics of Rules of Origin' (n 28) 335. Although Annex II "is not legally binding, its provisions may influence the interpretation given by the WTO organs to Article XXIV GATT regarding ROOs included in regional agreements." ibid. However, it can be debated whether preferential RoO are legal under Article XXIV and Members have been reluctant to bring claims under Article XXIV to the DSB. Mavroidis & Vermulst (n 20) 10-11. See also, Elsig, Hoekman, and Pauwelyn (n 57) 32.
[1079] Clemens Boonekamp, "Regional Trade Agreements and the WTO," in Carlos A Primo Braga and Bernard Hoekman (eds), *The Future of the Global Trade Order* (2nd edn, Eur U Institute 2017) 211.
[1080] Puccio (n 51) 198.
[1081] ibid.
[1082] ibid 199.

extent a digital file service input should be incorporated into the origin analysis of the tangible good. Thus, it will still be necessary to consider whether there should be a revision of the three substantial transformation criteria.

Ciuriak and Bienen point out that while harmonization may reduce the costs of complying with RoO under multiple PTAs, it may not necessarily reduce the administrative cost of complying with a particular PTA for a MSME.[1083] These authors propose a waiver of the certification of origin for MSMEs based on the value of the shipment in comparison to the value of customs payable: for example, if the tariff rate is low, and there is less incentive for circumvention, the value of the exempted transaction threshold would rise allowing MSMEs to ship more goods under the preferential tariff rates without having to incur the administrative costs of obtaining a certificate; if the tariff rate is high, and there is a greater incentive for circumvention, the exempted transaction threshold would be smaller.[1084] Simplification of the certification process has started to appear in or be discussed for some rules of origin instruments. Hoekman and Inama propose a simplified and common plurilateral procedure for non-preferential rules of origin.[1085] The revisions of the PEM include one certification process instead of the EUR.1 and EUR.MED certificates.[1086] The USMCA now allows importers to complete the certificate of origin, thus allowing them to control and verify the information on the certificate.[1087] The importer can also forgo the certificate and submit a "minimum set of data elements."[1088] The EU has an electronic self-certification system, called the REX system (Registered Exporter system).[1089]

While some trade and economic scholars encourage simplification of rules of origin, they do not advocate for harmonization due to the different levels of development and different trade practices of WTO Members. Erasmus, Flatters, and

[1083] Ciuriak and Bienen (n 579) 17-18.
[1084] ibid 18 -21. The authors also propose that MSMEs would still need to keep paperwork demonstrating proof of origin and be liable for remedies if an ex-post audit found that the goods originated from another country.
[1085] Hoekman and Inama (n 16) 24.
[1086] Commission, 'Guidance: Transitional PEM Rules of Origin' (n 332) 20-22.
[1087] Gantz, 'The United States-Mexico-Canada Agreement' (n 73) 6; USMCA ch 5 art 5.2.1; USITA, 'Understanding USMCA' (n 273). As in the US the importer is liable for errors or negligence in completing the certificate of origin, and as under NAFTA only exporters could complete the certificate of origin, US importers would sometimes trade under the MFN rates out of concern that the exporters had not completed the paperwork properly. Gantz (n 73) 6.
[1088] USMCA ch 5 art 5.2.3; USITA, 'Understanding USMCA' (n 273)
[1089] Commission, 'REX-Registered Exporter system' (ec.europa.eu) <https://ec.europa.eu/taxation_customs/online-services/online-services-and-databases-customs/rex-registered-exporter-system_en> accessed 3 November 2021.

Kirk, argue that focus should be on a "radical reform of Rules-of-Origin regimes, and not on harmonization."[1090] Instead, designers should "consider the effects of alternative Rules of Origin in light of their only necessary function and to discard their use for protection and other distorting and counterproductive uses."[1091] The authors also caution against referring to a megaregional agreement like the PEM when designing rules for trade between developing countries as the level of restrictiveness established by the megaregional agreement: developing countries have different needs to access goods produced in third party territories in order to be competitive and produce goods at low costs.[1092] Estevadeordal, Harris, and Suominen point out that "full harmonisation of preferential RoO would be as politically unfeasible as it would be technically unpalatable to producers around the world…even the more subtle differences [amoung RoO instruments] could be difficult to overcome due to political resistance by sectors benefiting from the status quo."[1093] Further, such harmonization is likely to meet resistance as states may not be willing to adopt rules based on those of other states.[1094] However, these authors still proposed (in 2009) that multilateral disciplines on preferential RoO within the WTO that aim to reduce complexity and restrictiveness of these rules may be beneficial for the trading system.[1095] Since that time there has been developments in plurilateral agreements to regulate trade. In 2018, Hoekman and Inama published a proposal for a plurilateral regime for non-preferential RoO, which will be discussed further below.

i. WTO as a Forum for Negotiations on a RoO Instrument

Before examining how a plurilateral agreement could encompass preferential RoO for 3D printed goods, it is necessary to briefly acknowledge the shift from negotiating multilateral agreements towards plurilateral agreements. The stagnation of

[1090] Erasmus, Flatters and Kirk (n 481) 292.
[1091] ibid.
[1092] ibid 291. Inama reports that the SADC negotiators adopted a text based on the EC preferential rules on origin after pressure from South Africa, despite protests from other members. This meant that the rules changed from an across-the-board format to product-specific rules of origin. While at a technical level, this "move might have been justified by the desire to provide a transparent and fair set of rules or origin for the SADC region…" it became apparent that this approach allowed powerful South African unions for machinery and electronic products to influence the design of the rules for the entire territory. Inama, *Rules of Origin in International Trade* (n 20) 472-473. As a result, the "SADC rules of origin are commonly considered as an example of the most restrictive and business-unfriendly set of rules of origin." Inama (n 20) 474.
[1093] Estevadeordal, Harris and Suominen (n 483) 50.
[1094] ibid.
[1095] ibid.

the Doha Round and the expansion of the WTO Membership has led to questioning by policymakers and scholars as to the Members' ability to negotiate and conclude multilateral agreements in the near future.[1096] The proliferation of RTAs is both seen as a reaction to the difficulties in negotiating multilateral agreements as well as an interest in developing deeper trade agreements.[1097] On the other hand, the successful completion of the plurilateral agreements, the Information Technology Agreement and the Trade Facilitation Agreement, indicates that there was and perhaps continues to exist an interest in negotiating trade instruments within the WTO framework. The 2015 Nairobi Decision on Preferential Rules of Origin for LDCs suggests a possibility of addressing the regulation of preferential RoO within the WTO. However, the ITA, the TFA, and the Nairobi Decision also regulate trade within a narrow range of tariff lines, procedural issues, or countries. The reasons why these plurilateral agreements and the Nairobi Decision were successful will be discussed below and will be examined in the context of developing a WTO instrument on Preferential RoO.

A WTO Instrument on Preferential RoO could focus on requiring Members to minimize negative externalities that can arise with preferential RoO. Hoekman and Mavoridis argue that the modernization of the WTO as an organization that supports "plurilateral domain-specific cooperation" requires it to "bolster its capacity to be a forum for constructive policy dialogue based on analysis of the negative policy spillovers created by domestic policies."[1098] The Secretariat should look into "the global economic effects of policies affecting conditions on markets" which would help "determine whether policies cause spillovers that are systematic in nature," and because "WTO members simply do not have enough of a common understanding of the magnitude of international spillovers caused by contested policies and need to invest time in considering alternative approaches to attenuating."[1099] Preferential RoO can cause negative spillovers by raising the costs to trade under preferential rates and diverting trade from third party Members.[1100] There is reason for the Secretariat to invest resources in studying preferential RoO. Primo Braga and Hoekman propose that for channeling "more of the energy that currently is invested in PTAs towards rule-

[1096] Bernard Hoekman, 'Urgent and Important: Improving WTO Performance by Revisiting Working Practices' (2019) 53 J World Trade 373, 374.
[1097] ibid; Boonekamp (n 1081) 211.
[1098] Bernard Hoekman and Petros C Mavroidis, 'WTO Reform: Back to the Past to Build for the Future' (2021) 12 Global Policy (Sup. 3) 5, 6.
[1099] ibid.
[1100] See Chapter 3, notes 516-524, 534-542.

making under the WTO umbrella," the necessary conditions "are deliberation on both old and new policy areas that generate negative externalities and call for concerted action and cooperation, with more collective learning about the experiences of PTAs in dealing with those policy areas."[1101] There is a large body of PTAs with preferential RoO that the Secretariat can consult, analyze and build recommendations upon.

Further, the WTO provides a forum for reciprocal negotiations, although some scholars caution that the notion of reciprocity is more nuanced than just an exchange of commitments. At the basic level, Elsig, Hoekman, and Pauwelyn argue, an institutional aspect of the WTO is that it provides a "simple provision of a negotiation platform where WTO Members can regularly meet, exchange concessions and explore new regulatory solutions to ongoing challenges."[1102] However, the authors note that with the exception of the expansion of the ITA and the TFA, the outcome of this platform "is straightforward given the lack of real progress on new agreements."[1103] Additionally, a new agreement may better reflect a strategic negotiation of an agreement that is acceptable, but not optimal, for all rather than a common understanding on the trade issue that initiated discussions. As Joseph Michael Finger points out, consensus "reinforces the idea that an agreement is an outcome that each Member considers to be to its advantage – through a mechanism that does not demand shared purpose."[1104] Thus, reciprocity "may not be compatible with an agreement having a theoretically consistent rationale –if that rationale is a matter of agreed objective. Reasoning from a base objective may impose on the analysis of GATT/WTO agreements something that negotiators had to avoid in order achieve agreement."[1105] While Members may have a baseline objective to make preferential RoO less susceptible to domestic protectionist pressures and negative spillovers, given the politically sensitive nature of some industries, like textiles and automotives, there may be some concessions that could make the preferential RoO Instrument not very stringent in requiring Members to limit the restrictiveness of the rules.

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[1101] Carlos A Primo Braga and Bernard Hoekman, 'The Future of the Global Trade Order' in Carlos A Primo Braga and Bernard Hoekman (eds), *The Future of the Global Trade Order* (2nd edn, Eur U Institute 2017) 23.
[1102] Elsig, Hoekman, and Pauwelyn (n 57) 16-17.
[1103] ibid 17.
[1104] Joseph Michael Finger, 'The GATT/WTO System and National Trade Policies: Which Comes First?' in Manfred Elsig, Bernard Hoekman, and Joost Pauwelyn (eds), *Assessing the World Trade Organization: Fit for Purpose?* (CUP 2017) 418.
[1105] ibid.

Nonetheless, reciprocal exchanges on preferential RoO for advanced manufactured products centered on tariff reductions may improve the chance that a concluded agreement relatively balances the benefits for all parties. Once "deeper" issues enter the discussions, such as labor wage rates or environmental regulations for ink or energy consumption, the potential for Members with more resources and greater interest in deep provisions, could use their economic and geopolitical weight to turn the negotiations in their favor. L. Alan Winters argues that there are two features "which make negotiating tariffs more straightforward than negotiating regulations:"

> [1] tariffs are continuous variables and so may be tweaked to reach acceptable agreements and [2] are "owned" by trade ministries so that the internal bureaucratic process is much simpler. The regulatory issues, on the other hand, are frequently "owned" by other ministries or by pseudo-independent agencies and often have a rather all-or-nothing character -- you either have an acceptable regime or you do not, you either meet the standard and can access a market or you do not.[1106]

As a result, regulatory issues are not only harder to negotiate, but also give "a strong first mover advantage to a bloc that can arrive at the global negotiating table with a ready-made proposal."[1107] Regulations are also "much more firmly exclusionary than tariffs: a tariff might be circumvented by reducing prices (preferably after reducing costs), but a regulation leaves no alternative than to accept it or reject it completely."[1108] Thus, if Members keep a preferential RoO Instrument as a "shallow" agreement, there is a possibility that reciprocity could lead to a mutually beneficial (or at least somewhat beneficial) result given the tradition of such negotiations within trade ministries. On the other hand, should these rules include "deeper" provisions (which may be beneficial– rules on environmental standards for ink to reduce pollution could produce positive externalities), trade ministers and the WTO would need to be careful that the inclusion of regulatory issues does not transform the negotiations into an "either/or" condition from one or a few of the parties. The success of the ITA and the FTA derives partially from the ability of the negotiators to side-step contentious political issues due to the limited scope of the products or practices covered by the agreements.

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[1106] L Alan Winters, 'The WTO and RTAs: Is It All Over for Multilateralism?' in Manfred Elsig, Bernard Hoekman, and Joost Pauwelyn (eds), *Assessing the World Trade Organization: Fit for Purpose?* (CUP 2017) 359-360.
[1107] ibid 360.
[1108] ibid.

### ii. First Plurilateral Success Story: Information Technology Agreement

Key factors for the success of the ITA and the ITA expansion were the focus on tariffs, the relatively narrow range of goods covered, the support of the IT industry, and a general interest to arrive at an agreement. First, the ITA is a Critical Mass Agreement (CMA), meaning that its disciplines apply only to the Members who are signatories to the agreement, but its benefits apply to all Members.[1109] The ITA resulted from negotiations to gradually eliminate tariffs on information-technology products.[1110] The 14 parties accounted for 80% of world trade in IT products[1111] and as Members joined, the ITA's coverage expanded to 97% of world trade in such products.[1112] This high level of coverage reduces the risk of "free riding" by the non-signatories.[1113] Gary Winslett reports that for the expansion negotiations, the Members agreed only to include IT products and refrained from requesting concessions on unrelated products as a condition for accepting the inclusion of another Member's IT product in the list.[1114] However, informal deals between China, the US, and EU regarding contested IT products took place before the ITA expansion could be concluded.[1115] Additional important factors were that the IT industry was in favor of the expansion, other domestic industries did not become involved or express interest in the discussions, and non-tariff domestic regulations were kept out of the negotiations.[1116] Finally, the ITA focuses on tariff reduction, a benefit that is relatively easy to convey to voters: lower or no tariffs means less expensive IT products.[1117] Thus, the ITA's success derives from: a general interest in reducing tariffs on a limited number of goods, general interest in reaching an agreement and streamlining the negotiation process, industry support, and a benefit that can be easily explained to voters.

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[1109] Gary Winslett, 'Critical mass agreements: the proven template for trade liberalization in the WTO' (2018) 17 World Trade Rev 405, 418.
[1110] Ministerial Declaration on Trade in Information Technology Products (Singapore, 13 December 1996) WT/MIN(96)/16, p 1 <http://docs.wto.org> accessed 30 October 2021.
[1111] ibid. The parties included the EC, at that time 15 states, and other states or customs unions in the process of acceding to the WTO in the Singapore Ministerial Conference in 1996.
[1112] Ministerial Declaration on the Expansion of Trade in Information Technology Products (n 429).
[1113] Rudolf Adlung and Hamid Mamdouh, 'Plurilateral Trade Agreements: An Escape Route for the WTO?' (2018) 52 J World Trade 85, 88.
[1114] Winslett (n 1109) 418. Adlung and Mamdouh report that during the negotiations for the original ITA, there may have been some concessions by the US to the EU with regards to liberalizing its liquour imports (n 1113) 96, fn 33).
[1115] Winslett (n 1109) 419.
[1116] ibid 419, 422.
[1117] ibid 420.

### iii. Second Plurilateral Success Story: Trade Facilitation Agreement

Regarding the TFA, a key factor in its success are the flexibilities it offers to developing countries in implementing commitments. Like the ITA, its origin is found in the Singapore ministerial conference.[1118] There was also a general understanding among the Members for the need for a multilateral agreement on trade facilitation.[1119] Developing countries initially expressed reluctance in negotiating from concern of being legally responsible for modernization of customs procedures for which they did not have technical or financial resources.[1120] However, as Alex Ansong notes, not only did developing countries agree to become parties if given flexibilities in implementing commitments, other Members supported including special and differential treatment provisions in order to conclude the agreement.[1121] With regards to enforcement, the TFA includes an expert advisory group which assists Members in understanding their obligations under the agreement and in resolving implementation problems before recourse to the DSU.[1122] Thus, the TFA's success derives from a general understanding of the need for an agreement on trade facilitation and a general willingness to consider the concerns of developing members. Considering the ITA and TFA as examples of successful plurilateral negotiations, would it be possible to conclude a plurilateral agreement for preferential RoO for 3D printed goods and goods with a significant digital service input under the WTO?

### iv. Potential Plurilateral Success Story: Rules of Origin?

Looking at developments in the design of preferential RoOs in PTAs as well as the interest of WTO members in CMAs, Hoekman and Inama argue that a plurilateral agreement on RoO is feasible, albeit for non-preferential rules of origin. The complex design of rules, the variations by Members of the rules, and the reduction of efficiency resulting from different rules for different products within a set of rules amounts to a non-tariff barrier to trade.[1123] Simplification and convergence of the non-preferential

[1118] Ministerial Declaration on Trade in Information Technology Products (Singapore) (n 1110).
[1119] Alex Ansong, 'Single Undertaking, Different Speeds: Pliable Models for Decision-making in the WTO' (2018) 21 J Intl Economic L 395, 409.
[1120] ibid 409-410.
[1121] Ibid.
[1122] TFA art. 18; Bernard Hoekman and Charles Sabel, 'Plurilateral Cooperation as an Alternative to Trade Agreements: Innovating One Domain at a Time' (2021) 12 Global Policy (Sup. 3) 49, 57.
[1123] Hoekman and Inama (n 16) 5.

rules would reduce the cost to trade.[1124] The authors focus on a plurilateral WTO instrument for non-preferential rules, because arguably preferential rules "fall out of the ambit" of the WTO.[1125] However, they examine what they call the "convergence" of preferential RoO resulting from Southern Hemisphere and Asian Members modelling RoO on PEM or NAFTA in recent RTAs.[1126]

One technical convergence the authors identify is the move away from determining regional or local value content based on the value added or net cost approach to formulas that determine the value of originating or non-originating materials.[1127] While their review of product specific RoO in NAFTA, CAFTA, and the TPP suggest this, other regional and mega-regional RoO indicate that convergence of technical rules is slow moving. With regards to CETA, the product specific rules for Annex 5 do focus on determining origin based on whether the value of the non-originating materials exceeds the transaction value or the ex-works price, however no formulas are provided to determine this result.[1128] The CPTPP (Article 3.5) provides three formulas: the focused value method (which is based on the value of certain non-originating material), the build-up method, and the build-down methods (which both take into account the value of materials).[1129] The TCA provides a formula for the MaxNOM, meaning "the maximum value of non-originating materials expressed as a percentage," but this formula does not appear in CETA or in the PEM.[1130] The USMCA preserves the transaction value and net cost value formulas from NAFTA, but with some modifications as to cumulation of non-originating materials.[1131] One area where

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[1124] ibid.
[1125] ibid 6.
[1126] ibid 11.
[1127] ibid 13.
[1128] CETA, annex 5 s A, "General Definitions, transaction value or ex-works price:
transaction value or ex-works price of the product means the price paid or payable to the producer of the product at the place where the last production was carried out, and must include the value of all materials. If there is no price paid or payable or if it does not include the value of all materials, the transaction value or ex-works price of the product:
must include the value of all materials and the cost of production employed in producing the product, calculated in accordance with generally accepted accounting principles; and
may include amounts for general expenses and profit to the producer that can be reasonably allocated to the product.
Any internal taxes which are, or may be, repaid when the product obtained is exported are excluded. If the transaction value or ex-works price of the product includes costs incurred subsequent to the product leaving the place of production, such as transportation, loading, unloading, handling, or insurance, those costs are to be excluded."
[1129] CPTPP ch 3 Rules of Origin and Origin Procedures, art 3.5 Regional Value Content.
[1130] TCA, annex 2, Introductory Notes to Product-Specific Rules of Origin, n 4(c).
[1131] USMCA ch 4 article 4.5 Regional Value Content & ch 4 art 4.11 Accumulation; CBP, 'Accumulation-Factsheet' (n 389).

there does seem to be some convergence is the use of the net cost method for automobiles under CETA, CPTPP, and the USMCA.[1132]

Hoekman and Inama propose that WTO Members consider a CMA for non-preferential rules of origin due to the perceived "bottom up" convergence of preferential rules of origin. First, they determine that as non-preferential rules of origin "must apply on a MFN basis," this suggests "that plurilateral cooperation initiatives in this area will have to take the form of a CMA."[1133] Next, they propose that to avoid "significant political constraints," the negotiators should focus on harmonizing rules for goods for which there are already MFN rates of zero.[1134] CMAs can be more transparent than PTAs as "they involve formal scheduling of commitments by signatories and regular reporting on activities to the WTO Membership as a whole," which may assist with reducing the differences of rules among PTAs.[1135] The authors also propose cooperation on the administration of the rules, and suggest a common approach on the procedures and qualifications for issuing certificates of origin.[1136] Finally, they suggest that the "single transformation" rule should be sufficient for origin qualification "in a world characterized by global value-chain based production,"[1137] although they acknowledge that it may be difficult to abolish a double transformation rule for sensitive sectors like textiles and agriculture.[1138] In general, the authors recommend that instead of focusing on "easy fixes" to RoO in RTAs, Members should identify the source of these issues and provide a framework for clearer and more efficient non-preferential RoO through a CMA under the WTO and even "break the wall that has separated preferential and non-preferential ROO."[1139] At this point, instead of trying to break down walls, let us begin to approach the design of a WTO plurilateral instrument on preferential RoO for 3D printed goods and other tangible goods that have a significant digital input.

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[1132] CETA Protocol on rules of origin and origin procedures art 17; CPTPP ch 3 art 3.5(d); USMCA ch 4 app Provisions Related to the Product-Specific Rules of Origin for Automotive Goods art 2.
[1133] Hoekman and Inama (n 16) 23.
[1134] ibid.
[1135] ibid 22-23.
[1136] ibid 23-24.
[1137] ibid 24.
[1138] ibid 24-25. A double or triple transformation rule requires that two or three rounds of origin qualification processing occur in the territory. Inama, *Rules of Origin in International Trade* (n 20) 248. With the example of 3D printing, it could be: 1) making the ink in the territory, 2) printing the good in the territory, provided that printing is sufficient processing to be a substantial transformation. A single transformation rule could be: printing the good in the territory, provided that printing is sufficient processing to be a substantial transformation.
[1139] Hoekman and Inama 25-26.

B. Designing a RoO Instrument under the WTO

The first step is to consider whether an agreement on preferential rules can be developed within the WTO framework. As some scholars have noted, preferential rules seem to be a form of WTO + law given the language of Annex II of the AOR and the fact that these rules are included in RTAs, for which the WTO has granted the Members significant allowance to regulate trade issues beyond the disciplines covered by the WTO instruments.[1140] Some scholars question whether preferential rules are legal measures under Article XXIV either based on a textual analysis of Article XXIV or on the protectionist effect of the rules.[1141] As stated in Annex II, the Members "recognizing that some Members apply preferential rules of origin agree…" that these rules lead "to the granting of tariff preferences going beyond the application of paragraph 1 of Article 1 of GATT 1994."[1142] Under Articles 1.1(4) and 1.2, Members must notify the Secretariat and either the Committee on Regional Trade Agreements or the Committee on Trade and Development of the preferential rules, any judicial decisions and administrative rules, or any modification or additions to existing rules.[1143] On the other hand, as Hoekman and Kostecki point out, "Article XXIV is entirely silent on rules of origin, which is rather surprising given that they have an important bearing on the effects of a PTA."[1144] It seems to be a bit of puzzle if one considers that under one Annex 1A agreement (GATT 1994) preferential rules are arguably not legal, but under another Annex 1A agreement (Agreement on Rules of Origin), recognizes that Members apply such rules. Resolving this question requires delving into issues of interpretation of the WTO instruments under the VCLT and international law, a deeper analysis beyond the scope of this dissertation. Therefore, we can propose two basic arguments: One, preferential RoO in PTAs are not legal under Article XXIV, and further, there should be no preferential rules, despite the allowance for such rules under Annex II. This would end the discussion here. However, preferential RoO are measures that traders across the world deal with on a daily basis. Further, Members continue to design PTAs with preferential RoO. For purposes of this dissertation, the

[1140] Inama, *Rules of Origin in International Trade* (n 20) 23; Hirsch, 'The Politics of Rules of Origin' (n 28) 332; Hoekman and Kostecki (n 80) 485-492.
[1141] Eg, Mavroidis and Vermulst (n 20) 10-11; Conconi, et. al. (n 38) 2362; Hoekman and Kostecki (n 80) 485-486.
[1142] AOR, Annex II arts 1 & 2.
[1143] ibid arts 1.1(4) & 1.2.
[1144] Hoekman and Kostecki (n 80) 485-487.

second argument, and the one that will be followed, is: there is some question as to how to legally apply preferential RoO under Annex II AOR and Article XXIV GATT 1994; however, given their impact on trade and their potential to cause trade distortions, the WTO, as an organization that promotes liberalized trade, should examine how it could address preferential RoO to reduce their capacity to be used for protectionist purposes and as non-tariff barriers to trade.

i. Learning from Ministerial Decisions for RoO for LDCs, the ITA (I & II) and the TFA: Wide Latitude in Design and Minimizing Political Hold-Ups

In the last ten years, Members have shown a willingness to collectively examine rules for preferential rules of origin for LDCs. At the 2013 Bali Ministerial Conference, the Members adopted a Ministerial Decision that established multilaterally agreed guidelines for simplifying preferential rules and making them more transparent.[1145] The decision provides recommendations on designing rules for the three substantial transformation criteria; for example, (1) when to include or exclude transportation costs using the *ad valorem* method, (2) an across-the-board rule on when non-originating inputs can be deemed to undergo a substantial transformation under the CTH, and (3) taking into account the producing capacity of the LDC when basing a rule on the manufacturing or processing operation method.[1146] The Bali Decision includes suggestions on allowing cumulation of materials with LDCs not part of the GSP, simplification of certification of origin procedures, and enhancing transparency by notification of the rules to the WTO.[1147] Two years later, at the Nairobi Ministerial Conference, another Ministerial Decision was adopted which includes more detailed provisions on assessing whether sufficient transformation occurs within the LDC and on the expansion of cumulation with other LDCs and GSPs beneficiaries of the preference granting Member to make it easier for products to qualify for origin under the GSP.[1148] The 2021 Report by the Committee on Rules of Origin (CRO) on the Bali and Nairobi decisions identifies that almost all preference-granting Members have submitted notifications about meeting the requirements for preferential RoO.[1149]

[1145]Ministerial Decision, 'Preferential Rules of Origin for Least Developed Countries' (Bali Ministerial RoO Decision) (7 December 2013) WT/MIN(13)/42, WT/L/917 <https://www.docs.wto.org>
[1146] ibid para 1.1-1.6.
[1147] Ibid para 1.7-1.10.
[1148] Ministerial Decision, 'Preferential Rules for Least Developed Countries' (Nairobi Ministerial RoO Decision) (19 December 2015), WT/MIN(15)/47, WT/L/917/Add.1, pp 1-2.
[1149] Committee on Rules of Origin (CRO), 'Report (2021) of the Committee on Rules of Origin to the General Council on Preferential Rules of Origin for Least Developed Countries' (25 October 2021)

While these Decisions approach a specific issue, preferential RoO for LDCs, they demonstrate 1) the regulation of preferential RoO can be approached within the framework of the WTO, and 2) it is possible to include guidelines for the three substantial transformation criteria within a WTO instrument. The Nairobi Decision permits Members to continue to have sovereignty when designing rules while encouraging them to take into consideration the specific production capacity and needs of the LDCs.[1150] However, this means that the prescriptiveness of the Decision is rather soft. For example, for the *ad valorem* criterion, "Preference-granting Members shall: Adopt a method of calculation based on the value of non-originating materials. However, Preference-granting Members applying another method may continue to use it."[1151] With regards to the CTH, "as a general principle," the Preference-granting Member shall, "allow for a simple change of tariff heading or change of tariff sub-heading" and shall eliminate all exclusions or restrictions to CTH rules unless if deemed necessary.[1152] Finally, Preference granting Members shall, "to the extent possible, avoid requirements" that impose two criteria for the same product (such as a CTH and *ad valorem* percentage).[1153] However, "if a Preference-granting Member still requires maintaining a combination of two or more criteria for the same product, that Preference-granting Member remains open to consider relaxing such requirements for that specific product upon due request by an LDC."[1154] Thus, the Decision continues the perspective of the pre-WTO GATT and the Uruguay Round of allowing Members a wide latitude of sovereignty in designing rules of origin.

