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Date , 19 March 2017

Questo lavoro è dedicato alla mia adorata Sister, a mamma, babbo, nonna, zii e cugini che mi sostengono sempre con tanta pazienza. Una dedica speciale ai piccini di casa, Cristiano Irene e Chiara, che spero si appassionino quanto me allo studio.

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Abstract

Cloud computing services are not entirely news as users (consumers and businesses) have been used online products based on cloud for quite a few years. Only recently, however, authorities have started to devote their attention to cloud services being however mainly concerned by issues connected with the protection of data, privacy and security. Competition issues have been so far poorly address despite cloud services being considered as pivotal to the development of small and medium size industries in Europe. This thesis aims at analyzing how current rules on abuse of dominance could be applied to cloud services with the task to evaluate whether current rules and principles can still be valid in such new environment. To do so the thesis moves from market definition to then considered assessment of dominance and lastly abusive conducts. In particular, the first part of the thesis consider market definition: starting from general rules and decisional practices, to then move to the analysis of characteristics and features of cloud services to finally try and evaluate how current rules could be adapted to cloud services. The same approach would be used in the second part of the thesis concerning assessment of dominance. In this section current state of cloud markets as resulting from available market reports would also be considered in order to second guess whether dominance is actually foreseeable. The last section is dedicated to the detection of those abusive conducts which might take place in the cloud environment. As in previous sections, the starting point is represented by current case law especially those concerning the IT sector to then check whether further conducts strictly related to cloud could occur. As a final note, the research and analysis is carried out mainly in light of EU rules with an eye on how the same topic is addressed in US antitrust law.

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¹ OFT responsibilities for anticompetitive practices are now transferred to the Competition and Market Authority (CMA).

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1. Introduction

Cloud computing has captured the attention of consumers and businesses as an alternative to traditional IT computing resources only recently. Cloud computing has actually been around for quite a long time, but it was until recently the domain of IT experts; it is only as the use of cloud computing started to increase, that the relevant authorities have commenced to question around its functioning and the possible flaws.

At EU level, the European Commission is quite extensively considering cloud computing services and in particular the contractual conditions applicable to the supply of such services as well as their privacy and security features. The aim here is evidently that of protecting users, and mainly consumers, from potential misconduct by cloud providers². The European Commission is not alone: at national level, in 2014 the UK Competition and Market Authority launched a review on contractual relationship applied to cloud storage, out of concerns raised by price increases and changes of contractual terms applied by providers after contracts with the consumers were concluded³. Concerns around cloud computing are not confined to the European territory, the US Federal Trade Commission is also carefully considering the impact that the development of cloud services can have in term of the flowing of data and other possible issues including that relating to jurisdictional conflict⁴. Yet again the focus of the national and US authority is mainly on users protection against unfair conducts by cloud providers.

On a similar path, albeit more market oriented, is the recent launch by the European Commission of a public tender *“to gain insight in the practices and issues relating to data portability and application portability while switching cloud service*

² Cloud computing is considered as a part of the wider digital agenda. Information on cloud computing initiatives at EU level can be found at <https://ec.europa.eu/digital-single-market/en/european-cloud-computing-strategy>. It is in this respect that, in June 2013, the European Commission set up a group of experts to define best practices for cloud computing contracts and to identify safe and fair conditions.

³<http://www.businesscloudnews.com/2015/12/01/uk-competition-and-markets-authority-to-launch-legal-probe-into-cloud-storage/>

⁴ Remarks of Commissioner Maureen K. Ohlhausen, Forum Global, 2014 Cloud Computing Conference, Washington D.C., June 11, 2014, available at https://www.ftc.gov/system/files/documents/public_statements/315251/140611forumglobal.pdf.

*providers*⁵: here the focus is not only on potential harmful by cloud providers against users in general and consumers in particular but also on conduct which can hamper market development⁶.

Preventing unfair practices is certainly necessary to build a feeling of trust among users which is a first and essential step to let cloud computing services⁷ grow; privacy, security and contractual fairness are not, however, the sole aspects on which the European Commission and, more in general competition authorities, should focus their attention. Ensuring the undistorted development of competition must also capture competition authorities attention at all level, especially in light of the role that cloud services can play in the EU Digital Agenda and in the fast growing of European small and medium size enterprises, as often recalled by the European Commission itself⁸. Despite this there has been few or no attempts so far to analyze directly how competition works, or will work, between cloud providers⁹. This lack of any comprehensive study on antitrust issues involving cloud computing can be partly ascribed to the difficulty in understanding the inner functioning of cloud services or, more probably, what cloud computing is in the first place. In addition, competition authorities are currently focusing their attention on other issues, still linked to the growth of online markets, such as online commerce¹⁰ and big data¹¹.

⁵ <https://ec.europa.eu/digital-single-market/en/news/study-switching-between-cloud-services-providers>

⁶ As indicated on the dedicated webpage of the European Commission (see link note above), *“the study should also analyze the anticipated effects that data portability and application portability can have in the development of the cloud market (on both the demand and the supply side)”*.

⁷ As it would be seen in Chapter 3 below, security concerns are usually mentioned among the factors still deterring, or at least delaying the switching to cloud technology. In this respect, please see in particular the findings of the RightScale Report, State of the Cloud, 2015.

⁸ Europa Press Release, “Digital Agenda: how cloud computing can boost Europe’s competitiveness”, 2 March 2011.

⁹ In my research, I only retrieved a presentation given by Kramer T., Head of the Digital Single Market Task Force at EU DG Comp, concerning “Cloud computing - From an EU Competition Law Perspective”.

¹⁰ In this respect please refer to the ongoing European Commission sector inquiry on e-commerce - relevant information as well as the Preliminary Findings of the European Commission is available at the following link: http://ec.europa.eu/competition/antitrust/sector_inquiries_e_commerce.html. Please see also Vestager M., speech E-commerce: a fair deal for consumers online, 6 October 2016, available at http://ec.europa.eu/commission/2014-2019/vestager/announcements/e-commerce-fair-deal-consumers-online_en.

¹¹ Many are the speeches focusing on the relevance of data in the current digital economy. By way of example, at EU level, Vestager M., Competition in a Big Data World, DLD 16, Munich, 17 January 2016, available at https://ec.europa.eu/commission/2014-2019/vestager/announcements/competition-big-data-world_en; Vestager M., Making data work for us, speech at Data Ethics event on Data as Power, Copenhagen, 9 September 2016, available at http://ec.europa.eu/commission/2014-2019/vestager/announcements/making-data-work-us_en; Vestager M., speech at EDPS-BEUC Conference on Big Data, Brussels, 29 September 2016 available at http://ec.europa.eu/commission/2014-2019/vestager/announcements/big-data-and-competition_en. Similarly at US level, please see Ramirez E. Deconstructing the Antitrust Implications of Big Data, speech held at Fordham Competition Law Institute , 43rd Annual Conference on International Antitrust Law and Policy, 22 September

Understanding the antitrust issues relating to the cloud sector is however a necessary and key step in the current digital era to ensure that competition among online operators evolve undistorted. In addition of representing a cheaper and higher quality IT resource for companies (especially small and medium sized), cloud computing also constitutes the basis for further IT evolutions. By way of example, it is thanks to cloud technology that the power of big data can be fully exploited: indeed big data require a larger amount of processing power and storage facilities to be used which is why normally big data companies employ cloud solutions¹².

In light of this, ensuring that competition among cloud providers is not altered appears to be all the more relevant as possible anticompetitive conducts can affect not only the cloud market(s) but also the development of further innovative services based, or relying, on the cloud.

Enforcing competition law in respect of cloud services, however, may entail a review of current rules and enforcement practices by the competition authorities. This point has been widely considered when considering other different internet services in their relationship with antitrust law.

1.1. Enforcing competition rules in internet based services: challenges and perspectives

One of the point which is usually raised when considering antitrust enforcement in the digital era is the need to look at the internet differently from traditional “brick and mortar” industries¹³. One of the main argument is that internet service providers compete in dynamic markets which present completely different characteristics compared to market populated by static industries.

Internet markets are constantly changing: new products can rapidly emerge creating entirely new markets; current products can be adapted so as to be able to

2016; Ramirez E., "Big Data, Media and Competition – New Rules for the Digital Economy?", 2015; Brill J. (FTC), "Weaving a Tapestry to Protect Privacy and Competition in the Age of Big Data", 2014.

Big Data has also captured the attention of national competition authorities, please see Lasserre B. (Autorité de Concurrence), "Les données et la concurrence dans l'économie numérique", 2016, available at http://www.autoritedelaconcurrence.fr/user/rdv.php?id_rub=631&id_article=2752; Chisholm A. (UK CMA), "Data and trust in digital markets: what are the concerns for competition and for consumers?", 2015.

¹² Sluijs J.P., Larouche P., Sauter W., Cloud Computing in the EU Policy Sphere, 2011 available on www.ssrn.com. On the relationship between cloud computing and big data, see among others Hashem I.A.T., Yaqoob I., Anuar N.B., Mokhtar S., Gani A., Khan S.u., The rise of big data on cloud computing: Review and open research issues, Information System, 2015, 47 page 98.

¹³ Gurkaynak G., Durlu D., Hagan M., Antitrust on the Internet: a Comparative Assessment of Competition Law Enforcement in the Internet Realm, in Business Law International, Vol. 14, No.1, January 2013.

compete also in neighboring markets, in this way complementary companies can easily become competitors.

The dynamic nature of these sectors is such that defining the boundaries of the relevant market and identifying the respect position of the companies there operating can become particularly complicated¹⁴. An example of this can be found in moving boundaries between instant messaging and voice-over-internet call services. Not later than a couple of years ago, Skype was the main (and most popular) service used for VoiP while WhatsApp was only used for instant messaging and Facebook as a social network. WhatsApp and Facebook were therefore active on markets different than the VoiP until more recently, when WhatsApp added a call functionality to its instant messaging services and Facebook allowed voice call through its Messenger service: in doing so, WhatsApp and Facebook quickly and apparently quite easily became direct competitors of Skype. Facebook offers another example of this "expansive" tendency of internet companies: indeed not long ago, such company expanded its social network feature to encompass also search capability in so starting to challenge directly Google in the market for online search.

When companies behave in the market in such a way, identifying the exchangeable products or services and, therefore, drawing the dividing line between different markets can get particularly complex. One suggestion could be to anticipate the evaluation of potential competition at the stage of market definition; such an approach would certainly be more in line with the peculiarity and dynamic nature of digital markets but it is certainly very hard to implement.

Assessment of market power need also to be adapted to fit dynamic markets. Relevant also in this respect is the fact, mentioned above, that complementary companies can quickly become competitors: an aspect which would most likely harden the task of competition authorities.

Indeed, market shares may not necessarily be a good (albeit preliminary) indicator of the strength of a given company; barriers to entry are usually low which

¹⁴ O'Connor D., Understanding Online Platform Competition: Common Misunderstandings, April 2016, available on www.ssrn.com, the author analyses this aspect with reference to online platform but its conclusions could be extended to all online services. Weber R.H., Competition Law Issues in the Online World, 2013, in www.sg-icf.ch. See also Gurkaynak G., Durlu D., Hagan M., Antitrust on the Internet: a Comparative Assessment of Competition Law Enforcement in the Internet Realm, cited above at 13 where the authors also underline with respect to geographic market definition that some of the usual criteria may be less relevant in online market definition as it is the case, for instance, of transport costs, trade barriers, availability of services.

makes easier for companies to enter the market and challenge the position of current companies should they offer a more innovative product. Here lies in fact another peculiarity of digital market which is the key relevance of innovation as a tool to rapidly leapfrog existing companies, thank to the introduction of a more advanced product, as well as a mean to survive competition: this is also why leading operators, despite the position they might enjoy on the market, are still under the (competitive) pressure to innovate to tackle any attack from competitors.

The history of online services is full of interesting examples of once successful companies with a solid market position being suddenly superseded by new innovators: the Yahoo! - Google¹⁵ case is among the most known together with MySpace/Facebook¹⁶.

There is also another phenomenon worth considering which can be described making reference, again, to the online search market. Google is indeed now widely considered as the leader in the general internet search services with a market share of almost 90%¹⁷, even more Google has enjoyed such a strong position in the market for quite a long time now, especially considering the dynamic nature (as said) of online markets. Still the findings of dominance by the European Commission, at least in respect of online search activity, appears somehow not particularly convincing. Indeed, the rather solid position enjoyed by Google in general search activity may need to be tested against threat stemming (not only from entry into the general online search sector, but also) from vertical search services, i.e. from search services devoted to a particular sector or area such as those provided, by way of example, by TripAdvisor, SkyScanner, Edream and the like. The point to be considered in this case is that, while Tripadvisor, Skyscanner and similar companies may not be able to overcome Google in general search engine they may still represent a competition

¹⁵ J. Greenberg, *Once Upon a Time, Yahoo was the most important Internet Company*, 2015, available at <http://www.wired.com/2015/11/once-upon-a-time-yahoo-was-the-most-important-internet-company/>; Sokol D.D., *Ma J. Understanding Online Markets and Antitrust Analysis*, 2016, available in www.ssrn.com; Dolmans M. Mostyn H. *Internet and Antitrust: An overview of EU and national case law*, in *e-Competition*, n. 71276, www.concurrences.com, the authors provide other interesting examples of innovative companies challenging the position of old incumbent such as Netflix, Spotify, Uber, Lyft, Wikipedia, to name a few, which determined the fall of old - usually brick and mortar - companies (such as Blockbuster) or of traditional product (such as cd, taxi services, encyclopedias).

¹⁶ J. Greenberg, *Once Upon a Time, Yahoo was the most important Internet Company*, cited above at 15; Sokol D.D., *Ma J. Understanding Online Markets and Antitrust Analysis*, cited above at 15; Dolmans M. Mostyn H. *Internet and Antitrust: An overview of EU and national case law*, cited above at 15.

¹⁷ See *Antitrust: Commission sends Statement of Objections to Google on Android operating system and applications – Factsheet* available at http://europa.eu/rapid/press-release_MEMO-16-1484_en.htm.

constraint on Google¹⁸.

The shifting nature of digital markets, briefly mentioned above, may (or should) affect antitrust enforcement in many ways.

As a starter, competition authorities would need to find the right measure of antitrust capable of reconciling the exigency of correcting market distortions by a vigorous enforcement of antitrust rules with that of avoiding an excessive rigidity such as to stifle innovation¹⁹.

Secondly, antitrust authorities would need to gain an in-depth knowledge of the (relevant) digital sector coupled with the ability to try and forecast future possible developments up to the point to forecast the impact that anticompetitive conducts (and mergers) may have on markets that do not yet exist²⁰.

So far, antitrust agencies in both side of the Atlantic have not been quite good in performing this task; this has sometimes led to the adoption of decisions which soon became outdated. At EU level, remarkable is the decision adopted by the European Commission in the Microsoft/Media Player²¹: as widely known, in that decision, the European Commission considered that Microsoft was harming competition by tying its media player (Windows Media Player) with its Windows PC

¹⁸ See, Renda A., Searching for harm or harming search? A look at the European Commission's antitrust investigation against Google, CEPS Special Report, No. 118, 2015.

The relationship between general online search activity and vertical search services is also relevant in the perspective of market definition and it is somehow illustrative of the difficulty to set the line between different markets.

¹⁹ This argument is usually recalled by those authors investigating application of competition rules to the digital industries. Some examples are Dolmans M., Mostyn H., Internet and Antitrust: An overview of EU and national case law, cited above at 15; Steel de A., Larouche P., Note on Disruptive Innovation and Competition Policy Enforcement, Global Forum on Competition, 2015; Lenard T.M., Introduction: Antitrust and the Dynamics of Competition in High-Tech Industries, Review of Industrial Organisation, 2011, Vol. 38 page 311; Jacobson J.M., Do we need a New Economy Exception for Antitrust Law?, 16 Antitrust, 2001, page 89 where the author states that the argument according to which antitrust rules should step back in case of innovative markets has little bearing as there is not proof that antitrust enforcement would generally retard innovation while relevant data show that "unchecked" market power impairs, rather than enhance, innovation. Evans D. S., Antitrust Issues raised by the Emerging Global Internet Economy, Colloquy Essay, Northwestern University Law Review, 2008, Vol. 102, No.4 where the author indicates that competition authorities should use great care in balancing the protection of consumers from anticompetitive behavior with the harm that interfering with complex businesses, rapidly changing, can cause.

Relevant to the topic are also the initial remarks in Jones A., Sufrin B., EU Competition Law, 6th ed. 2016, § 12 page 48, where the point of the right measure of antitrust is considered especially in respect of the debated issue of ex- ante regulating certain kind of "new" digital services, such as online platform. Also relevant in the analysis of the relationship between competition law and new economy is Coates K., An Emerging Competition Law for a New Economy? Introductory Remarks for the Chilling Competition Panel, 2016, available at <http://www.twentyfirstcenturycompetition.com/2016/01/an-emerging-competition-law-for-a-new-economy-introductory-remarks-for-the-chilling-competition-panel/>

²⁰ Eisenach J.A., Knable Gotts I., Recent Antitrust Development in the Online Sector, in Cugia di Sant'Orsola F., Noormohamed R., Guimarães D.A., Communication and Competition Law - Key Issues in the Telecoms, Media and Technology Sectors, 2015, Wolters Kluwer.

²¹ European Commission, Case COMP/C-3/37.792 Microsoft, 24 March 2004.

operating system and, as a result it ordered to Microsoft to create and offer to the market a version of the operating system without the media player²². The point with this decision is that it did not consider the increased ability of users to multi-home, i.e. to download, install and use more than one media player at a time, and, as a consequence, overestimated the foreclosure effect caused by having Windows Media Player pre-installed in personal computers. The remedy imposed was similarly questionable, at least in the fashion approved by the European Commission²³.

Similarly, in the US where the Federal Trade Commission authorised the merger between AOL-Times Warner subject to certain conditions out of the fear that AOL, which at the time was the leading narrow band provider, could become a leader in the provision of broadband access as well while as a matter of fact, however, AOL never became significant, let alone a leader, in the provision of broadband internet access²⁴.

Another adjustment demanded by the new digital era is on the timing of the intervention²⁵: antitrust enforcement need to be quick and procedure need to be carried out swiftly to adopt decisions in order to preserve the competitive structure of the markets. Again, the current attitude of competition authorities, at least of the main

²² For a summary of this decision please see the European Commission Press Release, Commission concludes on Microsoft investigation, imposes conduct remedies and a fine, 24 March 2004, available at http://europa.eu/rapid/press-release_IP-04-382_en.htm.