While, on the one hand such language allows Members flexibility in designing rules that may be more responsive to the needs of the preference-accepting parties of a GSP, it does raise questions to what extent this decision will lead to changes in the design of preferential RoO for GSPs. In 2020, the LDC Group at the WTO submitted a communication to the CRO stating that while some progress has been achieved in terms of transparency due to notification requirements, there had not been "parallel progress in implementing the substantive part of the Nairobi Decision, more precisely the paragraphs concerning the substantial transformation and certification

G/RO/94 p 1 <https://docs.wto.org> accessed 29 October 2021. Information about notifications can be found at the 'Origin Facilitator' (WTO/WCO/ITC) www.findrulesoforigin.org.
[1150] Nairobi Ministerial RoO Decision (n 1148) para 1.1 (a)-(b).
[1151] ibid para 1.1(a)
[1152] ibid para 1.2 (a)-(b).
[1153] ibid para 1.4.
[1154] ibid.

requirements."[1155] The Group hoped to make "concrete progress" as Members headed towards the 2021 Ministerial Meeting.[1156] The LDC group examined the use of the *ad valorem* percentage rule by the preference giving countries in contrast to the rules in the Nariobi Decision and then listed "some best practices and areas for improvement."[1157] For example, under Article 1.1(b) of the Nairobi Decision, preference granting Members shall "consider…allowing the use of non-originating materials up to 75% of the final value of the product."[1158] The LDC Group noted that with the exception of Canada, none of the preference granting Members provided this 75% allowance.[1159] Additionally, the LDC Group found that "some preference-granting Members hesitate to engage in the necessary reforms to implement more flexible rules of origin for LDCs and adhere to the spirit of the Nairobi Decision."[1160] We could question how effective such a WTO Instrument on preferential RoO for reciprocal PTAs would be in spurring members to implement such rules of origin. Given the history of the GATT, the AOR, and the standstill of the HWP, Members value their latitude in designing rules, and an attempt to impose stringent obligations on preferential RoO could be met with resistance.

At this point we can begin to consider whether an WTO Instrument on RoO could be devised for 3D printed products or goods which require a digital file as a necessary input for production (i.e. an input that replaces a key manually operated task). The ITA, TFA, and the Ministerial Decisions share an element in that they focus on a relatively narrow area of trade: a limited range of goods not politically sensitive (ITA), customs procedures (TFA), or LDCs (Bali and Nairobi Ministerial Decisions). Rules for 3D printed goods could apply to a range of goods that are in politically sensitive industries. Thus, Members interested in such an Instrument may wish to consider limiting the breadth of goods covered. As the range of goods made with 3D printing and other advanced manufacturing procedures is small relative to the range of goods produced with traditional manufacturing methods, it may be possible for negotiators to focus on a small set of tariff lines. For example negotiators could exclude goods in automobiles, textiles, and aerospace industries, and focus on tariff lines for

[1155] LDC Group Communication, 'Submission of LDC to the Committee on Rules of Origin *Ad Valorem* Criterion, (30 October 2020) G/RO/W/202 para 1.1 <https://docs.wto.org> accessed 29 October 2021.
[1156] ibid.
[1157] ibid para 1.4.
[1158] Nairobi Ministerial RoO Decision (n 1148) para 1.1(b).
[1159] LDC Group Communication (n 1155) para 1.6(b)
[1160] ibid 1.9.

consumer goods and appliances.[1161] In addition, the negotiators should allow for future expansion of the tariff lines covered by the agreement, as was included in the 1996 Ministerial Declaration on the ITA.[1162]

If Members are interested in including the origin of the digital file input as part of the origin analysis, this will require considering what services are origin conferring services. The focus should be on those services that are necessary for the manufacturing of the good, such as the 3D file downloaded into the printer or a different type of digital file which instructs a machine to make a good. If origin is based on the economic origin of the file under an *ad valorem* method, the value of the design work and other steps performed while creating the file could be cumulated to determine the overall value of the file. However, this also requires considering whether every email between designers and every mock-up should contribute to the origin conferring value. Such an approach would require significant accounting resources in firms to trace each step of the design process as well as determining where that step was performed geographically. This could result in a lot of paperwork and could damper the interest of policymakers, customs offices, and traders in including the file as part of the origin analysis.

Members, especially those with significant large multinational organizations or a burgeoning small IT industry, may resist rules that confer origin of a digital file based on where the economic value is created. It would mean imposing a tracing protocol upon an economy that thrives on fluidity, flexibility, and constant innovation.[1163] Firms already expend resources on tracing tangible goods, they may not be willing or able to do the same for intangible services. Since the service input is to be factored into the origin determination, services identified in RoO for goods that do not confer value should also be kept in mind. For example, financial services, logistic services, and advertising services all play a role in the creation, production, or distribution of a good, but they are excluded from contributing value when using the net cost method under

[1161] Gebhardt, Kessler, and Thurn (n 78) 109-119.
[1162] 'Participants shall meet periodically under the auspices of the Council on Trade in Goods to review the product coverage specified in the Attachments, with a view to agreeing, by consensus, whether in the light of technological developments, experience in applying the tariff concessions, or changes to the HS nomenclature, the Attachments should be modified to incorporate additional products, and to consult on non-tariff barriers to trade in information technology products. Such consultations shall be without prejudice to rights and obligations under the WTO Agreement.' Singapore Ministerial Declaration (ITA I) (n 1110), annex para 3.
[1163] Schaffer,'Trade Law in a Data-Driven Economy (n 477) 262.

the USCMA or CETA.[1164] Thus, when determining the origin of a good that would be subject to the net cost methods, these services should not confer value on the 3D file to determine the origin of the file. This could help limit the scope of the WTO RoO Instrument.

Although assigning origin to the digital input based on economic creation could align the origin determination of the digital input with the principle for origin determination of goods, rules based on the GATS rules may be more acceptable to Members. Under the Marrakesh Agreement they have already agreed to follow the GATS (either as an original member of the WTO or through accession)[1165]. Identifying the substantive business operations of a company can be done through accessing government records and databases, and court and administrative interpretations on SBO and on the geographical location of a legal seat can provide guidance.[1166] There may be some risk that companies would claim origin based on establishment strategically to qualify for preferential treatment, i.e., claiming origin in the territory of a daughter company or a subsidiary.[1167] Thus in the RoO Instrument, the Members could include requirements for proof that the alleged legal owner of the origin conferring input has SBO in the country or territory.

Given the interest in the US, the EU, and the OECD in 3D printing as a means of increasing manufacturing and the concerns raised by UNCTAD on the impact of 3D printing on production in developing countries, it seems that enough Members could be interested in pursuing negotiations. Whether there will be enough Members to reach a Multilateral Decision like the Bali and Nairobi Decisions is questionable at this point given the general challenges that the WTO faces on reaching consensus among the large and varied Membership. It is key, however, that the Members with a significant 3D printing industry or making significant investments in adopting the technology be the foundational members for a plurilateral Instrument.

3D printing and goods with digital file inputs are not focused in one sector and negotiations for an WTO instrument could face the risk of hold-ups and politically motivated proposals. 3D printed products are inputs in aircraft and vehicles, and entrepreneurs are developing 3D printed food and fabric, products of the politically

[1164] USMCA ch 4 art 5(8); CETA Protocols on Rules of Origin and Origin Procedures art 17.
[1165] The Marrakesh Agreement Establishing the World Trade Organization, arts XI and XII
[1166] Mavroidis, *The Regulation of International Trade*, vol 3 (n 66) 301.
[1167] Barnard with Snell (n 970) 464.

sensitive agricultural and textile industries.[1168] Members with such politically sensitive industries could demand concessions. Members that produce raw materials or plastics and metals that constitute ink could have certain bargaining leverage to extract concessions for preferential treatment for unrelated products as there can be no 3D product without the ink. Thus, unlike the ITA which had the advantage of focusing on a rather politically uncontentious industry despite some side negotiations among the EU, China, and the US, an instrument on rules of origin for 3D printing could "import" the protectionist motivations that led to the impasse of the HWP on rules for traditionally manufactured goods and animal and agricultural products.

Considering rules for 3D printed goods and other goods manufactured with a digital file provides an opportunity to address one of the key issues with RoO: the global value chain and the need to identify the origin of every part in the chain. The advantage of 3D printing is the reduction of parts to be assembled, such as GE's reduction of the parts of an aviation engine from 855 to 12.[1169] Such reduction could impact the value of labor and processing within a territory relative to the value of originating and non-originating materials. If a bicycle is made of fewer parts, the role of non-originating material in each part in the origin determination process of the final product may be more easily assessed. This could allow scholars and lawmakers to better examine the purpose and the functionality of cumulation in rules of origin. In addition, cumulation rules designed for goods that have thousands of parts may, when applied to the same type of good with fewer parts, result in preventing the good from qualifying for origin, as perhaps the percentage or value of the non-originating material in the ink is greater than the percentage or value of processing in the territory. Examining rules for goods manufactured through digital processes and the simplification of assembly can allow scholars and trade experts to design cumulation rules that may function better in discerning which goods qualify for preferential treatment and also encourage traders to trade under preferential rates.

The role of the WTO would not necessarily be to design the specific rules on cumulation, but to provide guidelines so that cumulation functions as means for increasing trade among the parties of a RTA. For example, the Nairobi Decision recognizes that "the development of cumulation possibilities should be considered in relation to the rules applied to determine sufficient or substantial transformation" and

[1168] Duchêne and others (n 254) 18 -19.
[1169] See Chapter 4, notes 811 - 815.

encourages Preference-granting Members "to expand cumulation to facilitate compliance with origin requirements by LDC producers" and provides a list of possibilities for expansion.[1170] Likewise, a WTO instrument could provide cumulation possibilities for goods produced through advanced manufacturing taking into consideration the unique production methods which differ from traditional manufacturing.

There may not be convergence among Members upon detailed guidelines for the *ad valorem* criteria. If advanced manufacturing reduces assembly, labor costs and time, and direct overhead costs, then there is a possibility that the raw materials have more value relative to the other factors of production, assuming we are not considering the 3D file as a high value input incorporated into direct overhead costs. A country that is a producer of ink or raw materials for ink may find *ad valorem* rules that exclude the 3D file's value favorable. A country that specializes in design of 3D files would not like such *ad valorem* rules. Members specializing in printing would want an *ad valorem* rule that allocates more value in processing and labor rather than in materials. Such issues could arise for other advanced manufacturing techniques which rely on digital technology and innovative or rare raw materials for production of the goods. On the other hand, the bottom-up convergence identified by Inama and Hoekman in RoO for PTAs may indicate that Members may be willing to at least consider reforms to preferential RoO and aim towards simplification of the rules. Members could work together to form guidelines for reducing confusion and inefficiencies when determining the origin of a 3D printed product. Similar to the Nariobi Decision, the WTO RoO Instrument could propose a recommended method for determining origin based on the *ad valorem* criterion, but also allow Members to continue to use other options. If enough Members apply the WTO recommended method, then convergence will occur at a plurilateral level. However, this raises the risk that certain countries with economic and political clout could be instrumental in the designs of guidelines that protect domestic industries or are beneficial to those Members that have already started adopting advanced manufacturing techniques at a widespread level.[1171]

[1170] Nairobi Ministerial RoO Decision (n 1148) para 2.1
[1171] Hoekman, 'Urgent and Important' (n 1096) 391.

### ii. Additional Considerations for a WTO Instrument on Preferential RoO for Advanced Manufactured Products

Other topics Members will have to address during negotiations is to what extent the WTO Instrument would reference other WTO instruments (current and future), how the provisions in the Instrument could impact the design of procedural rules in PTAs (such as origin certification requirements), along with maintaining the awareness as technology advances, how goods are produced will change as well. First, the Members should consider the extent the Instrument would be linked to any instrument regarding e-commerce. As stated above, if the moratorium on customs duties on electronic transmissions is made permanent, then there is some need to consider whether the origin of the 3D file should be included in the origin analysis. A finished, tangible, good is allocated a tariff based on the origin of the 3D file. This file crosses a border as an electronic transmission, which under the Moratorium is not subject to custom duties upon transmission. Thus, the Members would have to explain that the application of a tariff on the 3D printed good is not a custom duty on the transmission of the 3D file *per se*, but a duty on a finished product based on where most of the value for the product was created. The determination to outsource design work outside of the EU or USMCA territories for example is a strategic business decision based on issues of taxation, availability of skilled workers, and reduced cost of wages. A Member having significant industries that outsource design work, but prints in its own territory, would perhaps resist an instrument that allows for the value of the 3D file to determine origin. Further, linking a preferential RoO WTO instrument to negotiations on an e-commerce instrument may lead to delays in the completion of the RoO Instrument. E-commerce discussions could be prolonged due to differences in provisions unrelated to custom duties, or provisions on custom duties could be excluded from the e-commerce Instrument on the basis that no agreement was reached on this particular topic.

The Members would also have to consider that RoO for services based on the GATS. Would the Members include references in the Instrument to the GATS and state that the origin of the 3D file or digital file used in advanced manufacturing should be determined by Article I:2, Article XXVIII, and Article V:6 GATS? Or, would the Members use this negotiation as an opportunity to propose changes, such as the inclusion of Mode 5, or the hybridization of the regulation of trade in goods and services? A WTO Instrument on rules of origin for advanced manufacturing products may allow Members in a discrete manner to experiment with developing rules that apply to goods and

services inputs under one instrument (though as stated previously, the Instrument does not need to be dependent upon a Mode 5 or a successful hybridization of trade law). On the other hand, the extent to which negotiations would need to consider differences in the GATT and GATS towards trade liberalization may implicate decisionmaking on principles that go beyond the core issue of the Instrument, i.e. designing preferential rules of origin for advanced manufactured products. If the Members apply GATS provisions which provide for origin determination of a service based on the legal origin of the service provider, then they will need to ensure that provisions in the RoO Instrument are consistent with the GATS.

In addition to guidelines on the substantial transformation criteria, the WTO RoO Instrument should also include guidelines on the procedural aspects of determining origin for advanced manufactured products. Legal and economic scholars, policy advisors, and companies, great and small, generally recognize that the administrative costs of determining the origin of a good is high and that some action should be taken to simplify the administration of preferential RoO. There is a chance of interest at the industrial level and political level in a WTO RoO Instrument that provides guidelines on reducing efficiencies in determining origin. Further, as 3D printing becomes more widespread, exporters and importers when preparing paperwork will have to consider whether printing is sufficient processing to activate a CTH and what HS code a good falls into.[1172] Certainly, attempting to understand how a printed part for a vehicle meets the source material and labor value rules under the USMCA will take some guesswork. The WTO RoO Instrument would not provide specific details, but it would indicate guidelines for approaching customs determinations, indicating which type of documents are useful for demonstrating where and how the substantial transformation occurred, and establishing protocols for tracing the legal or economic origin of the 3D file that are not overly burdensome and protect confidentiality and trade secrets. Additionally, the Members would need to consider granting flexibilities to Developing

[1172] For example, buttons (not covered with textile material) fall into two categories under the HS based on materials. Plastic buttons are HS 9606.21, so buttons made of resin-based ink would fall into this category. Base metal buttons are HS 9606.22, so buttons of metal-based ink would fall into this category. However, some scientists are exploring hybrid-plastic-metal inks. Would such printed buttons fall into "other" category for buttons, HS 9606.29? Or, would the classification be determined applying Rules 3 and 4 of the General Rules For the Interpretation of the Harmonized System. WCO, 'General Rules for the Interpretation of the Harmonized System' (n 230); WCO, 'WCO Trade Tools: Harmonized System' (wcotradetools.org) <https://www.wcotradetools.org/en/harmonized-system> accessed 30 October 2021; Shinjiro Umezu and Hirotaka Sato (corresponding authors), 'Metal-plastic hybrid 3D printing using catalyst-loaded filament and electroless plating' (2020) 36 Additive Manufacturing 101556.

Countries in implementing the changes to customs procedures proposed in the RoO Instrument.

Further, the Instrument should take into consideration that use of advanced manufacturing for producing goods for international trade. Destler proposes, for preferential RoO generally, that FTAs should include "a sunset or review provision for RoOs, requiring their reanalysis and redrafting every 5 to 10 years. At this later point, industry leverage might not be so great, since the agreement itself would not hang in the balance."[1173] Such sunset provisions are all the more useful as good production is likely to change as technology advances. Guidelines could require members to review customs procedures and substantial rules in PTAs to verify whether they function given new updates in technologies or new standards established by advanced manufacturing industrial groups and international standard bodies. Indeed, this is one area where continued collaboration with the WCO would be beneficial as updates to the HS code could include new tariff lines for mixtures of materials that constitute 3D printing ink. Standards by industrial organizations with regards to machine set up and operation, and post-processing techniques could indicate how much human labor is generally required, and thus help indicate how to determine the labor value component for an *ad valorem* calculation. However, designing such review and reassessment provisions requires Members to be willing to commit themselves to undergo such investigations and make periodic changes to national or regional customs procedures.

In conclusion, a WTO RoO Instrument on preferential RoO for advanced manufacturing products is feasible, but there are several considerations that must be kept in mind for a successful negotiation of such an agreement. First, the Instrument should be a plurilateral agreement with a core of Members who have a strong interest in reaching an agreement and who are leaders in advanced manufacturing production. The Instrument should allow other Members to join, as Members for which advanced manufacturing is still a minor means of production may wish to become a party to the Instrument when advanced manufacturing becomes widespread. Members should not seek to harmonize the rules, but allow Members to continue to have sovereignty in designing rules for PTAs. This continues the approach to preferential RoO in the GATT-era and during the Uruguay Round Negotiations. It also acknowledges the different industrial capacities of the Members with regards to advanced manufacturing.

[1173] Destler (n 504) 186.

Further, such flexibilities may make Members more inclined to agree to become a party of such an instrument. A challenge may arise with regards to concession seeking and side agreements. This could lead to hold ups and eventually a stagnation of discussions, as has occurred with the HWP, as advanced manufacturing techniques such as 3D printing are used in politically sensitive areas. Further, large economies such as the EU and the US hope to “reshore” domestic manufacturing by means of 3D printing. Thus, negotiatiors may feel the pressure of domestic industrial and political policy objectives and attempt to negotiate rules that allow for continued use of preferential RoO as non-tariff barriers.

Members should consider designing provisions for the substantial criteria that take into account changes in terms of the relative weight of value creation in the raw materials, assembly, human processing, machine processing, and direct costs that advanced manufacturing brings to the production process. This investigation is to ensure that 1) preferential rules still function as a method for sifting-out those goods in which there was no substantial value or processing created in the territory of the parties of a PTA, 2) that the rules do not overly favor one factor of the value chain, for example, the ink producers, the file designers, or the print shop owners, which could favor the domestic industries of one or a few of the parties, and 3) help to prevent rules from being effectively restrictive, because they are designed in such a way that makes it difficult for an advanced manufactured product to qualify for origin by limiting the geographic pool for materials or limiting the ability of assembly shops to source and use 3D printed inputs. Additionally, the negotiators will need to consider carefully the relation of this Instrument to the GATS RoO and any instruments regulating the transmission of digital files should they decide to include the origin of the 3D file as part of the origin analysis. Finally, the negotiators should encourage simplifying customs procedures as well as flexibilities for developing countries to implement the rules and procedures. This flexibility should be extended to all Members, as advanced manufacturing is still in the process of being adopted as a production technique in developed countries and several developing countries have started to produce goods with 3D printing and design 3D files.

## V. Tapping into the WTO's Strengths: Assisting the Trade Community with Designing and Complying with RoO for Advanced Manufactured Products

While an instrument on rules of origin for 3D printed goods and goods produced with advanced manufacturing methods would allow the WTO to regulate trade in a digital world, there are other aspects of the WTO that could influence use of preferential RoO independent of an instrument and could improve upon the transparency, evenhandedness, and legitimacy of RoO. There are several elements about the WTO that could be strengthened through providing support on preferential RoO and advanced manufacturing. Indeed, much of what may be sought in terms of assistance in regulating and designing rules is already available to Members; however, it will take a joint effort of the administrative bodies of the Organization as well as the Members to make use of these resources.

### A. Activity by the Secretariat and the Committee on Rules of Origin

The WTO has an important role as a font of knowledge creation and technical expertise.[1174] The introduction of new manufacturing techniques and 3D printing could bring changes to where the most value is created or whether sufficient processing occurs. However, without adequate attention to such aspects, policymakers and lawmakers could design rules that are not compatible with manufacturing processes or benefit a few domestic industries in powerful states. Inama writes that "[e]xperience has shown that the lack of expertise and failure of a well-functioning negotiating machinery at the domestic level are the most formidable stumbling blocks to consensus building and sometimes may lead to fatal mistakes when negotiating rules of origin."[1175] As advanced manufacturing is still a nascent, but growing, mode of production, there is time for legal scholars and economists at the WTO to study the technology, experiment to see if rules are more or less restrictive, and provide recommendations for designing these rules.

Information and statistics useful for modernization of preferential RoO could be sourced from the Trade Policy Review Mechanism (TPRM) and the Committee on Rules of Origin (CRO). Elsig, Hoekman, and Pauwelyn note that one important tool of the WTO:

[1174] Elsig, Hoekman, and Pauwelyn (n 57) 16-18.
[1175] Inama, *Rules of Origin in International Trade* (n 20) 484.

> is the 'member-driven' work in the various committees, which allow for clarification, tabling concerns and learning about best practice, and can potentially lead to the elaboration of new regulatory initiatives…Overall, the question is how well the system supports the implementation of the obligations (first-order compliance) and how committees could contribute to designing new initiatives.[1176]

Article 1.2 of Annex II of the AOR requires Members to notify RoO to the Committee on Regional Trade Agreements (which implements the Transparency Mechanism for RTAs falling under GATT Article XXIV and GATS Article V) or the Committee on Trade and Development (which implements the Transparency Mechanism for GSPs).[1177] However, the extent of the supervisory effect of these committees is questionable given that of the 500 RTAs notified as of 2021, only 19 notifications resulted in a report from one of the committees.[1178] This statistic may result from the fact that the issuing of a report requires consensus and Members may be reluctant to point out inconsistencies in RTAs of other Members when their own RTAs may also not be consistent.[1179]

In the context of preferential RoO for LDCs, the CRO Reports to the General Council indicate that notification of required information and statistics on utilization rates from Members are inconsistent. The 2015 Naroibi Decision requires that preference-granting Members submit statistical data.[1180]The 2016 report indicates that "[14] Members had not provided the necessary information to the Secretariat."[1181] In 2017, there were 8 Members who had not yet submitted information.[1182] In 2018 the Report indicated that the data retrieved "enables Members to examine trade patterns and understand the impact the current origin requirements have on the ability of LDC exporters to effectively use the preferences available to them," however, there were "significant gaps" as 10 Members had not yet submitted data.[1183] In 2019, the report

[1176] Elsig, Hoekman, and Pauwelyn (n 57) 17.
[1177] AOR Annex II art 1.2.2; 'Transparency Mechanisms for RTAS' (wto.org) <https://www.wto.org/english/tratop_e/region_e/trans_mecha_e.htm> accessed 3 November 2021.
[1178] Van den Bossche and Prévost (n 159)140-141.
[1179] ibid 141.
[1180] Nairobi Ministerial ROO Decision (n 1148) para 4.3.
[1181] China, Iceland, India, Japan, Kazakhstan, Kyrgyz Republic, Morocco, New Zealand, Russian Federation, Switzerland, Chinese Taipei, Tajikistan, Thailand and Turkey did not submit data: CRO, 'Report of the Committee on Rules of Origin to the General Council on Preferential Rules of Origin for Least Developed Countries' (10 November 2016) G/RO/79 para 4 <https://docs.wto.org> accessed 30 October 2021.
[1182] CRO, 'Report (2017) of the Committee on Rules of Origin to the General Council on Preferential Rules of Origin for Least Developed Countries' (11 October 2017) G/RO/85 para 6 <https://docs.wto.org> accessed 30 October 2021.
[1183] CRO, 'Report (2018) of the Committee on Rules of Origin to the General Council on Preferential Rules of Origin for Least Developed Countries' (18 October 2018) G/RO/87 para 2 <https://docs.wto.org> accessed 30 October 2021.

indicated that data collection was slower and that the "Secretariat had reached out to these delegations and was working closely with some to bridge those statistical gaps."[1184] The situation in 2020 was the same.[1185] However, in 2021 the report stated the receipt of current and historical data from Iceland, India, the Russian Federation, and Turkey, but absent or partial data from Armenia, China, Kazakhstan, Kyrgyz Republic, Montenegro, Morocco, New Zealand, and Tajikistan.[1186] A communication from the LDC group circulated at the request of the delegation of Tanzania outlines the history of the patchy notification of data to the Secretariat and also concerns on the quality and accuracy of the data.[1187] The LDCs "believe that it is therefore necessary to strengthen the mandate of the Committee on Rules of Origin at the 12th Ministerial Conference by: (a) setting clearer obligations for preference granting members…and (b) strengthening the role of the WTO Secretariat to monitor conformity with Nairobi Decision."[1188] Thus, some WTO Members recognize that in order for the objectives of the multilateral decision on rules of origin to be achieved two things must occur, 1) Members should have stronger obligations, and 2) the Secretariat should have more oversight power.

We could image that an WTO Instrument on rules for advanced manufactured products or an initiative to submit data on the utilization rate of such rules may be met with similar inconsistent compliance. Timm Betz and Barbara Koremenos argue that "the *existence* [italics original] of monitoring provisions…facilitate the collection and dissemination of information," and "[a]s such, they are a response to informational problems in international cooperation," especially when states are uncertain about the

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[1184] CRO, 'Report (2019) of the Committee on Rules of Origin to the General Council on Preferential Rules of Origin for Least Developed Countries' (24 October 2019) G/RO/89 para 2 <https://docs.wto.org> accessed 30 October 2021.
[1185] CRO, 'Report (2020) of the Committee on Rules of Origin to the General Council on Preferential Rules of Origin for Least Developed Countries' (23 November 2020) G/RO/91 para 2 <https://docs.wto.org> accessed 30 October 2021.
[1186] CRO, 'Report (2021) of the Committee on Rules of Origin to the General Council on Preferential Rules of Origin for Least Developed Countries' (n 1149) para 2. The CRO compiled a chart of the notifications by preference-granting Members from 2010 to 2022, though the 2022 notifications have been received but not disseminated as of 25 March 2022. Canada, Chile, China, EU, Montenegro, Iceland, Norway, Switzerland, Chinese Tapei, and the USA (for 4 different sets of rules of origin) have submitted notifications regarding tariffs. Turkey has submitted notifications for both tariffs and imports. CRO, 'Status of Notifications of Preferential Rules of Origin for LDCS and Preferential Import Data: Note of the Secretariat' (25 March 2022) G/RO/W/163/Rev. 10, 4 <https://docs.wto.org> accessed 7 May 2022.
[1187] LDC Group Communication, '5th Anniversary of the Nairobi Ministerial Decision: Review of Implementation, Identification of Gaps and the Way Forward' (5 March 2020) G/RO/W/194 para 4.15 <https://docs.wto.org> accessed 30 October 2021.
[1188] ibid para 5.2

behavior and compliance of other states.[1189] However, "being scrutinized by international monitoring bodies is intrusive and may infringe on the conception of sovereignty for many states."[1190] On the other hand, if states perceive that there "are no incentives to defect and therefore no incentives to misreport information," then self-reporting can be "an efficient and trustworthy mechanism" while allowing states to "give up a minimum of sovereignty."[1191] However, the "utility of self-reporting is limited by fears that states fail to report behavior accurately," especially "when states have incentives to defect from an agreement."[1192] The authors point to agreements based on environmental, human rights, and financial obligations.

The question is whether rules of origin is something that states have an "incentive to defect" or misreport information. Further, preferential rules of origin have been linked in terms of trade regulation to states' commercial policies, and thus, states historically have been given a wide latitude of sovereignty in designing rules. The fact that the CRO reports on the Nairobi Decision indicate slow, absent, or partial notification of statistics of utilization rates suggests at least that it is difficult for the WTO to extract such information from Members who are not willing or not capable of providing such information. Regarding rules of origin for advanced manufactured products, states may also resist in providing information if obligated by the CRO or a WTO RoO Instrument as this would impinge upon a state's commercial policy and its regulation and development of technical industries, both areas where states would wish to retain sovereignty. On the other hand, there may be some hope that self-reporting could prove effective if RoO for advanced manufactured products are perceived as having a low incentive for defection. The rules are available on online platforms[1193] as well as on government websites and the rules must be made accessible to traders and customs officers. In fact, states could benefit from sharing information and analyzing utilization rates, as using such data to improve the RoO system could improve exports and imports among PTA parties and third party countries. Thus, in addition to a monitory mechanism for rules of origin, the WTO Secretariat could encourage Members to actively self-report by demonstrating the

[1189] Timm Betz and Barbara Koremenos, 'Monitoring Processes' in Jacob Katz Cogan, Ian Hurd, and Ian Johnstone (eds), *The Oxford Handbook of International Organizations* (OUP 2016) 589.
[1190] ibid.
[1191] Ibid 591.
[1192] ibid.
[1193] Eg,'Rules of Origin Facilitator' <findrulesoforigin.org> accessed 31 October 2021.

advantages of sharing information on statistics, technical developments, and trade patterns.

Notably, the information regarding the notification of statistical data in the CRO Reports on the Nairobi Decision fell under the category of transparency. As Leonardo Borlini reports, the Trade Policy Review Mechanism (TPRM) "is the main channel used by the WTO to promote accountability, predictability, and transparency,"[1194] features that several scholars on RoO have noted are weak in the RoO system. Further, the Trade Policy Review Board (TPRB) not only reviews trade policies and practices related to goods, but also to services and IP[1195], information which is relevant to 3D printing and other advanced manufacturing techniques that rely on a digital file. One setting in which transparency is disciplined by WTO law is "trade policy transparency", which "addresses the imperfect information about domestic policies and practices by Members that can impair trade liberalisation."[1196] Thus, transparency refers to actions such as "how a rule or a policy is developed domestically; how the rule is enforced, or a policy implemented" and "how the rule is published."[1197] A WTO tool which could stimulate a greater level of transparency on the design and implementation of preferential RoO may lead to an international approach to RoO that factors accountability, predictability, and transparency in negotiations and implementation of RoO. The WTO would also have to convince states that sovereignty costs, which Jonas Tallberg defines as "the reduction in state control associated with transparency and openness,"[1198] are low. Such costs can be elevated when "allowing nonstate access to policymaking [is] perceived by states as more threatening in some issues areas than in others, for historical, cultural, and functional reasons," including foreign policy.[1199] While rules of origin are typically associated with a state's commercial policy, a historical example of sovereignty, they do establish parameters for a state's engagement in foreign trade. Thus the WTO Secretariat must demonstrate that enhancing transparency and openness in the design and administration of RoO through the engagement of nonstate actors like the WTO and of researchers and

[1194] Leonardo Borlini, 'A Crisis Looming in the Dark: Some Remarks on the Reform Proposals on Notifications and Transparency' (2019) 63 QIL, Zoom-out 83, 84.
[1195] 'The Trade Policy Review Mechanism (TPRM)' (wto.org) <https://www.wto.org/english/tratop_e/tpr_e/tprm_e.htm> accessed 3 November 2021.
[1196] Borlini (n 1194) 90.
[1197] ibid 90-91.
[1198] Jonas Tallberg, 'Transparency' in Jacob Katz Cogan, Ian Hurd, and Ian Johnstone (eds), *The Oxford Handbook of International Organizations* (OUP 2016) 1174.
[1199] ibid.

NGOS does not "cost" states much in terms of their sovereignty over commercial and foreign policy.

Tools that apply transparency to shed light upon the sometimes obscure political and legal practice of rule design would benefit not only the traders and custom officials that apply such rules, but also would allow the WTO to provide a framework for the regulation of trade in the digital trading environment. As Borlini also argues, "[w]here the legal framework is inadequate to reflect a dynamic and evolving reality, transparency as a trade policy tool may permit the acquisition of information for stimulating the iterative process of redefining the relevant problem and revisiting the question of what constitutes relevant knowledge about that particular problem."[1200] The application of current preferential RoO to advanced manufacturing products, such as 3D printed goods, may not reflect the dynamic and evolving reality of the production and trade of goods in increasingly automated and digitalized global value chains. The issue with relying on the TPRM is that it appears to sometimes go unheeded: notifications may be incomplete, or not submitted on a timely basis, compliance with the TPRB remarks is voluntary, and information on non-tariff barriers is not comprehensive.[1201] Betz and Koremenos note that the WTO's TPRM, 'which is part of an elaborate and well-equipped international organization, seems to have reached the limits of the WTO's resources and capacities."[1202] Thus, increasing the "bite" of the TPRM, at least with regards to preferential RoO may spur Members to design rules that are more efficient and do not distort trade by making it unduly disadvantageous to import goods from third parties of a RTA. This may also mean requiring more transparency at the level of the WTO as an institution. As Anne Peters writes:

> Transparency is a *conditio sine qua non* both for *critique* [italics original] of an organization and for an informed *consent* [italics original] to its activities. Both member states and outsiders, including affected individuals, will only be able to assess the quality of the operations of an international organization and its impact on themselves if they possess sufficient information on those operations. Transparency thereby safeguards member state sovereignty and functions *as a surrogate* [italics original] for the lack of democratic and judicial accountability in international organizations.[1203]

[1200] Borlini (n 1194) 93.
[1201] ibid 94-95.
[1202] Betz and Koremenos (n 1189) 590.
[1203] Anne Peters, 'International Organizations and International Law' in Jacob Katz Cogan, Ian Hurd, and Ian Johnstone (eds), *The Oxford Handbook of International Organizations* (OUP 2016) 49.

The WTO should allow access to the information it collects on the design and use of rules of origin and be open about how it assesses such data and develops its recommendations. This may also help Members feel more comfortable in terms of sovereignty in the monitoring or self-reporting processes. Thus, modernization at the WTO is not just confronting digital trade from the angle of e-commerce or hybridization of services, but amplifying and strengthening mechanisms already in place, such as the TPRM.

If it is still too early to begin discussions on a WTO instrument for preferential RoO for advanced manufacturing goods, the CRO could establish research initiatives into on how rules implicate the digital trade and manufacturing environment. The LDC Group has already called upon the CRO to take a more active role in the debate on "how to effectively identify and share best practices and lessons learned that could implement the substantive aspects of the Nairobi Ministerial Decision."[1204] Identifying and sharing best practices in relation the application of rules of origin for advanced manufactured goods would benefit all Members. As the studies by researchers at UNCTAD and OECD demonstrate, 3D printing has the possibility to shift the dynamics of production at a global level: will reshoring production to northern countries leave southern countries, or countries with a comparative advantage in low labor costs, worse off? If southern countries rely more on tariff revenues than northern countries, how would southern countries interpret rules of origin in relation to advanced manufactured products? These are questions that can be explored from a policy or economic perspective, but which also have an impact on the design and implementation of legal rules. The benefits of such an exercise can also lead to reflections on changes to trade practice and RTA negotiations, such as the inclusion of deeper provisions in agreements. Additionally, there should be collaboration with the Committee on Customs Valuation and the Technical Committee on Customs Valuation in understanding how the value of the digital service input should be incorporated into the value determination of an advanced manufactured product as RoO chapters refer to the CVA.[1205] Finally, the CRO should collaborate with WCO and study how the WCO

[1204] CRO, 'Examination of Existing Origin-Related Documentary Requirements: Submission of the Least Developed Countries' (25 March 2022) G/RO/W/211 <https://docs.wto.org> accessed 7 May 2022.

[1205] Eg, in the PEM, "customs value" refers to value as determined under the CVA. PEM app 1 art 1(e). ASEAN TIGA also refers to FOB and CIF value of goods under the CVA. ASEAN TIGA ch 3 art 25 (c) and (d).

is initiating updates to the HS in response to changes in trade and manufacturing, such as the addition of a product line and code for additive manufacturing machines.

The WTO could also take an active role in processing and analyzing the preferential RoO in the notified RTAs and understanding how these rules have impacted trade.[1206] Donner Abreu looking into the nexus among RoO, the WTO, and RTAs suggests a symbiosis between the multilateral framework and RTA network through more active WTO involvement in providing guidelines for preferential RoO. This derives not only from the repository of information in the WTO, but also from the diversity of the WTO membership.[1207] Given these elements and the fact that RTAs will continue to be negotiated by WTO members, Donner Abreu argues that a debate on RoO within the WTO, "would appear to be a positive contribution, both to increasing the utilization of the improved market access brought by RTAs, while simultaneously ensuring and increasing the participation of third parties in both the debate and the reaping of benefits of real open regionalism."[1208] The WTO could assist Members by using its resources and negotiating platform to identify where and how to reduce the costs of RoO. Boonekamp notes that the costs for traders to comply with RoO may be "exacerbated by the fact that the production process might need to be changed to meet the rules of origin" of a RTA.[1209] The current approach to the *ad valorem* criterion can discourage producers from adopting more efficient or automated means of production. Advanced manufacturing techniques, such as 3D printing, promise to make manufacturing more efficient by reducing inputs and automating processes. In addition, parties to an RTA may wish to source 3D printed inputs due to their lower costs or better performance, but be constrained by preferential RoO to source local products. The WTO could examine the impact of RTAs on third parties and, as Boonekamp writes, "an agreement in the WTO on important lacunae such as preferential rules of origin…could bring uniformity to how such measures are to be evaluated."[1210] The WTO is a forum where, as Elsig, Hoekman, and Pauwelyn point out, "WTO Members can regularly meet, exchange concessions, and explore new regulatory solutions to ongoing challenges."[1211] The WTO could utilize this platform to explore the impact of

[1206] Hoekman, 'Urgent and Important' (n 1096) 386-387
[1207] Donner Abreu (n 358) 104.
[1208] ibid.
[1209] Boonekamp (n 1079) 205.
[1210] Ibid 208.
[1211] Elsig, Hoekman, and Pauwelyn (n 57) 16-17.

advanced manufacturing and preferential RoO on trade. Boonekamp argues that it is not "clearly the case that the WTO's ability to negotiate on market access has been impaired by RTAs," and "the WTO remains an impressive negotiating forum for global trade rules," and could remain a firm anchor in the international trade law system by making progress in multilateral rules for preferential RoO.[1212]

B. Collaboration with Participants in Global Trade

The WTO could assist with making rules of origin less politically murky and more functional by encouraging various participants of global trade to use the WTO as a platform for widening the discussion on rules of origin, whether in the form of supporting research on utilization rates or even providing an opportunity to non-governmental actors speak during negotiations or discussions on new rules. However, the invitation to non-governmental actors to collaborate should be extended with some caution, as scholars suggest that the influence of lobbyists in the design of RoO has led to their trade distortive effect.[1213] There may be some benefits in seeking input from businesses and actors involved in manufacturing and trade. Primo Braga and Hoekman argue that the "purely state-to-state nature of WTO operations is increasingly outdated."[1214] This results from the rise of GVCs as a predominant means of manufacturing, and thus, an increase in "the interface between private and public international law" and a "rise to transnational initiatives among firms to agree on norms and standards."[1215] As a result, "[g]reater engagement with business organizations is necessary for better economic governance."[1216] This can be achieved by inviting the business community to participate in the decisionmaking process for digital trade and preferential RoO in Committees as well as providing more institutional transparency.[1217] Hoekman and Nelson argue in their article on 21st trade agreements that in the case of deep integration, initiatives that "aim to manage economic relations beyond border measures, it is critical that the set of people involved in deliberations go beyond those who have worked on shallow integration agreements," including representatives of international businesses, voters, and consumers.[1218] If the labor

[1212] Boonekamp (n 1079) 211.
[1213] See Chapter 3, notes 495 – 507.
[1214] Primo Braga and Hoekman (n 1101) 24.
[1215] ibid.
[1216] ibid.
[1217] Hoekman and Mavroidis (n 1098) 8.
[1218] Hoekman and Nelson (n 41) 19.

minimum wage requirement in the USCMA is a precursor to the inclusion of deep provisions in preferential RoO, then the WTO could include industry representatives and consumer representatives in its discussions on RoO to understand how such deep RoO provisions impact trade. Further, as governments continue to place hopes in advanced manufacturing, especially 3D printing, to reshore manufacturing and bolster the domestic labor pool and economy, the WTO, as a negotiating platform, may be able to temper trade distortive effects of RoO for 3D products by engaging industrialists, consumer advocates, developing country and LDC advocates, and political bodies in a discussion on the design and implementation of such rules.

Greater involvement of the WTO's technical assistance resources would be beneficial for Members as they examine and design RoO in the context of advanced manufacturing. Elsig, Hoekman, and Pauwelyn identify the WTO's technical assistance resources as one of the services that makes the WTO stand out as an international organization.[1219] The term technical assistance generally refers to courses for and technical missions to developing countries.[1220] As the scholarship on RoO has shown, policymakers, customs officials, and traders in developed and developing economies could also use some help in implementing, interpreting, and complying with RoO. Indeed, the general lack of understanding on how RoO function is one reason why they can be used as tools for protectionist interests.[1221] Currently, on the WTO website, the technical assistance available to the general public is an online course that provides guidance on "the basic concepts of rules of origin and with WTO disciplines governing their use" and a course titled "Underutilization of trade preferences: blame it on the rules of origin?" [1222] On 19 May 2021 and on 7 April 2022, the CRO held half-day webinars on "What drives the utilization of trade preferences," which explored utilization rates and how governments can assist traders; videos and presentations are available online.[1223] The WTO also includes a search engine[1224] for over 800 FTAs in

[1219] Elsig, Hoekman, and Pauwelyn (n 57) 17.
[1220] Van den Bossche and Prévost (n 159) 17-18.
[1221] See Chapter 3, Part I.
[1222] 'Rules of Origin' (wto.org) <https://www.wto.org/english/tratop_e/roi_e/roi_e.htm#techass> accessed 7 May 2022, see bottom of page for information on the courses.
[1223] 'What Drives the Utilization of Trade Preferences,' conference (n 7); 'What Drives the Utilization of Trade Preferences' conference held 7 April 2022. Videos and presentations available at <https://www.wto.org/english/tratop_e/roi_e/preference_utilization_7april22_e.htm> accessed 7 May 2022.
[1224] 'Rules of Origin Facilitator' (ITC/WCO/WTO) <https://findrulesoforigin.org/en?culture=en> accessed 3 November 2021.

force that makes legal documents easily accessible, conveys the number of tariff lines per substantial transformation criteria through graphics and includes materials on the terminology, abbreviations, basic requirements under the substantial transformation criterion. The WTO has taken steps in making Members and the general public aware of rules, albeit rules that have already been designed and implemented.

WTO should also seek the input of customs organizations, researchers at national and regional trade offices, and legal scholars and economists and provide assistance at the design stage. According to Inama, preferential RoO "demand a mutildisciplinary approach comprising knowledge of customs laws, industrial trade policy aspects, and, ultimately, economics."[1225] Inama proposes an ideal sequence for the drafting RoO in RTAs, however, within this sequence assistance from the WTO can be useful in providing guidance on the design process. The first step is to consult manufacturers and producers as they are "the best positioned to know and describe how the finished product has been obtained and what kind of manufacture or processing operations have been carried out."[1226] In the context of RoO for 3D printed goods and goods that require a digital file input, the WTO should seek comments from producers of such goods and the advanced manufacturing ecosystem (machine makers, ink makers, file makers), as they are "best positioned to know and describe" how a finished 3D good is obtained and what processing is carried out. Next, the WTO, perhaps in conjunction with the WCO, should seek input from customs officials, who will have to make determinations on the origin of 3D printed goods and additive manufacturing machines. The second step is to transform this information into a "technically sound rule of origin reflecting the processing and manufacturing operations carried out by the producer."[1227] However, it may be better for the parties of the RTA to design detailed specific rules given the particular objectives of the parties and any desire to retain sovereignty over commercial policies.

Having input from technical experts, both in technology industries and customs administration, would assist the WTO in assessing the trade restrictiveness of a technical rule and provide guidance on how to design and interpret rules to minimize trade distortions. For example, having information on processing performed by machine and by human at the printing stage would allow the CRO to provide guidance

[1225] Inama, *Rules of Origin in International Trade* (n 20) 481.
[1226] ibid 482.
[1227] ibid.

on designing a CTH product specific rule that is not unduly restrictive (i.e. by raising the human requirement so high that a printed good can never qualify for origin). Likewise, the CRO could provide guidance to a Member interested in adopting advanced manufacturing production for a certain sector on whether it will be able to comply with the origin requirements under the RTAs to which it is a party. The next step in Inama's sequence, is having the rules "examined in the overall context of the negotiating scenario by the trade policy makers/negotiators who will have to carefully balance their priorities in the negotiating contexts, assess the economic and industrial implications of a specific rule, and seek the possible options."[1228] The CRO can assist with research on whether a proposed rule or changes to existing rules will result in trade deflection or impair the ability of third countries to trade with members of the RTA due to the restrictiveness of the rules. The CRO could also identify whether it would be easy for third parties to circumvent the rules and provide guidance on strengthening the rules without making them unduly restrictive.

### C. Bringing Disputes on RoO for Advanced Manufactured Goods to the DSB

Finally, it is necessary to consider what role the DSB could have in the regulation of preferential RoO. As there have been no disputes on preferential RoO, it is still unknown what approach a Panel or an AB would take, but we can make some guesses. First, as discussed in Chapter 1, a Panel has already stated Members have much sovereignty to design non-preferential RoO as long as they meet the requirements of Article 2 of the AOR.[1229] It is possible that a Panel would also take the same approach with preferential RoO given the history of sovereignty granted to preferential RoO, especially during the Uruguay Round. As Annex II of the AOR contains no prohibitions on making the rules restrictive, the focus of a dispute may be on whether the rules were clearly defined. In other words, the claimant would have to argue that the Respondent-Member's rules were so unclear as to rise to a violation of Article 3(a) of the Annex, which states that when issuing "administrative determinations of general application, the requirements to be fulfilled are clearly defined."

One could argue that the Complainant-Members of the RTA agreed to the design and language of the allegedly unclear rules. Yet, in fact during the negotiations some Members may have had more bargaining power than others in their design. On

[1228] ibid 482-483.
[1229] Panel Report, *US-Rules of Origin for Textiles and Apparel Products*, para 6.23-24.

6 January 2022, Mexico filed a request for a USMCA dispute panel arguing that the US is unduly restricting trade in automotive parts by not allowing Mexico to meet the RVC requirement using the methodologies set out in the Annex to the USMCA.[1230] Canada joined Mexico as a party and the dispute panel is expected to issue a decision in September 2022.[1231] This suggests that (1) negotiated preferential rules of origin can be the subject of a trade dispute, (2) whether the rules are unduly restrictive can be under scrutiny, and (3) the technical aspects of the rules have an impact on the ability for Members to trade within the territory. Finally, a third party to a RTA may argue that the RoO of the RTA impair its ability to trade with Members of the RTA and other Members.[1232] As Annex II contains no prohibitions on the restrictiveness of the rules, the Third Party Member may claim a violation of GATT Article XXIV; however, as scholars have pointed out[1233], Members may be reluctant to do so as the Respondent-Member may counterclaim and point out the inconsistencies in the Claimant's RTAs.