²³ As widely known, the European Commission imposed on Microsoft the duty to market two different versions of its OS, one including the media player, another without it; no indications were provided in respect of price of the two versions and Microsoft was left free to sell them at exactly the same price (which it actually did) and, as a consequence, OEM continued to buy the Windows version including the media player. For a comment on the Microsoft decision see, among others, Sanad A., The inadequacy of the European Commission's Remedies for Microsoft's tying practices in the Microsoft Cases: Casting doubt on the suitability of the Commission's approach for an Information Technology Economy, in *Global Antitrust Review 2014*. Also critical in respect of the Media Player decision are Pardolesi R., Renda A., Fool Monti Kill Bill?, 2004, available on www.ssrn.com where the authors underlined that the Commission did not sufficiently prove foreclosure effect as it failed to consider, inter alia, that with high speed internet connection downloading of alternative media players was much easier and that users tend to use more than one media player at a time. In this respect, please also see Economides N. Lianos I., The Quest for Appropriate Remedies in the Microsoft Antitrust EU Cases: A Comparative Appraisal, 2009, available on www.ssrn.com, which underlined that as a result of the remedies few OEM entered the market, an aspect which could be explained by the fact that the order of the Commission did not require Microsoft to charge a lower fee for the licenses which did not include the media player. Interestingly to note the authors underlined that the Commission theory according to which Microsoft was trying to expand its dominance in the OS market also to the market of music streaming never materialized. See also Renda A., Searching for harm or harming search? A look at the European Commission's antitrust investigation against Google, cited above at . For a different view on the Commission Media Player decision as showing the negative effects on competition of bundling of media players, please see Kuhn K., Stillman R. Caffara C., Economic Theories of Bundling and their policies implications in Abuse Cases: An Assessment in Light of the Microsoft Case, 2005, available on www.ssrn.com.

²⁴ Eisenach J.A., Knable Gotts I., Recent Antitrust Development in the Online Sector, cited above at 20.

²⁵ The need to respond quickly to the challenge of the new digital world is also underlined by Gurkaynak G., Durlu D., Hagan M., Antitrust on the Internet: A Comparative Assessment of Competition Law Enforcement in the Internet Realm, cited above at 13.

EU competition authority, does not go in this sense: remarkable is the fact that the European Commission opened an investigation against Google's potential abusive practice into the online search market in 2010 and it took 5 years to send a statement of objection²⁶: the risk is that the European Commission may end up sanctioning Google for conducts which may have already exhausted their (if any) anticompetitive effects on the market.

Competition authorities may also need to coordinate their enforcement actions: online services are, by definition, global in nature and anticompetitive conducts may impact contemporaneously more than one jurisdiction²⁷.

Coordination between supra-national and national authorities may also be required in light of potential jurisdictional issues which may arise in respect of cloud services. In fact, provision of cloud services can involve several jurisdictions depending on where physical infrastructures, data storage or the user is located. The effect of a possible abusive conduct can therefore impact several jurisdictions. Let's assume that the illicit consists in blocking portability of data of a Chinese user from a cloud service located in the US to another one located in the EU: in this case which is the competent authority, the Chinese, the US, the EU or all of them?

Even when the cloud provider, data and user are in principle within one and the same geographic space, establishing jurisdiction may not be easy if, by way of example, the conduct impedes the file sharing between users located in different countries.

As widely known, in the EU, the notion of jurisdiction has been interpreted widely so as to encompass all kind of conducts which produce effects in the EU area²⁸ even when non implemented in such area: an approach which can in fact be

²⁶ More information on the phase of the Google sage is available at http://ec.europa.eu/competition/elojade/isef/index.cfm?fuseaction=dsp_result.

²⁷ In this sense also Steel de A., Larouche P., Note on Disruptive Innovation and Competition Policy Enforcement, cited above at 19.

²⁸ For a recent examples of this *vis expansiva* of the European Commission reference is made to European Commission, Case AT 40028, Alternators and Starters, 27 January 2016 where the contacts between the parties occurred completely outside the EU and actually no implementation of the collusive agreement occurred in the EU; nonetheless jurisdiction was established only on the basis that the agreement could have produced effects within the EU territory. The Alternators and Starters case is only the latest in time, the decisional practices of the European Commission knows further example of wider interpretation of EU jurisdiction. Inter alia, reference could be made to the decision in the Javico case ECJ (ECJ, Case 306/96, Javico International and Javico AG v. Yves Saint Laurent Parfums SA, 28 April 1998, ECR 1998, I-01983) where jurisdiction was found in a case concerning ban imposed on distributors in Ukraine and Russia. More widely on this, Whish R., Bayley D. Competition Law, 2015 OUP; Jones A., Sufirin B., EU Competition Law, 6th ed. 2016.

particularly suitable for cloud services but, at the same time, could increase the cases of overlapping jurisdictions. Setting jurisdiction represents therefore another issue for the authorities to consider.

Past experiences demonstrate that antitrust authorities can be reluctant to adapt to the peculiarities of the on-line world, or this is what seems. At EU level, the Director General for Competition, questioned on the point of how to enforce competition rules in the fast changing world of the internet, stated that the traditional antitrust enforcement remains perfectly fit to face the challenges posed by the web-economy since, in any case, internet is not different from any other utilities, such as gas, power, telephony etc.²⁹. In the US, agencies demonstrated to be more cautious on whether the instruments to enforce competition law and the time length of the procedure can be adequate to face the dynamic world of internet based companies³⁰, nonetheless no change of approach is traceable in the courts' decisional practice as the Microsoft case demonstrates. Indeed, interestingly to note in the seminal US v. Microsoft case³¹ held before the Court of Appeal, Microsoft advanced the point that dynamic industries, as it is notably the case of software industries, require a change of route in enforcing competition rules imposing to retrieve direct proof of the company actual behavior³². The court did recognize that there was a lively debate on whether dynamic industries need a special consideration when it comes to competition enforcement but, at the same time, it recognised that there was no general consensus on whether, and to what extent, the current monopolisation doctrine need to be amended to account for competition in technological market characterized by network effects³³.

²⁹ Italianer A, Competition Policy in the Digital Age, speech for the 47th Innsbruck Symposium - "Real Sector Economy and the Internet - Digital Interconnection as an issue for Competition Policy, March 2014. At national level, see also recently Grenfell M. (CMA Executive Director), Lecture on antitrust in the digital age, 15 November 2016 who underlined that competition tools so far available are capable to catch anticompetitive conducts occurring into the digital sectors but need to be adapted to the new situations; the director further underlined that fast-moving character of the digital markets require a quick intervention by competition authorities to tackle anticompetitive conducts which can damage innovation in a very short period of time.

³⁰ Rosch T.J., Commissioner FTC, Intel, Apple, Google, Microsoft, and Facebook: Observations on Antitrust and the High-Tech Sector, 2010 available on www.ftc.gov.

³¹ U.S. v. Microsoft Corp., 253 F. 3d 34 (D.C. Cir. 2001).

³² U.S. v. Microsoft Corp., 253 F. 3d 34 (D.C. Cir. 2001), § IIA. In particular, Microsoft argued that monopoly power must be proved directly rather than through circumstantial evidences, that is by examining the company actual behavior.

³³ U.S. v. Microsoft Corp., 253 F. 3d 34, cited at 31 § IB. The US Court of Appeal actually recognized that the extent to which old economy monopolisation doctrine is applicable to dynamic market was the object of extensive debate which originates from the fact that, in dynamic markets, dominance may be only temporary as technological improvement can easily alter the market and change the respective positions of the companies on

Even when the challenges posed by the new online world are considered in more details, the attention is always captured by the specific issue the agency has to face from time to time: that is the case of the discussions around implementation of competition law in social networking, in respect of e-commerce platforms and lastly the recent issues of the weight of big data in competition between online companies³⁴. Indeed, the tendency of the antitrust agencies, at least at EU level, is that of focusing on specific ad sectorial issue raised by the online world rather than making an effort and trying to gather a bigger picture.

While there is no general consensus on whether the above mentioned characteristics should justify a deviation from the traditional enforcement of competition rules³⁵, they would nevertheless need to be considered when carrying out the usual antitrust analysis and it is likely that they may have an impact on the way in which the market is defined and dominance is assessed. These aspects will be the object of a closer examination in the following paragraphs.

Against this background, the general feeling is that controversies can arise more quickly than it happened in other industries and will also pose increased challenges to antitrust enforcers. As intuitive, the boundaries of the relevant market(s) would be less steady when companies can easily make different products as potential substitutes which in turn also means that assessing the position of companies in the relevant market can prove to be harder than it used to be in conventional sectors³⁶. In addition to that, some of the traditional line of interpretation may need to be rethought when it comes to (some) internet services: as mentioned above, internet operators followed a business model according to which certain web-services are offered for free to all users, when that is the case the traditional approach followed with respect to predation may need to be rethought.

the market. The Court further observed that in technological markets, firms compete through innovation for temporary market dominance from which they may be displaced by the next wave of products advancement.

³⁴ Among the others, Vestager M., Competition in a big data world, Speech given at DLD 16, 17 January 2016, available at https://ec.europa.eu/commission/2014-2019/vestager/announcements/competition-big-data-world_en. This has been the tendency also at the Member State level, please see P. Marsden, Exercising choice: some reflections on competition enforcement in online markets, Speech given at the Baltic Competition Conference, 2 October 2014; Pitruzzella G., Presentazione del Presidente Pitruzzella, Relazione annuale, 15 giugno 2016.

³⁵ Against this solution is, for instance, Jacobson M.J., Do We Need a "New Economy" Exception for Antitrust?, 16 Antitrust, Fall 2001, at 89.

³⁶ Evans D.S., Antitrust Policy and the New Economy, 2002.

To be fair, as rightly pointed out³⁷, the problem with this new economy and, in particular, with introducing dynamic considerations into antitrust analysis is the absence of empirical evidences relating to the relationship between market structure, competition and innovation, without which dynamic analysis in competition law remains in a gestational state. This explains why despite the widespread consensus on the unfitness of traditional approaches no alternative coherent approach has emerged so far³⁸.

1.2. What is Cloud Computing?

When dealing with cloud computing, the first obstacle to overcome is to figure out what exactly cloud computing is and how it functions. Cloud computing, as a technology, is not entirely new: consumers and businesses have been using online services based on cloud technology for a while (without being aware of that), for instance, while checking email or their social profiles. Although largely widespread and more or less familiar to anyone, these services represent only one form of cloud computing services.

In general terms, cloud computing is based on the key idea of virtualization of computing resources which, traditionally physically located close to the user usually in personal hardware or in-house storage datacenters, are now located far from the user and closer to the provider, in datacenters owned by cloud providers or third parties where computing resources are shared among different users³⁹. The virtualisation of computing resources has an impact on several factors: in addition to the different way in which computing resources are stored also the way in which computing resources are managed is different. In traditional computing, IT resources are usually managed by each single user (consumer or business) which usually customise the resources to its specific needs; to the contrary, in cloud computing, management of the resources is (almost) entirely in the hands of the cloud provider, with the resources provided being based on the idea of mass customisation with limited possibility for users to introduce specific tailoring. These features enable

³⁷ Ginsburg D.H., Wright J.D., Dynamic Analysis and the Limits of Antitrust Institutions, in *Antitrust Law Journal*. 2012, Vol. 78 Issue 1, p 1-21.

³⁸ Cugia di Sant'Orsola F., Noormohamed R., Guimaraes D.A., *Communications and Competition Law, Key issues in the Telecoms, Media and Technology Sectors*, Wolters Kluwer, 2015.

³⁹ Kushida K.E., Murray J., Zysmann J., *Diffusing the Cloud: Cloud Computing and Implications for Public Policy*, 2011, *J. Int. Compet. Trade*.

greater flexibility in the use and allocation of resources as cloud computing allows the provider to dynamically add, remove or modify the hardware resources without the need to reconfigure the up level service that depends on those resources⁴⁰. Cloud computing also enables economies of scale as the competitiveness of cloud computing stands on the ability of the provider to build out capacity a scale greater than that possible to individuals: aggregated demand can be then amortized over this scalable infrastructure and sold back to users at a much lower cost⁴¹.

1.2.1. Definitions

There is no general standard definition of cloud computing nor there is agreement on what cloud computing represents in the current IT scenario. Cloud computing can be described as an internet based technology through which computing resources are delivered to users as a service and on demand⁴² or it can just be considered as a different way to deliver “old kind” IT resources. The most accredited definition of cloud computing is, however, the one provided by the National Institute of Standard and Technology (NIST)⁴³, according to which cloud computing is “*a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction*”.

Following the definition of the NIST, cloud computing exhibits five essential characteristics:

- A. *on demand self service*: computing capabilities (server time and network storage) are provided automatically, as needed by consumers or, in other terms, computing resources are accessed unilaterally by

⁴⁰ *Ibidem*.

⁴¹ Kushida K.E., Murray J., Zysmann J., Diffusing the Cloud: Cloud Computing and Implications for Public Policy, 2011, J. Int. Compet. Trade, cited above at 39.

⁴² Millard C. Cloud Computing Law, OUP, 2013; Etro F. The Economics of Cloud Computing, in IUP Journal of Managerial Economics, Vol. IX, No. 2, 2011.

⁴³ The NIST Definition of Cloud Computing, Recommendations of the National Institute of Standards and Technology, Sept. 2011, available on line at <http://csrc.nist.gov/publications/nistpubs/800-145/SP800-145.pdf>. NIST definition is widely referred to by scholars; in this sense please see Millard C. Cloud Computing Law, cited above at 42; Robinson N. Valeri L., Cave J., The Cloud: understanding the security, privacy and trust challenges, 2011.

For a review of the different definition of cloud computing adopted in literature, please see Stieninger M., Niedbal D., Characteristics of Cloud Computing in a Business Context: A Systematic Literature Review, in Global Journal of Flexible Systems Management; March 2014, Vol. 15 Issue 1, p 59-68.

users each time they need them;

- B. *broad network access*: computing capabilities are available over the network and available for different platforms (e.g., mobile phones, tablets, laptops, and workstations), regardless of the location of the users. In this sense, cloud computing services are characterized by ubiquity;
- C. *resource pooling*: the provider's computing resources are pooled to serve at the same time multiple consumers using a multi-tenant model, resources are allocated dynamically according to consumers' demand;
- D. *rapid elasticity*: capabilities can be elastically provisioned and released, in some cases automatically, depending on the demand;
- E. *measured service*: cloud systems automatically control and optimize the use of resources; resources usage can be monitored, controlled, and reported, in a transparent way by both the provider and consumer of the utilized service⁴⁴.

The NIST also provides a categorization of deployment modes and service models. In particular, cloud computing services can be deployed through four models:

- *Private cloud*: cloud infrastructure is provided for exclusive use by a single organization comprising multiple consumers (e.g., business units). It may be owned, managed, and operated by the organization, a third party, or some combination of them, and it may exist on or off premises. By way of example, a private cloud can be used by a business to distribute application among its employees, or to manage a platform or to manage the entire IT infrastructure of the business. Examples of private cloud software are Microsoft System Center and Amazon Virtual Private Cloud;
- *Community cloud*: cloud infrastructure is provided by certain organizations⁴⁵ for exclusive use by a specific community of users. It may be owned, managed, and operated by one or more of the organizations in the community, a third party, or some combination of them, and it may exist on or

⁴⁴ The NIST Definition of Cloud Computing, cited above at 43.

⁴⁵ In particular it is provided by organizations that have shared concerns (e.g., mission, security requirements, policy, and compliance considerations) with users.

off premises. Community cloud services are usually adopted by national agencies or institutions. Community cloud services are adopted by university to share IT resources, in the aviation industry to better manage air transport (an example is the ATI cloud created by SITA specifically for the aviation industry⁴⁶; similarly in the media industry is the Media Community Cloud created by Siemens in order to enhance the exchange of digital media content⁴⁷);

- *Public cloud*: cloud infrastructure is open for use by the general public. It may be owned, managed, and operated by a business, academic, or government organization, or some combination of them. It exists on the premises of the cloud provider. Examples of public cloud include Amazon AWS, Google Apps, Salesforce.com, Microsoft Office 365;

- *Hybrid cloud*: cloud infrastructure is a composition of two or more distinct cloud infrastructures (private, community, or public) that remain unique entities, but are bound together by standardized or proprietary technology enabling data and application portability (e.g., cloud bursting for load balancing between clouds). Examples of use of hybrid clouds are provided by those organizations which have human resource and customer relationship management data in a public cloud and, at the same time, have confidential data in their private cloud.

Turning now to the service models, in brief, a distinction can be made between:

- *Infrastructure as a Service* (“IaaS”): provision of processing, storage, network, and other fundamental computing resources allowing users to deploy and run arbitrary software, which can include operating systems and applications. The way in which virtualization is obtained may vary depending on the different type of service provided but, in general terms, the basic idea concerns the abstraction of computing from physical resources: through virtualization, applications and software platforms are decoupled from the underlying physical hardware with software mimics hardware which somehow

⁴⁶ More information on this specific type of cloud can be found at the following link <https://www.sita.aero/solutions-and-services/ati-cloud>

⁴⁷ More information on this specific service can be found at http://www.sourcingfocus.com/uploaded/documents/Siemens_Community_Clouds_Whitepaper.pdf.

misguide computing applications giving them the impression to deal with physical hardware when in fact they deal with virtual machine⁴⁸. The degree of control which users may be granted over the files varies; in general, users have low or no control over the underlying cloud infrastructure but have control over operating systems, storage and deployed applications. By way of example, in the case of storage facility, users' files are located physically in a datacenter owned by the cloud provider and managed automatically by cloud providers; in this case, users may choose among different available data-storage mechanisms, which may include database and caching tools, or they can sometimes use their own applications to manage data storage⁴⁹. Examples of IaaS services are Amazon Elastic Compute Cloud, Rackspace and IBM Computing on Demand. In particular, Amazon EC2 virtualises physical resources, such as memory, CPU, disk, into virtual machines which are then leased to users; in practice this virtualized machines mimic the physical machine that users normally employ.

- *Platform as a Service* ("PaaS"): allows the creation and deployment of users-created or purchased applications. Applications can be created and run using the suite of programming languages and software development tools made available by the cloud provider or, in certain cases, belonging to themselves. The applications which have been developed could then be run through the internet as a SaaS. As indicated, in PaaS service, the cloud provider makes available to the user the tools necessary to the programmers to design their applications; PaaS solutions also encompass hardware solutions where the applications created can be stored together with the

⁴⁸ For an extensive explanation of how the virtualization process takes place, please see Millard C. Cloud Computing Law, cited above at 42. In particular, the author explains that a physical server may host multiple virtual machines. Each virtual machine operates as a virtual server, running with its own operating system in which applications or other software may be installed to run. In this way, different users may independently create and run their own virtual machines (and application) within one physical server. The author also indicates that not all cloud computing require the use of virtual machine although they may still involve virtualisation. Some cloud computing involves the opposite: instead of one physical server running multiple virtual machine, multiple physical computers are put to work together on a single processing operation. Virtualisation software may be proprietary, such as Microsoft Hyper-V or open source, such as Xen, KVM and Oracle VM VirtualBox. Similarly the operating systems can be proprietary, such as Windows, or open source such as Linux.

⁴⁹ Millard C., Cloud Computing Law cited above at 42 where the service in question concern virtualisation of network, multiple networking hardware and software resources may be combined into a single logical unit, or multiple virtualised network, isolated from each other, may use shared physical infrastructure simultaneously. As with physical networks, virtual networks may involve virtual Internet Protocol addresses, routers, switched, firewall and links. Users can manage their own virtual networks, such as virtual private networks (VPNs) connecting the virtual machine of their choice.

programming and other tools. In simpler terms, it is possible to argue that PaaS comprehends both a (virtualised) hardware and a software layer. As with the IaaS layer, the control over PaaS is almost entirely on the cloud provider which defines the set of tools which can be used, or are otherwise supported, to create the applications in its PaaS; users have control over the deployed applications and limited control over the possible configuration settings for the application-hosting environment. As for the underlying cloud infrastructure - including network, servers, operating systems, or storage - this is entirely under the management of the cloud provider while users cannot exercise any form of control over, and usually they are not even aware of, the kind of cloud infrastructure which is employed by the cloud provider⁵⁰. Interestingly to note the infrastructure employed in PaaS can be either physical or virtual; in other terms PaaS can, in its turn, be built over a IaaS. Examples of PaaS are Microsoft Windows Azure and Google App Engine.