A Member to an RTA may instead claim that the application of the rules by the customs offices of the Respondent-Member is inconsistent or arbitrary, thus impairing its ability to trade under the preferential rules. Article 3(c) of Annex II states that Members agree to ensure "laws, regulations, judicial decisions and administrative rules of general application relating to preferential rules of origin are published as if they were subject to, and in accordance with, the provisions of paragraph 1 of Article X of GATT 94." A Panel would first have to decide to what extent the term "as if they were subject to" requires Members to comply with Article X(1) GATT 1994, which requires that laws, regulations, judicial decisions and administrative rules of general application

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[1230] Harrup, n 393; Associated Press, n 393.
[1231] Foley & Lardner LLP, 'USMCA's Panel on Automotive Rules of Origin and What It Could Mean to Manufacturers in the Region' (jdsupra.com 9 February 2022) <https://www.jdsupra.com/legalnews/usmca-s-panel-on-automotive-rules-of-7460799/> accessed 7 May 2022.
[1232] This was the argument of the US during the GATT era. The US mission submitted a request for consultations with the European Communities and EFTA resulting from a set of trade agreements concluded between the two parties in 1972. The US argued that that the application of the preferential rules of origin in the set of trade agreements concluded between the EC and the EFTA parties would be "likely to nullify or impair benefits accruing to the United States" under the GATT. United States, 'Rules of Origin: United States-Request for Consultations under Article XXII:1' (31 January 1974) l/3992. This is the only document found via a search of the documents available online at the WTO. Another document indicates that the L/3992 series was scheduled for destruction on 20 February 1976. 'Destructions of Documents' (22 December 1975) L/4281. Documents found at <https://docs.wto.org> accessed 7 January 2022. See also, Hoekman and Inama (n 16) 2, fn 5; Hoekman and Kostecki (n 80) 487.
[1233] See Chapter 1, notes 178 - 180.

"are published promptly in such a manner as to enable governments and traders to become acquainted with them." There is no reference in the Declaration to Paragraph 3 of Article X GATT 1994, which requires the parties to "administer in a uniform, impartial and reasonable manner all its laws, regulations, decisions and rulings of the kind described in paragraph 1" of Article X. Puccio argues that the language of Article 3(c) in the Declaration specifically rereferring to the first paragraph of Article X of the GATT, 'clearly indicates that rules of origin were not included in the open list of regulations that fell under Article X of GATT and therefore excludes the application of Article X(3)(a) GATT."[1234]

Should a party try in any case to bring a claim under Article X(3)(a) regarding preferential RoO, they would face resistance from *EC-Selected Customs Matters*. In this dispute, the US challenged the European Communities' system of customs administration as a whole under Article X:3(a) and Article X:3(b). In particular, the US argued that differences in penalty provisions and audit procedures by the national custom offices was a violation of Article X:3. The AB found that "the mere existence of differences in laws themselves is not sufficient to show a breach of the uniformity requirement in Article X:3(a) with respect to the administration of European Communities customs law."[1235] To establish a claim, the US had to demonstrate that "differences in audit procedures necessarily lead to non-uniform administration of [EC] customs law in particular cases" and the US had not done so before the Panel.[1236] The AB emphasized that States can exercise discretion in administering laws without breaching the uniformity requirement of Article X:3: "Different results in the application of a law or provision do not necessarily reflect non-uniform administration of the law itself, but may stem as well from the exercise of discretion in the application of the law or circumstances of the case."[1237] Should a Member try to claim Article X:3 GATT 1994 applies to preferential RoO, and that differences in the application of RoO for 3D printed products by customs bodies of the Respondent-Member breach the uniformity requirement of Article X:3, they would have to provide ample evidence of origin determinations in particular cases that lead to a non-uniform administration of customs laws.

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[1234] Puccio (n 51) 192.
[1235] Appellate Body Report, *EC-Selected Customs Matters* (circulated 13 November 2006, adopted 11 December 2006) WT/DS315/AB/R para 216.
[1236] ibid.
[1237] ibid; Matsushita (n 22) 239;

Finally, even if a new WTO instrument for preferential Roo for advanced manufacturing includes language on reducing trade restrictiveness of the rules, it must be determined if a claim could be brought under that new Instrument. If the instrument takes the form of a Ministerial Decision, there is some possibility that a claim could be brought under it. For example, in *US-Clove Cigarettes*, the AB upheld a Panel's finding that a Doha Ministerial Decision was a subsequent agreement under the VCLT Article 31.2(a) and thus could fill gaps in the original text, in this instance the Agreement on Technical Barriers to Trade.[1238] However, whether any decisions of the CRO could be deemed a subsequent agreement could be problematic as the AB's decision in *US-Tuna II* to find a TBT Committee decision as a subsequent agreement has been controversial to some Members.[1239] If the Instrument takes the form of a plurilateral agreement, it could follow the examples of the ITA and the TFA. The ITA does not include provisions on dispute settlement, but disputes have been brought before the DSB on the basis of Articles II: 1(a) and II:1(b) and X:1 and X:2 GATT 1994.[1240] Therefore, claims arising from a plurilateral agreement on rules of origin for advanced manufactured products could be brought under the AOR Annex II. The TFA, on the other hand includes provisions in Article 20 on when Members can bring claims to the DSB. In sum, dispute settlement of preferential RoO has yet to be tested at the WTO. Given the proliferation of preferential RoO and their impact on trade, judicial guidance on designing and implementing the rules may be beneficial to the trade community, provided that a Panel or the AB can find a balance between respecting the sovereignty of the Members to design rules to achieve the objectives of the RTA and requiring that such rules contribute to an international law framework that is evenhanded and promotes trade liberalization.

### D. RoO for Advanced Manufactured Goods: An Opportunity for the WTO to Advance

While detailed technical rules may be better suited for RTAs given the specific trading environment of the parties, the WTO could use its information resources and

[1238] Appellate Body Report, *US – Measures Affecting the Production and Sale of Clove Cigarettes* (circulated 4 April 2012, adopted 24 April 2012) WT/DS406/AB/R paras 241–268; Matsushita (n 22) 56.
[1239] Appellate Body Report, *US-Measures Concerning the Importation, Marketing and Sale of Tuna and Tuna Products* (circulated 16 May 2012, adopted 13 June 2012) WT/DS381/AB/R para 372; Matsushita (n 22) 56.
[1240] Panel Report, *EC-Tariff Treatment of Certain Information Technology Products* (circulated 16 August 2010, adopted 21 September 2010) WT/DS375/R, WT/DS376/R, WT/DS377/R paras 3.1-3.5.

negotiating platforms to explore how preferential RoO cause distortive effects and prepare recommendations on rules for modern global production methods that would also require transparency in the design and implementation of the rules. Adlung and Mamdouh encourages the continued use of the WTO's "broad deliberative and exploratory function concerning all issues relating to the conduct of trade relations between Members."[1241] Although "this function has been stifled on various occasions by linking it closely with negotiating intentions and proposals…there are no suitable other settings; RTAs would never be able to fill in. Regardless of what happens in and around the [Doha Development Agenda], it is therefore essential to resuscitate and promote the WTO's role as a forum for conceptual exploration and exchange."[1242]

The WTO's role as a forum is necessary, because preferential RoO cause direct and indirect distortive effects on trade, increase costs to trade, and can be utilized to protect domestic markets. Greater WTO involvement in preferential RoO could mitigate the maladies of these rules, while bolstering the WTO's legitimacy as a forum for the regulation of international trade. The WTO must also reassure states that their sovereignty in designing rules is not at risk. However as Professor Jackson proposes, "in order for the world to cope with the challenges of instant communication" and "fast and cheap transportation," the notion of sovereignty must also be updated to something that "can be called 'sovereignty-modern.'"[1243] Further, he argues that the world still needs international institutions:

> a general perspective suggests that a key lesson of the last one hundred years is that international institutions (including judicial institutions) are critical and are here to stay. They increasingly play a larger role in world and local affairs…Clearly a fragmented nation-state sovereignty emphasis will not be able to cope with the world reality that has been imposed on this globe, nor will myopic wishfulness for hegemonic supremacy be workable.[1244]

Regarding RoO, a multilateral agreement may not be necessary: by modernizing and improving upon already existing elements of the WTO, the Members can modernize and improve upon preferential RoO as trade becomes more dependent on the production of goods with digital service inputs.

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[1241] Adlung and Mamdouh (n 1113) 111.
[1242] ibid.
[1243] Jackson (n 76) 52-53.
[1244] ibid 53.

## VI. Improving the Preferential Rules of Origin System for All States and Traders, Great and Small

While the WTO has an important role in regulating international trade, the development of the design of preferential RoO has occurred through PTA negotiations. Although preferential RoO may benefit the parties of the RTA at the exclusion of other states, recent activity in the area of preferential RoO suggests that states can collaborate in identifying how preferential RoO can be improved. As discussed above, the Bali and Nairobi Ministerial Decisions are examples of such cooperation. Outside of the WTO context, the revisions to the PEM agreement also represent a mega-regional effort to redesign RoO to make them easier to administer and to comply with. Further, the addition of the additive manufacturing machine product line to the HS Nomenclature also suggests that states are also willing to consider updating trade instruments to reflect new products and changes in manufacturing. While RTAs have costs for traders and entangle the spaghetti bowl further, there are some benefits to regulating trade in a PTA.[1245] These include what Boonekamp refers to as "learning by doing": "When first setting out to enter into the trading system, a country's traders need to learn how to do so, and this is perhaps done by encouraging contracts with those with a similar culture, language, and so on."[1246] Hoekman points out that "RTAs may encompass innovative approaches to attenuate the market-segmenting effects of regulatory policies that other countries might usefully emulate."[1247] In the area of digital trade, Schaffer notes that PTAs respond to the WTO negotiations' failure to "fill key regulatory gaps for digital trade" and that PTAs allow states to "instill their priorities and values into standards for the digital economy."[1248] Given a few signs of international cooperation in terms of preferential RoO and the benefits of PTAs, how could the international trade community as a collection of sovereign states work together to design or apply rules to advanced manufactured products, such as 3D printed goods?

A first step is to investigate trade and technology to minimize any lobbyist pressures on the designers of the rules. US and the EU political bodies aim to boost domestic manufacturing with 3D printing. However, those in the additive manufacturing community in the US point to tariffs on raw materials as limiting their ability to produce

[1245] Boonekamp (n 1079) 203-206.
[1246] ibid 204.
[1247] Hoekman, 'Urgent and Important' (n 1096) 386.
[1248] Shaffer, 'Trade Law in a Data-Driven Economy (n 477) 268.

goods in the US.[1249] Researchers in the EU point to the need to train workers in the technical and digital skills required to design files and operate the printers.[1250] Before sitting down to the negotiating table, states should understand first how 3D printing and advanced manufacturing production actually function and whether support for domestic printers and designers can be achieved through other measures, such as lowering existing tariffs or labor or educational measures separate from any RoO provisions. Flexibilities in the rules should be considered so that they can adapt as manufacturing processes and technology change.

However, this approach also means increasing the transparency of the negotiation process. As Maria Laura Marceddu notes, the traditional confidential, closed door negotiations are coming under scrutiny by the public.[1251] In her research, she finds a gradual shift in the US, EU, Canada, Australia, New Zealand, Mexico and Malaysia towards increasing transparency of FTA negotiations. However, she points out that, with the exception of the EU, these nations make texts available after an agreement is reached.[1252] While public consultations during negotiations can increase the legitimacy of the FTA negotiations, she argues:

> it is difficult to know exactly what inputs are considered, and to what extent, in the deciding on the direction of the trade and investment agenda. This, in turn, raises questions about which kind of stakeholders are better placed to influence the negotiations outputs and, in broader terms, questions on how [to] effectively and meaningfully engage non-state actors in highly technical negotiations.[1253]

With regards to negotiations on the technical rules, it is important for there to be objective and neutral assessments of advanced manufacturing in the territory of the RTA and its potential growth, which can serve as counterpoints to proposals from industry lobbysists. Drafts of the rules should be made available at the very least to custom officials and those who administer the rules. Finally, ideally, negotiators should provide an explanation on how they applied the inputs to arrive to an *ad valorem* formula or a particular product-specific rule. This may help reduce the risk of the

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[1249] David Shepardson, 'U.S. coronavirus tariff exemptions sought for robots, drones, elevators' (*Reuters* 4 May 2020) <https://jp.reuters.com/article/us-health-coronavirus-usa-china-idUKKBN22G2VK> accessed 1 November 2021; Michael Cao, 'Trade Wars and Tariffs – a 3D Printing Perspective' (*IC 3D Industries* 13 February 2020) <https://www.ic3dprinters.com/trade-wars-and-tariffs-a-3d-printing-perspective/> accessed 1 November 2021.
[1250] Eur Economic & Social Committee, 'Living tomorrow. 3D printing — a tool to empower the European economy' (n 742) para 3.4.
[1251] Maria Laura Marceddu, 'Implementing Transparency and Public Participation in FTA Negotiations: Are the Times a-Changin'? (2018) 21 J Intl Economic L 681, 682.
[1252] ibid 699.
[1253] ibid 700.

substantial criteria and product-specific rules being unduly restrictive to support a particular industry in one of the states.

It is recommendable to consider aspects of the rules where an internationally shared approach would facilitate trade. One such area are definitions of terms such as simple assembly or simple processing. Given the changes that advanced manufacturing may bring to production, such terms may cause confusion. The US-Japan FTA defines the assembly of 5 or less parts of non-originating material to be simple assembly.[1254] Advanced manufacturing promises to reduce the number of parts required for assembly. Thus, negotiators should consider whether rules that impose a floor on the number of parts to be assembled are functional rules in the digital production and trade environment. A product may consist of only 5 3D printed parts, but that does not necessarily indicate that producing it and assembling those pieces was a simple task. Some of the manual processes which may have been "simple" in traditional manufacturing sectors, such as polishing, require training and skilled handling in advanced manufacturing sectors. Rule designers should find a balance between a one-size-fits all definition for terms such as "simple assembly" and distinct definitions for each type of manufacturing process. If technology advances, but the terms and definitions continue to reflect older manufacturing techniques, the rules could leave more and more space to the interpretation of customs offices.

Thinking about rules for advanced manufactured products also presents an opportunity to reconsider restrictive direct transport rules which can impact utilization rates and form an obstacle to trade.[1255] Initially, 3D printing may allow traders to minimize the impact of direct transport requirements by reducing transport of inputs through printing them in the territory of interest. However, as 3D printing advances, manufacturers of inputs may want to export them, and thus face complicated direct transport documentation.[1256] Revisions to the PEM include moving from the direct transport rule to a "more lenient rule of non-alteration" which allows for splitting of consignments in a third country under supervision of a customs official and where there is no doubt of the originating status of the goods.[1257] Thus, states should consult with each other, the WCO, universities, and technology companies to understand how

[1254] U.S.-Japan Trade Agreement, Annex II Tariffs and Tariff-Related Provisions of the US, Product-Specific Rules of Origin art 19 (d).
[1255] Soprano (n 329) 104; Crivelli, Inama and Kasteng (n 456) 12-13, 15.
[1256] Paul Brenton (n 33) 172.
[1257] Commission, 'Guidance: Transitional PEM Rules of Origin' (n 332) 19.

goods are made and how to craft language in the rules that facilitates trade and efficient determinations of origin.

Next, states should consider how the value of the 3D file or any significant digital file used to manufacture a good should be included in the origin analysis. This is a discussion that touches upon other areas of the law, such as intellectual property rights, corporate law and tax law. These are also areas of the law that are territorial, despite some efforts at establishing international baselines, such as TRIPS, the EU IP Enforcement Directive, the UN Convention on Contracts for the International Sale of Goods, and the recent deal on a minimum global tax. However, states still retain a significant level of sovereignty in deciding how to regulate trade in intellectual property rights, whether a business has substantive business operations in the territory, and how to tax income. Declaring that a 3D file originates in Country X on the basis that the owner has SBOs in X may subject that file to the intellectual property laws of Country X. By declaring that the owner is a legal person located in Country X, the owner is subjecting itself to corporation laws in X, and may be liable for taxes in X. Thus, if states want to include the digital file as an origin conferring input in an RTA they should consider how assigning origin to a digital file may lead to obligations and rights arising under other areas of national or territorial laws.

Having conducted research, parties negotiating a PTA should consider the content of the rules in connection with their distinct commercial policy objectives and shared objectives for trade between the parties. Simplification of the rules means clarity in the substantial transformation criteria as product specific rules. These rules may differ because of different objectives and production capabilities of the parties.[1258] As Dr. Anna Jerzewska, a trade consultant, explained to me, traders would like instructions in "plain English" that clearly explain formulas and expressions such as MaxNOM 50% (EXW).[1259] As Jitsuya suggests, a more standardized method of expression would benefit traders.[1260] The changes to certification procedures and cumulation requirements in the PEM revisions suggests that States can recognize the need to clarify and update the content and the expression of the rules to make them functionable rules. As the TCA reached its first year, traders are reported serious hold

[1258] Jitsuya (n 324) 549.
[1259] Interview with Dr. Anna Jerzewska (Milan/Geneva, 22 September 2021). Dr. Jerzewska's website: <https://www.tradeandborders.com> accessed 3 November 2021.
[1260] Jitsuya (n 324) 562-564.

ups in customs due to confusion over the acceptability of paperwork and even contemplated forgoing trade with the EU, because of the costs to understand the rules and comply with them.[1261] Further, if States do not want to include digital design files, R&D, or engineering activity as independent origin conferring inputs, it would be beneficial for states to design rules to clearly specify how such activity can be included in direct costs for the *ad valorem* criterion. While preferential RoO in different RTAs may continue to be distinct due to the different commercial policy goals of states, it may benefit trade for all if there is a more systematic and simplified expression of the rules. This would enable states to retain sovereignty in determining how restrictive the rules should be, while also allowing domestic businesses to benefit from trade under such rules and improve efficiency in manufacturing.

One objective that states can seek to achieve collectively is reducing the restrictiveness of the preferential RoO. As noted by Inama, "[i]n assessing the good and the bad of rules of origin, there are two basic parameters that may be used": the index of restrictiveness and the index of technical soundness.[1262] Restrictiveness is "related to the degree of stringency or leniency of a given rule of origin with respect to the industrial capacity and trade flows of the parties" to a PTA or GSP, and it must be assessed taking into account the "industrial capacity, trade flows, and trade policy objectives" of the parties.[1263] Given the differences in the industrial capacities, trade flows, and trade policy objectives of states, rules on reducing restrictiveness would differ in each instrument. A type of restrictiveness that states could agree to reduce, and which would have an impact on GVCs and advanced manufactured parts in those chains, is reducing the degree of the "effective" restrictiveness of rules. Estevadeordal, Suominen, and Harris point out that a restrictiveness of a rule derives not just from the wording of the text, but to the extent that it limits input and geographical pools for the parties of a PTA.[1264] A rule requiring that a 3D printed good or a good made with 3D printed parts contain a certain percentage of local content does not impact each producer equally: a producer in a large economy with diversified industries may have less difficulty and costs in meeting that requirement than a producer in a small economy

[1261] Jason Douglas, 'Is Brexit Hurting the U.K. Economy? Trade Data Flash a Warning' *The Wall Street Journal* (19 October 2021) < https://www.wsj.com/articles/is-brexit-hurting-the-u-k-economy-trade-export-import-european-union-england-11634651205> accessed 1 November 2021.
[1262] Inama, *Rules of Origin in International Trade* (n 20) 487.
[1263] ibid.
[1264] Estevadeordal, Suominen and Harris (n 483) 30-32.

with a narrow industrial sector, and who may be constrained to pay a high cost for domestic inputs from a firm with a monopoly on the parts or is inefficient in production methods. Thus, states should avoid designing a new agreement promising to reduce costs and complexity and to promote technological advancement, only which, due to its effective restrictiveness, locks producers into using traditional production methods or source products from dominant and protectionist industries.

The "index of technical soundness," according to Inama, "is determined against the accuracy and predictability of given rules of origin in providing an origin outcome in the simplest and most predictable manner and its ease in administrating it."[1265] He references the HS and the CVA as "useful instruments in drawing the boundaries of the degree of technical soundness."[1266] RoO for advanced manufactured goods should be simple, predictable, and easy to administer. States should avoid designing procedural rules that effectively make it too complicated to seek preferential tariff treatment for advanced manufactured parts or final goods. This will require investigation into the industrial capacities of the parties to a PTA, the technical and administrative capacities of the custom offices, and the development of advanced manufacturing production to understand how the goods are made, where value is created, and where application of the current rules could result in inconsistent origin determinations.

States should also resist increasing the size of RoO chapters without including helpful detailed definitions and lists of what elements can be included in the substantial transformation tests. In 2005, William E James wrote that the New Zealand-Singapore Closer Economic Partnership (CEP), which entered into force in 2001[1267]:

> is a model of apparent simplicity in its rules of origin. Instead of hundreds of pages of detailed product specific rules, the agreement adopts the principle of goods wholly obtained in either country as sufficient to confer origin in the case of primary, unprocessed goods and scrap. For goods processed or manufactured in either country it uses a minimum value-added test of forty percent.[1268]

[1265] Inama, *Rules of Origin in International Trade* (n 20) 487.
[1266] ibid.
[1267] New Zealand Ministry of Foreign Affairs & Trade, 'CEP Text' (mfat.govt.nz) <https://www.mfat.govt.nz/br/trade/free-trade-agreements/free-trade-agreements-in-force/nz-singapore-closer-economic-partnership/cep-text/> accessed 2 November 2021.
[1268] James (n 99) 285.

These rules are found in article that consists of 5 subparts and is about 2 pages long.[1269] The CEP agreement 2000 includes an 7 page "explanatory" Annex which helpfully provides details on what types of expenditure can be included in labor costs and overhead.[1270] Fast forward 16 years later, and the preferential RoO were revised as part of the CEP Upgrade, which entered into force on 1 January 2020.[1271] There is now a chapter for preferential RoO. Included are build-up and build-down formulas making the chapter similar in structure to those in USMCA and ASEAN. Gone are the detailed lists of what expenditures can be included in labor and overhead. Added is Annex 3.1 with 324 pages of product specific rules. The New Zealand Ministry of Foreign Affairs and Trade in its "National Interest Analysis" of the upgrade proposes that changes to its "wholly produced or obtained" section aim "to reflect international best practice."[1272] A requirement that the last process of manufacture occur in the territory was added to the 40% threshold. These "innovative dimensions of the ROO":

> recognize that in the face of increasing competitive pressures, manufacturers today are seeking to specialize as much as possible, draw on input materials from the most cost effective sources and locate aspects of their business in different places. These features often make it difficult for exports to qualify under traditional ROO.[1273]

It will be interesting to monitor the results of this change in the rules and to compare whether utilization rates of the preferential rules increase. One recommendable aspect is to preserve the "explanatory annex" in future agreements, as understanding what falls under labor costs, such as training, and under overhead, such as "research, development, design, and engineering" could be useful for determining the origin of advanced manufactured products under an *ad valorem* method.

Finally, states should provide assistance to traders as well as collaborate with organizations such as the WCO and ICC. According to Dr. Jerzewska, traders appreciate guidelines from domestic customs offices, both in terms of the substantive rules and the procedural rules. Some customs and trade agencies, like those of the

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[1269] CEP agreement 2000 art 5.
[1270] ibid annex 1.
[1271] Agreement between New Zealand and Singapore on Closer Economic Partnership - Upgrade (entered into force 1 January 2020); New Zealand Ministry of Foreign Affairs & Trade, 'CEP Overview' (mfat.govt.nz) < https://www.mfat.govt.nz/br/trade/free-trade-agreements/free-trade-agreements-in-force/nz-singapore-closer-economic-partnership/cep-overview/#bookmark0> accessed 2 November 2021.
[1272] New Zealand Ministry of Foreign Affairs & Trade, 'National Interest Analysis' (mfat.govt.nz) <https://www.mfat.govt.nz/assets/Trade-agreements/Singapore-NZ-CEP/National-Interest-Analysis.pdf> accessed 2 November 2021.
[1273] ibid.

US and EU, provide information. The US published the U.S. Customs and Border Protection Valuation Encyclopedia (1980 – 2015), a compendium of interpretations and guidance on several key issues in customs valuation, such as whether a particular design service is an "assist" and if the costs of such a service should be included in the value of the final product.[1274] While this information may allow traders to understand how to find the value of a product, there are still other aspects of origin determination that must be considered, such as tracing requirements, certification requirements, and understanding whether a CTH occurred. For example, the US offers a publication titled, "What Every Member of the Trade Community Should Know About: U.S. Rules of Origin." It was published in 2004 and has not been updated.[1275] Neither the CBP's website nor the International Trade Administration's website[1276] includes information about RoO on the homescreen, instead a search in the search function is necessary. The EU's welcome page to its Access2Markets database does reference rules of origin, but does not provide a hyperlink to another page with more information.[1277] However, once you go to the "My Trade Assistant"[1278] and then click on the compass icon for Rules of Origin, you are directed to page on rules of origin with hyperlinks to more materials and tools.[1279] Dr. Jerzewska further finds that traders appreciate clear and simple instructions that are up-to-date with trading practices. If states are unable to agree to new definitions to terms or changes to product specific rules for advanced manufactured products in a new RoO instrument or RTA chapter, then they should at least update the materials on trade offices websites to provide an indication of whether 3D printing is sufficient processing or whether training to operate a 3D printing machine can be included in labor costs under the *ad valorem* method.

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[1274] CBP, *U.S. Customs and Border Protection Valuation Encyclopedia (1980 – 2015)*, (first Issued 1990, revised 26 May 2016) EO13891-OT-029 pp 32-42 <https://www.cbp.gov/document/publications/customs-valuation-encyclopedia-1980-2015> accessed 2 November 2021.

[1275] CBP, 'Rules of Origin' (1 May 2004) EO13891-OT-122 <https://www.cbp.gov/document/publications/rules-origin> accessed 2 November 2021.

[1276] USITA, homepage (trade.gov) < https://www.trade.gov> accessed 2 November 2021.

[1277] Commission, 'Welcome to Access2Markets to Market Access Database Users' (trade.ec.europea.edu) <https://trade.ec.europa.eu/access-to-markets/en/content/welcome-access2markets-market-access-database-users> accessed 2 November 2021.

[1278] Commission, 'My Trade Assistant' (trade.ec.europa.eu) <https://trade.ec.europa.eu/access-to-markets/en/home> accessed 2 November 2021.

[1279] Commission, 'Rules of origin in Access2Markets' (trade.ec.europa.edu) < https://trade.ec.europa.eu/access-to-markets/en/content/rules-origin-access2markets> accessed 2 November 2021.

Some states may not have the financial or organizational resources to create and update guidelines, and this is where the WTO's technical assistance could play a significant role in improving the preferential RoO system for the benefit of all Members. States should devote resources to training customs officials and participants in international trade. While referencing the Latin American countries, it is possible to apply Estevadeordal and Suominen's words to all countries: "training for exporters and customs about the technical requirements and implementation of rules of origin…would help shorten the learning lags associated with rules of origin [and] reduce the administrative hurdles facing both exporters and customs."[1280] Additionally, many states are also members of the WCO. This organization specializes in understanding how products are produced and traded and it shares this knowledge. For example, on 21 February 2022, the WCO held a workshop for delegates from the African Continental Free Trade Area on drafting rules of origin handbooks.[1281]

The WCO Tools website includes a data base on agreements with rules of origin, the HS nomenclature search function, and tools to determine customs values for a product.[1282] Further, the WCO dispute settlement system and letters of advice can provide useful interpretations of the HS nomenclature, though non-binding.[1283] WCO also publishes resolutions on trade topics, such as the role of customs in facilitating trade in medicines and vaccines in response to the COVID-19 pandemic.[1284] States can seek consultations on whether a good should be classified under one heading or another or advice on how to address a particular trade topic, such as 3D printed goods, but are not obligated to make changes to their RoO or customs procedures. By collaborating with the WCO, states may be able to give its domestic producers, importers, and exporters clearer instructions on how to participate in international trade. In the end, the most powerful tool that the international trading

[1280] Estevadeordal and Suominen (n 270) 90.
[1281] WCO, 'WCO Shares Good Practices for Drafting a Rules of Origin Tool with the AfCFTA' (wcoomd.org 24 February 2022) < http://www.wcoomd.org/en/media/newsroom/2022/february/wco-shares-good-practices-for-drafting-a-rules-of-origin-tool-with-the-afcfta.aspx> accessed 7 May 2022.
[1282] 'Welcome to WCO Trade Tools' (wcodtradetools.org) <https://www.wcotradetools.org/en> accessed 2 November 2021.
[1283] Foltea (n 220) 235, 241-242.
[1284] WCO, 'Resolution of the Customs Co-Operation Council on the Role of Customs in Facilitating the Cross-Border Movement of Situationally Critical Medicines and Vaccines' (December 2020) <http://www.wcoomd.org/-/media/wco/public/global/pdf/about-us/legal-instruments/resolutions/resolution-facilitating-cross-border-movement-of-situationally-critical-medicines-and-vaccines.pdf?la=en> accessed 2 November 2021. See also, WCO, 'Resolutions' (*wcoomd.org*) < http://www.wcoomd.org/en/about-us/legal-instruments/resolutions.aspx> accessed 2 November 2021.

system can provide to “lift all boats” is clear and easily accessible information on how to comply with rules of origin procedures.

## VII. Conclusion

The history of the GATT and WTO negotiations demonstrates that states were reluctant to concede sovereignty in terms of preferential RoO, and they may continue to have this perspective even though changes to how goods are produced may require a reconsideration of the content of the rules at a multilateral level. However, the underutilization rates identified by economists and trade scholars, the recognition by the PEM members of the need to simplify and change certificate of origin procedures, and the general challenges faced by traders demonstrates that states should consider collectively how the rules are crafted. The perspective of the WTO’s role in regulating preferential RoO and states’ sovereignty over these rules needs to become pliant for the international trade system to modernize with changes in manufacturing and trade.

Preferential RoO must discriminate, as that is their purpose, but policymakers in their zeal for promoting commercial policy objectives should take a moment to examine the comprehensibility of the rules implemented to support such objectives. This is a language that must be “spoken” and “understood” by all participants in the trading system. The changes to production created by changes in technology provides an opportunity for states to update rules and to provide guidelines on how to apply rules in existing agreements to new types of goods and production methods. Even if 3D printing reshores some manufacturing job and produces goods for the domestic market, 3D printed parts may still be part of a GVC chain. Production chains and manufacturing locations are elements of a strategic business plan connected to suppliers, logistics companies, and producers.[1285] As Paul Brenton notes, “[r]ules of origin may be an important factor in determining the investment decisions of multilateral firms” and “if the nature and application of a given set of rules of origin increase the uncertainty concerning the extent to which preferential access will actually be provided, the level of investment will be less than if such uncertainty were reduced.”[1286] If a manufacturer will have to pay high costs to import ink to print in a domestic shop because they cannot understand how to comply with the rules they may question

[1285] Interview with Dr. Anna Jerzewska (n 1259).
[1286] Brenton (n 33) 172.

relocating from a territory where it is cheaper to import raw materials and invest in the domestic 3D shop, despite the encouragement of the state to reshore manufacturing jobs. A state may be protective of its freedom from international oversight to negotiate and design rules for trade agreements, but restrictive rules to promote one set of “deep” objectives may impair its ability to achieve other “deep” objectives, such as training a new digitally-skilled workforce.  Thus, a little dose of international cooperation among states and cooperation of states with international organizations may go a long way in making the trading system more beneficial for all producers, importers, and exporters, great and small, and in domestic and foreign markets.

## Conclusion
## A New Horizon for Preferential Rules of Origin

The study of preferential rules of origin provides an opportunity to examine both the development of a particular type of trade law in trade instruments and how the international trade law framework is, or should, develop in a trade environment increasingly linked to digital technology. First, RoO show an interesting tug-of-war between efforts to make them more complex by the addition of "deep" trade provisions (such as the USMCA) and between efforts to simplify them and make them more trader-friendly (the PEM revisions). Next, as Duy and Geraets, Carroll, and Willems have suggested, RoO can be situated within the debate on whether goods and services trade measures should be merged rather than having trade in goods and services be regulated by different legal instruments (GATT 1994 and GATS). In this dissertation, the link between trade law and trade in the digital era is 3D printing, which may bring changes to both how goods are produced and what type of goods are traded internationally. Further, 3D printing can bring into the discussion questions on how a new digital-focused trade framework can sustain (or improve) goals to make global trade more equitable and to make international trade organizations more responsive to changes in trade.

This dissertation proposes that trade law should not be fixed intractably to one point while trade practices advance. This is not necessarily a call for a general evolutionary interpretation of trade law, but rather a proposal to think about how trade law could be pliant, allowing for a symbiosis between the advancement of trade and the application of trade measures to these changing trade practices. This means designing rules that recognize that technology changes often more rapidly than trade negotiators can design rules. It also requires, however, rule designers to know how to construct a legal core – a principle or objective – that remains firm so that there is legal predictability and consistency as trade develops. While preferential RoO would benefit from some flexibility, this dissertation also cautions against making them too malleable – formed for the purpose of protectionist or trade distortive goals. 3D printing was chosen as a technology, because it is not yet widespread although in use, and so we can still apply the exercise of "what if" without venturing too far off into the hypothetical. What if we have to apply RoO to 3D printed goods consistently? This dissertation's

main findings are first, if there is not some pliancy worked into preferential RoO in connection with advanced manufactured products (such as a 3D printed good), application of preferential RoO may not function in achieving the intended goals of the parties to the trade instruments: the design of the rules could inaccurately designate origin, they could be too permissive and let in third party goods or they could be too restrictive and keep out goods produced in the territory. Second, the susceptibility of preferential RoO for advanced manufactured goods to protectionist goals demonstrates that there is a need for a united effort, whether at the multilateral level or plurilateral level, to find a balance between achieving trade and commercial policy goals and crafting and sustaining a trade framework that supports producers, traders, and consumers across the globe.

The possibility for states to design or redesign preferential RoO to meet changes in the production and distribution of goods results in part from RoO's rather unique place in international trade law, which the first two Chapters presented. In the first Chapter, the Common Declaration with Regard to Preferential Rules of Origin was introduced, an Annex to the Agreement on Rules of Origin. This Declaration, on the one hand, places preferential RoO at least in the ambit of the WTO as an organization that focuses on the study and advancement of global trade. Whether any of the Members can bring legal claims under the Declaration that another Member's preferential RoO impair rights or violate obligations is still an open question. The Declaration does not oblige Members to ensure that their rules are not trade restrictive, only that the requirements are clearly defined and some reporting requirements to the Secretariat are met. Questions about the legality of preferential RoO under WTO law aside, the history of the design and application of these rules suggests that Members have received wide latitude in sovereignty in designing these rules with some parameters by the World Customs Organization and the HS Nomenclature. The variety in the design of the rules is seen in Chapter 2. This Chapter presented a brief introduction to the more technical aspects of RoO as well as the administration of these rules in customs offices. However, the main takeaways are (1) that among PTAs there are variations and variations of the wholly produced and substantial transformation criteria for determining the origin of a good, and (2) that these rules evolve from one trade instrument to another. This suggests it could be possible for states, whether in groups of two or three, as a region, or in a plurilateral setting, to at least think about and start upon the design of rules focused on advanced manufactured goods.

In Chapter 3, we identified where the design of RoO drifts away from the objectives of a legal framework that supports predictable and efficient regulation of trade, and then began to explore how we could redirect the design of such rules into a framework for digital trade. Issues with transparency and lobbying in the negotiations of the rules can be compounded by the complexity in the wording of the rules. As a result, traders and trade policy specialists can struggle to understand the legal obligations established by the rules and how to identify the origin of a product. An important observation was made in this chapter: the restrictiveness that appears from reading the legal text in the instrument can be different from the restrictiveness that producers experience when trying to understand and meet the rules. This "effective" restrictiveness becomes apparent when studying the implications of the insertion of "deeper" trade provisions within RoO chapters. While the inclusion of rules aimed to increase the quality of labor wages or environmental standards shows the ability of states to experiment and develop new rules (and a perhaps genuine interest in improving the quality of life of producers and consumers), such provisions could reduce the options for producers of sources of input or act as a disincentive for the adoption of new and more efficient methods of production.

This tension between qualifying for origin based on *ad valorem* methods that favor labor value and the desire to innovate with less-labor intensive production methods leads us again to 3D printing, as it promises to reduce assembly of parts and the machine does much of the fabrication of the parts. Yet, from a legal perspective it brings us towards the exploration of how we should transpose trade rules established within an era of traditional manufacturing into a digital trade framework. In the context of RoO, this could mean reframing how the rules designate inputs that contribute origin conferring value or processing. As Neeraj and Duy point out, regarding 3D printed goods, we must consider whether the 3D file could be a component of the product along with any tangible inputs. This brought us away from RoO for a moment as we had to discuss another area of trade law that is influenced by advances in the technological production of goods: classification of products under GATS and GATT, in other words, is the product a service or a good? While hybridization of goods and services measures is an ongoing debate, this dissertation looked to the GATS, scholarship, and provisions in trade instruments to identify the 3D file as a service.

The goal of the fourth Chapter was to identify where a RoO determination for goods based on traditional manufacturing processes is out of synch with additive

manufacturing and to consider whether service inputs, such as design and development, should be origin conferring inputs of a final tangible good. The wholly produced criterion and the three substantial transformation criteria were explored in the following contexts: (1) the specific technology of printing a good, and (2) the 3D file. The first approach required understanding what makes 3D printing different from traditional manufacturing. We found that there could be the potential for a shift in legal outcome when the substantial transformation criteria are applied to 3D printed goods. The CTH criterion could be too permissive, as all 3D printed goods must undergo a tariff line change, while current language in agreements on assembly and substantial processing may or may not exclude assembly or post-processing of 3D printed goods from substantial processing (and thus origin conferring) status. Under the *ad valorem* criterion, origin could shift from being based on where the most labor value is created to where the ink comes from. Next, the 3D file was considered in the origin analysis, given the proposals by Duy and Geraets, Carroll, and Willems that service and design inputs should be incorporated into the origin determination of a tangible good. We found that most likely it would be possible to incorporate the 3D file as an input using an *ad valorem* method, but complications arose as to where to designate the origin of the file. The economic origin of a file could be difficult to identify given the global design chain of digital files, while designating origin based on the legal seat of the supplier could fail to identify where most of the work was done of the file. This means a making a potential choice, have a combined goods-service RoO based entirely on economic origin (but with potentially significant tracing requirements) or a goods/economic - services/legal supplier RoO that combines two approaches to identifying origin, but that may be more feasible as long as it is possible to identify the legal seat of the supplier of the file. Yet, the addition of the file as an input in origin determination could potentially open the door to strategic design of RoO: states with strong service sectors may try to "claim" origin of the good based on the 3D file if it benefits their domestic industries to have such origin; likewise, states that want to promote manufacturing may try to "obtain" origin on the basis that printing in the territory qualifies a good for origin. This presents a new risk to the use of RoO as a tool to achieve protectionist or trade distortive goals even within a new digital-based trade framework.

The final Chapter of this dissertation explored how to find a place for preferential RoO for advanced manufactured products in the current and developing trade law framework and how states can work together to design rules that both support the

general goal of giving preferential tariff treatment to goods produced within the territory without impairing trade with third parties. The idea of a WTO Instrument on Preferential RoO was suggested to achieve this goal at a plurilateral level. The first part focused on the importance of identifying the core principles of preferential RoO for advanced manufactured products, like 3D printed goods. This means understanding how these rules could be connected to an e-commerce WTO instrument or e-commerce provisions, but not making the rules dependent on them. Issues of connecting RoO with "deep" regulatory-based trade provisions was also discussed. Next, Members should use the design process to simplify rules on verifying origin. Thus, Members can bring with them the history of preferential RoO for traditional manufactured products, but should craft a set of rules with a central purpose of sorting out which advanced manufactured goods receive preferential tariff treatment, even if digital trade laws are created or modified, while having the flexibility to respond to changes in technological production. Finally, Members should make complying with the rules as streamlined as possible and responsive to the socio-economic position of traders.

Next, the second part of this Chapter looked at how to achieve such a shift in the approach to designing preferential RoO that are functional yet trader-friendly. First, we experimented with how to achieve a WTO Instrument at a plurilateral level, referencing plurilateral agreements like the ITA and TFA, as well as the Ministerial Decisions on non-reciprocal preferential RoO for LDC. This led us to find that a WTO Instrument would likely need to focus on a narrow range of goods in order to avoid hold-up issues from Members that have sensitive industries, such as the automobile and textile industries. Further, we found that the Instrument would likely need to give Members sovereignty in the design of the rules. And so, we could question to what extent the Instrument could include provisions that curtail the use of preferential RoO for protectionist purposes or that result in trade distortion. Next, we looked at how the WTO can provide a forum for the exploration of such rules, allowing Members to design and implement such rules in the context of PTAs. This in turn, could help the WTO strengthen its position as a resource of trade expertise and as a platform for negotiations, although it is still questionable as to how the WTO's judicial bodies would review new RoO under the Declaration. Finally, the dissertation proposes that during negotiations for PTAs states should not only discuss the rules among diplomats, but open the process to trade specialists, industries (with limitations on lobbying), customs officials, and technology researchers. In a single world, the main finding of this second

part of the chapter is “collaboration.” Allowing those impacted by origin determination participate in the design of the rules could not only make the rules more transparent, but it could also strengthen the legal “core” because the designers would be able to better understand how to make the rules more predictable and equitable for traders.

The main findings of this dissertation lead into the discussion of “what is the purpose of trade law today” that Shaffer, Hoekman and Nelson, and Grant Cohen participate in, along with other trade analysists. Digital-based production is being adopted by states at various levels of development. The geo-political approach to regulating trade has followed a trajectory from multilateralism towards mega-regional, regional, and bilateral agreements. 3D printing and preferential RoO are two particular examples, one of changes in production, the other in changes to legal provisions on trade. Yet, studying these two examples shows us how, at a more general level, those the trade law community must adopt or continue to maintain an awareness of how the technological actuality of production must be taken into consideration when creating a digital-based framework for trade. We have seen with 3D printing that this means finding a balance: rules must allow for innovation, but still set some parameters to achieve the intended trade policy purpose behind the rules; there must be worked into the rules some method for updating or revising the rules without having to completely start from scratch as technology changes. Next, we must think of whether trade law could have a greater purpose in the era of digital trade. How can we devise laws and provisions that both achieve trade policy goals, support innovation, and foster a predictable and equitable trade environment for all. The adoption of 3D printing in developing countries could bring progress in manufacturing and acquisition of digital skills, and the adoption of 3D printing in developed countries could also provide jobs for those coming from traditional manufacturing. Yet the strategic design of preferential RoO could diminish such benefits if states use the rules to protect or boost domestic goods or services industries. 3D printing and preferential RoO is an example of how trade analysists and trade law experts should consider how rules addressed to regulate particular technologies can impact traders differently based on the level of economic or technical development of a country or region.

Under these considerations regarding the design of laws and the purpose of trade today, I propose the following regarding a preferential RoO regime for advanced manufactured products. First, I recommend that those interested in incorporating the service input into the origin analysis trace out scenarios that focus on how these rules

would be applied by those trading in such goods. This requires a collaboration with trade customs official, industry participants, and economists. If we design an *ad valorem* rule that allows for the 3D file as a distinct input, which could result in the good originating from the territory of the file, how does a trader figure out how to comply with the rule and what is the impact on trade in that particular good? Do these results lead to a more transparent, predictable, and equitable trading system? Next, given the complications already arising from GVCs towards origin analysis for goods, designers test may want to test out the new rules, while maintaining any necessary confidentiality. Do the intended users of the rules understand them? How can the rules be clear and functional at the same time? Finally, while I understand the great interest in and the potential benefits of a RoO regime that combines origin of a digital file with the origin of a tangible good, perhaps if such a combined regime is a long-term goal, trade negotiators, trade offices, and customs officials could recognize ways to incorporate the value of design work into the substantial transformation criteria that are already existing. This could be definitions in the texts that clearly specify that design work value can be incorporated into direct overhead costs. Or, rules could allow a certain percentage of design work in the territory to offset percentages of non-originating materials, so as to allow the value of design work to have more relevance in determining origin (although documentation showing that the design work was in the territory would be needed). Perhaps it would be possible consider the upload of a digital file as a step in the assembly of a product, so that printing a good has more potential to qualify as substantial processing under the CTH and processing operations criteria. Any new rules should be designed with the aim to simplify the process of qualifying a good for preferential origin status.

Finally, this dissertation proposes a few suggestions for further research. Additive manufacturing is a technology which has the potential to compliment traditional manufacturing as well as become the primary source of manufacturing for certain products in the medical, automotive, and aerospace fields. Early in the COVID-19 pandemic, we witnessed innovative uses of 3D printing to produce personal protective gear and valves for ventilators.[1287] The shocks to GVCs resulting from the closures of factories and backlogs at ports due to quarantine measures brought to attention the need to consider producing inputs "closer to home," and 3D printing is

[1287] Yu Ying Clarrisa Choong and others, 'The Global Rise of 3D Printing During the COVID-19 Pandemic' (2020) 5 Nature Rev Materials 637, 638.

one way to shorten GVCs.[1288] However, 3D printing is still subject to some of the trade concerns that beset traditionally manufactured parts, such as tariffs on primary materials. Once the origin of a 3D printed good is established, the next analysis WTO and trade scholars may wish to consider is whether imported 3D products are discriminated against domestic products under measures that potentially violate Article I (MFN) or Article III (National Treatment) of GATT 1994. This would set off a very interesting exploration into whether 3D printed goods are "like" traditionally manufactured goods.

Next, this dissertation proposes that legal trade scholars and trade analysts become familiar with rules of origin. In some ways, they are the "bread and butter" of international trade: these rules are applied daily by customs offices throughout the world, and they impact whether traders decide to move goods across borders. Rules of origin are also important for aspects of trade not directly related to customs administrative procedures. For example, in an article published in 2021, Alessandro Antimiani and Lucian Cernat proposed a "GVC for LDCs", in which inputs produced in LDCs would remain duty-free across the entire supply chain of a final product.[1289] However, the authors note, "[r]ules of origin would be a critical element in the success of this proposal, and hence sufficient consideration needs to be given to the specific mechanisms and procedures that would govern such a scheme."[1290] While the authors suggest that rules of origin "do not pose an insurmountable problem" given evidence of LDC preferential schemes, they did not include a rules of origin analysis to the model presented in the article. Such an analysis of the procedural aspects of rules "could be an additional improvement in the model to better capture the potential impact of this trade policy proposal."[1291] Likewise, another such proposal for improving the conditions of trade for LDCs or MSMEs may require an understanding of how to identify the origin of goods produced in such territories or by such firms. Finally, rules of origin continue to be dynamic elements of trade and they make "mainstream" news. The rules for RVC in automotive products under the USMCA are being contested by Mexico and Canada, and this dispute was reported by the Associated Press and *The Wall Street Journal*,

[1288] Rohit Jhamb, '3D Printing Sentiment Index: When the Going Gets Tough, the Tough Get Creative' (ultimaker.com 01 April 2021) < https://ultimaker.com/it/learn/3d-printing-sentiment-index-2021> accessed 9 January 2022.
[1289] Alessandro Antimiani and Lucian Cernat, 'Untapping the Full Development Potential of Trade along Global Supply Chains: "*GVCs for LDCSs*" Proposal' (2021) 55 J World Trade 697, 700.
[1290] ibid 712.
[1291] Ibid.

along with other media outlets in the US.[1292] Perhaps the time has come for rules of origin to move, if not to the center, then further from the fringes, of international trade law investigation and analysis.

[1292] Harrup (n 393); Associated Press (n 393); Foley & Lardner LLP (n 1231).

## Bibliography

### Books, Chapters in Books, Journal Articles, and Working Papers


— — *World Economic Situation and Prospects as of mid-2021* (United Nations 2021) <https://www.un.org/development/desa/dpad/wp-content/uploads/sites/45/publication/WESP2021_UPDATE.pdf> accessed 2 November 2021

— — '*World Tariff Profiles 2020* (WTO, ITC & UNCTAD 2020) <https://www.wto.org/english/res_e/booksp_e/tariff_profiles20_e.pdf> accessed 24 October 2021

Abeliansky AL and I Martínez-Zarsoso, K Prettner, '3D Printing, International Trade, and FDI' (2020) 85 Economic Modelling 298

Adlung R and H Mamdouh, 'Plurilateral Trade Agreements: An Escape Route for the WTO?' (2018) 52 J World Trade 85

Acharya R, 'Regional trade agreements: recent developments,' in Rhoni Acharya (ed*), Regional Trade Agreements and the Multilateral Trading System* (CUP 2016)

Aaronson SA and P Leblond, 'Another Digital Divide: The Rise of Data Realms and its Implications for the WTO' (2018) 21 J Intl Economic L 245

Aaronson SA and T Struett, 'Data is Divisive: A History of Public Communications on E-commerce, 1998 – 2020' (2020) CIGI Papers No. 247 <https://www.jstor.org/stable/resrep27511> accessed 3 November 2021

Andrenelli A and J López González, 'Electronic Transmissions and International Trade - Shedding New Light on the Moratorium Debate' (2019) OECD Trade Policy Paper, No. 233 <http://dx.doi.org/10.1787/57b50a4b-en> accessed 23 October 2021

— —'3D Printing and International Trade: What is the Evidence to Date?' (2021) OECD Trade Policy Paper, No. 256 <https://www.oecd.org/publications/3d-printing-and-international-trade-0de14497-en.htm> accessed 26 November 2021

Ansong A, 'Single Undertaking, Different Speeds: Pliable Models for Decision-making in the WTO' (2018) 21 J Intl Economic L 395

Antikainen M and D Jongsma, 'The Art of CAD: Copyrightability of Digital Design Files' in Rosa Maria Ballardini, Marcus Norrgård, Jouni Partanen (eds), *3D Printing, Intellectual Property and Innovation: Insights from Law and Technology* (WoltersKluwer 2017)

Antimiani A and L Cernat, ‘Untapping the Full Development Potential of Trade along Global Supply Chains: “*GVCs for LDCSs*” Proposal’ (2021) 55 J World Trade 697

Arbabian ME and MR Wagner, ‘The impact of 3D Printing on Manufacturer-Retailer Supply Chains,’ (2020) 285 Eur J Operational Research 538,

Asakura H, ‘The Harmonized System and Rules of Origin’ (1993) 27 J World Trade 5

Baldwin R, ‘21st Century Regionalism: Filling the Gap between 21st Century Trade and 20th Century Trade Rules’ (May 2011) Policy Insight (Centre for Economic Policy Research) <https://cepr.org/sites/default/files/policy_insights/PolicyInsight56.pdf> accessed 24 October 2021

Banga R, ‘Growing Trade in Electronic Transmissions: Implications for the South’ (2019) UNCTAD Research Paper No. 29 < https://unctad.org/system/files/official-document/ser-rp-2019d1_en.pdf> accessed 23 October 2021.