- *Software as a Service* (“SaaS”): allows the use of provider’s applications running on a cloud infrastructure. Conceptually, SaaS is the easiest to get and the most visible among cloud services⁵¹, it relates to applications which are based on a cloud infrastructure and deployed to users over the internet. Applications are accessible from various client devices through either a thin client interface, such as a web browser (e.g., web-based email), or a program interface. Users retain barely no control over SaaS as they do not manage or control the underlying cloud infrastructure including network, servers, operating systems, storage, or even individual application capabilities, with the possible exception of limited user specific application configuration settings⁵². Some SaaS services sometimes use a single running

⁵⁰ In this respect, users have less visibility on the resources used to run their applications. PaaS providers offer users less flexibility and control than IaaS, however PaaS users do control the application code they deploy, and therefore have control over security of their application, see Millar C., Cloud Computing Law cited above at 42.

⁵¹ Sluijs J.P., Larouche P., Sauter W., Cloud Computing in the EU Policy Sphere, Tilec Discussion Paper, cited above at 12.

⁵² *Ibidem*. NIST Recommendations also specifies that a cloud infrastructure is the collection of hardware and software that enables the five essential characteristics of cloud computing. The cloud infrastructure can be viewed as containing both a physical layer and an abstraction layer. The physical layer consists of the hardware resources that are necessary to support the cloud services being provided, and typically includes server, storage and network components. The abstraction layer consists of the software deployed across the physical layer, which manifests the essential cloud characteristics. Conceptually the abstraction layer sits above the physical layer. See also Yoo C., Cloud Computing: Architectural and Policy Implications, *Rev Ind Organ* (2011) 38:405–421.

application to serve multiple users. While SaaS application often originate from SaaS providers, third party SaaS applications may be installed on a SaaS provider's infrastructure for offering as a service, or on private cloud for internal use⁵³. Examples of SaaS includes Gmail, Google Docs and Salesforce.com.

IaaS, PaaS and SaaS may be used as provider-hosted services or installed on users' infrastructure for private cloud computing.

1.3. Purpose and structure of this thesis

The purpose of this thesis is exactly that of analyzing if and how competition rules would need to be adapted to take into account of the peculiar nature of cloud computing services, a relatively recent novelty in the panorama of online services.

My intention is to contribute to the general thinking around competition enforcement in digital markets focusing on assessment of dominance and abuse of dominance in cloud computing services. My choice was dictated by the eager to understand how competition would work in an area not yet deeply considered and by the curiosity to verify whether my findings and thoughts would then be confirmed by enforcement practices.

In addition to that, I also believe that it is about time that cloud computing, and the analysis of competition enforcement in such sector, is taken to a further step which go beyond those issues so far (shyly) raised of interoperability and portability between cloud storage systems. As mentioned in the previous paragraph and as it will emerge from following sections, cloud computing services are (much) wider and more complex than data storage. It is actually a whole new digital universe which has been created by the virtualization of IT resources; a universe which can participate of some of the issues which competition authorities have experienced in the past with Microsoft and recently with Google but which, most likely, may entail facing all new questions.

Further point to consider is that ensuring that competition goes on undistorted is not only relevant for the sake of cloud computing markets but also to ensure that technologies built on cloud can develop correctly. I have indicated already that big

⁵³ Millar C., Cloud Computing Law cited above at 42.

data need to be powered by cloud technology; other developments - not yet foresaw or foreseeable - may need cloud power to be unleashed.

Last, but not least, competition enforcement in cloud computing services is interesting also in a comparative perspective. Cloud services are so far the domain of US based companies with internet giants already active in the sector. Antitrust enforcement has sometimes experiences different outcome in US and EU⁵⁴, it will also be interesting to see whether cloud services would represent another sector of divergence or whether, to the contrary, the position of the two main antitrust authorities would converge.

In term of methodology, my analysis was carried out starting from general principles applicable to dominance and abuse of dominance in the EU with a sneak peak to US rules. An attempt was then made to retrieve indications from the existing case law concerning IT companies, internet services and in general the online world. Finally principles and case law indications were applied to the peculiarity of cloud services.

Following a by-the-book approach, the first chapter considers market definition, the second is on dominance and the last one concerns the identification of possible abusive conducts in cloud services.

⁵⁴ In addition to the Microsoft saga, other example can be the different approach towards Google with the FTC declining to file charges against the search company while the EU Commission, as mentioned, has opened several proceedings against Google (see, Goldfein S., Keyte J., EU and Google: Study in Divergence for Antitrust Enforcement, in *New York Law Journal*, 2015; more widely Ohlhausen M.K., U.S. – E.U. Convergence: Can We Bridge the Atlantic? Remarks at the 2016 Georgetown Global Antitrust Symposium Dinner, 2016).

2. Market Definition

At EU level, market definition is a part of every antitrust investigations, be it related to mergers, cartels or abuse of dominance, although its role varies depending on the conduct under scrutiny: in mergers, market definition is necessary to understand and evaluate the impact that the transaction may have on the market, it is therefore functional to a forward-looking analysis; in cartels, it is necessary to establish the perimeter of the cartel in question to evaluate the impact of the anticompetitive agreement and the measure of the potential fine⁵⁵; in abuse of dominance, market definition is a pre-condition to the finding of market power as the analysis is, in this case, backward-looking.

The centrality of market definition in the assessment of dominance is commonly recognised by the competition agencies operating in the EU jurisdictions while it plays less of a role in the US.

Even if, in the US as well, market definition is a phase of the competition analyses, the attitude of the US agencies and courts towards market definition appears to be slightly different. Indeed there, market definition is considered extremely relevant only in merger control cases, while in cases different than merger the tendency is to limit the definition to a rough indication of the contours of the market⁵⁶; rough indication which may even become unnecessary when the harm can be demonstrated directly⁵⁷. In other terms, if the conduct put in place by a company is evaluated as plainly harmful to competition, then it is deemed not necessary to go into the details of the relevant market. In the perspective of an abuse of dominance

⁵⁵ At EU level, see recently, General Court, Case T-216/13, *Telefonica SA v. Commission*, 28 June 2016, § 213 where the Court indicates that market definition in art. 101 TFEU cases is only necessary to evaluate whether the conduct hampered trade between Member States.

This represents a consolidated principles followed also at national level. In this respect please see in Italy, the decision adopted by the *Consiglio di Stato* (the Highest administrative court), No. 3032 of 13 June 2014, relating to the ICA decision in the case I 731 - *Gare Campane*, according to which market definition in anticompetitive agreement cases is necessary to delimit the ambit within which the anticompetitive agreement could restrict or alter competition.

⁵⁶ Rosch T.J., Commissioner FTC, Intel, Apple, Google, Microsoft, and Facebook: Observations on Antitrust and the High-Tech Sector, Remarks before the ABA Antitrust Section Fall Forum, 18 November 2010, available at www.ftc.gov/speeches/rosch/101118fallforum.pdf.

⁵⁷ ABA, *Market Definition in Antitrust, Theory and Case Studies*, 2012 p. 21.

case (or, in US antitrust parlance, monopolisation case), this implies that abuse of dominance can be found even if dominance is not precisely assessed against a properly defined market.

The US approach has certainly the merit of simplifying antitrust enforcement in those sectors where the definition of the relevant market can be particularly complex⁵⁸ and therefore it could be particularly suitable for dynamic industries (and cloud computing) by privileging the substance of enforcement over the respect of procedural path. Such a solution would go in the direction, sometimes hoped for, of focusing on competitive effects of the conduct rather than on market definition⁵⁹. This line of thought is usually justified in light of the fact that fast changing markets are less subject to conventional presumptions, which make them much harder to define⁶⁰. In addition to that, the traditional approach to market definition, based as it is on price-oriented analysis, may not be fit to define markets where (some of the) services are provided for free to customers or, anyhow, where competition is more based on technological improvement than price. It is further argued that in conduct cases, it is easier than in other areas and namely easier than in merger review, to focus on the effect of the conduct put in place by a company because those are already perceivable at the moment of the antitrust analysis⁶¹.

Although particularly attractive and suitable to the peculiarities of the internet sector, extending the US approach towards market definition to EU jurisdiction may still not be advisable. First, US rules on monopolisation differ from EU provisions on abuse of dominance on a material respect since Sec. 2 of the Sherman Act also encompasses acquisition of monopoly power (i.e. of dominance) and attempt to monopolise. The more limited importance accorded to market definition in the US finds a direct justification on the fact that unilateral conducts may be punished regardless of whether a dominant position (monopoly power) is held by a given company. This is not the case at EU level where the finding of dominance is pivotal to

⁵⁸ As in general the onus of proof is on the antitrust agency, an infringement decision may be annulled by the relevant court if and when a doubt is raised on the correctness of market definition and, by that token, on the conclusion reached on violation of competition law.

⁵⁹ Shelaski H. A., *Information, Innovation and Competition Policy for the Internet*, 2013, p. 1673, available at http://scholarship.law.upenn.edu/cgi/viewcontent.cgi?article=1025&context=penn_law_review. The author makes reference to David McGowan, *Between Logic and Experience: Error Costs and United States v. Microsoft Corp.* At EU level, see also Jones A., Sufrin B., *EU Competition Law*, cited above at 19.

⁶⁰ In this sense also, Gurkaynak G., Durlu D., Hagan M., *Antitrust on the Internet: a Comparative Assessment of Competition Law Enforcement in the Internet Realm*, cited above at 13.

⁶¹ *Ibidem*.

any enforcement of competition rules to unilateral conducts. It should also be considered that a wider formulation of Sec. 2 is coupled with a less incisive enforcement practice which is sometimes more protective towards big companies⁶².

Extending the American way to conducts subject to EU jurisdictions has the potential to render unlawful conducts so far considered perfectly legitimate when realised by non-dominant companies. Such an outcome would extend massively the perimeter of enforcement of competition law and would run counter the rationale behind the rules on abuse of dominance according to which certain conducts could be detrimental to competition when realised by a dominant undertaking because they occur in markets where the degree of competition is already diminished due precisely to the presence of the dominant company. This outcome can be risky in any industrial sector and particularly so in nascent markets based on innovation where balancing antitrust enforcement is fundamental. Disconnecting enforcement of art. 102 Tfeu from a clear definition of the market and a likewise finding of dominance would increase the enforcement rate of the authority and, most likely, negatively affect innovation. Rather than decreasing the relevance of market definition in competition law analysis it would be advisable for competition agencies to try and get a deep knowledge of online market and make their assessment facing a market defined to the largest extent possible. In other terms, instead of less market definition, online markets may require more market definition.

2.1. General rules on market definition

As mentioned, with some differences in the application, market definition applies generally to the enforcement of competition rules regardless of whether the analysis deals with abuse of dominance, merger or cartel. This is also reflected in the methodology followed by the European Commission which is the same for the three areas and it is generally described in the Notice on the Relevant Market⁶³.

US agencies also have guidelines concerning market definition, however

⁶² On this see also Ohlhausen M.K., U.S. – E.U. Convergence: Can We Bridge the Atlantic? Remarks at the 2016 Georgetown Global Antitrust Symposium Dinner, cited above at 58.

⁶³ Commission Notice on the definition of the relevant market for the purposes of Community competition law, OJ, 97/C 372/03 ("Notice on the Relevant Market"). Please note that the Commission Notice represents merely a guidance provided to companies and their advisors on how the European Commission interprets the notion of relevant market and the evidences that it may use in its assessment. Guidelines are not in themselves binding.

those guidelines only relate to horizontal merger⁶⁴. In practice rules on market definition are sometimes followed in conducts cases⁶⁵ as well but the general tendency is to consider that merger rules could not be extended to conducts case since in the latter situations the exercise of market power may have already allowed a company to raise prices above the competitive level, so that following the same approach used in assessing horizontal merger may lead to misleading results⁶⁶. This clarified, there are no major differences between the two jurisdictions in the approach to market definition.

The relevant market is identified according to a product and a geographic dimension. A relevant product market is defined as an area comprising “*all those products and/or services which are regarded as interchangeable or substitutable by the consumer, by reason of the products’ characteristics, their prices and their intended use*”; a relevant geographic market encompasses “*the area in which the undertakings concerned are involved in the supply and demand of products or services, in which the conditions of competition are sufficiently homogeneous and which can be distinguished from neighbouring areas because the conditions of competition are appreciably different in those areas*”⁶⁷. In assessing both market dimensions, the Notice on the Relevant Market identifies three sources of competitive constraints which should be considered: substitution on the side of demand, substitution on the side of supply and potential competition. Demand side substitutability identifies those products which consumers would consider substitutes and therefore should be included within the same market; supply-side substitutability aim at identifying those suppliers which may be able, within a short period of time and low investments, to start producing the product that the undertaking being considered is making. Both demand-side and supply side criteria apply to actual competitors, i.e. competitors already active in the market. A third parameter is also reported in the

⁶⁴ US DoJ and FTC, Horizontal Merger Guidelines, 2010.

⁶⁵ Sullivan L.A., Grimes W.S., Sagers C.L., The Law of Antitrust, An Integrated Handbook, 3rd. Ed., West Academic Publishing, 2016.

⁶⁶ ABA, Market Definition in Antitrust, Theory and Case Studies, cited above at 57 p. 22. This is the problem usually referred to as “cellophane fallacy” in reference to a case decided by the Supreme Court (United States v. E.I. du Pont de Nemours and Co). The misleading factor is that in cases where price is already the result of the exercise of market power, the switching of customers to other suppliers in response to a increase in price does not mean that the increase is not profitable since it is already the result of the exercise of market power.

⁶⁷ Notice on the Relevant Market, cited above at 63 § 7-8. Under US antitrust law, a relevant market is defined as comprehending “*the array of producers of substitutes products that could control price if united in a hypothetical cartel or as an hypothetical monopoly*”, see Areeda P.H., Hovenkamp H., Antitrust Law: An Analysis of Antitrust Principles and their applications, 2016, Wolters Kluwer §530, p. 236.

Notice on the Relevant Market, it is potential competition or, in other words, the competition constraints which may be exercised by those undertakings which are not yet in the market but could enter quickly in case an increase in price, or the change of another competition parameter, would make entry profitable. Despite the indications of the Notice on the Relevant Market, in practice market definition is carried out considering mostly, when not exclusively, demand-side substitution; supply side substitution is taken into account only when it is capable to determine the same outcome as demand-side substitution and potential competition is analysed in a further stage when dealing with market power⁶⁸.

In more details, demand-side substitution is evaluated considering the reactions of customers to an increase in the price of a given product. The test applied by the Commission is the so called SSNIP test according to which it is evaluated whether consumers would switch to another product should a small⁶⁹ but significant non-transitory increase in price of the analysed product occurs. If, as a result of such increase, a consumer would switch to another product, so that the increase in price become unprofitable, then the candidate market should also include that other product. This exercise is repeated with other products up to the moment in which the SSNIP criteria is satisfied and the increase in price would no more induce consumers to opt for another product. The SSNIP test is equally applied when investigating the geographic dimension of the market except that in this case the substitution considered is between geographic areas and it is aimed at identifying whether consumers would be induced to buy that product in a different location as a result of a small but significant non-transitory increase in price occurring in a certain territory⁷⁰. This test has been applied at large by the European Commission and the European courts although it could prove to be particularly tricky in dominance cases where the price considered in the SSNIP test could already be set at the highest possible level (in other terms it could be a monopoly price) so as that a small increase in the price of a product would induce consumers to move to another one not necessarily because those two products are felt as substitutes but rather because consumers were already at a point where they would cease to buy product from the

⁶⁸ Notice on the Relevant Market, cited above at 63 §14.

⁶⁹ The increase in price considered is that in the range of 5-10%, see Notice on the Relevant Market, cited above at 63 § 17.

⁷⁰ Notice on the Relevant Market, cited above at 63 § 15-19.

monopolist⁷¹.

Supply-side substitutability is also considered when defining the relevant market although, as mentioned, to a less extent and only in respect of those industries where its effect is akin to demand substitution, i.e. where suppliers are able to switch production to the relevant product in the short term in response to a small increase in prices without incurring significant costs or risks⁷². As indicated in the Notice on the Relevant Market, this typically occurs in cases where a company produces different types of a good: in that case even if from the perspective of consumers products are not substitutable, those goods would be included as part of the same market when the supplier is able to easily and cheaply offer and sell the several varieties. To the contrary, when supplying change entails incurring material costs in order to adjust the productive assets, or when it requires the adoption of strategic decisions and time consuming processes then it would not be considered at the stage of market definition⁷³.

2.1.1. Evidences used to define the relevant market

The Notice on the Relevant Market contains indications also in respect of the range of evidences which can be used to evaluate demand-side and supply-side substitution. As expressly indicated, the list of evidences provided in the notice is merely indicative and any other relevant evidence can be employed by the parties to prove a certain definition. This said, when defining the relevant product market, the Commission would consider evidences relating to substitution in the recent past⁷⁴, inferences stemming from quantitative tests expressly designed to delineate the market⁷⁵, the view of customers and competitors⁷⁶, consumer preferences as

⁷¹ This situation is usually referred to as the Cellophane Fallacy after the erroneous decision adopted by the US Supreme Court in *United States v. El Pont de Nemour and Co.* (351 US 377_1956).

⁷² Notice on the Relevant Market, cited above at 63§ 20.

⁷³ Notice on the Relevant Market, cited above at 63§ 23. See also O'Donoghue R., Padilla J., *The Law and Economics of Article 102 TFEU*, Hart Publishing, 2016, Chapter 3.

⁷⁴ Notice on the Relevant Market, cited above at 63 § 38 where it is indicated that this implies the evaluation of recent events or shocks that can provide example of substitutions among products. Also the launch of new products in the past and the impact that it has on existing product is considered helpful.

⁷⁵ Notice on the Relevant Market, cited above at 63 § 39. Examples of those tests concern the evaluation of cross elasticity, test based on similar price movements over time, etc.

⁷⁶ Notice on the Relevant Market, cited above at 63 § 40. Usually, the Commission will contact customers and competitors and ask them questions about the possible boundaries of the market, substitutions, etc.

illustrated for instance by market studies and consumers surveys, analysis on barriers and costs associated with switching demand to potential substitutes⁷⁷, the presence in the market of different group of customers which can be subject to price discrimination⁷⁸.

The Notice on the Relevant Market also enlists a set of evidences helpful in assessing the extent to which suppliers located outside the candidate market can effectively constraint the behaviour of companies located inside such market. In particular, the Commission would consider: past evidence of diversion of orders to other areas⁷⁹, basic demand characteristics such as customers' preferences for national products which may influence the substitutability⁸⁰, current geographic patterns of purchase⁸¹, information on trade flows⁸², barrier and switching costs associated with diverting orders to companies located in other areas⁸³ (such as transport costs, legal barriers, contractual obligations⁸⁴), in addition also customers and competitors view on geographic substitutability would be considered⁸⁵.