Barnard C with J Snell, ‘Free Movement of Legal Persons and the Provision of Services,’ in Catharine Barnard and Steve Peers (eds), *European Union Law* (3rd edn OUP 2020)

Betz T and B Koremenos, ‘Monitoring Processes’ in Jacob Katz Cogan, Ian Hurd, and Ian Johnstone (eds), *The Oxford Handbook of International Organizations* (OUP 2016)

Bhagwati J, ‘Economic Perspectives on Trade in Professional Services’ (1986) U Chicago Legal Forum 45.
— — ‘US Trade Policy: The Infatuation with FTAS’ (1995) Columbia U Discussion Paper Series No. 726, April <https://academiccommons.columbia.edu/doi/10.7916/D8CN7BFM> accessed 23 October 2021.
— —*Termites in the Trading System: How Preferential Agreements Undermine Free Trade* (OUP 2008)

Bonneau V and others, ‘The disruptive nature of 3D printing’ (2017) Digital Transformation Monitor, January <https://ati.ec.europa.eu/sites/default/files/2020-07/The%20disruptive%20nature%20of%203D%20printing%20%20%28v1%29.pdf> accessed 25 October 2021.

Boonekamp C, “Regional Trade Agreements and the WTO,” in Carlos A Primo Braga and Bernard Hoekman (eds), *The Future of the Global Trade Order* (2nd edn, Eur U Institute 2017)

Borlini L, ‘A Crisis Looming in the Dark: Some Remarks on the Reform Proposals on Notifications and Transparency’ (2019) 63 QIL, Zoom-out 83

Brenton P, ‘Preferential Rules of Origin’ in Jean-Pierre Chauffour and Jean-Christophe Maur (eds), *Preferential Trade Agreement Policies for Development: A Handbook* (World Bank 2011)

Cadot O and A Estevadeordal, A Suwa-Eisenmann, T Verdier, ‘Introduction’, in Olivier Cadot, Antoni Estevadeordal, Akiko Suwa-Eisenmann and Theirry Verdier (eds), *The Origin of Goods: Rules of Origin in Regional Trade Agreements* (OUP 2006)

Cadot O and C Carrere, J de Melo, B Tumurchudur, ‘Product-Specific Rules of Origin in EU and US Preferential Trade Arrangements: An Assessment’ (2006) 5 World Trade Rev 199

Cadot O and J de Melo, ‘Why OECD Countries Should Reform Rules of Origin’ (2008) 23 The World Bank Research Observer 77

Cernat L and Z Kutlina-Dimitrova, ‘Thinking in a Box: A “Mode 5” Approach to Service Trade’ (2014) 48 J World Trade 1109

Choong YYC and others, ‘The Global Rise of 3D Printing During the COVID-19 Pandemic’ (2020) 5 Nature Rev Materials 637

Ciuriak D and D Bienen, ‘Overcoming Low Preference Utilization in Preferential Trade Agreements: Presumption of Origin for Small Shipments’ (2014) Trade & Development Discussion Paper No. 02/2014, bkp Development Research and Consulting < https://www.bkp-development.com/index.php/publications-2-en/discussion-papers/331-discussion-paper-2014-2> accessed 9 May 2022

Coke Hamilton P and SN Sirmimanne (supervisors), ‘What is at Stake for Developing Countries in Trade Negotiations on e-Commerce?: The Case of the Joint Statement Initiative’ (2021) UNCTAD: Division on Intl Trade & Commodities & Division on Technology & Logistics <https://unctad.org/system/files/official-document/ditctncd2020d5_en.pdf> accessed 29 October 2021

Committee on Ways and Means – US House of Representatives, ‘Overview and Compilation of U.S. Trade Statues’ (2003 edn, US Government Printing Office June 2003)

Conconi P and M García-Santana, L Puccio, R Venturini, ‘From Final Goods to Inputs: The Protectionist Effect of Rules of Origin’ (2018) 108 American Economic Rev 2335

Crivelli P and S Inama, J Kasteng, ‘Using Utilization Rates to Identify Rules of Origin Reforms: The Case of EU Free Trade Area Agreements’ (2021) EUI Working Papers RCS 2021/21, <https://cadmus.eui.eu/handle/1814/70396> accessed 24 October 2021

Dedrick J and KL Kraemer, G Linden, ‘Who Profits from Innovation in Global Value Chains?: A Study of the iPod and Notebook PCs’ (2010) 19 Industrial & Corporate Change 81

Destler IM, ‘Rules of Origin and U.S. Trade Policy’ in Olivier Cadot, Antoni Estevadeordal, Akiko Suwa-Eisenmann, and Theirry Verdier (eds), *The Origin of Goods: Rules of Origin in Regional Trade Agreements* (OUP 2006)

Díaz Gavier P and J Gaudalupe Báscones, ‘On Article 8.1(b)(iv) of the Customs Valuation Agreement: When is the Value of Certain Services Supplied by the Buyer Relevant for Customs Value (i.e. Engineering, Development, Artwork, Design Work, and Plans and Sketches)?’(2014) 9 Global Trade & Customs J 260

Dinh D, *Rules of Origin for Services: From the Early Days of GATS to the Era of Servicification* (Edward Elgar 2020)

Dobinson I and F Johns, ‘Qualitative Legal Research,’ in Mike McConville and Wing Hong Chui (eds), *Research Methods for Law* (Edinburgh UP 2007, reprinted in 2012)

Donner Abreu M, ‘Preferential Rules of Origin in Regional Trade Agreements’ in Rohini Acharya (ed*), Regional Trade Agreements and The Multilateral Trading System* (CUP 2016)

Dreier WA, “A Question of Liability: Who’s to Blame When Products Developed by Licensees Cause Unforeseen…?”, reprinted from (2000) New Jersey LJ April 3 <https://norrismclaughlin.com/articles/category/a-question-of-liability-whos-to-blame-when-products-developed-by-licensees-cause-unforeseen> accessed 25 October 2021

Duchêne V and others, *Identifying Current and Future Application Areas, Existing Industrial Value Chains and Missing Competences in the EU, in the Area of Additive Manufacturing (3D printing)* Final Report for the Commission Executive Agency for Small & Medium-Sized Enterprises (Publications Office Eur Union 2016) <https://data.europa.eu/doi/10.2826/72202> accessed 8 January 2022

Elsig M and B Hoekman and J Pauwelyn, ‘Thinking About the Performance of the World Trade Organization: A Discussion Across Disciplines’ in Manfred Elsig, Bernard Hoekman, and Joost Pauwelyn (eds), *Assessing the World Trade Organization: Fit for Purpose?* (CUP 2017) 23

Erasmus H and F Flatters, R Kirk, ‘Rules of Origin as tools of development? Some lessons from SADC,’ in Olivier Cadot, Antoni Estevadeordal, Akiko Suwa-Eisenmann, and Theirry Verdier (eds), *The Origin of Goods: Rules of Origin in Regional Trade Agreements* (OUP 2006)

Estevadeordal A and K Souminen, ‘Rules of Origin in Preferential Trading Arrangements: Is All Well with the Spaghetti Bowl in the Americas?’ (2005) Economia (Spring) 63
——and J Harris, K Suominen, ‘Multilateralising Preferential Rules of Origin around the World’ (2009) IDB Working Paper Series, #IDB-WP-I37 <https://publications.iadb.org/publications/english/document/Multilateralising-Preferential-Rules-of-Origin-around-the-World.pdf> accessed 23 October 2021

Fan Z and J Sotelo, V Sundareswaran, ‘3D Printing: A Guide for Decision-Makers’ (January 2020) World Economic Forum – White Paper <http://www3.weforum.org/docs/WEF_Impacts_3D_Printing_on_Trade_Supply_Chains_Toolkit.pdf> accessed 24 October 2021

Farrokhina F and C Richards, ‘E-Commerce Products Under the World Trade Organization Agreements: Goods, Services, Both or Neither?’ (2016) 50 J World Trade 793

Fink C and D Nikomborirak, ‘Rules of Origin in Services: A Case Study of Five ASEAN Countries’ in Marion Panizzon, Nicole Pohl, and Pierre Sauvé (eds), *GATS and the Regulation of International Trade in Services* (CUP 2008)

Finger JM, ‘The GATT/WTO System and National Trade Policies: Which Comes First?’ in Manfred Elsig, Bernard Hoekman, and Joost Pauwelyn (eds), *Assessing the World Trade Organization: Fit for Purpose?* (CUP 2017)

Fleuter S, ‘The Role of Digital Products under the WTO: A New Framework for GATT and GATS Classification’ (2016) 17 Chicago J Intl L 153

Foltea M, ‘The World Customs Organization’ in Marina Foltea (ed), *International Organizations in WTO Dispute Settlement* (CUP 2012)

Forrester IS and T Kaul, ‘Tariff Classification,’ in Patrick F J Macrory, Arthur Edmond Appleton and Michael G Plummer (eds), *World Trade Organization: Legal, Economic and Political Analysis* (Springer 2005)

Forrester IS and OE Odarda, ‘The Agreement on Customs Valuation’ in Patrick F J Macrory, Arthur Edmond Appleton and Michael G Plummer, *World Trade Organization: Legal, Economic and Political Analysis* (Springer 2005)

Freund C and A Mulabdic, M Ruta, ‘Is 3D Printing a Threat to Global Trade? The Trade Effects You Didn’t Hear About,’ (2020) World Development Report Policy Research Working Paper, No. 9024 <https://openknowledge.worldbank.org/handle/10986/32453> accessed 26 November 2021

Flores Ituarte I and SH Khajavi, M Salmi, ‘Current and Future Business Models for 3D Printing Applications,’ in Rosa Maria Ballardini, Marcus Norrgård, Jouni Partanen (eds), *3D Printing, Intellectual Property, and Innovation: Insights from Law and Technology* (WoltersKluwer 2017)

Gantz DA, ‘The United States-Mexico-Canada Agreement: Tariffs, Customs, and Rules of Origin’ (2019) Baker Institute Rep. no. 02.21.19
— — ‘North America’s Shifting Supply Chains: The USMCA, COVID-19, and the U.S.-China Trade War’ (2020) Rice U Baker Institute for Public Policy <https://doi.org/10.25613/0gaq-h036> accessed 8 January 2022

Gebhardt A, and J Kessler, L Thurn, *3D Printing: Understanding Additive Manufacturing* (2nd edn, Hanser 2019)

Gereffi G and J Lee, ‘Why the World Suddenly Cares About Global Supply Chains,’ (2012) 48 J Supply Chain Management 24

Geraets D and C Carroll, AR Willems, ‘Reconciling Rules of Origin and Global Value Chains: The Case for Reform’ (2015) 18 J Intl Economic L 287

Gladstone J and C Aquilar Flores, ‘Free trade agreements: compliance with rules of origin and utilization of preferential tariffs’ (2017) 23 Intl Trade L & Regulation 113.

Grant Cohen H, ‘What is International Trade Law For?’ (2019) 113 The American J Intl L 326, 342.

Grossman GM, ‘The Theory of Domestic Content Protection and Content Preference’ (1981) 96 QJ of Economics 583

Guzman AT and JHB Pauwelyn, *International Trade Law* (2nd edn, WoltersKluwer 2012)

Hirsch M, ‘Agreement on Rules of Origin’ in Rüdiger Wolfrum, Peter-Tobias Stoll and Holger P. Hestermeyer (eds), *WTO – Trade in Goods* (Koninklijke Brill NV 2010)
— —‘The Politics of Rules of Origin’ in Tomer Broude, Marc L Busch, and Amelia Porges (eds), *The Politics of International Economic L*aw (CUP 2011)

Hoekman B, ‘Rules of Origin for Goods and Services: Conceptual Issues and Economic Considerations’ (1993) 27 J World Trade 82
— — ‘Urgent and Important: Improving WTO Performance by Revisiting Working Practices’ (2019) 53 J World Trade 373
— — and MM Kostecki, *The Political Economy of the World Trading System: The WTO and Beyond* (3rd edn, OUP 2009)
—— and D Nelson, ‘21st Century Trade Agreements and the Owl of Minerva’ (2018), EUI Working Papers, RSCAS 2018/04 <https://cadmus.eui.eu/bitstream/handle/1814/50964/RSCAS_2018_04.pdf?sequence=1&isAllowed=y > accessed 23 October 2021
— — and S Inama, ‘Harmonization of Rules of Origin: An Agenda for Plurilateral Cooperation’ (2018) 22 East Asian Economic Rev
— — and PC Mavroidis, ‘WTO Reform: Back to the Past to Build for the Future’ (2021) 12 Global Policy (Sup 3)
— — and C Sabel, ‘Plurilateral Cooperation as an Alternative to Trade Agreements: Innovating One Domain at a Time’ (2021) 12 Global Policy (Sup 3)

Hestermeyer HP and L Nielsen, ‘The Legality of Local Content Measures under WTO Law’ (2014) 48 J World Trade 553

Imagawa H and E Vermulst, ‘The Agreement on Rules of Origin’, in Patrick FJ Macrory, Arthur Edmond Appleton and Michael G Plummer (eds) *World Trade Organization: Legal, Economic and Political Analysis* (Springer 2005)

Inama S, ‘Trade Preferences and the World Trade Organization Negotiations on Market Access: Battling for Compensation of Erosion GSP, ACP, and Other Trade Preferences or Assessing and Improving Their Utilization and Value by Addressing Rules of Origin and Graduation?’ (2003) 37 J World Trade 959
—— *Rules of Origin in International Trade* (CUP 2009)
——and EW Sim, *Rules of Origin in ASEAN* (CUP 2015).
——and P Crivelli, ‘Convergence on the Calculation Methodology for Drafting Rules of Origin in FTAS Using the Ad Valorem Criterion’ (2019) 14 Global Trade & Customs J 146

International Chamber of Commerce, ‘Business Recommendations on Rules of Origin in Preferential Trade Agreements’ (May 2017) Doc. No. 104-89 <https://cdn.iccwbo.org/content/uploads/sites/3/2017/05/ICC-Policy-Statement-on-rules-of-origin-in-preferential-trade-agreements.pdf > accessed 3 January 2022

Jackson JH, ‘The Evolution of the World Trading System – The Legal and Institutional Context’ in Daniel Bethlehem, Isabelle Van Damme, Donald McRae and Rodney Neufeld, *The Oxford Handbook of International Trade* (OUP 2009)

James WE, ‘Rules of Origin and Rules of Preference and the World Trade Organization: The Challenge to Global Trade Liberalization’ in Patrick F J Macrory, Arthur Edmond Appleton and Michael G Plummer (eds) *World Trade Organization: Legal, Economic and Political Analysis* (Springer 2005)

Jones VC and L Wong, ‘International Trade: Rules of Origin’ (2020) Congressional Research Service Report, 3 March <https://crsreports.congress.gov/product/pdf/RL/RL34524/16> accessed 23 October 2021

Kretz D and E Van de Velde, *Advanced Technologies for Industry - Product Watch: 3D Printing of Hybrid Components*, Report for the Commission Executive Agency for Small & Medium-sized Enterprises (Publications Office Eur Union 2021) <https://data.europa.eu/doi/10.2826/581451> accessed 8 January 2022

Krishna K, ‘Understanding Rules of Origin’ (February 2005) NBER Working Paper 11150

Langbroek P and others, ‘Methodology of Legal Research: Challenges and Opportunities’ (2017) 13 Utrecht L Rev 1

Latrille P, ‘Services Rules in Regional Trade Agreements: How Diverse or Creative are They Compared to the Multilateral Rules?’ in Rhoni Acharya (ed), *Regional Trade Agreements and the Multilateral Trading System* (CUP 2016)

Low P, “The Role of Services in Global Value Chains,” in Deborah K Elms and Patrick Low (eds), *Global Value Chains in a Changing World* (WTO Publications 2013)

Mariani P and G Sacerdoti, ‘Trade in Goods and Level Playing Field’ (2021) Working Paper No. 7/2021, DCU Brexit Institute <https://ssrn.com/abstract=3797021> accessed 23 October 2021.

Marceddu ML, ‘Implementing Transparency and Public Participation in FTA Negotiations: Are the Times a-Changin’? (2018) 21 J Intl Economic L 681

Matsushita, M and TJ Schoenbaum, PC Mavroidis, M Hahn, *The World Trade Organization: Law, Practice, and Policy* (3rd edn, OUP 2017)

Mavroidis PC, *The Regulation of International Trade*, vol. 1 (MIT Press 2016)
— — ‘And You Put the Load Right on Me: Digital Taxes, Tax Discrimination, and Trade in Services’ (2020) 12 Trade, L & Development 75
— — *The Regulation of International Trade*, vol 3 (MIT Press 2020)

— —and E Vermulst, ‘The Case for Dropping Preferential Rules of Origin’ (2018) 52 J World Trade 1

Meltzer JP, “Governing Digital Trade,” (2019) 18 World Trade Rev (2Supp) s35.

Micallef JA, ‘Digital Trade in EU FTAs: Are EU FTAs Allowing Cross Border Digital Trade to Reach Its Full Potential?’ (2019) 53 J World Trade 855

Miroudot S and C Cadestin, ‘Services in Global Value Chains: From Inputs to Value-Creating Activities’ (2017) OECD Trade Policy Papers No. 197 <https://www.oecd-ilibrary.org/trade/services-in-global-value-chains_465f0d8b-en> accessed 25 October 2021

Munro J, ‘Pushing the Boundaries of “Products” and “Goods” under GATT 1994: An Analysis of the Coverage of New and Unorthodox Articles of Commerce’ (2013) 47 J World Trade 1323

National Board of Trade – Sweden, ‘Trade Regulation in a 3D Printed World: A Primer’ (2016) Kommerskollegium 2016: 1
— — ‘Rules of Origin in the 21st Century’ (2020) Kommerskollegium <https://www.kommerskollegium.se/globalassets/publikationer/rapporter/2020/rules-of-origin-in-the-21st-century.pdf> accessed 24 October 2021.

Neeraj RS, ‘Trade Rules for the Digital Economy: Charting New Waters at the WTO’ (2018) 18 World Trade Rev (2Supp) s126

Nieß V and S Wende, ‘Intellectual Property and Product Liability Challenges in Three-Dimensional Printing’ (2017) 6 IEEE Consumer Electronics Magazine October 128

Neufeld, N. ‘Great Expectations: How the World Trade Organization's Trade Facilitation Agreement Impacts Trade and Trade Cooperation’ (2019) 11 Trade, L & Development 11

Nordberg A and Schovsbo J, “EU Design Law and 3D Printing: Finding the Right Balance in a New E-Ecosystem’ in Rosa Maria Ballardini, Marcus Norrgård, Jouni Partanen (eds), *3D Printing, Intellectual Property and Innovation: Insights from Law and Technology* (WoltersKluwer 2017)

Osborn LS, *3D Printing and Intellectual Property* (CUP 2019)

Pauwelyn J, ‘Comment – Nothing Dramatic (…Regarding Administration of Customs Laws)’ (2009) 8 World Trade Rev (Special Issue 1)

— — ‘Taking the Preferences Out of Preferential Trade Agreements: TTIP as a Provider of Public Goods’ reprinted in Joost HB Pauwelyn, Andrew T Guzman, Jennifer A Hillman, *International Trade Law* (3rd edn, WoltersKluwer 2016)
— — and AT Guzman, JA Hillman, *International Trade Law* (3rd edn, WoltersKluwer 2016)

Peng, S ‘A New Trade Regime for the Servitization of Manufacturing: Rethinking the Goods-Services Dichotomy’ (2020) 54 J World Trade 718

Peters A, ‘International Organizations and International Law’ in Jacob Katz Cogan, Ian Hurd, and Ian Johnstone (eds), *The Oxford Handbook of International Organizations* (OUP 2016)

Powers W and R Ubee, ‘A Comprehensive Comparison of Rules of Origin in U.S. Trade Agreements,’ (2020) Economic Working Papers Series 2020-05-D, US Intl Trade Commission, <https://www.usitc.gov/publications/332/working_papers/powers_ubee_comprehensive_analysis_of_us_roo_2020-05-20_compliant.pdf> accessed 24 October 2021.

Primo Braga CA and B Hoekman, ‘The Future of the Global Trade Order’ in Carlos A. Primo Braga and Bernard Hoekman (eds), *The Future of the Global Trade Order* (2nd edn, Eur U Institute 2017)

Puccio L, ’20 Years After Marrakesh: Reconsidering the Effects of Preferential Rules of Origin and Anti-Circumvention Rules on Trade in Inputs and Global Production Networks’ 2014 Eur YB Intl Economic L 173

Reinsich WA and J Caporal, M Waddoups, N Tekarli, ‘The Impact of Rules of Origin on Supply Chains: USMCA’s Auto Rules as a Case Study’ (April 2019) Center for Strategic and International Studies <https://csis-website-prod.s3.amazonaws.com/s3fs-public/publication/190403_Scholl_RulesofOrigin_WEB_v3.pdf> accessed 24 October 2021

Rimmer M, ‘*ClearCorrect:* Intellectual Property, 3D Printing, and the Future of Trade’ (2019) 23 Gonzaga J Intl L 55

Sauvé P, ‘Life Beyond Local Content: Exploring Alternative Measures of Industry Support in the Context of WTO Accession’ (2016) 1 J Int’l Trade 1
— ‘To Fuse, Not to Fuse, or Simply Confuse? Assessing the Case for Normative Convergence Between Goods and Services Trade Law’ (2019) 22 J Intl Economic L 356

Shaffer G, ‘Retooling Trade Agreements for Social Inclusion’ (2019) U Illinois L Rev 1
— —‘Trade Law in a Data-Driven Economy: The Need for Modesty and Resilience’ (2021) 20 World Trade Rev. 259

Singh R and S Singh, ‘Do Rules of Origin Extend Disproportionate Trade Gains under SAFTA: A Case Study of Bicycle and Textile Industries’ (2021) 16 Global Trade & Customs J 59

Smith F and L Woods, ‘A Distinction without a Difference: Exploring the Boundary between Goods and Services in the World Trade Organization and the European Union’ (2005) 12 Columbia J Eur L 1

Soprano R, ‘Brexit and the EU-UK Free Trade Agreement: Dos and Don’ts When Drafting Rules of Origin’ (2019) 18 J Intl Trade L & Policy 96

Stabell C and Ø Fjeldstad ‘Configuring Value for Competitive Advantage: On Chains, Shops, and Networks’ (1998) 19 Strategic Management J 413.

Suominen K, *Revolutionizing World Trade: How Disruptive Technologies Open Opportunities for All* (Stanford UP 2019)

Tallberg J, ‘Transparency’ in Jacob Katz Cogan, Ian Hurd, and Ian Johnstone (eds), *The Oxford Handbook of International Organizations* (OUP 2016)

Tuomi J, and S Chekurov, J Partanen, ‘3D Printing History, Principles and Technologies,’ in Rosa Maria Ballardini, Marcus Norrgård, Jouni Partanen (eds), *3D Printing, Intellectual Property, and Innovation: Insights from Law and Technology* (WoltersKluwer 2017)

Umezu S and H Sato (corresponding authors), ‘Metal-Plastic Hybrid 3D Printing Using Catalyst-Loaded Filament and Electroless Plating’ (2020) 36 Additive Manufacturing 101556

Van den Bossche P, *The Law and Policy of the World Trade Organization: Text, Cases and Materials* (2nd edn, CUP 2008)
— —and W Zdouc, *The Law and Policy of the World Trade Organization: Text, Cases and Materials* (4th edn, CUP 2019)
— —and D Prévost, *Essentials of WTO Law* (2nd edn, CUP 2021)
Van de Heetkamp A and R Tusveld, *Origin Management: Rules of Origin in Free Trade Agreements* (Springer 2011)

Vermulst EA, ‘Rules of Origin as Commercial Policy Instruments – Revisited’ (1992) 26 J World Trade 61
— —and P Waer, ‘European Community Rules of Origin as Commercial Policy Instruments?’ (1990) 24 J World Trade 55, 98

Weinmann C, ‘Trademark Licensors and Product Liability Claims - A European Perspective’ (2005) The Trademark Reporter 1394.

Willemyns I, ‘GATS Classification of Digital Services – Does “The Cloud” Have a Silver Lining?’ (2019) 53 J World Trade 59

Winslett G, ‘Critical Mass Agreements: The Proven Template for Trade Liberalization in the WTO’ (2018) 17 World Trade Rev 405

Winters LA, ‘The WTO and RTAs: Is It All Over for Multilateralism?’ in Manfred Elsig, Bernard Hoekman, and Joost Pauwelyn (eds), *Assessing the World Trade Organization: Fit for Purpose?* (CUP 2017)

World Trade Organization, *World Trade Report 2019: The Future of Services Trade* (WTO Publications 2019)

Wu M, ‘Digital Trade-Related Provisions in Regional Trade Agreements: Existing Models and Lessons for the Multilateral Trade System’ (2017) RTA Exchange (ICTSD and IDB)

Zampetti, AB ‘Democratic Legitimacy in the World Trade Organization: The Justice Dimension’(2003) 37 J World Trade 105
— —and P Sauvé, ‘Rules of Origin for Services: Economic and Legal Considerations,’ in Olivier Cadot, Antoni Estevadeordal, Akiko Suwa-Eisenmann, and Theirry Verdier (eds), *The Origin of Goods: Rules of Origin in Regional Trade Agreements* (OUP 2006)

## Agreements, Treaties, and International Trade Instruments

Agreement between New Zealand and Singapore on a Closer Economic Partnership (CEP agreement 2000) (signed 14 November 2000, entered into force 1 January 2001)

Agreement between New Zealand and Singapore on Closer Economic Partnership - Upgrade (entered into force 1 January 2020)

Agreement between the United States of America, the United Mexican States, and Canada (USMCA) (signed 30 November 2018, entered into force 1 July 2020)

Agreement On Implementation Of Article VII Of The General Agreement On Tariffs And Trade 1994 (Customs Valuation Agreement) (CVA) (15 April 1994) LT/UR/A-1A/4

Agreement on Rules of Origin (AOR) (15 April 1994) LT/UR/A-1A/7

Agreement on Subsidies and Countervailing Measures (SCM Agreement) (15 April 1994) LT/UR/A-1A/9

Agreement on Trade-Related Investment Measures (TRIMS) (15 April 1994) LT/UR/A-1A/13

Agreement on Trade Facilitation (TFA) (entered into force 22 February 2017) WT/L/940

ASEAN Trade in Goods Agreement (ATIGA) (signed 26 February 2009, entered into force 17 May 2010)

ASEAN-Australia-New Zealand Free Trade Agreement (signed 27 February 2009, entered into force 1 January 2010)

ASEAN-India Free Trade Agreement (signed 13 August 2009, entered into force 1 January 2010)

ASEAN-Korea Free Trade Area (AKFTA) (signed 13 December 2005, entered into force 1 June 2007)

Comprehensive and Economic Trade Agreement (CETA) (signed 30 October 2016, some provisions entered into force on 21 September 2017)

Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP), incorporating Trans-Pacific Partnership Agreement (TPP) (signed 8 March 2018, partially in force)

Free Trade Agreement between the European Union and the Republic of Korea (signed 10 May 2010, entered into force 13 December 2015)

General Agreement on Tariffs and Trade (GATT 1947) <https://www.wto.org/english/docs_e/legal_e/gatt47_01_e.htm> accessed 2 December 2021

General Agreement on Tariffs and Trade 1994 (GATT 1994) <https://www.wto.org/english/docs_e/legal_e/06-gatt_e.htm> accessed 2 December 2021.