2.1.2. The relevant decisional practice

In addition to the guidelines of the Notice on the Relevant Market, decisional practice of the European Commission and courts is also useful in addressing market definition⁸⁶. As mentioned in the previous paragraphs, the way in which market is defined may slightly differ depending on whether such exercise is carried out in merger control cases or in abuse of dominance investigations. this said, in this paper reference would be made to the practice of the EU competition agency at large in an

⁷⁷ Notice on the Relevant Market, cited above at 63 § 42.

⁷⁸ Notice on the Relevant Market, cited above at 63 § 43.

⁷⁹ Notice on the Relevant Market, cited above at 63 § 45. The Commission would consider evidences on changes of price between different geographic areas and consequent customers reactions. In this respect, the Commission also considers that the same quantitative tests employed to measure product substitutability could be employed in geographic definition as well, bearing in mind that the evaluation could be influenced by a great variety of factors of difference between territories.

⁸⁰ Notice on the Relevant Market, cited above at 63 § 46.

⁸¹ Notice on the Relevant Market, cited above at 63 § 48. The Commission indicates that useful insight can derive from the tendency of customers to purchase from companies located anywhere in the European Union on similar terms, or whether they procure their supplies from tenders where companies from anywhere in the Union participate.

⁸² Notice on the Relevant Market, cited above at 63 § 49.

⁸³ Notice on the Relevant Market, cited above at 63 § 50. In this respect, the Commission would consider whether the diversion towards other areas is prevented by the measure of transport costs, regulatory barriers such as quota, custom tariffs; also significant switching costs in buying on other areas would be considered.

⁸⁴ O'Donoghue R., Padilla J., *The Law and Economics of Article 102 TFEU*, § 3 cited above at 73.

⁸⁵ Notice on the Relevant Market, cited above at 63 § 47.

⁸⁶ Whish R. Bailey D., *Competition Law*, cited above at 28.

attempt to find useful guidelines to be transposed to market definition in cloud computing services as well.

To my knowledge, there is no decision concerning abuse of dominance in cloud computing cases at EU level. An example of such decision can however be found in the US where a Section 2 of the Sherman Act violation was investigated by the US District of California in the real estate property management business. The case involved two companies, RealPage Inc. (“RealPage”) and Yardi System (“Yardi”)⁸⁷, both marketing cloud solutions specifically for the real estate sector⁸⁸. Yardi has developed a software, called Voyager, for the management of back office accounting which could be installed on a computer (on premises) – or accessed remotely through the internet. On its side, RealPage marketed a SaaS solution whereby it offered “vertically-integrated” systems and support designed to address specifically the needs of multifamily real estate owners and property managers throughout the United States. RealPage SaaS allowed clients to aggregate applications from multiple software providers into a single system, which was stored on RealPage’s servers and could be remotely accessed by the client via the Internet. The controversy between the parties concerned an alleged attempt by Yardi to sabotage RealPage SaaS with the purpose not to lose clients in favour of its competitor⁸⁹. On market definition, the District Court followed the proposal of RealPage according to which the relevant market coincided with that of supplying vertically integrated cloud computing services specifically designed to meet the need of real property owners. It was indeed observed that generic cloud computing services were not sufficiently specialised to meet the need of real estate owners and managers; self-hosting could not be considered as a reasonable substitute because a small but significant increase in price in the vertical cloud market would not cause cloud customers to switch to on-premise hosting due to the latter inability to meet the specific needs of users as well as because of its too much higher costs (e.g. cost to hire IT personnel, to purchase hardware, to manage and maintain the infrastructure

⁸⁷ RealPage Inc. c. Yardi System Inc., Case No. CV 11–00690–ODW (JEMx), US District Court, C.D. California, Western Division, Feb. 13, 2012, 852 F.Supp.2d 1215 (C.D.Cal. 2012).

⁸⁸ The case originated from a claim raised by RealPage against Yardi accused of violating Section 1 of the Sherman Act, Section 2 of the Sherman Act as well as violation of the California Cartwright Act, Cal. Bus. & Prof.Code §§ 16720, 16722, 16726 & 16727; intentional interference with contract; intentional interference with prospective economic advantage; and unfair competition in violation of the California Business and Professions Code section 17200, also known as the Unfair Competition Law.

⁸⁹ RealPage Inc. v Yardi Inc. No. CV 11–00690 ODW (JEMx), Aug. 11, 2011.

necessary for on premise hosting).

The decisional practice is wider in the area of merger control at least at EU level⁹⁰. In this sector three categories of decisions can be identified. In a first category, cloud services were the direct and close object of evaluation; in a second category cloud computing was addressed when considering widely IT services; lastly, in a third category, cloud computing emerged only in the course of the market investigation as a point raised by the respondents.

Cloud services were the specific object of two merger decisions: a first decision concerned the acquisition of control by two companies, CDC - active in the management of funds - and Bull - active in the IT infrastructure sector - over a joint venture whose main purpose was the marketing of services in the area of cloud computing⁹¹; a second and most recent decision concerned the acquisition by IT company ATOS of Bull, also active in the IT service⁹². While those decisions

⁹⁰ Merger decisions concerning the cloud computing sector are also available at national level. In 2015, the Polish Office of Competition and Consumer Protection cleared an acquisition by 1&1 Internet SE of Home.pl S.A. in the sector of information technology and computer service activities. The authority identified as relevant markets: (i) the national market for .pl national domain (registration and operation), (ii) the national market for hosting services and (iii) the national market for cloud computing. With reference to the market for cloud computing, the authority took in consideration the position of the notifying parties according to which the relevant product market (cloud computing) could be further segmented into Infrastructure-as-a-service - IaaS, web presence and web applications, hosted communication and collaboration and Software-as-a-Service - SaaS. No definitive conclusion on the definition of the market was adopted by the authority. As for the geographic dimension of the market, the Polish authority considered it to be national in light of language barriers, recipient's localisation, speed of action (considering big data transmission distances) as well as the ambit of activity of the notifying parties. (Urząd Ochrony Konkurencji i Konsumentów, Decision no. DKK2-421/46/15/AI of 22 December 2015). The French competition authority considered cloud computing services in decision relating to the acquisition by the Vivendi group of the Telindus France groupe; in that decision the authority largely recalled and applied the approach followed by the European Commission in its merger decision (Autorité de la Concurrence, Decision no. 14-DCC-62 of 29 April 2014). Cloud services were also referred to by the Finnish Competition Authority in the context of a merger review encompassing the market for hosting services offered to businesses. When evaluating the relevant product market, the authority considered that hosting services could be possibly divided into server colocation rental and server rental and maintenance which includes cloud services; the authority however left open the definition. Considering the geographical dimension, the authority considered it to be at least national due to the fact that hosting services are not dependent on the location of customers or of the data centers since, for example, cloud services can be provided for customers' use anywhere in the world (Kilpailu- ja kuluttajavirasto, decision no. 197/KKV14.00.10/2014 of 26 May 2014). The Spanish competition authority considered cloud services as part of the wider market for rental of storage capacity and processing and identified such market as having a EEA-wide dimension noting that this broad geographic market definition is particularly suitable to cloud services where the main suppliers are active worldwide (Comisión Nacional de la Competencia, decision no. C/0369/11 of 29 July 2011). In UK, the OFT referred to cloud services in the context of the analysis of SAP (a software company) acquisition of Ariba, a software and IT services company also providing cloud services. In that decision, the OFT considered whether it is appropriate to separate between on-premise solutions and solutions that are provided in the cloud; the authority however noted that there is no clear view on this point which was ultimately left open. The UK case is also interesting because, similarly to the EU approach, the authority started its analysis moving from the results of the Gartner report (OFT, Anticipated acquisition by SAP AG of Ariba, Inc, 27 September 2012).

⁹¹ Please see European Commission, Case COMP/M.6798, CDC/Bull/JV, 30 January 2013.

⁹² Please see European Commission, Case COMP/M.7308, Atos/Bull, 31 July 2014. Those decisions relate to simplified procedure cases and therefore contain no information on definition of the relevant market. However, more information on the activities of the parties can be drawn from press releases; please see <http://atos.net/en->

concerned expressly cloud services, they were (unfortunately) decided following a simplified procedure⁹³ and therefore they did not contain any description of the relevant market.

A second category, larger in term of numbers of decisions, concerns the IT sector at large. The IT service was the sector considered in the decision of December 2014 concerning the acquisition by IBM Germany of the business responsible for the provision of IT services within Lufthansa Systems Aktiengesellschaft (seller)⁹⁴. Although, as it is sometimes the case, the European Commission did not reach any definite conclusion on possible further segmentations within the wider market, the decision is anyhow interesting to our purposes. In that decision, indeed, the European Commission⁹⁵ considered whether a segmentation was possible depending on the different functionalities of the IT services and on the different industries in which the customers are active⁹⁵.

As for functionality, following the indication contained in the Gartner report⁹⁶, the European Commission considered whether a segmentation was possible between: i) consulting, ii) implementation, iii) IT outsourcing, iv) business process outsourcing, v) software support and vi) hardware support. The decision then

[us/home/we-are/news/press-release/2014/pr-2014_05_26_01.html](http://ec.europa.eu/competition/mergers/cases/additional_data/m8215_56_6.pdf): in this press release it is reported that "Bull is a leading player in Cloud, Cybersecurity, and Big Data, and the European global leader in High-Performance Computing" and that the transaction would create the "number one" European cloud operator. Similarly a recent merger decision in the cloud area was adopted by the European Commission on 24 October 2016; it concerns the acquisition by Apollo Management L.P. of the US business of Rackspace. Based on the few information so far available, the businesses of the parties overlap in the sub-segment of public cloud computing services. The decision (Case No. M.8215) has not been published yet, however, since it was issued following the simplified procedure, it is unlikely to provide indication useful to market definition (a brief description of the transaction is available at http://ec.europa.eu/competition/mergers/cases/additional_data/m8215_56_6.pdf as well as at http://europa.eu/rapid/press-release_MEX-16-3529_en.htm). Based on the information publicly available, the Apollo/Rackspace merger was also cleared at US level in late August 2016, unfortunately the decision is not available.

⁹³ At EU level, it is provided that mergers meeting certain criteria do not usually raise competition concerns and, therefore, are evaluated following a simplified procedure. This has as its drawback that the decision issued contains barely few information on the transaction and the relevant markets.

⁹⁴ European Commission, Case COMP/M. 7458, IBM/INF Business of Deutsche Lufthansa, 15 December 2014. Similarly, European Commission, Case COMP/M. 6873, Intercontinental Exchange/NYSE Euronext, 24 June 2013; European Commission, Case COMP/M.6921 IBM Italia/Ubis, 19 June 2013.

⁹⁵ In this respect, please also see European Commission, Case COMP/M. 5301 Cap Gemini/Bas, 13 October 2008. In the description of the relevant market, the European Commission when considering whether the IT services should be considered as a market comprehending all the IT services or whether the market should be further subdivided. In doing that, the European Commission indicated that the market investigation has show that the market for IT service is a dynamic market with a degree of supply side substitutability between the various IT services. In addition, the European Commission noticed that while small competitors seem to focus only on specific sub-segments, the largest IT service provider are active across the various service categories offering almost all IT services to their customers. As a consequence, a relevant product market comprising all IT services cannot be excluded (§12). See also, European Commission, Case COMP/M.6921 IBM Italia/Ubis, cited above at 94, § 9-10.

⁹⁶ Gartner is a research and advisory company. It publishes reports on emerging markets among which cloud computing.

expressly considered whether the segment of IT outsourcing services could be further sub-divided into: a) public cloud computing services, b) IaaS, c) infrastructure outsourcing services (including potential further sub-segments for data centre services, network outsourcing, end-user device outsourcing, and help desk outsourcing), and (d) application outsourcing services⁹⁷.

The notifying parties argued that such sub-segmentation did not make sense considering that (i) the purpose of all these services is the same and namely that of delivering day-to-day IT operations and management of infrastructure, applications, and flow of information; (ii) even if a supplier would not be able to offer specific services within the IT outsourcing segment, it could act as prime contractor and entrust other suppliers with the provision of the services that are not in its portfolio; (iii) infrastructure outsourcing services are generally the same with respect to all industry sectors (whereas application outsourcing services may be tailor-made based on the specific applications needed within each industry sector); and (iv) there would be full demand-side substitutability between infrastructure outsourcing services, IaaS, and cloud services as they are all aimed at satisfying the same needs of a customer, the difference residing in the technical way of achieving this⁹⁸.

The European Commission indicated that although certain factors could point towards separate markets for infrastructure outsourcing services seen from a demand-side perspective, from a supply side perspective the degree of substitutability between IT outsourcing services and other type of IT services was high, as providers of IT services that do not currently provide IT outsourcing services would have the ability to start providing them in the short term⁹⁹.

As regard a possible segmentation based on the industry sector, the notifying parties argued against such conclusion considering that the technology, skills and know how involved in the provision of those services were the same for all industries. Contrary to such position, the European Commission evaluated that a distinction

⁹⁷ See also, European Commission, Case COMP/M.6921 IBM Italia/Ubis, cited above at 94, § 15. During the market investigation, some respondents pointed out to elements that from a demand side led to the existence of a possible separate relevant market for infrastructure outsourcing services (or even of possible separate market segments for data center services and network outsourcing services), namely the fact that these services may be offered and purchased on a stand-alone basis, and that they have specific product characteristics. From a supply-side perspective, the market investigation also revealed that almost all responding competitors and several customers consider that competitors, which do not currently provide IT outsourcing services, would have the ability to start providing these services in the short term (§17).

⁹⁸ See also, European Commission, Case COMP/M.6921 IBM Italia/Ubis, cited above at 94, § 14.

⁹⁹ Case COMP/M. 7458, IBM/INF Business of Deutsche Lufthansa, cited above at 94 § 23

between industries was plausible¹⁰⁰. On the geographical dimension of the market, the European Commission indicated that the market for IT services can be considered wider than the national dimension since the major IT services suppliers operate on a worldwide basis and customers frequently have worldwide/EEA wide tenders¹⁰¹. The position expressed by the European Commission in the IBM case has been reiterated in further merger decisions concerning IT services at large¹⁰².

Although not directly dealing with cloud computing, such range of decisions nonetheless provide indications on how cloud computing services have been considered so far, adding some insights on how to define the market in cloud computing cases.

Interestingly to note, in those decisions, the European Commission did not refer nor even consider the definition and classification of cloud services as provided by the NIST. This is evident considering that, in the NIST definitions, “public cloud” is used to refer to a deployment mode common to all the service models and not to a specific cloud service; this means, in turn, that both IaaS, PaaS and SaaS can be deployed as a public cloud. Differently, in the IBM case, the European Commission seems to qualify public cloud as a service alternative to IaaS. This outcome may also be ascribed to the fact that cloud services was not considered closely in the mentioned decisions but only as part of the wider IT outsourcing services sector.

Also relevant are the observations of the notifying parties which indicated that infrastructure outsourcing services present the same characteristics regardless of the industrial sectors in which they are employed; to the contrary applications outsourcing services are generally tailor-made to the specific need of each industry.

Those decisions are also meaningful as for the evidences and methodology. The European Commission referred, quite extensively, to the findings of an industrial sector report as the starting base to then articulate market definition; supply-side substitution was also extensively considered in the analysis, a point which may indicate that in respect of IT service - and possibly cloud computing services - in

¹⁰⁰ Case COMP/M. 7458, IBM/INF Business of Deutsche Lufthansa, cited above at 94, § 28. This approach followed the one followed in European Commission, Case COMP/M.6921 IBM Italia/Ubis, cited above at 94 § 22 et seq.

¹⁰¹ Case COMP/M. 7458, IBM/INF Business of Deutsche Lufthansa, cited above at 94 § 34. See also, European Commission, CapGemini, cited above at 94, § 17-20.

¹⁰² Please see Case COMP/M. 6873, Intercontinental Exchange/NYSE Euronext, cited above at 94 Case COMP/M.6921 IBM Italia/Ubis, cited above at 94 Case COMP/M. 5301 Cap Gemini/Bas, 13 October 2008, cited above at 94.

addition to demand side substitutability, also substitution between suppliers need to be addressed. Supply-side substitutability was also determinative when considering the geographic dimension of the market, where the European Commission (correctly) pointed out that IT services can be supplied from anywhere in the world and customers were able to buy those services on a worldwide/EEA basis.

Another relevant decision is Seagate/HDD business¹⁰³ where the focus of the analysis was on substitutability between different storage devices. A point considered in that case was whether the development of cloud solutions could affect the usage of traditional large storage devices, such as hard disk drive. Following the decision, while cloud services can indeed have an impact on usage of large storage devices, such effect was - at the time (2011) - still limited in the short period of time considering the persisting worries on migrating to the cloud relating to both security and problems associated with the transfer of data¹⁰⁴.

Lastly, in a set of decisions, cloud services were not directly considered when exploring the possible segmentations of IT markets but popped-up during the market investigations mainly with reference to the impact that cloud services can have in future evolution of IT services.

Computer Science Corporation/iSoft Group¹⁰⁵ concerned a merger between a provider of IT services (CSC) and a provider of healthcare software (iSoft); in that case the markets at issue were those of IT services and IT software. When collecting the view of competitors and consumers on IT software market, one respondent pointed out that an important contemporary *“emerging dimension to the delivery of healthcare software to provider organisations is that hosting, utility computing and Software as a Service (SaaS) are becoming popular mechanisms to deliver consumer software services. All major technologies companies upon which software vendors build their solutions are moving to cloud based technologies to support this new paradigm of software provisions”*¹⁰⁶. The European Commission did not elaborate further on this point merely acknowledging that an increase in the use of SaaS in the healthcare sector in the future was likely.

¹⁰³ European Commission, Case COMP/M.6214, Seagate/HDD Business of Samsung 19 October 2011.

¹⁰⁴ The market investigation revealed that such period could be around 3 years in the case of consumers and not less than 5-10 years in the case of enterprises

¹⁰⁵ European Commission, Case COMP/ M. 6237 Computer Science Corporation/iSoft Group, 20 June 2011.

¹⁰⁶ European Commission, Case COMP/ M. 6237 Computer Science Corporation/iSoft cited above at 105, footnote 14.

Similarly in Avnet/Magirus¹⁰⁷, the notifying parties submitted that cloud services can be considered as substitutes to the traditional approach of purchasing of IT hardware, software and services and key OEM are driving convergence between these categories¹⁰⁸; this position was also shared by major customers and by a small portion of competitors¹⁰⁹.

In Microsoft/Nokia¹¹⁰, the issue was whether cloud services could operate as substitute for on premise solutions within the enterprise mail server software and services market¹¹¹. In more details, according to Microsoft the enterprise mail server software and services market comprises the following segments: i) on-premise enterprise mail servers, ii) IaaS and iii) SaaS. Such segmentation was based on the evaluation that while enterprise mail servers were traditionally deployed on-premise, they are now increasingly offered as hosted solutions through IaaS or SaaS; Microsoft also noted that from a demand side perspective, adoption of IaaS and SaaS is growing along all businesses and from a supply-side perspective, competition from hosted solution has led providers of on-premise mail server software to reduce royalties and/or to increase functionalities to users without commensurate royalty increases¹¹². Respondents to the market investigation underlined that potential issues of security and confidentiality could deter from employing IaaS solutions as substitute for on premise solutions, despite their comparability in term of functionality and availability¹¹³. Perplexities were also raised

¹⁰⁷ European Commission, Case COMP/M. 6577, Avnet/Magirus, 21 September 2012.

¹⁰⁸ Case COMP/M. 6577, Avnet/Magirus, cited above at 107 §14.

¹⁰⁹ Case COMP/M. 6577, Avnet/Magirus, cited above at 107 § 16. As it is sometimes the case, the European Commission left the definition of the market open. In addition, in European Commission, Case COMP/M. 7337, IMS Health/Cegedim Business, 19 December 2014, one point which was evaluated in defining the relevant market was whether the market of Customer Relation Management (CRM) software could be further segmented on the basis of (i) functionality of the software, such as sales force automation or marketing automation; (ii) industry sector in which the customer is active; (iii) mode of deployment, that is to say installation on the premises or host-based deployment (SaaS); or (iv) customization, i.e. custom-built solutions as opposed to standardized software.

¹¹⁰ European Commission, Case COMP/M. 7047, Microsoft/Nokia, 4 December 2013.

¹¹¹ Case COMP/M. 7047, Microsoft/Nokia, cited above at 110, §57. The European Commission considered several markets among which that of mail server software and services which includes a range of communications services, such as email, calendar, contact, and task management, as well as other services, such as archiving and voicemail handling, to computing devices such as smartphones, tablets and PCs ("clients"). The view of Microsoft, as the notifying party, was that a distinction should be made between enterprise mail server software and services and consumer email services due to differences in characteristics and functionalities.

¹¹² European Commission, Case COMP/M. 7047, Microsoft/Nokia, cited above at 110, § 57-60.

¹¹³ European Commission, Case COMP/M. 7047, Microsoft/Nokia, cited above at 110, § 65. Several respondents however indicated that customers may not perceive hosted solutions as sufficiently secure given the lack of direct control over the servers; further point which was indicated is that IaaS does not allow the same level of integration in the corporate network.

in respect of SaaS and their ability of being perceived as substitutes for on premises solutions, at least for sophisticated corporate customers: indeed, SaaS usually presents a smaller set of advanced features and, as such, are perceived as incapable to face corporate needs¹¹⁴. In term of geographical dimension, it was indicated that the market for enterprise mail server software and service was at least EEA-wide if not worldwide¹¹⁵.

The interesting point to note in this last set of decisions, where cloud services came up only during the market investigation, is how the perception of the possible impact of cloud services on traditional IT services was different between respondents and the European Commission: indeed, while respondents frequently brought up the point that cloud could reshape competition in the traditional IT sector, this aspect was, more or less, neglected by the European Commission, at least at the time when those decisions were adopted. Anyhow, the suggestions stemming from the market investigation is that security and confidentiality are issues which could weight in the choices of users and that the use of cloud solutions is increasing.

2.2. A tentative definition of cloud market(s)

Having described the relevant framework, in the following sections an attempt would be made to apply the mentioned principles and guidelines to market definition in cloud computing services.

2.2.1. Basic principles and evidences

Briefly recalling, drawing the boundaries of the relevant market is a first necessary step in any abuse of dominance investigation carried out at EU level.

As mentioned, market definition is also relevant under the US regime although it appears to play a key role mainly in the context of merger control while agencies and courts seem to confer less importance to this phase when it comes to abusive conducts especially if the abusive nature of the conduct is clear or almost clear.

¹¹⁴ European Commission, Case COMP/M. 7047, Microsoft/Nokia, cited above at 110, § 66. On the other hand, it was also indicated that, due to their simplified fashion, SaaS could be perceived as substitute of on-premises solution by those customers that do not need the full set of sophisticated capabilities.

¹¹⁵ European Commission, Case COMP/M. 7047, Microsoft/Nokia, cited above at 110, § 85.

2.2.1.1. How to define relevant market

Before actually moving to define the market(s), a reflection on the principles which can be applied to market definition in cloud computing markets is needed. Based on what indicated above and on the general consideration applicable in general to digital dynamic markets, two points can be made which could differentiate market analysis in cloud computing sector compared to traditional industries.

The first is the relevance which supply substitution is likely to have in assessing cloud markets. The Notice on the Relevant Market and the general traditional approach followed by the European Commission in merger cases, focus mainly (when not exclusively) on demand-side substitutability. The characteristics of cloud computing cases and the *vis expansiva* of cloud providers mainly represented by big companies already active in the online sector, may suggest a larger role for supply-side substitutability. Cloud computing can be one of those area where supply-side substitution may produce on the market the same impact that demand-side substitutability usually has. Suppliers can be really in the position to swiftly adapt their production to meet the new need of users in term of IT resources by simply adding features, functionalities or delivery mode to their core products/services. When that is the case, the competition constraints which can derive may play a role in setting the boundaries of the market. The point which remain open is how to balance and evaluate the outcomes of the analysis carried out applying the two test (i.e. demand-side and supply-side) which could potentially bring to different conclusions; in this respect, it would be interesting to see how the practice of the authorities will evolve.

Further point to consider is whether cloud computing may represent the occasion to reconsider anticipating potential competition analysis at the stage of market definition. In a sense, conferring relevance to supply-side substitution and, in particular, to the ability of supplier to easily swift production somehow already implies an evaluation of constraints stemming from potential competitors. Indeed, when considering supply-side substitutability, the analysis would need to be extended not only to providers already active in offering cloud computing services but also to those offering other type of online services, such as e-commerce platform, social networking, search engine, etc. This point could not be neglected especially considering how some cloud computing services developed in the first place.

Second point to note: the test applied to measure competition constraints may need to be reformulated. In particular, one possibility would be to substitute the small but significant non transitory increase in price - SSNIP - test with the small but significant non-transitory decrease in quality - SSNDQ - test.

We have mentioned already the scepticism on the suitability of SSNIP test for internet services, in light of the free nature of those services and the fact that, to the contrary, the SSNIP test is based on price¹¹⁶. This reasoning could only partially be extended to cloud computing since, contrary to social networking and search engines (on which most of the literature is focused), cloud services are offered against payment of prices¹¹⁷ albeit according to different formulas in part contemplated also services provided for free¹¹⁸. Despite this, price does not seem the decisive factor in users' choice: this applies especially to PaaS and SaaS while in respect of IaaS, where the possibility to differentiate services is somehow more limited, it could not be excluded that after an initial period, competition may develop along "more traditional" line where price assumes a key role¹¹⁹.

This clarified concerning IaaS, in general, cloud services are deemed cheaper than on-premise IT services, which may imply that a potential increase in price would not impact on profitability of cloud services compared to on-premise solution and, therefore, users may internalise it without this necessarily imply absence of substitutability; as a further articulation of the reasoning the price which will determine users to switch to other products may be much higher than the ordinary 5-10% reference would suggest. Secondly, users choices could, more likely, be determined by factors different than price, namely security, interoperability, privacy,

¹¹⁶ Weber. R. H. Competition Law Issue in Online World, 2013, St Gallen International Competition Law Forum; Grunes A.P., Stucke M.E., No Mistake About it: The Important Role of Antitrust in the Era of Big Data, 2015, available on www.antitrustsource.com.

¹¹⁷ On this please also see Cai Z., Yang H., Chen G., Li X., Pricing for Resources Allocation in Cloud Computing, International Conference on Logistics Engineering, Management and Computer Science -LEMCS 2015.

¹¹⁸ Cloud services are usually paid for on a pay-as-you-go basis or following a weekly/monthly/annual subscription. Some cloud services are however offered for free at least up to a certain point: this is the case for instance of cloud storage as well as of other SaaS consisting in providing word processor, spread sheets, email etc. By way of example, Libero mail grants 1 GB for free and offers higher capacity packages (e.g. Libero Mail Plus 5 GB) at around 20 euro a year or 1 TB at 5 euro a month: information based on Libero website accessed on 28 November 2015); Yahoo! Mail offers for free to its customer up to 1 TB of storage capacity. Google Drive offers a complete set of services to its customers including email, pictures and file, free up to 15 GB. Apple offers its iCloud storage service for free up to 5 GB, Dropbox offers up to 2 GB for free.

¹¹⁹ In this sense also Fershtman C. & Gandal N., Migration to the Cloud Ecosystem: Ushering in a New Generation of Platform Competition, in *Digiworld Economic Journal*, no. 85, 1st Q. 2012, p. 109 where the authors indicate that, similarly to personal computer, IaaS market is characterized by relatively homogeneous products and therefore price competition may be, likely, more important than in PaaS and SaaS.

confidentiality, level of performance, etc. In other terms, while price is not an element driving users choice, quality components could be so as a small but significant decrease in their level can induce users to move away¹²⁰. One evidence of this behaviour can be found in the recent Facebook/WhatsApp merger; it was indeed found that when rumours about Facebook acquiring WhatsApp become to widespread, many users downloaded competing instant communication application fearing a decrease in the privacy protection granted by WhatsApp¹²¹. The point with this solution is however to identify the thresholds of decrease in quality playing as a deterring factor: the reason is self intuitive, the relevance accorded to quality parameters changes from user to user and it may be difficult to establish a general rule.

Considering now evidence, the impression is that the traditional approach may be usefully extended to cloud computing.

First, inputs relevant to market definition can certainly be derived from the finding of market reports specifically dealing with cloud computing or, anyhow, with the IT sector. Evidence from past entry would certainly play a major role, tendency of operators to integrate different functionalities¹²² coupled with a close evaluation of expansion of online companies in neighbouring sectors or services¹²³.

As it derives from the analysis of the current decisional practices, the position

¹²⁰ Kushida K.E., Murray J., Zysmann J., *Diffusing the Cloud: Cloud Computing and Implications for Public Policy*, 2011, J. Int. Compet. Trade.

¹²¹ Among many articles reporting the news, please see <https://www.abine.com/blog/2014/whatsapp-privacy-and-facebook-acquisition/>

¹²² Harbour J., Koslov T.I., Section 2 in a Web 2.0 World: An Expanded Vision of Relevant Product Markets, in *Antitrust Law Journal*, 2010, Vol. 76, p. 769. Many are the examples in the internet world of this tendency to integrate several functionalities: Facebook is a well known social network mainly used by consumers to connect with friends and colleagues. Although social networking remains the core activity of Facebook, the services it offers have recently expanded and they now comprehend search services (please see Search FYI: Find What the World is Saying With Facebook Search, available at <http://newsroom.fb.com/news/2015/10/search-fyi-find-what-the-world-is-saying-with-facebook-search/>) and call over the internet - through the Messenger application. This point was also acknowledged in European Commission, Case COMP/M. 7217, Facebook/Whatsapp, 3 October 2014, § 52-61, where the European Commission indicated that the line between the social network and consumer communication services has become blurred as each of these services adopt similar functionalities but anyhow considering that there remained important differences between those services and that the social networking market should not encompass consumers communication services.

¹²³ Cloud computing is full of examples: Amazon is generally known for being a leading company in the online retail market; what is probably less known is that Amazon is also a company leader in the provision of cloud computing services sub specie of Infrastructure-as-a-Service (or IaaS). Amazon developed its cloud service from its e-commerce business by taking advantage of the knowledge and skills it already has and, more importantly, from its huge database and extended infrastructure. More particularly, Amazon started to rent out its infrastructure to compensate from the fact that during certain period of the year the e-commerce business experienced a slowing of the demand and, as a consequence, the computing power was inefficiently used (contrary to pick period where it runs at full). Amazon is not alone. Microsoft and Google, also active greatly in the cloud business, developed their cloud solutions from their core activities. See also, Kushida K.E., Murray J., Zysmann J., *Diffusing the Cloud: Cloud Computing and Implications for Public Policy*, cited above at 39, § 4.2.

expressed by operators in the markets, consumers or competitors may be particularly useful considering that they might have a better knowledge and, more importantly, an updated understanding of the developments taking place in the market.

Relevant Product Market

Applying the principles identified above, the following sections would consider possible definitions of the market.

2.2.1.2. One and the same market for cloud services?

The first point to consider is whether the three service models identify each a separate market or whether they could be considered as part of a wider cloud market.

Considering first demand-side substitutability, the three services appear to differ in terms of both characteristics and intended use. As indicated, IaaS, PaaS and SaaS are all based on the key idea of virtualisation of, and remote access to, computing resources. The kind of computing resources which is virtualised is however different in the three services which, as a consequence, aim at satisfying different purposes. Briefly recalling the description provided in the Introduction, IaaS relates to virtualisation of infrastructure resources such as network, servers, etc. IaaS is particularly aimed at satisfying the need for IT infrastructures of businesses, either large sized or small-medium sized. PaaS concerns the virtualisation of platforms employed for the design and running of applications. PaaS solutions comprehend an infrastructure and software layers in order to allow app developers to design their application, to test it and run it as well as to store the data and other relevant information. The need which PaaS is aimed at satisfying is that of application developers and so, in general, of businesses of different size; although it could not be excluded that also personal users may make use of PaaS to design their own application. SaaS refers to virtual applications as such it encompasses a variegated range of software aimed at satisfying different need for users. Users are in this case both businesses and consumers.

Considering the characteristics of the three cloud services, their functionalities and the needs that they are aimed at satisfying, it could be possible to conclude that IaaS, PaaS and SaaS belong to distinct markets. This conclusion does not change

when we try to apply the SSNDQ test. Indeed, should a decrease in the quality of a IaaS service occurs, user would probably switch to another IaaS solution while it is highly unlikely that they would switch to PaaS or SaaS since, as indicated, the need that those services are aimed at answering is completely different¹²⁴.

On supply-side substitution, an important aspect to note is that some of the operators, namely the leading companies in the markets (such as Amazon, Google, Microsoft), are active in all the three fields offering on the market both IaaS, PaaS and SaaS: in this case, it is evident that they are capable of easily and quickly switch from the supply of one cloud service to another¹²⁵. The panorama is different for smaller companies which, usually are specified in the provision of only one cloud services and sometimes in the provision of a particular kind of it. When that is the case switching from provision of one cloud service to another may not, as such, be feasible or possible in a timely manner. Relevant in this respect is the consideration that, switching from IaaS to PaaS or SaaS and vice versa may imply the need to bear, in certain cases, material investment costs or anyhow require to possess the relevant know how. By way of example switching to IaaS would require for a company to have available enough physical resources (physical servers, database, computing machines, etc.) on which ultimately store relevant data. This implies that a company wishing to provide IaaS must therefore invest in the building and maintenance of physical resources (servers, database or else) which can be costly and time consuming and, presumably, something which cannot easily be carried out in the short term by a small company focusing their activity in only one cloud segment or a new entrant to the cloud sector¹²⁶. In light of what just indicated, there could be doubt on whether supply-side substitutability can be a competition constraint enough

¹²⁴ Gurkaynak G., Durlu D., Hagan M., Antitrust on the Internet: A Comparative Assessment of Competition Law Enforcement in the Internet Realm, cited above at 13.

¹²⁵ This is true for general cloud service not presenting specific characteristics tailored on the necessity of a special sector. The outcome could be different when, to the contrary, the cloud service has been designed considering specifically the requirements of a specific industrial sector: in that case even a big online company may not be able to start swiftly to offer that product on the market. A good example of this point is offered by the US case concerning cloud service for the real estate sector: in such case, the virtual service was structured so as to face the necessity and requirements of the real estate sector and, as such, it was considered that no substitutability existed with the general cloud services. When that is the case, even big online company may not be able to easily switch to production of such specified cloud service.

¹²⁶ A similar reasoning can be applied to PaaS. Competing in the PaaS sector requires, in addition to the availability of hardware infrastructure, the ability to provide software solutions functional to the development, running and management of applications: while this could be relatively easy for larger companies already active in all the three cloud area, the same may not be true for smaller companies and new entrants due to the extent of the investments required.

to deter a company from decreasing the quality of its services, and therefore whether cloud services may be considered as substitutes on the side of suppliers.

Concluding on this point, there seems to be good ground to conclude that each of the cloud services should be analysed separately and not be considered as part of the same market.

This conclusion appears to be supported by the decisional practices of the EU so far considered. It is so that in *IBM/Lufthansa System*¹²⁷, the European Commission considered IaaS as a possible autonomous further segmentation of the IT outsourcing market; in *Computer Science Corporation/iSoft Group*¹²⁸, the European Commission considered middleware and application software as possible segmentation of the IT software markets; in *Microsoft/Nokia*, IaaS and SaaS were considered separately although no conclusive decision was reached on the point of whether they should, to the contrary, be considered as part of the same market¹²⁹. Also looking at the US, the decision in the case *RealPage/Yardi* considered the SaaS service at issue as identifying an autonomous market and expressly excluded any substitution with other cloud services.

Also relevant to the conclusion reached are the evidences contained in market reports where it is indicated that, with the exception of few market leaders, most of the operators are active in the provision of only one type of service (i.e. those companies provide only IaaS, or PaaS or SaaS solution)¹³⁰; as a consequence those reports provide market information (i.e. market shares and development status and trend) separately for each of the service.

2.2.1.3. Each service a separate market

Assuming that each of the cloud service belongs to a distinct market, the second step is to consider whether a further segmentation should be introduced within each market depending on the specific characteristics of the service. In particular, a distinction can be considered based on the category of end users to

¹²⁷ European Commission, Case COMP/M. 7458, *IBM/INF Business of Deutsche Lufthansa*, cited above at 94. Similarly in European Commission, Case COMP/M. 5301 *Cap Gemini/Bas*, 13 October 2008; European Commission, Case COMP/M.6921 *IBM Italia/Ubis*,

¹²⁸ European Commission, Case COMP/ M. 6237 *Computer Science Corporation/iSoft Group*, 20 June 2011.

¹²⁹ European Commission, Case COMP/M. 7047, *Microsoft/Nokia*, cited above at 110. Please note that the market at issue there was that of enterprise mail server.

¹³⁰ Wikibon, *Public Cloud Market Shares 2014 and 2015*, August 2015.

which the service is targeted or on the industrial sector making use of the cloud.

Based on the category of users, it is reasonable to distinguish between cloud services dedicated to consumers or small businesses from cloud services offered to medium-large size companies. The rationale beneath such distinction lies on the differences in the characteristics that cloud services need to have depending on the targeted users. In particular, cloud services dedicated to consumers or small businesses are usually simpler in their design and functionality since they need to meet more basic necessities in term of processing, management, security and, not least, integration with current on-premise infrastructures. To the contrary, medium-large size enterprises usually require IT services to offer a larger set of functionalities, a greater storage space and higher level of security features.

Further element to consider is that cloud providers usually offer dedicated services to consumers and enterprises; actually some providers are specialised in the provision of their services only to one category of users, usually enterprises¹³¹. As a result, analysing this point under the perspective of demand-side substitutability, it seems reasonable to conclude that cloud services for consumers and small-size business are not substitute for cloud services dedicated to medium-large enterprises.

This conclusion does not change applying the SSNDQ; indeed it is possible to infer that the answer to a decrease in quality of a cloud services designed for a category of users would induce users to switch to a cloud services designed for the same category of users. This approach finds support in some of the decision of the European Commission¹³². By way of example, in the decision concerning the Seagate/HDD merger, the market investigation provided separate feedback and considerations depending on whether the cloud service considered was used by consumers or enterprises; similarly in Microsoft/Nokia, the European Commission considered that a distinction should be made between enterprises and consumers

¹³¹ This is for instance the case of Cisco and Citrix which are specialized in the provisions of conferencing and communication space for companies and Salesforce.com is specialised in the provision of CRM only for companies; See Wikibon, Public Cloud Market Shares 2014 and 2015, August 2015. This distinction generally applied for internet based service such as Skype. Skype offers two different kind of services for private customers and companies. Skype for private customers is suitable for connection of up to 20 persons and it is provided for free (unless the customer intends to buy credit); Skype Business allows up to 250 persons to be connected online, it is integrated in the office suite and contains other enhanced features, such as the possibility to manage the employee accounts, it is not provided for free but on a subscription base; see <https://support.skype.com/it/faq/FA34551/che-differenza-c-e-tra-skype-e-skype-per-business>. Similarly, Dropbox offers two distinguished cloud storage services based on the type of customers (private or business).