General Agreement on Trade in Services (GATS)(15 April 1994) LT/UR/A-1B/S/1

International Convention on the Harmonized Commodity Description and Coding System (HS Convention) (adopted 14 June 1983, entered into force 1 January 1988)

International Convention on the Simplification and Harmonization of Customs Procedures (Kyoto Convention 1973, signed 18 May 1973, entered into Force 24 September 1974)

International Convention on the Simplification and Harmonization of Customs Procedures (as amended) (Revised Kyoto Convention) (entered into force 3 February 2006)

International Convention Relating to the Simplification of Customs Formalities (entered into force 27 November 1924) XXX LNTS 775

Ministerial Declaration on Trade in Information Technology Products (Information Technology Agreement/ITA) (Singapore, 13 December 1996) WT/MIN(96)/16

Ministerial Declaration on the Expansion of Trade in Information Technology Products (ITA Expansion) (Nairobi, 16 December 2015) WT/MIN(15)/25

North American Free Trade Agreement (NAFTA) (signed 17 December 1992, entered into force 1 January 1994)

Regional Comprehensive Economic Partnership (RCEP) (signed 15 November 2020)

South-Asian Free Trade Area (SAFTA) (signed 6 January 2004, entered into force 1 January 2006)

Tariff Act of 1930, 19 U.S.C. §1592

The Marrakesh Agreement Establishing the World Trade Organization (15 April 1994) LT/UR/A/2

Trade Agreement Between The United States of America and Japan (US-Japan Trade Agreement) (signed 17 October 2019, entered into force 1 January 2020)

Trade And Cooperation Agreement Between The European Union And The European Atomic Energy Community, Of The One Part, And The United Kingdom Of

Great Britain And Northern Ireland, Of The Other Part, (TCA) (signed 30 December 2020, entered into force 1 January 2021) L 444/14

Vienna Convention on the Law of Treaties (VCLT) (entered into force 27 January 1980) 1155 UNTS 331.

Understanding on the Interpretation of Article XXIV of the General Agreement on Tariffs and Trade 1994, <https://www.wto.org/english/docs_e/legal_e/10-24_e.htm> accessed 2 December 2021.

Understanding on Rules and Procedures Governing the Settlement of Disputes (DSU) (15 April 1994) LT/UR/A-2/DS/U/1

United States – Bahrain Free Trade Agreement (signed 14 September 2004, entered into force 11 January 2006)

United States – Israel Free Trade Agreement (signed 22 April 1985, entered into force 1 September 1985)

United States – Korea Free Trade Agreement (KORUS) (signed 30 June 2007, entered into force 12 March 2012)

**Drafts, Reports, Communications, and Internal Communications of GATT and WTO – Located at <https://docs.wto.org>**

— — 'Destructions of Documents' (22 December 1975) L/4281.
— — 'Statement by Indonesia: Facilitator's Consultation on Electronic Commerce, MC11 declaration, and other relevant plenary sessions', delivered on 13 December (20 December 2017) WT/MIN(17)/68

Committee on Rules of Origin, 'Draft Consolidated Text of Non-Preferential Rules of Origin' (11 February 2010) G/RO/W/111/Rev.5
— — 'Report of the Committee on Rules of Origin to the General Council on Preferential Rules of Origin for Least Developed Countries' (10 November 2016) G/RO/79
— — 'Report (2017) of the Committee on Rules of Origin to the General Council on Preferential Rules of Origin for Least Developed Countries' (11 October 2017) G/RO/85
— — 'Report (2018) of the Committee on Rules of Origin to the General Council on Preferential Rules of Origin for Least Developed Countries' (18 October 2018) G/RO/87

— — ‘Report (2019) of the Committee on Rules of Origin to the General Council on Preferential Rules of Origin for Least Developed Countries’ (24 October 2019) G/RO/89
— — ‘Report (2020) of the Committee on Rules of Origin to the General Council on Preferential Rules of Origin for Least Developed Countries’ (23 November 2020) G/RO/91
— — ‘Report (2021) of the Committee on Rules of Origin to the General Council on Preferential Rules of Origin for Least Developed Countries’ (25 October 2021) G/RO/94
— — ‘Status of Notifications of Preferential Rules of Origin for LDCS and Preferential Import Data: Note of the Secretariat’ (25 March 2022) G/RO/W/163/Rev. 10, 4

Committee of Participants on the Expansion of Trade in Information Technology Products, ‘Status of Implementation: Note by Secretariat’ (25 March 2022) G/IT/1/Rev.59

Communication from India and South Africa (10 March 2020) WTO: Work Programme on Electronic Commerce.

General Council Decision, ‘Transparency Mechanism for Preferential Trade Arrangements’ (14 December 2010) WT/L/806

LDC Group Communication, ‘5th Anniversary of the Nairobi Ministerial Decision: Review of Implementation, Identification of Gaps and the Way Forward’ (5 March 2020) G/RO/W/194
— — ‘Submission of LDC to the Committee on Rules of Origin *Ad Valorem* Criterion’ (30 October 2020) G/RO/W/202
— — ‘Examination of Existing Origin-Related Documentary Requirements: Submission of the Least Developed Countries’ (25 March 2022) G/RO/W/211

Ministerial Decision, ‘Preferential Rules of Origin for Least Developed Countries’ (Bali Ministerial ROO Decision) (7 December 2013) WT/MIN(13)/42, WT/L/917

Ministerial Decision, ‘Preferential Rules for Least Developed Countries’ (Nairobi Ministerial ROO0 Decision) (19 December 2015), WT/MIN(15)/47, WT/L/917/Add.1

Negotiating Group on Non-Tariff Measures, ‘Meeting of 30 November 1989’ (19 December 1989) MTN.GNG/NG2/14
— — ‘Meeting of 14-15 February 1990’ (13 March 1990) MTN.GNG.NG2/16
— — ‘Points Made in Relation to Rules of Origin: Synopsis by the Secretariat’ (13 March 1990) MTN.GNG/NG2/W/54/Rev.1

Negotiating Group on Rules, ‘Compendium Of Issues Related To Regional Trade Agreements, Background Note by the Secretariat, Revision’ (1 August 2002) WTO doc. TN/RL/W/8/Rev. 1

Negotiating Group on Rule Making and Trade-Related Investment Measures, ‘Rules of Origin, Note by the Secretariat’ (6 June 1991) MTN.GNG/RM/W/2

Preparatory Committee of the United Nations Conference on Trade and Employment, “Report to Commission A by The Sub-Committee on Articles 14, 15, & 24” (15 August 1947) E/PC/T/174

Technical Committee on Rules of Origin, ‘Intersessional Developments Director’s Report’ (21 December 2018) OC0211E1a

Trade Negotiations Committee, ’Draft Final Act Embodying the Results of the Uruguay Round of Multilateral Trade Negotiations’ (3 December 1990) MTN.TNC/W/35/Rev.1
— — ‘Draft Final Act Embodying the Results of the Uruguay Round of Multilateral Trade’ (20 December 1991) MTN.TNC/W/FA

United States, ‘Rules of Origin: United States-Request for Consultations under Article XXII:1’ (31 January 1974) l/3992

Work Programme on Electronic Commerce, ‘General Council Decision’ (adopted 10 December 2019) WT/L/1079

**WTO Disputes**

*Canada-Certain Measures Affecting the Renewable Energy Generation Sector and Canada – Measures Relating to the Feed-In Tariff Program (Canada-Renewable Energy)* Appellate Body Reports (6 May 2013) 3AB-2013-1, WT/DS412/AB/R; WT/DS426/AB/R

*China – Measures Affecting Trading Rights and Distribution Services for Certain Publications and Audiovisual Entertainment Products*, Appellate Body Report (21 December 2009) WT/DS363/AB/R

*European Communities – Measures Affecting Asbestos and Asbestos-Containing Products*, Appellate Body Report (12 March 2001, adopted 5 April 2001) WT/DS135/AB/R

*European Communities – Customs Classification of Frozen Boneless Chicken Cuts,* Appellate Body Report (circulated 12 September 2005, adopted 27 September 2005) WT/DS269/AB/R and WT/DS286/AB/R

*European Communities - Regime for the Importation, Sale and Distribution of Bananas*, Appellate Body Report (9 September 1997, adopted 25 September 1997) WT/DS27/AB/R

*European Communities - Selected Customs Matters*, Appellate Body Report (circulated 13 November 2006, adopted 11 December 2006) WT/DS315/AB/R

*European Communities -Tariff Treatment of Certain Information Technology Products*, Panel Report (circulated 16 August 2010, adopted 21 September 2010) WT/DS375/R, WT/DS376/R, WT/DS377/R

*Turkey – Restrictions on Imports of Textile and Clothing Products, Appellate Body Report* (adopted 19 November 1999) WT/DS34/14.3

*United States – Final Countervailing Duty Determination with Respect to Certain Softwood Lumber from Canada (US-Softwood Lumber IV),* Appellate Body Report (19 January 2004) AB-2003-6, WT/DS257/AB/R

*United States – Measures Affecting Textiles and Apparel Products, Request for Consultations by the European Communities* (3 June 1997) WT/DS85/1
— — Notification of Mutually-Agreed Solution (11 February 1998) WT/DS85/9.

*United States – Measures Affecting Textiles and Apparel Products (II), Request for Consultations by the European Communities* (25 November 1998) WT/DS151/1
— — Notification of Mutually Agreed Solution (31 July 2000) WT/DS151/10

*United States – Measures Affecting the Production and Sale of Clove Cigarettes*, Appellate Body Report (circulated 4 April 2012, adopted 24 April 2012) WT/DS406/AB/R

*United States – Measures Affecting Trade in Large Civil Aircraft (Second Complaint),* Appellate Body Report (12 March 2012, adopted 23 March 2012) WT/DS353/AB/R

*United States – Measures Concerning the Importation, Marketing and Sale of Tuna and Tuna Products*, Appellate Body Report (circulated 16 May 2012, adopted 13 June 2012) WT/DS381/AB/R

*United States – Preliminary Determinations With Respect to Certain Softwood Lumber from Canada (US-Softwood Lumber (III)),* Panel Report (27 September 2002) WT/DS236/R

*United States – Rules of Origin for Textiles and Apparel Products (*Panel Report circulated 20 June 2003, adopted 21 July 2003) WT/DS243/R

**National and Regional Legislation, Judicial Decisions, Administrative Rulings, and Administrative Opinions**

Answer given by Ms. Malmström on behalf of the European Commission (14 November 2018) E-004978/2018 <https://www.europarl.europa.eu/doceo/document/E-8-2018-004978-ASW_EN.html> accessed 25 October 2021

Case C-434/15, *Asociación Profesional Élite Taxi v. Uber Systems Spain SL* [2017] ECLI:EU:C:2017:364

Case C-509/19, *BMW Bayerische Motorenwerke AG v. Hauptzollamt München* [2020] ECLI:EU:C:2020:694.

*ClearCorrect Operating v. International Trade Commi*ssion, 810 F. 3d 1283, Court of Appeals, Federal Circuit 2015.

Commission, 'Notice concerning the application of the Regional Convention on pan-Euro-Mediterranean preferential rules of origin or the protocols on rules of origin providing for diagonal cumulation between Contracting Parties to this Convention," (30 March 2020) OJ 2020/C 322/03
— — 'Guidance: Transitional PEM Rules of Origin' (v1.0-16 August 2021) Brussels, 25 August 2021, TAXUD/E4/AM/GD

Consolidated versions of the Treaty on European Union and the Treaty on the Functioning of the European Union (TFEU) [2012] OJ C 326, 1

Council Decision of 14 April 2011 on the signing, on behalf of the European Union, of the Regional Convention on pan-Euro-Mediterranean preferential rules of origin (PEM) (2013) OJ 56 L 54/1.

Council Decision (EU) 2019/2198 of 25 November 2019 on the position to be taken on behalf of the European Union within the Joint Committee established by the Regional Convention on pan-Euro-Mediterranean preferential rules of origin as regards the amendment of the Convention (PEM Transitional Rules) [2019] OJ L 339/1–148.

Council Decision No 2/2005 of the Eu-Morocco Association Council of 18 November 2005 amending Protocol 4 to the Euro-Mediterranean Agreement, concerning the

definition of the concept of ‘originating products’ and methods of administrative cooperation [2005] OJ L 336

Council Directive 2000/31/EC of 8 June 2000 on certain legal aspects of information society services, in particular electronic commerce, in the Internal Market (Directive on Electronic Commerce) [2000] OJ L178/1

Council Directive 2006/123/EC of the European Parliament and the Council of 12 December 2006 on services in the internal market (Services Directive) [2006] OJ L376/36

Customs Modernization Act, 19 U.S.C. §1484(a)(1)(B).

Ministry of Finance Regulation No. 17/PMK.010/2018 on the Second Amendment of Regulation No. 6/PMK.010/2017 on Stipulation of Goods Classification System and Import Duty on Imported Goods ("Regulation 17") [Indonesia]

Opinion of the European Economic and Social Committee, ‘Living tomorrow. 3D printing — a tool to empower the European economy’ (own-initiative opinion) (2015/C 332/05) C 332/36, 8 October 2015

Regulation (EU) No 952/2013) of the European Parliament and of the Council of 9 October 2013 laying down the Union Customs Code (recast) (partially entered into force on 1 May 2016) OJ L 269.

US Customs and Border Protection (CBP), Ruling Letter, *Re: Country of origin marking of orthodontic ‘aligners’* (1 March 2001) HQ 562012, MAR-05 RR:CR:SM 562012 BLS
— —Court Decision, *EOS of North America, Inc. v United States* (10 May 2013) Slip Op. 13-59.
— —Ruling Letter, *National Commodity Specialist Division, The tariff classification of a Robo 3D Printer from China* (12 September 2017) NY N289281
— —Ruling Letter, *re: U.S. Government Procurement; Country of Origin of Storage Infrastructure Solution Systems; Substantial Transformation* (July 16, 2015) HQ H59758, printed in (5 August 2015) 49 Customs Bulletin & Decisions 54.
— —*Notice of Issuance of Final Determination Concerning Roasted Coffee* (21 November 2017) 82 Federal Register 55387
— — *The Tariff Classification of a Smart Speaker from China* (16 October 2019) N306364

**Online Articles, Newspaper Articles, Website Postings, and Blog Postings**


— — '3D Printing Solutions: Let's Manufacture Possibilities' (hp.com 2021) <https://www.hp.com/us-en/printers/3d-printers.html> accessed 3 November 2021.
— — '3D Printing Technology for Improved Hearing' (sonova.com 2020) <https://www.sonova.com/en/story/innovation/3d-printing-technology-improved-hearing> accessed 24 October 2021
— — 'About Solvay' (solvay.com) < https://www.solvay.com/en/our-company> accessed 24 October 2021
— —'About Us' (home.sandvik) <https://www.home.sandvik/en/about-us/> accessed 24 October 2021.
— —'Additive Manufacturing: Aviation and Aerospace Industry' (GE Additive) <https://www.ge.com/additive/additive-manufacturing/industries/aviation-aerospace> accessed 24 October 2021.
— —'Additive Manufacturing Solutions' (solvay.com) < https://www.solvay.com/en/chemical-categories/specialty-polymers/additive-manufacturing> accessed 24 October 2021.
— —'America Makes' (*Americamakes.us)* <https://www.americamakes.us/about/> accessed 24 October 2021.
— —'Certificate of Incorporation' (GE.com 2019) <https://www.ge.com/sites/default/files/GE_Certificate_of_Incorporation_Effective_December_9_2019.pdf> accessed 3 November 2021.
— — 'GE Nigeria launches e-learning portal at Lagos Garage Week 2018' (GE 7 December 2018), <https://www.ge.com/news/press-releases/ge-nigeria-launches-e-learning-portal-lagos-garage-week-2018> accessed 2 November 2021
— — 'Indonesia Tax Information' (Deloitte 30 April 2018) <https://www2.deloitte.com/content/dam/Deloitte/id/Documents/tax/id-tax-info-apr2018.pdf> accessed 29 October 2021.
— — 'Japanese Foreign Trade in Figures' (santadartrade.com July 2021), <https://santandertrade.com/en/portal/analyse-markets/japan/foreign-trade-in-figures?url_de_la_page=%2Fen%2Fportal%2Fanalyse-markets%2Fjapan%2Fforeign-trade-in-figures&&actualiser_id_banque=oui&id_banque=0&memoriser_choix=memoriser> accessed 3 November 2021.
— — 'Post-elaborazione' (formlabs.com) <https://formlabs.com/it/negozio/post-processing/> accessed 24 October 2021.
— — 'Results for 'Ultrasonic Bath' (amazon.com) <https://www.amazon.com/Ultrasonic-Bath/s?k=Ultrasonic+Bath> accessed 24 October 2021
— — 'Regulations Updates' (Ministry of Finance, Republic of Indonesia) <https://www.kemenkeu.go.id/en/publications/regulation-updates/> accessed 29 October 2021
— —'Solvay in Italia' (solvay.it) <https://www.solvay.it/it/solvay-in/index.html> accessed 24 October 2021

— — ‘The World Bank in Mexico’ (Worldbank.org 6 October 2021) <https://www.worldbank.org/en/country/mexico/overview> accessed 2 November 2021.
— — ‘Understanding CNC Machining’ (*Thomas Publishing Company*) <https://www.thomasnet.com/articles/custom-manufacturing-fabricating/understanding-cnc-machining/> accessed 24 October 2021.
— — ‘Welcome to WCO Trade Tools’ (wcodtradetools.org) <https://www.wcotradetools.org/en> accessed 2 November 2021.

Agenzia delle accise, dogane e monopoli, ‘I.V.O. Binding Information on Origin’ (adm.gov.it) <https://www.adm.gov.it/portale/en/-informazioni-vincolanti-in-materia-di-origine> accessed 2 December 2021

Align Technology, ‘Align Technology Announces Plans to Assume Operations From Its Manufacturing Services Provider,’ (Align Technology Investor Release 22 December 2008) <http://investor.aligntech.com/static-files/de067378-b820-409a-ba5a-fa79087f2fb6> accessed 24 October 2021.
— — ‘Align Technology Expands Operations in Costa Rica with New Facilities to Support Continued Long-Term Growth,’ (Align Technology Investor Release 25 July 2018) <http://investor.aligntech.com/news-releases/news-release-details/align-technology-expands-operations-costa-rica-new-facilities> accessed 24 October 2021

Associated Press, ‘Mexico Asks USMCA Dispute Resolution Panel on Auto Content’ *US News & World Report* (January 6 2022) <https://www.usnews.com/news/business/articles/2022-01-06/mexico-asks-usmca-dispute-resolution-panel-on-auto-content> accessed 8 January 2022

Aston R, ‘3D Printing Done Right’ (*Innovation Q*) <https://www.boeing.com/features/innovation-quarterly/nov2017/feature-thought-leadership-3d-printing.page> accessed 24 October 2021

Brannon I, ‘Titanium Production’s Perilous U.S. Future’ (*Forbes* 29 April 2019) <https://www.forbes.com/sites/ikebrannon/2019/04/29/titanium-productions-perilous-u-s-future/?sh=652a00776a72> accessed 24 October 2021

Brenner M, ‘Navigating Rules of Origin in the New Trade Environment’ Proceeding of the 20th Judicial Conference of the United States Court of International Trade (cit.uscourts.gov) <https://www.cit.uscourts.gov/sites/cit/files/MBrenner%20CIT%20Nov182019%20doc.pdf> accessed 2 December 2021

Bournias Varotsis A, ‘3D printing vs. CNC machining’ (*3D Hubs*), <https://www.3dhubs.com/knowledge-base/3d-printing-vs-cnc-machining/> accessed 24 October 2021

Cao M, ‘Trade Wars and Tariffs – a 3D Printing Perspective’ (*IC 3D Industries* 13 February 2020) <https://www.ic3dprinters.com/trade-wars-and-tariffs-a-3d-printing-perspective/> accessed 1 November 2021

CECIMO, ‘Press Release: CECIMO Appreciates the Approval of a New Product Nomenclature Standard for Additive Manufacturing Machines’ (cecimo.eu 25 April 2019) <https://www.cecimo.eu/news/press-release-cecimo-appreciates-the-approval-of-a-new-product-nomenclature-standard-for-additive-manufacturing-machines/> accessed 24 October 2021

Commission, ‘Trade for all: Towards a More Responsible Trade and Investment Policy’(Publications Office Eur Union 2015) <https://trade.ec.europa.eu/doclib/docs/2015/october/tradoc_153846.pdf> accessed 23 October 2021
— —‘Preferential Trade: Guidance on the Rules of Origin’ (ec.europa.eu June 2020) <https://ec.europa.eu/taxation_customs/system/files/2020-06/01_2019_guidance_preferential_origin.pdf> accessed 2 December 2021
— — ‘Access 2Markets: Frequently Asked Questions-What is the Harmonized System’ (trade.ec.europa.eu) <https://trade.ec.europa.eu/access-to-markets/en/faqs> accessed 2 December 2021
— —‘Advanced Manufacturing’ (ec.europa.eu) < https://ec.europa.eu/info/research-and-innovation/research-area/industrial-research-and-innovation/key-enabling-technologies/advanced-manufacturing_en> accessed 2 December 2021.
— ‘Common Provisions’ [for preferential origin arrangements] (ec.europa.eu) <https://ec.europa.eu/taxation_customs/customs-4/international-affairs/origin-goods/general-aspects-preferential-origin/common-provisions_en> accessed 2 December 2021
— —‘EU Customs strategy’ (ec.europa.edu) <https://ec.europa.eu/taxation_customs/customs-4/eu-customs-strategy_en?> accessed 2 December 2021
— —‘EU-UK: A New Relationship’ (ec.europa.eu) <https://ec.europa.eu/taxation_customs/united-kingdom_en> accessed 5 January 2022
— —‘Rules of origin in Access2Markets’ (trade.ec.europa.edu) <https://trade.ec.europa.eu/access-to-markets/en/content/rules-origin-access2markets> accessed 2 November 2021
— —‘REX-Registered Exporter System’ (ec.europa.eu) <https://ec.europa.eu/taxation_customs/online-services/online-services-and-databases-customs/rex-registered-exporter-system_en> accessed 3 November 2021
— —‘The Pan-Euro-Mediterranean Cumulation and the PEM Convention’ (ec.europa.eu) <https://ec.europa.eu/taxation_customs/customs-4/international-affairs/pan-euro-mediterranean-cumulation-and-pem-convention_en> accessed 5 May 2022

— —‘Union Customs Code’ (ec.europa.eu) <https://ec.europa.eu/taxation_customs/customs-4/union-customs-code_en> accessed 3 January 2022
— —‘Welcome to Access2Markets to Market Access Database Users’ (trade.ec.europea.edu) <https://trade.ec.europa.eu/access-to-markets/en/content/welcome-access2markets-market-access-database-users> accessed 2 November 2021

Congressional Budget Office, Cost Estimate for H.R. 5430 (December 2019) <https://www.cbo.gov/system/files/2019-12/hr5430.pdf> accessed 24 October 2021

Conner Industries, ‘Dual Sourcing: Is it a Gamble for Supply Chain Managers?’(connerindustries.com 2020) <https://www.connerindustries.com/dual-sourcing-is-it-a-gamble-for-supply-chain-managers/> accessed 2 December 2021

Customs and Tariff Bureau, ‘Outline for Rules of Origin’ (July 2017) Japan Ministry of Finance <https://www.customs.go.jp/roo/english/origin/outline_of_roo.pdf> accessed 2 December 2021

D’Aveni RA, ‘How 3-D Printing Can Jumpstart Developing Economies’ (*Forbes* 19 March 2019) <https://www.forbes.com/sites/richarddaveni/2019/03/19/how-3d-printing-can-jumpstart-developing-economies/?sh=12bcfedd4400> accessed 2 November 2021

Davis J, ‘The Strati: a 3D-printed electric car that could be built in 24 hours’ *The Guardian* (London, 9 December 2014) <https://www.theguardian.com/technology/2014/dec/09/3d-printed-electric-car> accessed 2 December 2021

de Sousa A, ‘A Realistic Steak is Fake Meat’s Holy Grail’ (*Bloomberg Business* 22 November 2019) < https://www.bloomberg.com/news/articles/2019-11-22/fake-meat-companies-are-racing-to-3d-print-steaks> accessed 24 October 2021.