¹³² European Commission, Case COMP/M. 7047, Microsoft/Nokia, cited above at 110.

mail server software based on the different characteristics and functionalities¹³³.

Likewise, a further distinction can be made, for each cloud service, based on the industrial sector. In particular, it is possible that a distinction should be made depending on whether a cloud services is devoted to healthcare, real estate, automotive, customer management area, etc. By way of example, it could be imagined that the protection of the data stored in a virtual space would be subject to a higher degree of security in the healthcare sector compared to the one adopted in area where the sensibility of data is not an issue; similarly a cloud service may need to present peculiar elaboration features to be employed in a certain industry which, at the same time, can make it completely useless when implemented in a different area.

Similarly to the customer/enterprise distinction, a segmentation based on the industrial sector to which the cloud service is devoted finds a justification also in the light of the decisions adopted by the European Commission in cases involving IT services.

In addition to that, as mentioned above, the need to further differentiate the market depending on the industry was also considered and implemented in the decision adopted by the US District Court in *RealPage vs Yardi* where it was considered that the market was as narrow as cloud services specifically designed for the real estate sector with the exclusion of generic cloud service which were not capable to meet the need of real estate property and management.

Further point to consider is whether the market should comprehend both on-line and off-line services or, said in other terms, whether cloud service should be included in the same market as on-premise IT service.

Starting from the purposes, cloud service and on-premise IT service can be considered substitutes as both type of service aims at satisfying the personal or business needs that users have of information technology resources; cloud services are in a sense an evolution of on-premises IT services which is thought to be capable to replace in full the use of in-site IT resources in the long term.

Cloud services and on-premise IT services are however distinguished in many other respects, some of which are ascribable to the inner characteristics of cloud services. As mentioned in the premises, cloud services are characterised by the

¹³³ European Commission, Case COMP/M. 7047, Microsoft/Nokia, cited above at 110 § 67.

possibility to rapidly adapt to the current needs of users by increasing (or decreasing) the computing resources in term of processing, storing, etc. This feature is peculiar to cloud computing and cannot be replicated by on-premises computing resources. In addition to that, cloud computing are differentiated from on-premises solutions also in term of price: as indicated already, cloud services are cheaper than off-line resources also considering that they do not request the user to bear further costs for the updating, the anti-virus protection and crash recovery. Using the words of the European Commission, cloud services offer to users a different enhanced experience¹³⁴ which cannot be replicated by on-premise solutions so as that while cloud solutions are capable of exerting competitive pressure over on-premise service, the contrary is not true. On this basis, it is reasonable to argue that cloud services and on-premises computing solutions are not part of the same market.

This conclusion appears to be supported by the few EU precedent where cloud computing was also considered.

In the decision concerning Seagate/HDD business¹³⁵, an issue touched upon during the market investigation was whether the traditional “off-line” storage method and new cloud storage system could be considered as substitute. In that occasion, it was indicated that one obstacle to the perception of those two storage media as substitute by the customers was the persisting worries relating to problems associated with the transfer of data and to storing their data on the cloud.

A similar point was raised in Microsoft/Nokia¹³⁶, where the issue was whether IaaS solutions for email server could be seen as substitute for on-premises email service. In that case, the European Commission did not reach a conclusive solution while observing that the market investigation revealed that full substitutability between the two solutions was not envisageable. Indeed, from one side, IaaS solution have a significantly lower cost compared to on-premise solution; from the other side, IaaS solutions presented a lower degree of security and a lower level of integration in the corporate network compared to the on-premises counterpart, at

¹³⁴ This point was considered by the EU agency when analyzing the Facebook/Whatsapp merger where the European Commission indicated that, although instant messaging and traditional messaging system (e.g. SMS, MMS, etc) answered the same need of users to communicate with each others, they materially differed on the way in which such necessity was answered, noting that, contrary to traditional messaging systems, instant messaging presented enhanced functionalities; as a result while instant messages were capable to exert a competitive pressure over the traditional communication system, the contrary was not true.

¹³⁵ European Commission, Case COMP/M.6214, Seagate/HDD business 19 October 2011.

¹³⁶ European Commission, Case COMP/M. 7047, Microsoft/Nokia, cited above at 110.

least based on the results of the market investigation¹³⁷.

Last point to consider in this respect is whether, within each cloud market, a distinction can be made depending on the deployment mode. As indicated the NIST classification indicates four deployment modes, namely public cloud where the computing resources are made available to the general public of users; private cloud, where resources are developed for the use by a private customer; community cloud which is developed for the use by a certain community; hybrid cloud which is a mixed up of public, private and hybrid connected through interoperable solutions.

In respect of the cloud deployment mode, probably the most relevant difference is between public cloud from one side and private and community cloud for the other side (with hybrid cloud sharing the features of all the other deployment models) and lies in the fact that in public cloud resources are standardised and mass customised so as to be of use for every users; in private cloud the service is defined and designed around the customer requests and needs. As a consequence, there appears to be little, if any, substitutability between public and private cloud: as a private cloud is built to answer the specific needs of a single user, the users of a public cloud would have hard time to turn to a private cloud in response to a variation in the condition of the provision of public cloud services, similarly a user of a private cloud would hardly turn to a public cloud as the standardised characteristics of this latter would not answer the user's need. However, a high degree of substitution could exist from a supply side perspective since even those cloud providers which only offer public (or private) cloud can start offering private (or public) cloud in the short time and without incurring material costs, simply by changing and adapting the characteristics of the services they offer.

A possible distinction based on the deployments mode appears to be supported by the fact that market reports usually also provide market information separately for public, private and hybrid cloud.

¹³⁷ European Commission, Case COMP/M. 7047, Microsoft/Nokia, cited above at 110, § 65. The possibility substitutability between cloud solution and on-premise solution was considered also in Case COMP/M. 7337, IMS Health/Cegedim Business, 19 December 2014 and Case COMP/M. 3978, Oracle/Siebel, 22 December 2015. More specifically, there the issue was about a possible substitution between a SaaS Customer relation management software and the corresponding on-premise software solution. As it is often the case, the European Commission left open the definition of the market not reaching any conclusion on whether the CRM market should be further segmented.

2.2.1.4. Further possible distinction

An additional point to consider is whether, within each service, a further distinction can be introduced considering the type of service.

Introducing this further distinction can be particularly necessary in the case of SaaS. As mentioned already, SaaS refers to the provision of application through the internet; as such this expression covers a wide range of different services. Notable examples of SaaS products are Customer Relationship Management solution¹³⁸, social networking¹³⁹, dating application, travel planning application, communication applications¹⁴⁰, storage application¹⁴¹ etc. Those applications can present similarities in term of the underlying technology and deployment mode but they differ materially in the need that they answer. There could be little doubt about the absence of substitutability between an application providing a communication service and a SaaS offering travel planning solution; similarly substitutability from the point of view of customers can be excluded between social networking application and communication application because, even if in both cases the aim is to help people to communicate, the features that those kind of SaaS present are usually very different and so is the experience offered to customers¹⁴². There could be margin therefore to consider possible additional segmentation based on the type of application within the wider SaaS sector.

2.2.1.5. Preliminary conclusions

Preliminarily concluding on these aspects, based on the above, it is possible to argue that each cloud service belong to a separate market and, within each market, further segmentations appear to be reasonable. Distinguished markets can in particular be envisaged based on the end customers to which the service is directed and the industry sector where the service is used. Further, a distinguished market can be found for cloud service and the corresponding on-premise solutions. A distinction can be made based on the deployment mode. Lastly, depending on the

¹³⁸ The leading company in this field is Salesforce which is one of the leading companies in the market.

¹³⁹ Notable examples, LinkedIn providing social network services for professionals; Facebook, Twitter, and the like providing general social networking; and all those more specialized social networking focusing on a specific interests of the people being connected.

¹⁴⁰ Notably Skype providing different application for consumers or business.

¹⁴¹ Such as Dropbox, Google Drive, etc.

¹⁴² In this regard, please refer to Commission decision on the Facebook/WhatsApp merger, cited above at 122.

cloud service considered, and particularly for SaaS, possible sub-segmentation can be introduced depending on each of the service offered.

An important point to note is that these preliminary conclusions may be short-lived: as recalled, cloud services are new services, still in the infancy of their evolution and, as such, subject to rapid change. The shape that such evolution will take would impact the assessment of substitutability between services; this particularly applies to the point, just observed, concerning substitution with on-premises solutions. It is indeed likely that the concerns so far raised around the arguably lower reliability of cloud services, compared to the on-site solutions, would decrease as cloud services become more widespread among users and, as a consequence, users would probably consider to a higher extent cloud service as substitute for their on-premise solution. This means that the boundaries of the relevant market can change quickly in the short term; an aspect which the antitrust authorities would need to consider closely when addressing market definition in respect of cloud services.

2.2.2. Relevant Geographic Market

In setting the boundaries of the geographical dimension of cloud markets, the first thing to note is that cloud computing services appear to be global by nature based, as they are, on the key idea of ubiquity.

This inertly idea need however to be tested against the general rule on geographic market definition. The point to consider is whether a user can access to the same service in any region at the same condition or whether different conditions are applied depending on where the user is located. Usually this factor is tested against price and it is said that when the price of the same product in a region is materially higher than the price applied (for the same product) in a different region than the two regions belong to different geographical markets.

Applied to cloud computing services, this would require to assess whether the same cloud service is provided against a (materially) different price depending on the region where a user is located. In this respect, it should be noted that, as indicated in the sections above, price does not appear to be the key aspect of competition between cloud providers nor the focus of users' choice: as a consequence it could be envisaged that no material difference would be detected in the price of the services

depending on regions. A rapid comparative analysis on the economic conditions proposed by, for instance, cloud storage service by several operators seem to confirm this finding.

Using a comparative tool, it is possible to detect that, by way of example, Microsoft and Amazon offer their cloud storage service in five macro regions being North America, South America, Europe, Asia, Australia.

The price offered by Microsoft for its Windows Azure service is \$95 per month in North America and Europe; \$147 per month in Asia; \$147 per month in Australia and \$193 per month in South America. With the exception of South America, the price for Microsoft cloud storage service is more or less aligned in all main regions¹⁴³.

The price offered by Amazon is also similarly aligned in all the main regions with the exception of South America. Indeed, Amazon offers its AWS-S3 at \$130 per month in North America and Europe, \$202 per month in Asia, \$202 per month in Australia and \$266 in South America¹⁴⁴.

Since, as mentioned, competition between cloud providers and users' choices is likely guided by factors other than price (such as characteristics and quality of the service offered as well as, in particular, to the security and data protection), it is at those factors that we mainly need to look at also in respect of geographic market definition. In other terms, it would be necessary to evaluate whether companies would propose different qualitative conditions depending on where users are located.

In assessing this aspect, it is necessary to consider possible differences in national legislations dealing with subject which are key in cloud services, such as privacy, data protection, security, liability of cloud providers, etc.

In this respect, it should be considered that some of those aspects are - or would be - dealt with at EU level¹⁴⁵ as a consequence EU member states would have

¹⁴³ Analysis based on results given by a cloud comparator tool named cloudorado, lastly accessed on 8 November 2016. Relevant link is https://www.cloudorado.com/cloud_storage_comparison.jsp. Based on the results of the comparison, no cloud storage service is offered in Africa. The comparison is realized assuming the following characteristics: storage capacity 200 Gigabyte, Transfer out 1 Terabyte; Get request (this parameter refers to request for retrieving data) 500K; PUT request (this parameter refers to request for editing/updating data) 200K.

This tool allows to compare also cloud hosting and cloud server prices with similar outcome.

¹⁴⁴ *Ibidem*

¹⁴⁵ Relevant examples are the EU Regulation on data protection (Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation)) in O.J. L119/2016, of 4 May 2016 entering into force on 28 May 2018. This Regulation does not apply directly to cloud but it contains reference to treatment of personal data on the internet.

homogeneous legislation and so would likely be condition applied to cloud services in implementation of relevant legislation.

Significant difference may however exist with non-EU countries and namely with the US: a difference which can be such to induce EU users to prefer cloud services abiding by EU rules.

Another element to evaluate is that of language¹⁴⁶. Cloud services, especially those dedicated to consumers, are usually provided in different languages. By way of example, Google Drive is available in several languages and each of the versions change to take into account the peculiarity of the preferred language. Language could still be a differentiating factors especially for consumers which may tend to prefer the cloud service which is also available in their native tongue. To the contrary, it is probable that language would play less of a role for cloud services dedicated to businesses: indeed, usually IT business solutions are proposed in English and users are therefore acquainted with the use of such language.

There is also another aspect to consider: cloud services are usually offered to users by the local company belonging to a multinational company. Continuing the example, Google Drive is offered to Italian users by Google Italy; even when a user seeks to have access to a cloud service offered by a foreign company, it is usually re-directed to the site of the local supplier. This situation especially occurs when the user in question is a consumers.

Based on what indicated above, it appears reasonable to conclude that, despite the global vocation of cloud services, the geographical dimension of the market of cloud services, generally considered, is narrower coinciding with the national boundaries or in some cases, with a wider regional area, such as the EU. In particular, it seems acceptable to consider that the provision of cloud services to businesses can be considered supranational, coinciding with a regional area where the legislation is homogeneous (e.g. EU, US, etc.), while the provision of cloud services to consumers could be designed around the boundaries of each country.

¹⁴⁶ Gurkaynak G., Durlu D., Hagan M., Antitrust on the Internet: A Comparative Assessment of Competition Law Enforcement in the Internet Realm, cited above at 13. The authors refer to the position held by the European Commission in the Google/Double Click case (Case COMP/M. 4731, Google/Double Click, 11 March 2008), where the geographic market was analysed against national preferences, languages or culture specificities.

3. Dominance

Having defined the relevant market, it is then necessary to assess whether a given company holds market power and to what degree, in other terms whether it could be said to hold a dominant position.

Dominance is a very interesting topic and one which is usually highly debated in the investigation carried out by competition authorities. The reason is easy to understand, in the EU, dominance is a pre-condition: absent dominance any conduct, even when falling in one of the abusive conduct category, goes unpunished and the company remains completely free to implement it.

3.1. Defining dominance

Art. 102 TFEU identifies the kind of conducts which can amount to an abuse of dominant position, however it does not provide any definition of what is meant by “dominance”; a gap which has been filled by the decisional practice of the courts.

Dominance was firstly defined in the seminal 1978 United Brands decision where the Court of Justice clarified that it consisted in “*a position of economic strength enjoyed by an undertaking which enables it to prevent effective competition being maintained on the relevant market by giving it the power to behave to an appreciable extent independently of its competitors, customers and ultimately of its consumers*”¹⁴⁷. The following year, the Court of Justice considered again the issue of dominance and in Hoffmann-La Roche specified that such position does not preclude the presence of some competition but it enables a company to appreciably influence the conditions under which competition develops¹⁴⁸. Since then, such definition has been echoed in basically every decisions relating to abuse of dominance.

In addition to the practice of the European courts, an important tool to take into account when seeking to define dominance is represented by the European

¹⁴⁷ ECJ, C 27/76, United Brands v. Commission, 14 February 1978, in E.C.R. 1978 p. 207.

¹⁴⁸ ECJ, Case 85/76, Hoffmann-LaRoche & Co AG v. Commission [1979] ECR 461, §39.

Commission's Guidance on Article 82¹⁴⁹ where the notion of dominance is further developed. Starting from the definition of dominance as developed by European Courts, the Guidance clarified that the notion of independence relates to "*the degree of competitive constraints exerted on the undertaking in question. Dominance entails that these competitive constraints are not sufficiently effective and hence the undertaking in question enjoys substantial market power over a period of time*"¹⁵⁰.

The idea of dominance is therefore linked to that of market power. Market power is defined as the undertaking's ability to profitably raise the price, over a period of time, above the threshold which would have prevailed in a situation of perfect competition¹⁵¹. The Guidance, therefore, poses an equivalence between holding a dominant position, having substantial market power and lacking competitive constraints. With the Guidance, the notion of dominance has shifted from a classical formula based on the ability of a firm to resist competitive constraints to a more economic-based approach according to which dominance identifies the ability of a firm to raise prices above the competitive level. This shift reflects, at least in principle, a change in antitrust enforcement towards an effects-based approach more focused on consumers' welfare¹⁵²; it remains to be seen whether, and to what extent, the European Commission and the national competition authorities would follow this path.

As it emerges, not all degrees of market power are relevant in a competition law perspective as dominance can only be found when a firm enjoys a substantial degree of market power; only in such case, a firm is deemed capable of profitably raising the prices of a product above the competitive level.

The adoption of an effect-based approach is also reflected in the factors which, according to the Guidance, can be considered when assessing the degree of market power and, hence, dominance; those factors are:

¹⁴⁹ European Commission, Guidance on the Commission's enforcement priorities in applying Article 82 of the EC Treaty to abusive exclusionary conduct by dominant undertakings, in O.J. C 45-2009 ("Guidance"), § 10. The Guidance is a document having a peculiar nature, it is not a guideline in the proper sense and it is not binding. It is however very useful as it describes the reasoning that the European Commission will apply in a case of dominance and therefore provides a good reference for companies and practitioners.

¹⁵⁰ Guidance on Article 82, § 10.

¹⁵¹ Guidance on Article 82, § 11. On this point, see also Whish R., Bailey D., Competition Law, cited above at 28, p. 42. See also, Gerardin D., Layne-Farrar A., Petit N., EU Competition Law and Economics, 2012, § 2.56.

¹⁵² Gonzalez Diaz, Enrique Snelder R., EU Competition Law, Vol. V, Abuse of Dominance Under Art. 102 TFEU, Claeys & Casteels Publishing, 2013.

- “constraints imposed by the existing supplies from, and the position on the market of, actual competitors (the market position of the dominant undertaking and its competitors);
- constraints imposed by the credible threat of future expansion by actual competitors or entry by potential competitors (expansion and entry);
- constraints imposed by the bargaining strength of the undertaking's customers (countervailing buyer power)”¹⁵³.

Interestingly to note, the US legal system does not refer to dominance but to the notion of monopoly power. The notion of monopoly power is actually akin to the concept of dominance in EU law. The Supreme Court, in the *Du Pont de Nemour* case, has defined monopoly power as “the power to control prices or exclude competition”¹⁵⁴ which can somehow be assimilated to the idea of a high degree of market power. The correspondence between monopoly power and market power has been traced by those scholars¹⁵⁵ who have defined market power as “the ability to raise prices above those that would be charged in a competitive market”¹⁵⁶. A definition which has been echoed in courts’ decisions according to which a firm enjoys market power when it is capable to profitably raise prices above the competitive level for a sustained period of time¹⁵⁷. This ability is evaluated in light of the existing competition constraints deriving from the competitive pressure which may be exercised by actual or potential competitors, and/or by customers. Market power is

¹⁵³ Guidance, §12.

¹⁵⁴ *E.I. du Pont de Nemours*, 351 U.S. 377, 391 (1956). See also ABA, *Monopolization and Dominance Handbook*, ABA Section of Antitrust Law, 2011, where it is indicated that while the Supreme Court appears to treat the two elements as being one, certain lower courts have required proof of both elements in order to establish monopoly power.

For a wider analysis of the notion of market power and the factors relevant to the finding of market power, please see Areeda P. E., Hovenkamp H., *Antitrust Law: an analysis of antitrust principles and their application*, cited above 67 § 501. It is in particular interesting to note that the authors underlined how the definition provided by the courts can be intrinsically confusing as, from one side, monopoly prices in a market are capable to attract rivals and therefore induce entry, from the other side, the use of the disjunctive “or” seems to imply that exclusion of rivals confers in itself monopoly power which is not always the case.

¹⁵⁵ In this sense, please see also, Areeda P. E., Hovenkamp H., *Antitrust Law*, cited above at 67 § 83-87; ABA, *Monopolization and Dominance Handbook*, cited above at 154: the authors point out, however, that the terms monopoly power and market power are sometimes used interchangeably.

¹⁵⁶ Areeda P. E., Hovenkamp H., *Antitrust Law: an analysis of antitrust principles and their application*, cited above 67 § 501.

ABA, *Monopolization and Dominance Handbook*, cited above at 154 citing *NCAA v. Bd. of Regents of the University of Okla.*, 468 U.S. 85, 109 n. 38 (1984); *Jeffersib Parish Hosp. Dist. No. 2 v. Hyde*, 466 U.S. 2, 27 n. 46 (1984).

¹⁵⁷ This point has been underlined in *United States v. Archer-Daniels-Midland Co.*, 866 F. 2d 242, 246 (8th Circ. 1988).

evaluated in the light of several factors¹⁵⁸ which, similarly to EU, are market share of the relevant company; presence or absence of barriers to potential entry by potential competitors or expansion by actual competitors; existence of excess capacity; existence of purchasing firms that possess sufficient demand-side market power.

Based on what briefly described above, EU and US legal system bears important similarity, at least, with respect to the identification of the requirement for the enforcement of competition law to unilateral conducts. As it will be seen below, however, this is the stage where, probably, the similarities end.

3.1.1. Measuring market power

As mentioned above, market power is assessed through references to certain factors. Those factors are largely similar under EU and US jurisdictions.

3.1.1.1. Market shares

Market shares represent a first important indicator of the position enjoyed by a company in the relevant market¹⁵⁹ but they are not alone enough to prove market power. In addition to market shares also the position of competitors, the dynamics of the market, barriers to entry, products differentiation¹⁶⁰ should be verified. This is an approach largely consolidated at EU level and shared also on the other side of the Atlantic where, again, market shares are usually described only as a first (good) indicator of market power not enough though to prove market power¹⁶¹.

This said for the general principles, in practical terms, the assessment of the market share held by an undertaking in the relevant market represents generally the first phase of each analysis on dominance. It is for this reason that the Guidance and the practices of the European courts have developed certain guidelines introducing a presumption of dominance/absence of dominance based on market shares thresholds.

¹⁵⁸ ABA, Monopolization and Dominance Handbook, cited above at 154 p. 61.

¹⁵⁹ See also O'Donoghue R., Padilla J., The Law and Economics of Article 102 TFEU, cited above at 73 § 4.2.

¹⁶⁰ Guidance, § 13

¹⁶¹ ABA, Monopolization and Dominance Handbook, cited above at 154 p. 76.

According to the Guidance, low market shares - below 40% - are a sign of absence of market power (and hence dominance) while high, or very high, market shares are interpreted as raising a presumption of market power¹⁶².

This approach is confirmed by the practice of the European courts where market shares below 30% were considered extremely unlikely to give rise to market power - unless other factors (such as high barriers to entry) were present leading to a different conclusion and very low market shares, in range of 10%, were usually deemed a sign of absence of market power¹⁶³.

Conversely, European courts have considered high, or very high, market shares as a strong evidence of market power. Notable example of this approach is the decision adopted in Hoffmann-Laroche¹⁶⁴ where the court indicated that “*very large market shares are in themselves, and save in exceptional circumstances, evidence of the existence of a dominant position*”; and in Akzo, where the Court introduced what has been considered as a presumption of dominance in presence of market share above 50%¹⁶⁵, again absent exceptional circumstances. Actually Akzo represents a landmark decision when it comes to assessment of market power although it has attracted the critics of those fostering a less formalistic approach on dominance and the European Commission, itself, does not formally refer to the Akzo presumption in its Guidance. In practice, however, ever since the Akzo decision was adopted, high market shares have been considered as a strong indication of market power¹⁶⁶ which can be rebutted only after a closer look at the other relevant indicators. So much so that the European Commission itself, in the notable Intel decision, recognized that “*market shares between 70% and 80% have, according to*

¹⁶² Guidance on Article 82, § 14 -15. The Guidance specifies that high (or very high) market shares can be considered as an indicator of possible serious effects of abusive conduct such as to justify an intervention by the European Commission under art. 102 TFEU.

¹⁶³ European Commission, Saba's EEC distribution System, OJ 1983, L 376/41.

¹⁶⁴ ECJ, Case 85/76, Hoffman-La Roche v. Commission, 1979, ECR 461, § 41.

¹⁶⁵ ECJ, Case 62/86, AKZO v. Commission, 1991, ECR I-3359, §60. The Akzo presumption has been applied more or less constantly since.

¹⁶⁶ General Court in Case T-321-05, AstraZeneca v. Commission, 2010, ECR II-000, § 245 where the General Court stressed the importance of high market shares held during a long period of time where the General Court indicated that the European Commission could not disregard the importance of AstraZeneca very large market share detained for a long period of time. For a general overview, please also see, Whish R., Bailey D., Competition Law cited above at 28.

*the case law, been held to be in themselves a clear indication of the existence of a dominant position*¹⁶⁷.

As a last point on presumption, European courts indicated that when market shares are between 40% and 50% no presumption can be established and the assessment of market power need to be carried out in light of additional factors¹⁶⁸.

Reliance on market shares as a first hint on market power is not peculiar to the EU; in the US as well market shares are considered a good proxy of market power to be further evaluated in light of other relevant factors.

The approach followed in the US towards definition of the relevant thresholds is, however, slightly different from the European. Indeed, in the US, the thresholds above which a presumption of market power (still subject to further verification) can be established is set at above 70%¹⁶⁹ which at EU level would be interpreted as a "clear indication" of market power. The identification of the lower threshold also mark a material distinction with the EU approach: indeed, in the US, absence of market power is presumed for market share below 50%¹⁷⁰ which in the EU is considered, at least, "problematic". A grey area is then left for market shares ranging between 50% and 70% where no inference of market power can be made based on the market share alone¹⁷¹.

Compared to the EU, the American approach appears generally more favorable to the position of big undertaking and to their reaching and maintaining a material position in the market¹⁷². The different attitude of the US towards identification of market power is also illustrated by a proposal advanced in 2008 by

¹⁶⁷ European Commission, COMP/37.990, Intel, 13 May 2009, § 852. The European Commission there specified that such an insight was subject to further verification.

¹⁶⁸ ECJ, Case 85/76, Hoffman-La Roche v. Commission, 1979, ECR 461, where a 43% of market share in the market for vitamin B3 was held not enough to establish the existence of a dominant position; see also O'Donoghue R., Padilla J., The Law and Economics of Article 102 TFEU, § 4.2. cited above at 73.

¹⁶⁹ ABA, Monopolization and Dominance Handbook cited above at 154, citing MCI Comm'ns v. AT&T, 708 F. 2d 1081, 1107 (7th Circuit 1982) and United States v. Grinnel Corp., 384 U.S. 563, 571 (1966).

¹⁷⁰ ABA, Monopolization and Dominance Handbook, cited above at 154 citing Bailey v. Allgas, Inc. 284 F. 3d 1237, 1250 (11th Circ. 2002).

¹⁷¹ ABA, Monopolization and Dominance Handbook, cited above at 154. In such case, additional evidences are necessary to substantiate a finding of monopoly power.

¹⁷² This is somehow a by-product of the difference in the EU-US approach towards large corporation which is often recalled: what is usually indicated is that, differently from the EU, Americans see monopoly or anyhow a strong position in the market as the right reward for a successful corporate strategy. This is also why, again differently from EU, US antitrust law does not enumerate excessive pricing among anticompetitive conduct since the ability to apply over competitive price is again considered as a reward for the success of a company. On this see, Evans D. S., Antitrust Issues raised by the Emerging Global Internet Economy, cited above at 19 and more widely, ABA, Monopolization and Dominance Handbook, cited above at 154, Areeda P. E., Hovenkamp H., Antitrust Law: an analysis of antitrust principles and their application, cited above at 67.

the Antitrust Division. In particular, the Antitrust Division proposed to introduce a safe harbor test for market shares below 50%, based on the fact that in several years of application of Section 2, no court found monopoly power when the market share held by the company was below 50%. That proposal was subsequently withdrawn and no safe harbor have, therefore, been introduced in the US jurisdiction¹⁷³; it is nonetheless indicative of the fact that in the US it is probably more unlikely than in the EU that a low market share would bring to a finding of market power.

This considered, as indicated, in the assessment of market power, market shares are not considered in a vacuum but usually they are related to the relative position of competitors and market structure in general. It is for this reason that also very low market shares have, sometimes, be accompanied with a finding of market power where, for instance, the market was fragmented¹⁷⁴.

In addition, the Commission has in general considered that a difference in market share between a given company and its largest competitors in the range of 20% is considered as a sign of dominance. This difference can be particularly relevant when the gap with closer competitors has remained stable over a significant period of time¹⁷⁵.

In addition to that, the European Commission has also assessed the difference between the market share held by a company and the sum of market shares held by its rivals. The gap in the market shares is not considered relevant in absolute terms but only in so far as it can be indicative of the ability of company's rivals to quickly expand their production to meet the demand of consumers¹⁷⁶.

Product differentiation also influence the assessment: the Guidance indicates product differentiation as a factor mitigating the relevance of market power when different products belong to the same market (this usually occurs when differentiation is not linked to the characteristics of the product but to other aspects, such as brands or consumer perception). In such case, even low market shares may be indicative of

¹⁷³ ABA, Monopolization and Dominance Handbook, cited above at 154.

¹⁷⁴ See for instance, Case T-219/99, *British Airways v. Commission*, 2003, ECR 5917, § 175-226. Similarly in *United Brands*, a market share ranging from 40% to 45% was considered enough to establish dominance in light of the difference with the one held by the competitors.

¹⁷⁵ O'Donoghue R., Padilla J., *The Law and Economics of Article 102 Tfeu*, cited above at 73. § 4.2. The authors recall that, in certain cases, the Commission has considered as relevant also smaller gaps in market shares between the "dominant" company and its largest competitor.

¹⁷⁶ *Ibidem*.

market power to the extent that the differentiation of product reduces, in fact, the competitive constraints that competitors may exert over the company¹⁷⁷.

3.1.1.2. Barriers to entry/expansion

Findings of market power is highly influenced by analysis on barriers to entry/expansion. As the Guidance specifies, an undertaking, even when holding high market share, may be deterred from increasing prices if such conduct would cause the entry/expansion¹⁷⁸ of rivals. Conversely, in presence of high barriers to entry (or expansion), low market shares can confer market power allowing an undertaking to determine its conduct on the market without worrying about the possible reactions of rivals¹⁷⁹.

The concept of barriers to entry refers to the presence of obstacles, of different kind, hindering or materially delaying¹⁸⁰ entrance by new competitors (or expansion by existing competitors) in answer to an increase in the price charged by the undertaking under analysis¹⁸¹.

Entry can limit the exercise of market power only when it is likely, timely and sufficient¹⁸². More specifically, "likely" means that new entrants need to find entry sufficiently profitable taking into account factors such as the barriers to entry, the likely reactions of the allegedly dominant undertaking and other competitors, and the risks and costs of failure. "Timely" refers to the fact that entry must occur swiftly in order to have a deterrent effect or limit the exercise of market power; "sufficient" means that entry should not be on a small-scale but must be of such a magnitude to deter any attempt to increase prices by the undertaking considered¹⁸³.

¹⁷⁷ Guidance § 13; Gonzalez Diaz, Enrique Snelder R., EU Competition Law, Vol. V, Abuse of Dominance Under Art. 102 TFEU, cited above at 152 § 2.41.

¹⁷⁸ In the following paragraph reference will be generally to barriers to entry interpreted as extending also to barriers to expansion.

¹⁷⁹ Guidance, § 16.

¹⁸⁰ OECD, Competition and Barriers to entry, 2007, p. 18.

¹⁸¹ While the Guidance does not contain a definition of barriers to entry, reference could be made to the Discussion Paper on the application of art. 82, where barriers to entry and expansion are defined as "*factors that make entry impossible or unprofitable while permitting established undertakings to charge prices above the competitive level*" (§ 38). In the US, a definition of barrier to entry has been provided in the case *Rebel Oil Co. Inc. v. Atl. Richfields Co.* 51 F 3d 1421, 1434 (9th Circ. 1995). Please see also, Gonzalez Diaz, Enrique Snelder R., EU Competition Law, cited above at 152, Whish R., Bailey D., Competition Law cited above at 28. ABA, Monopolization and Dominance Handbook, cited above 154.

¹⁸² Guidance, § 16.

¹⁸³ *Ibidem*.

Barriers to entry can take several forms: they can be imputable to the advantages of the dominant company (e.g. privileged access to essential input, economies of scale and scope, a highly developed distribution network) to characteristics of the market (e.g. network effects), to legal barriers (such as tariff and quotas, legal authorization by a relevant authority, release of a license by an IPR holder), costs faced by customers in changing suppliers (so called switching costs).

Interestingly to note, Guidance mentions, among possible barriers to entry, the conduct of the (allegedly dominant) undertaking: this situation may occur when such company has made significant investments that a potential entrant would have to match to enter the market or when an undertaking has concluded long term supply agreement¹⁸⁴. The practice of the European Commission and courts is populated by decisions where the conduct of a company is taken into account already at the stage of assessing dominance¹⁸⁵.

Notable is the judgment in the Michelin case where the European Commission considered the implementation of discriminatory prices as an index of dominance. Against the finding of the European Commission, Michelin argued that the same factor (i.e. price discrimination) could not be used as proof of dominance and abuse of such position¹⁸⁶. The Court of Justice did not rule on this point but anyhow upheld the decision adopted by the European Commission and so, indirectly, confirmed the validity of such reasoning¹⁸⁷. Since then, the European Commission has considered the conduct of a company as a possible barrier to entry in other cases¹⁸⁸.

Presence or absence of barriers to entry/expansion is a factor sometimes referred to under US antitrust rules as well¹⁸⁹. In general term the approach is similar to the European one: easy of entrance into the market can be considered as a factor mitigating the ability of a company to raise prices and, as a consequence, to exercise

¹⁸⁴ Guidance, § 16; Gonzalez Diaz, Enrique Snelder R., EU Competition Law, cited above at 152.

¹⁸⁵ Whish R., Bailey D., Competition Law cited above at 28 where reference is made to the ECJ decision in C-27/76, United Brands v. Commission, 1978 ECR 207.

¹⁸⁶ ECJ, Case 322/81, N.V. Nederlandsche Banden-Industrie-Michelin v. Commission, [1983] ECR 3461, §71.

¹⁸⁷ ECJ, Case 322/81, Michelin, cited above at 186.

¹⁸⁸ This is for example the case of European Commission, ECS/Akzo Chemie, 14 December 1985 O.J. L 374 - 31/12/1985 p.1, where the European Commission indicated that "AKZO has on its own account been able effectively to eliminate "troublesome" competitors (besides ECS) from the market or weaken them substantially" (§69). This decision was then upheld on appeal by ECJ, Case 62/86, AKZO v. Commission, 1991, ECR I-3359. This point is debated especially in light of the circularity of the reasoning; see Whish R. Bailey D., Competition Law, cited above at 28, p. 186; Jones A., Sufrin B., EU Competition Law, Text, Cases and Materials, cited above at 19, the authors in particular indicate that while the reasoning can be criticized because of its circularity, there are cases where in fact conduct can be a symptom of market power (to be however assessed with caution).

¹⁸⁹ ABA, Monopolization and Dominance Handbook, cited above at 154.

market power. In reality, however, the impression is that the analysis of this factor has less relevance under US antitrust law than it is the case within EU legal system. This is confirmed by the fact that, as observed, US courts have not conferred to entry barriers the same importance that it has under EU law, although when easy of entrance has been detected by the courts this point has been used to ground a finding of absence of monopoly power¹⁹⁰. The scarce relevance of entry barriers evaluation is indirectly confirmed by the very limited (when not absent) space devoted to the analysis of this element in the context of market power in the textbooks dealing with monopolization under US antitrust law.

3.1.1.3. Countervailing buyer power

The Guidance reports that evaluation of market power is also influenced by buyer power in so referring to competition constraints which may be exerted by customers. The reasoning here is that even an undertaking with a high market share may not be able to act to an appreciable extent independently of customers with sufficient bargaining strength. The ability of customers to put competitive pressure over a company may result from the customers' size or their commercial significance for a given undertaking, and their ability to switch quickly to competing suppliers, to promote new entry or to vertically integrate, and to credibly threaten to do so.

The Guidance further clarifies that countervailing buyer power can represent a valid deterrent to contain or defeat market power when it is of a sufficient magnitude; to the contrary such outcome cannot be reached when buyer power only ensures that a particular or limited segment of customers is shielded from the market power of the dominant undertaking¹⁹¹.

Countervailing buyer power is not usually mentioned when it comes to analysis of monopoly power in the US.

In general term, countervailing buyer power is unlikely to play a role in cloud services due to the absence of (actual or potential) buyers enjoying a position on the

¹⁹⁰ Hovenkamp, *Federal Antitrust Policy, The Law of Competition and its Practice*, 5th Ed., West Academic Publishing, 2016, § 6.2. b). The author refers to certain cases where US courts have used easy of entrance as an element running against a finding of monopoly power, such as *United States vs Syufy Enterp.*, 903 F. 2d 659, 664-669 (9th Circ. 1990) where monopoly power was denied based on the absence of entry barriers to exhibiting of film.

¹⁹¹ Guidance, § 18.

market likely to counteract to attempt by a cloud providers to use (and abuse) its market power; for this reason it would not be addressed in the following sections.

3.2. Assessing dominance in cloud computing services

Analyzing dominance in cloud computing services may provide to be, at this moment in time, particularly difficult. Cloud computing is a relatively new sector and the extent to which it would develop is not clear although it is the object of wide speculation¹⁹²; as indicated in the Introduction we have probably been using cloud services for a longer time that we might think but it is only recently that cloud services have started to attract the attention of users (as a “substitute” for physical IT resources) and, as a consequence, of legal practitioners and institutions. Even so, the attention has been mainly devoted to the studying of issues, such as privacy and security, which have very few (if nothing) to do with competition¹⁹³. The consequence of this is that there are no (at least to my knowledge) comprehensive economic studies or market reports which consider cloud services from an antitrust perspective; even less so are there decisions of the EU Commission analyzing dominance in cloud computing service to which reference can be made. Despite this, other tools are available which can provide indications, or at least represents the basis for a reasoning, on dominance in cloud services; those tools are market reports analyzing in general the development of cloud services and the position of cloud suppliers, as well as decisions adopted with reference, more widely, to the digital sector¹⁹⁴.