Douglas J, ‘Is Brexit Hurting the U.K. Economy? Trade Data Flash a Warning’ *The Wall Street Journal* (New York, 19 October 2021) < https://www.wsj.com/articles/is-brexit-hurting-the-u-k-economy-trade-export-import-european-union-england-11634651205> accessed 1 November 2021

Ferrill E and ER Yoches, ‘IP Law and 3D Printing: Designers Can Work Around Lack of Cover’ (*Wired*) <https://www.wired.com/insights/2013/09/ip-law-and-3d-printing-designers-can-work-around-lack-of-cover/> accessed 25 October 2021

Foley & Lardner LLP**,** ‘USMCA's Panel on Automotive Rules of Origin and What It Could Mean to Manufacturers in the Region’ (jdsupra.com 9 February 2022)

<https://www.jdsupra.com/legalnews/usmca-s-panel-on-automotive-rules-of-7460799/> accessed 7 May 2022.

Grant M, 'Bill of Materials (BOM)' (Investopedia.com 30 October 2020) <https://www.investopedia.com/terms/b/bill-of-materials.asp> accessed 2 December 2021.

Greenfield D, 'Ford and Nissan Use HP 3D Printing to Address Production Sustainability' (May 2021) Automotion World 20-22

Gregurić L, "How Much do 3D Printing Materials Cost?" (all3dp.com 11 February 2019) <https://all3dp.com/2/how-much-do-3d-printer-materials-cost/> accessed 24 October 2021

Mohammadi G, 'The History of CNC Machining, Part I & 2' (*Bantam Tools*) <https://medium.com/cnc-life/history-of-cnc-machining-part-1-2a4b290d994d> <https://medium.com/cnc-life/history-of-cnc-machining-part-2-the-evolution-from-nc-to-cnc-4b9fe1653536> both accessed 24 October 2021

Hancké B and L Mathei, 'Brexit, Batteries and the Fate of the British Car Industry' (Europp Blog 25 January 2021) <https://blogs.lse.ac.uk/europpblog/2021/01/25/brexit-batteries-and-the-fate-of-the-british-car-industry/> accessed 2 December 2021

Harrup A, 'Mexico Requests USMCA Panel to Resolve Dispute Over Auto Rates' *Wall Street Journal* (New York, 6 January 2022) < https://www.wsj.com/articles/mexico-requests-usmca-panel-to-resolve-dispute-over-auto-rules-11641513131> accessed 8 January 2022.

Heldebrand JM, and SA Martin, R Smith, 'Is Trade the Disrupter or the Disrupted?' (2018) EY Global Trade Symposium Report <https://assets.ey.com/content/dam/ey-sites/ey-com/en_gl/topics/global-trade/global-trade-pdfs/1808-2835224_Global_Trade_Symposium_report_012125-18Gbl.pdf> accessed 23 October 2021

International Chamber of Commerce (ICC), 'Builidng Business Engagement ahead of the WTO's 12th Ministerial Conference' (iccwbo.org 24 June 2021) <https://iccwbo.org/media-wall/news-speeches/building-business-engagement-ahead-of-the-wtos-12th-ministerial-conference/> accessed 3 January 2022.
— — 'Certificates of Origin' (iccwbo.org) <https://iccwbo.org/resources-for-business/certificates-of-origin/> accessed 2 December 2021
— —'International Certificate of Origin (ICO) Council' (iccwbo.org) <https://iccwbo.org/resources-for-business/certificates-of-origin/international-certificate-origin-council/> accessed 2 December 2021

International Magnesium Association, 'About Magnesium' (intlmag.org) <https://www.intlmag.org/page/basics_about_mg_ima>

Jhamb R, '3D Printing Sentiment Index: When the Going Gets Tough, the Tough Get Creative' (ultimaker.com 01 April 2021) < https://ultimaker.com/it/learn/3d-printing-sentiment-index-2021> accessed 9 January 2022

Kenton W, 'Direct Costs' (*Investopedia* 27 June 2020) <https://www.investopedia.com/terms/d/directcost.asp> accessed 24 October 2021

Kenner JM, 'A Brief Overview of Several Decisions Discussing Substantial Transformation' Proceeding of the 20th Judicial Conference of US Court of Int'l Trade (cit.uscourts.gov), <https://www.cit.uscourts.gov/sites/cit/files/JKenner%20A%20Brief%20Overview%20of%20Several%20Decisions%20Discussing%20Substantial%20Transformation%20final.pdf> accessed 2 December 2021

King H, 'College student 3D prints his own braces' (CNN.com 16 March 2016) <https://money.cnn.com/2016/03/16/technology/homemade-invisalign/> accessed 24 October 2021

Leering R, '3D Printing: A Threat to Global Trade' (think.ing.com 28 September 2017) https://think.ing.com/reports/3d-printing-a-threat-to-global-trade/ accessed 2 November 2021
— — '3D Printing is a Threat to World Trade but Its Impact is Still Limited' (think.ing.com 5 August 2021) <https://think.ing.com/articles/the-threat-for-world-trade-is-limited-for-now/> accessed 2 November 2021

M Aysha, 'The List of Bicycles Made with 3D Printing Technologies,' (*3D Natives* 22 September 2020) <https://www.3dnatives.com/en/ranking-3d-printed-bikes-220920204/#!> accessed 24 October 2021. [Only initial of last name provided]

Methenitis WM and K Price Dozier, 'Making Sense of a World in Motion – a Global Trade Perspective' (2016) EY Global Trade Symposium Report, <http://www.goingglobalskills.com/pdfs/making-sense-of-a-world-in-motion.pdf> accessed 23 October 2021.

Ministry of Electronics and Information Technology, 'National Strategy for Additive Manufacturing' (Meity.gov.in December 2020) <https://www.meity.gov.in/writereaddata/files/National%20Strategy%20for%20Additive%20Manufacturing.pdf> accessed 2 November 2021

Ministry of Foreign Affairs, Regional Integration and Intl Trade of Mauritius, 'The SADC Free Trade Area' (Mauritius Trade Easy) <https://www.mauritiustrade.mu/en/trade-agreements/sadc> accessed 24 October 2021

Molitch-Hou M, '3D Systems Displays Mass Additive Manufacturing Bot at AMUG' (engineering.com 4 April 2016) <https://www.engineering.com/story/3d-systems-displays-mass-additive-manufacturing-bot-at-amug> accessed 25 October 2021

New Zealand Ministry of Foreign Affairs & Trade, 'CEP Overview' (mfat.govt.nz) <https://www.mfat.govt.nz/br/trade/free-trade-agreements/free-trade-agreements-in-force/nz-singapore-closer-economic-partnership/cep-overview/#bookmark0> accessed 2 November 2021
— — 'CEP Text' (mfat.govt.nz) <https://www.mfat.govt.nz/br/trade/free-trade-agreements/free-trade-agreements-in-force/nz-singapore-closer-economic-partnership/cep-text/> accessed 2 November 2021
— — 'National Interest Analysis' (mfat.govt.nz) <https://www.mfat.govt.nz/assets/Trade-agreements/Singapore-NZ-CEP/National-Interest-Analysis.pdf> accessed 2 November 2021

O'Carroll L, 'UK Carmakers Face Higher Tariffs as EU Rejects Component Plea' *The Guardian* (London, 30 September 2020) <https://www.theguardian.com/politics/2020/sep/30/uk-carmakers-face-higher-tariffs-as-eu-rejects-component-plea-brexit> accessed 2 December 2021

Office of the US Trade Representative (USTR), 'Key Barriers to Digital Trade' (USTR.gov 31 March 2017) <https://ustr.gov/about-us/policy-offices/press-office/fact-sheets/2017/march/key-barriers-digital-trade> accessed 24 October 2021).
— —'United States–Mexico–Canada Trade Fact Sheet: Rebalancing Trade to Support Manufacturing' (ustr.gov) <https://ustr.gov/trade-agreements/free-trade-agreements/united-states-mexico-canada-agreement/fact-sheets/rebalancing> accessed 2 December 2021

Page J, 'Determining Origin in a Predetermined World: The Impact of Energizer Battery', Proceeding of the 20th Judicial Conference of US Court of Int'l Trade (cit.uscourts.gov), <https://www.cit.uscourts.gov/sites/cit/files/JPage%20CIT%20Conference%20Article.pdf> accessed 2 December 2021

Pierce JE, 'IP Strategies for the Rise of 3D Printing' (Venable LLP 14 April 2015) <https://www.venable.com/insights/publications/2015/04/ip-strategies-for-the-rise-of-3d-printing> accessed 25 October 2021

Rubin G, ‘How Do You Like Your Beef…Old-Style Cow or 3D-Printed?’*The Guardian* (London, 10 November 2019) <https://www.theguardian.com/technology/2019/nov/10/3d-printed-meat-european-restaurant-menus-environment> accessed 24 October 2021

SDG Knowledge Hub, ‘New Trade Agreement between US, Mexico, and Canada Enters into Force,’(sdg.iisd.org 2 July 2020) <https://sdg.iisd.org/news/new-trade-agreement-between-us-mexico-and-canada-enters-into-force/> accessed 2 December 2021

Shepardson D, ‘U.S. Coronavirus Tariff Exemptions Sought for Robots, Drones, Elevators’ (*Reuters* 4 May 2020) <https://jp.reuters.com/article/us-health-coronavirus-usa-china-idUKKBN22G2VK> accessed 1 November 2021

Sher D, ‘Japanese Additive Manufacturing is Rising’ (3D Printing Media Network 7 December 2020) <https://www.3dprintingmedia.network/japanese-additive-manufacturing-is-rising/> accessed 3 November 2021

Sotelo J and V Sundareswaran, ‘Would a Digital Border Tax Slow Down Adoption of 3D Printing?’ (*World Economic Forum* 08 January 2020) <https://www.weforum.org/agenda/2020/01/would-a-digital-border-tax-slow-down-adoption-of-3d-printing/> accessed 25 October 2021.

Structo, ‘Part I: The Birth of Clear Aligners’ (*Structo3D* 18 July 2017) <https://www.structo3d.com/blogs/blog/part-1-the-birth-of-clear-aligners> accessed 24 October 2021

Tagliabue J, ‘Italian Silk Industry Upset by a New U.S. Trade Law’ *New York Times* (New York, 10 April 1997) Section D p 4 <https://www.nytimes.com/1997/04/10/business/italian-silk-industry-upset-by-a-new-us-trade-law.html> accessed 6 January 2022.

The White House, ‘President Obama Launches Advanced Manufacturing Partnership’ (Obama White House 4 June 2011) < https://obamawhitehouse.archives.gov/the-press-office/2011/06/24/president-obama-launches-advanced-manufacturing-partnership> accessed 24 October 2021

Tingvall P and M Rentzhog, ‘Is the WTO 3D Printing-Ready?’ (2018) Word Trade Rep <https://www.wto.org/english/res_e/publications_e/opinionpiece_by_patrik_tingvall_and_magnus_rentzhog_e.pdf> accessed 2 November 2021.

US Customs and Border Protection (CBP),‘U.S. Customs and Border Protection Valuation Encyclopedia (1980 – 2015)’ (first Issued 1990, revised 26 May 2016)

EO13891-OT-029 <https://www.cbp.gov/document/publications/customs-valuation-encyclopedia-1980-2015> accessed 2 November 2021
— — 'Rules of Origin' (1 May 2004) EO13891-OT-122 <https://www.cbp.gov/document/publications/rules-origin> accessed 2 November 2021
— —'What Every Member of the Trade Community Should Know About : Customs Administrative Enforcement Process: Fines, Penalties, Forfeitures and Liquidated Damages' (cbp.gov February 2004) <https://www.cbp.gov/sites/default/files/documents/icp052_3.pdf> accessed 2 December 2021
— —'Accumulation' (cbp.gov 28 May 2014) <https://www.cbp.gov/trade/nafta/guide-customs-procedures/other-instances-confer-origin/accumulation> accessed 2 December 2021
— —'What Every Member of the Trade Community Should Know: Reasonable Care' (cbp.gov September 2017) <https://www.cbp.gov/sites/default/files/assets/documents/2018-Mar/icprescare2017revision.pdf> accessed 2 December 2021
— —'Accumulation - Factsheet' CBP Publication No. 1141-0620 <https://www.cbp.gov/sites/default/files/assets/documents/2020-Jun/%2316_Accumulation_USMCA%20Informational%20Fact%20Sheet.pdf> accessed 2 December 2021

US Court of International Trade, 'About the Court' (cit.uscourts.gov) <https://www.cit.uscourts.gov/about-court> accessed 2 December 2021

US International Trade Administration (USITA), 'Japan Additive Manufacturing and 3D Printing' (trade.gov 15 June 2020) < https://www.trade.gov/market-intelligence/japan-additive-manufacturing-and-3d-printing > accessed 3 November 2021
— — 'Italy – Country Commercial Guide: Advanced Manufacturing' (trade.gov 28 October 2021) < https://www.trade.gov/country-commercial-guides/italy-advanced-manufacturing> accessed 8 January 2022
— — 'FTA Provisions for Accumulation' (trade.gov) <https://www.trade.gov/fta-provisions-accumulation> accessed 2 December 2021.
— —'FTA Provisions for De Minimis Rule' (trade.gov) <https://www.trade.gov/fta-provisions-de-minimis-rule.> accessed 2 December 2021
— — 'Homepage' (trade.gov) < https://www.trade.gov> accessed 2 November 2021.
— —'Understanding USMCA' (trade.gov) <https://www.trade.gov/usmca-dayone-0> accessed 2 December 2021

Waters R, 'Google to End Use of 'Double Irish' as Tax Loophole Set to Close' *Financial Times* (London, 1 January 2020) < https://www.ft.com/content/991f11ae-2c51-11ea-bc77-65e4aa615551> accessed 25 October 2021

World Customs Organization (WCO), 'Comparative Study on Preferential Rules of Origin' (wccomd.org 2017) <http://www.wcoomd.org/-/media/wco/public/global/pdf/topics/origin/instruments-and-tools/reference-material/170130-b_comparative-study-on-pref_roo_master-file_final-20_06_2017.pdf?db=web> accessed 2 December 2021
— —'Frequently Asked Questions' (wcoomd.org 10 June 2020)<http://www.wcoomd.org/en/topics/nomenclature/overview/harmonized_system_faq.aspx> accessed 2 December 2021
— —'The WCO Has Published the HS 2017/HS 2022 Correlation Tables for the Harmonized System' (wcoomd.org 13 November 2020) <http://www.wcoomd.org/en/media/newsroom/2020/november/the-wco-has-published-the-hs-2017-2022.aspx>. accessed 2 December 2021
— — 'Resolution of the Customs Co-Operation Council on the Role of Customs in Facilitating the Cross-Border Movement of Situationally Critical Medicines and Vaccines' (December 2020) <http://www.wcoomd.org/-/media/wco/public/global/pdf/about-us/legal-instruments/resolutions/resolution-facilitating-cross-border-movement-of-situationally-critical-medicines-and-vaccines.pdf?la=en> accessed 2 November 2021
— — 'Conventions: Summary of Position as 30 June 2021' (wcoomd.org 2 July 2021) <http://www.wcoomd.org/-/media/wco/public/global/pdf/about-us/legal-instruments/conventions-and-agreements/revised-kyoto/sg0219eb.pdf?la=en> accessed 2 December 2021
— — 'WCO Shares Good Practices for Drafting a Rules of Origin Tool with the AfCFTA' (wcoomd.org 24 February 2022) <http://www.wcoomd.org/en/media/newsroom/2022/february/wco-shares-good-practices-for-drafting-a-rules-of-origin-tool-with-the-afcfta.aspx> accessed 7 May 2022
— — 'Position of Contracting Parties to the Harmonized System Convention and Non-Contracting Party Administrations' (wcoomd.org 7 March 2022) <http://www.wcoomd.org/-/media/wco/public/global/pdf/topics/nomenclature/overview/hs-contracting-parties/positions-of-cp/situation_hs.pdf?db=web> accessed 5 May 2022
— — 'Positions as regards ratifications and accessions (as of 15 March 2022): International Convention on the Simplifcation and Harmonization of Customs Procedures (as amended)' (wccomd.org 15 March 2022) <http://www.wcoomd.org/-/media/wco/public/global/pdf/about-us/legal-instruments/conventions-and-agreements/revised-kyoto/pg0321ea.pdf?la=en> accessed 5 May 2022
— — 'The Revised Kyoto Convention Management Committee Meeting (RKC/MC) held its 28th Meeting and welcomed two new contracting parties' (wccomd.org 17 March 2022) <http://www.wcoomd.org/en/media/newsroom/2022/march/the-rkc-mc-held-its-28th-meeting-and-welcomed-two-new-contracting-parties.aspx> accessed 6 May 2022.

——‘Activities and Programmes’ (wcoomd.org) <http://www.wcoomd.org/en/topics/enforcement-and-compliance/activities-and-programmes.aspx> accessed 2 December 2021
— —‘Amending the HS’ (wcoomd.org) <http://www.wcoomd.org/en/topics/nomenclature/activities-and-programmes/amending_hs.aspx> accessed 24 October 2021
— —‘General Rules for the Interpretation of the Harmonized System’ (wcoomd.org) <http://www.wcoomd.org/-/media/wco/public/global/pdf/topics/nomenclature/instruments-and-tools/hs-nomenclature-2017/2017/0001_2017e_gir.pdf?la=en> accessed 2 December 2021
— — ‘HS Nomenclature 2022 - Chapter 20’ (wccomd.org) < http://www.wcoomd.org/-/media/wco/public/global/pdf/topics/nomenclature/instruments-and-tools/hs-nomenclature-2022/2022/0420_2022e.pdf?la=en>accessed 7 January 2022
— —'HS Nomenclature 2022 – Chapter 84’ (wcoomed.org) <http://www.wcoomd.org/-/media/wco/public/global/pdf/topics/nomenclature/instruments-and-tools/hs-nomenclature-2022/2022/1684_2022e.pdf?la=en> accessed 7 January 2022
— — ‘HS Nomenclature 2022 Edition’ (wccomd.org) <http://www.wcoomd.org/en/topics/nomenclature/instrument-and-tools/hs-nomenclature-2022-edition/hs-nomenclature-2022-edition.aspx> accessed 7 January 2022
— — ‘Resolutions’ (wcoomd.org) < http://www.wcoomd.org/en/about-us/legal-instruments/resolutions.aspx> accessed 2 November 2021
— —‘RILO: A Unique and United Network’ (wcomd.org) < http://www.wcoomd.org/-/media/wco/public/global/pdf/topics/enforcement-and-compliance/tools-and-instruments/rilo/rilo-brochure_en.pdf?db=web> accessed 2 December 2021
— —'Trade Tools: Harmonized System’ (wcotradetools.org) <https://www.wcotradetools.org/en/harmonized-system> accessed 30 October 2021
— —‘What is the Harmonized System (HS)?’ (wcoomd.org) <http://www.wcoomd.org/en/topics/nomenclature/overview/what-is-the-harmonized-system.aspx> accessed 2 December 2021

World Intellectual Property Office, ‘Valuing Intellectual Property Assets’ (wipo.int), <https://www.wipo.int/sme/en/value_ip_assets/> accessed 25 October 2021.

World Trade Organization (WTO), ‘Briefing note: The Expansion of Trade in Information Technology Products (ITA Expansion)’ (wto.org 16 December 2015) <https://www.wto.org/english/news_e/news15_e/itabriefingnotes161215_e.pdf> accessed 2 December 2021.
— —‘WTO Members Discuss Implementation of Information Technology Agreement’ (wto.org 30 October 2018) <https://www.wto.org/english/news_e/news18_e/ita_30oct18_e.htm> accessed 2 December 2021.

— —‘WTO members Agree to Extend E-commerce Non-violation Moratoriums’ (wto.org 10 December 2019) <https://www.wto.org/english/news_e/news19_e/gc_10dec19_e.htm> accessed 3 November 2021
— —‘Event Marks 25th Anniversary of the WTO’s Agreement on Rules of Origin’ (wto.org 4 March 2020) <https://www.wto.org/english/news_e/news20_e/roi_04mar20_e.htm> accessed 1 December 2021
— — ‘E-commerce Talks: Two “Foundational” Articles Cleaned; Development Issues Discussed’ (wto.org 13 September 2021) <https://www.wto.org/english/news_e/news21_e/jsec_12sep21_e.htm> accessed 29 October 2021
— — ‘Architectural and Engineering Services’ (wto.org) <https://www.wto.org/english/tratop_e/serv_e/architecture_e/architecture_e.htm> accessed 24 October 2021
— —‘Electronic Commerce’ (wto.org) <https://www.wto.org/english/thewto_e/minist_e/mc11_e/briefing_notes_e/bfecom_e.htm> accessed 24 October 2021
— — ‘Guide to Reading the GATS Schedules of Specific Commitments and the List of Article II (MFN) Exemptions’ (wto.org) <https://www.wto.org/english/tratop_e/serv_e/guide1_e.htm> accessed 24 October 24
— —‘Information Technology Agreement – an Explanation’ (wto.org) <https://www.wto.org/english/tratop_e/inftec_e/itaintro_e.htm> accessed 2 December 2021
— — ‘Rules of Origin’ (wto.org) <https://www.wto.org/english/tratop_e/roi_e/roi_e.htm#techass> accessed 3 November
— —‘ ‘Schedules of Concessions,’ (wto.org) <https://www.wto.org/english/tratop_e/schedules_e/goods_schedules_e.htm> accessed 24 October 2021
— —‘Trade Facilitation – Cutting Red Tape at the Border’ (wto.org) <https://www.wto.org/english/tratop_e/tradfa_e/tradfa_introduction_e.htm> accessed 2 December 2021
— — ‘The Trade Policy Review Mechanism (TPRM)’ (wto.org) <https://www.wto.org/english/tratop_e/tpr_e/tprm_e.htm> accessed 3 November 2021
— —‘Transparency Mechanisms for RTAS’ (wto.org) <https://www.wto.org/english/tratop_e/region_e/trans_mecha_e.htm> accessed 3 November 2021
— —‘The Uruguay Round’ (wto.org) <https://www.wto.org/english/thewto_e/whatis_e/tif_e/fact5_e.htm> accessed 2 December 2021
— —‘The WTO and World Customs Organization’ (wto.org)

<https://www.wto.org/english/thewto_e/coher_e/wto_wco_e.htm> accessed 2 December 2021
— —'What is a WTO Schedule' (*Goods Schedules e-Library*, wto.org) <https://goods-schedules.wto.org/what-is-a-wto-schedule> accessed 24 October 2021

**Websites, Presentations, and Miscellaneous Material**

— — 'Schedule B Search Engine' (United States Census Bureau) <https://uscensus.prod.3ceonline.com/#!#current-question-pos> accessed 2 November 2021
— — 'Indonesia Tariff Schedule' (World Integrated Trade Solution). <https://wits.worldbank.org/tariff/trains/en/country/IDN/year/LTST/pagenumber/1/pageSize/100> accessed 29 October 2021

Commission, 'My Trade Assistant' <https://trade.ec.europa.eu/access-to-markets/en/home> accessed 1 December 2021 (includes Tariff Calculator)

Harris JT, 'Rules of Origin Preference Utilization' (What Drives the Utilization of Trade Preferences WTO conference 19 May 2021) <https://www.wto.org/english/tratop_e/roi_e/s1_harris19may21.pdf> accessed 1 December 2021

International Trade Center, 'Accumulation/Cumulation' (Rules of Origin Facilitator) <https://findrulesoforigin.org/en/glossary?uid=accum&returnto=gloscenter> accessed 2 December 2021
— —'Rules of Origin Facilitator' www.findrulesoforigin.org accessed 2 December 2021

Interview with Dr. Anna Jerzewska (Milan/Geneva, 22 September 2021). Dr. Jerzewska's website: <https://www.tradeandborders.com> accessed 3 November 2021

Martí DF, 'What Drives the Utilization of Trade Preferences? Lessons from the work of the WTO Committee on Rules of Origin; (What Drives the Utilization of Trade Preferences WTO conference 19 May 2021) <https://www.wto.org/english/tratop_e/roi_e/s1_harris19may21.pdf> accessed 1 December 2021

U.S. Patent No. 4, 575,330 (Apparatus for Production of Three-Dimensional Objects by Stereolithography), Filed 8 August 1984, issued 11 March 1986. <https://patentimages.storage.googleapis.com/5c/a0/27/e49642dab99cf6/US4575330.pdf> accessed 2 December 2021

WTO, 'What Drives the Utilization of Trade Preferences' conference held 19 May 2021. Videos and presentations available at <https://www.wto.org/english/tratop_e/roi_e/preference_utilization_190521_e.htm> accessed 3 November 2021.
— — 'What Drives the Utilization of Trade Preferences' conference held 7 April 2022. Videos and presentations available at <https://www.wto.org/english/tratop_e/roi_e/preference_utilization_7april22_e.htm> accessed 7 May 2022.
— — 'Trade Facilitation Database,' (tfadatabase.org 2022) <https://tfadatabase.org/implementation> accessed 7 May 2022