¹⁹² According to RightScale State of the Cloud Report, 2015, the adoption of cloud computing is increasing rapidly although most of the enterprise indicated only 20% of their IT resources is managed on a cloud. Based on a recent report published by Forbes, the global SaaS market is projected to grow from \$49B of 2015 to \$67B in 2019; global spending on IaaS is expected to increase of 32.8% in 2015 compared to the previous year; cloud applications would account for 90% of the market by 2019, compared to 81% of 2014 (Roundup of Cloud Computing Forecasts and Market Estimates Q3 Update, 2015, available at <http://www.forbes.com/sites/louiscolombus/2015/09/27/roundup-of-cloud-computing-forecasts-and-market-estimates-q3-update-2015/> - the Report put together the forecast and market estimate as resulting from research and advisory consultancies reports including International Data Corporation (IDC), Forrester, Gartner, Ovum, Wikibon and others).

¹⁹³ Although, to be fair, recently the idea that privacy is a factor impacting on competition has gained growing consent especially between competition authority. In this respect, in the course of the recent Conference hosted by the Italian Competition Authority on 9 November 2016, it was indicated that privacy rules can play a role in fostering competition. My view in this respect is that we should be careful in considering privacy as a factor of competition and, more importantly, in considering violation of privacy rules as a violation of competition rules as well. The history of antitrust law and its relationship with sectorial discipline (such as IP law) has showed how finding the right of balance for antitrust enforcement can be complicated and how it requires an attentive analysis.

¹⁹⁴ RightScale State of the Cloud Report, cited above at 7; Wikibon, Public Cloud Market Shares 2014 and 2015, 451 Research Vendor Window, 2015.

3.2.1. Market shares in cloud computing

a) General principles

Market share, and in particular, its relevance to measure market power is highly debated in respect of new markets, especially when those new markets are innovation driven¹⁹⁵.

One of the argument is that the undertaking which first enters the market and contributes to its development enjoys a “first mover advantage” and can quickly acquire high market shares in the market; however this does not imply that such undertaking could enjoy market power because those high market shares may not be sustainable in the long period, in particular when the market faces entry by new companies and/or expansion by companies already in the market¹⁹⁶.

This seems to be particularly the case in innovation driven markets, hence in respect of cloud computing services where, regardless of the position enjoyed in the market, undertakings are always under the competition constraints to innovate in order to avoid being annihilated by more innovative competitors.

The Guidance does not contain any specification concerning market share calculation in new markets; however the European Commission, in some of its decisions, has acknowledged the need to use some caution when facing high market shares in nascent market. This position was adopted, for instance, in Microsoft/Skype where the European Commission considered that market shares provide only a limited indication in nascent and fast growing markets since market share can change very quickly within a short period of time¹⁹⁷.

When it comes to innovation driven markets, close attention need to be devoted to the analysis of low market share. As indicated above, although market shares are not considered as a conclusive factor in the assessment of market power,

¹⁹⁵ Sidak J.G., Teece D.J., Dynamic Competition in Antitrust Law, *Journal of Competition Law and Economics*, 2009, 5(4), page 581; O'Connor D., *Understanding Online Platform Competition: Common Misunderstandings*, cited above at 14.

¹⁹⁶ More extensively on dominance assessment in new economy, see also Faull J. Nikpay A., *The Eu Law of Competition*, OUP, 2014.

¹⁹⁷ European Commission. *Microsoft/Skype*, § 78. See also, General Court, Case T-79/12, *Cisco Systems Inc. and Messagenet S.p.A. v. Commission*, 11 December 2013, not yet published. This case concerned the appeal brought by Cisco System Inc. and Messagenet S.p.A. against the decision of the European Commission clearing the Microsoft/Skype merger. In literature, Cugia di Sant'Orsola F., Noormohamed R., Guimaraes D.A., *Communications and Competition Law*, cited above, Ch. 9, §3.

a presumption exists that low market shares are a sign of absence of market power. In cloud computing markets, this presumption may need to be reviewed.

Several factors point towards such conclusion. First is product differentiation. As indicated above, the Guidance expressly mentions product differentiation as something to be taken into account when dealing with market power. In the case of cloud service, product differentiation can in fact allow a company with low market share to enjoy a certain degree of market power, at least with respect to those users who particularly value features of a certain cloud service.

Secondly is “cloud loyalty”. Consumers can indeed develop a special link to a certain service or provider and decide to stay with it regardless of the quality of competing services. This phenomenon is not uncommon, particularly to sector where innovation and technology play a significant role. A good example is in fact represented by the loyalty developed towards Apple products and in particular towards Apple iPhone despite the (very) high price of such smartphone and the substantially similarity with competing products.

Further is market fragmentation. As mentioned, the Guidance indicates that the market share of a given company need not to be considered in absolute terms but have to be weighted against the market shares held by its competitors. In this context, it is also usually argued that market fragmentation run against a finding of market power, since when the gap between the market share held by the undertaking being considered and its competitor is limited, any attempt to exercise market power would clash against the reaction of competitors. The extent to which such argument can be applied to cloud service depends on the relevance which product differentiation and cloud loyalty actually have. If, as indicated, those factors would play a major role then market segmentation would not necessarily operate to limit market power since the fact that there are many operators on the market with limited market share does not necessarily mean that they are subject to competition constraints.

Based on what indicated above, it can actually be questioned whether market shares can provide a good (although first) indicator of market power. To briefly recap, indeed, high market shares say few about the ability to exercise market power since the position of the leader of the market can rapidly be leapfrogged by a more

innovative new entrant; and if it is true that this is something that can occur in every industrial sector, it is safe to contend that its bearing could be higher in cloud services due to the major role played by innovation. On the other side, low market share need to be also carefully considered as, due to product differentiation and cloud loyalty, it is not possible to presume absence of market power when market share is low. This considered, it appears that when it comes to cloud services, more than the actual measure of the market share, what is really relevant is the contestability of the market position of a company¹⁹⁸. In other terms, more than the market share held by one company what is really relevant is to estimate the degree of new entrance by the competitors of such undertaking.

a) Measuring market shares

Market share as an indicator of market power brings also another difficulty: identifying how to calculate them.

Calculating market shares requires the previous definition of the relevant market which is, as such, a hard task in respect of cloud computing markets as already underlined in the previous chapter. Even assuming that a precise market definition can be achieved, there rests to identify the correct base for calculation.

Usually, market shares are calculated taking into account sales in value or (in certain cases) in volume.

Sales in value, as the relevant criterion presumes that services are provided against payment of a price. This is not always the case for cloud services. Indeed, some cloud computing services are provided, fully or partially, for free to users. This is the case, for instance, of cloud storage systems which are offered for free to users up to a certain volume of data stored: Google Drive is free up to 15GB, Apple iCloud up to 5 GB, DropBox up to 2 GB. Once the free space is terminated, a user can upgrade its cloud service and pay the monthly fee or, to the contrary, it can create another account and take advantage of the free storage space offered by the operator; in other terms, a user can activate more than one account and enjoy a cloud service completely for free. When that is the case, calculating market share by making reference to sale in value would not provide a good picture of the market as it

¹⁹⁸ This point is also made by Evans D.S., *Antitrust in the New Economy*, Essay 7, in *Microsoft, Antitrust and the New Economy: Selected Essays*, 2002.

would not account for those users enjoying free services; said differently market share in such cases would underestimate the market position of a company.

Similarly, certain companies adopt a mixed policy whereby a certain number of months, depending on each providers, are offered for free when a new subscription is activated: this is the case, for instance of Amazon AWS which is provided for free for the first 12 months¹⁹⁹; Microsoft Azure grants 30 days free trial to new users²⁰⁰ similarly to Salesforce.com which provides for a 30 day free trial²⁰¹. As in the previous case, market share calculated on the basis of the value of sales can underestimated or overestimate the positing of a given operator in the market depending on the moment in time in which the analysis is carried out.

An alternative could be that of calculating market share based on the volume of sale. IN this respect, one option is to calculate volume of sale based on the number of subscribers. This approach was followed by the European Commission in the Microsoft/Skype merger where volume of sale was preferred, as a criterion, over revenue since communication services are usually provided for free²⁰². Along a similar path is Facebook/WhatsApp where market shares were calculated based on the number of users using the communication services²⁰³.

The use of volume of sale, in term of number of subscriptions, can still fail to provide a true picture of the position enjoyed by each cloud provider in the market. As indicated by the European Commission in WorldCom/MCI²⁰⁴, to employ the number of subscribers as a tool to calculate market share may be too complex due to the difficulty to identify how many real users were using the service. This can be particularly true for cloud computing services used by companies. It could happen, indeed, that companies may allow their employees to use the subscribed cloud services for personal purposes up to a certain limit. In such case, while the formal subscribers would be just one (i.e. the company) the actual users may be a larger

¹⁹⁹ Please see <https://aws.amazon.com/it/free/>, lastly accessed on 1 March 2017.

²⁰⁰ Please see <https://azure.microsoft.com/en-us/pricing/free-trial/>, lastly accessed on 1 March 2017.

²⁰¹ Please see <https://www.salesforce.com/form/signup/freetrial-sales.jsp>, lastly accessed on 1 March 2017.

²⁰² European Commission. Microsoft/Skype, § 80

²⁰³ European Commission, Facebook/WhatsApp, § 84 ss. The European Commission evaluated the use of different method, such as traffic volume (which was discarded due to the lack of report on the number of message sent, received, etc.). The number of subscription were used as the measure for market share calculation purposes also in Wanadoo (European Commission, Case COMP/38.233, Wanadoo Interactive, 16 July 2003).

²⁰⁴ European Commission, Case IV/1069, WorldCom/MIC, 3 February 1998, § 100.

number²⁰⁵. In this case, again the position of a supplier in the market can result underestimated²⁰⁶.

An alternative criterion could be to consider the amount of data stored in the cloud. This parameter is, as evident, not suitable to every cloud services but could be employed to measure the strength of companies providing storage solutions. The negative side is that its implementation may not be particularly easy due to absence of data on total volume of data stored as well as to the fact that, due to the inner flexibility of the cloud services, the volume of data that users can store in the cloud may change quite rapidly.

An alternative measurement tool could be the capacity sold by each cloud provider, either in term of gigabyte or computing power depending on the cloud service at issue. This methodology is probably the better fitted to describe the real position of a cloud supplier on the relevant market. However, this criterion also presents some complexity. First of all, it may not be easy to calculate, or even estimate, the total volume of the market. Cloud services have as their characteristic that of elasticity and flexibility, meaning that the volume offered by a cloud provider to its users can change quickly depending on the need of the users and, as a consequence, also the volume of the total market can change quickly and be very difficult to estimate.

²⁰⁵ In the WorldCom decision, cited above at 204, the European Commission noted that a network with a large portion of corporate subscribers might register a low number of individual subscribers but each company may have its own private internal network with many connected users. For this reason the number of subscribers was considered unlikely to provide a real mirror of the actual strength of a network.

²⁰⁶ This issue is also relevant in merger control albeit to a different perspective. Indeed, sometime the revenue realized by a company does not provide a real image of the relevance that such company may have in the market. Said differently, a company may realize low turnover because, for instance, it is a new entrant in the market and its business is still not completely developed. In such case, a possible merger consisting in the acquisition of such company may fall outside the European Commission jurisdiction because of too low turnover. This can be potentially an issue when the company in question is an innovative start up and the acquisition, for instance, by a leader of the market may have the effect to chill the innovative breath of the company. This issue has been the object of closer analysis by scholars (among others, please see Steel de A., Larouche P., note on Disruptive Innovation and Competition Policy Enforcement, cited above at 19). The European Commission itself is well aware of the problem and in fact it launched a public consultation on 7 October 2016 on Evaluation of procedural and jurisdictional aspects of EU merger control, - available at the following link http://ec.europa.eu/competition/consultations/2016_merger_control/index_en.html. There the European Commission recognized that the current system of thresholds based only on turnover may not be fit to the mergers involving digital business where companies may have a very high economic value despite low turnover. It is not unlikely that such need for a review of current thresholds system was pushed by the numerous announcements of mergers concerning the acquisition of start up companies active in the digital sector: examples are recent Terenda (US based company) acquisition of a UK start up company providing big data solutions (<https://techcrunch.com/2016/07/25/big-data-company-teradata-acquires-uks-big-data-partnership/>) which, at least based on the public information available, was not subject to any competition review, as well as many other transaction inside and outside the European Union involving companies active in big data and cloud business (for a general review please see <http://www.zdnet.com/article/big-data-acquisitions-all-about-the-enterprise/>).

Another aspect to take into account is that of captive production. In this respect, it needs to be considered that certain cloud suppliers, in addition to just offering cloud services on the market, can use part of their cloud capacity to build up other IT services. By way of example, Google applications are usually built up over Google PaaS which means that some of the capacity that Google has available is not offered on the market but employed in-house. Should the measure of market share be calculated based on the capacity or computing power, captive production would need to be closely considered in order to avoid an overestimation of the position enjoyed on the market by a certain cloud supplier. As widely known, this is not an easy task and the way in which captive production needs to be assessed has been widely considered especially in the field of merger control. The point is usually to evaluate whether captive production/capacity needs to be considered as part of the product market or whether the product market needs to be estimated by taking into account only product sold in the merchant market. The general position is that captive capacity/production is included only if it can be demonstrated that it would be profitable for the supplier to forego captive use and sell into the merchant market in response to a SSNIP of the product in the merchant market²⁰⁷.

3.2.2. Barriers to entry/expansion in cloud services

Barriers to entry can play a material role in the assessment of market power in respect of cloud computing services. As mentioned in the paragraphs above, barriers to entry/expansion can take several forms as they can be the result of advantages enjoyed by a certain company over the market, by the characteristics of the market, the presence of legal or regulatory barriers as well as to costs faced by users in switching from one supplier to the other.

As with market share, in the absence of comprehensive studies on the functioning of the market for cloud services, it is not easy to identify potential barriers to entry or expansion. Some consideration can however be made.

- a) Advantages enjoyed by an undertaking over the market
 - i) Initial capital investment

²⁰⁷ ICN, Report on Merger Guidelines, § 1.52

When considering the advantages that a potential dominant undertaking may have on the market, relevance could be accorded to initial capital investments, that is to the costs an actual competitor incurs to expand its activity or which a potential new entrant need to bear to enter the market. Initial capital investment has been considered as a potential barrier to entry in certain decision of the highest courts both at EU and US level²⁰⁸; however the extent to which such costs can, in general, amount to a barrier to entry has been highly debated. Some authors contend that high investment costs are not a barrier to entry because in a well-functioning capital market, capital is available equally to all firms wishing to enter a certain market²⁰⁹; others argue that capital is not available to all firms at the same condition²¹⁰, while certain others authors²¹¹ observe that the extent to which high initial investment costs could amount to a barrier to entry ultimately depend on whether it is perceived as such by a potential entrant²¹².

The importance which initial capital investments can have in deterring entry or expansion depends, probably, on the kind of cloud service considered as well as on whether the company wishing to provide cloud service is already active in the provision of connected IT services or not²¹³.

Initial investment costs may be a relevant factor in the decision of a new company to enter the IaaS market. As mentioned, IaaS consists in the provision of virtualized infrastructure, such as computing processing, storage, networking which, despite their virtual nature, need ultimately to rest on physical infrastructures. In other terms, in order to compete on the IaaS market, an undertaking need to invest heavily in physical databases and servers; more than that, a company need to be able to

²⁰⁸ ECJ, Case 27/76, *United Brands v. Commission*, 1978, ECR 207, 1 CMLR 429, in this case the court identifies as barrier to entry the "exceptionally large capital investments required for the creation and running of banana plantation" (§ 122). In the US, *Lockheed Martin Corporation v. Boeing Co.*, 314 F. Suppl. 2d 1198, 1230 (M.D. Fla 2004), where the court indicated that "*high startup costs and the advantages of experience may be important to the ultimate decision of whether a defendant has captured a dangerous market share*". See also OECD, *Competition and Barriers to entry*, 2008.

²⁰⁹ Notable sustainer of this approach is Stigler G., *The Organization of Industry*, 1968.

²¹⁰ Joseph Stiglitz & Andrew Weiss, —*Credit Rating in Markets with Imperfect Information*, Il 71 *American Economic Review* 912 (1983).

²¹¹ Richard Schmalensee, *Horizontal Merger Policy: Problems and Changes*, Il 1 *Economic Perspectives* 41 (1987).

²¹² For a recollection of the different orientation, please see OECD, *Competition and Barriers to entry*, cited above at 208.

²¹³ In this respect, see also Weber R.H., *Competition Law Issues in the Online World*, cited above at 14; the author indicates that in general terms, entry in the internet sector can be easy as all that is required is a "good idea and a websites"

obtain quickly financial resources to ensure scalability of IaaS service. As often recalled, the key feature of cloud services in general, and IaaS in particular, is the ability to offer computing resources in a flexible way and to an amount which match the need from time to time manifested by the user. The investment necessary to install physical infrastructures and ensure flexibility and scalability can probably represent a barrier to entry if the company wishing to start providing IaaS service is entirely new to the sector.

The outcome can be different when a company is already providing on line services. By way of example, Amazon, being the current leader of the IaaS market, has developed its service starting from its online retail business; similarly Amazon's competitors (e.g. Microsoft, Google, Salesforce) have built their cloud services on products they were already producing²¹⁴. A potential competitor which is already active in the provision of some sort of online service can find itself in a position similar to that of Amazon in the early days of IaaS service and the costs which it would need to face would only be that of expanding its current business to the provision of IaaS service. When that is the case, it is foreseeable that a company may not need to incur material capital investment to start offering cloud service as it could leverage on its current activity, hence initial capital investment would probably not be such to deter expansion of activity to the IaaS sector.

Initial investment costs appear less likely to influence entrance in PaaS and SaaS markets. Indeed, PaaS and SaaS need not to be built on physical infrastructures; PaaS solutions may be provided by cloud providers by relying on IaaS while SaaS solutions may rely on PaaS. In practical terms, this means that PaaS and SaaS providers could enjoy the advantages connected to the use of cloud solutions, which, on the point of costs, results in PaaS and SaaS solutions being possible without the need of high initial capital investment²¹⁵.

²¹⁴ As mentioned already, Amazon developed its cloud services from its online retailing services; Microsoft from its global web email and services for small business; Google from its search and advertising business; Salesforce from its CRM application. All those companies faced pressure from their core business which urged them to move to the cloud; more on this point Kushida K.E., Murray J., Zysman J., *Diffusing the Cloud: Cloud Computing and Implications of Public Policy*, cited above at 39.

²¹⁵ For instance, DropBox is a provider of online storage solution (SaaS) powered by cloud computing service model of IaaS. Please also note that SaaS solutions deserve a further specification: as seen on the section dedicated to market definition, SaaS differs greatly based on the kind of service actually provided to users (be it communication services, social networking, word processing, etc.). In respect of SaaS solution, therefore, a potential new entrant may have to face initial costs which are not ascribable to the use of the cloud technology but

ii) Installed base

A factor which need to be closely considered when it comes to the analysis of barrier to entry in cloud services is the impact that the pre-existing installed base can have in deterring entrance by potential competitors.

As mentioned, some of the current operators in the cloud markets have developed their cloud suites as an evolution of their core businesses²¹⁶, because of this, those operators already enjoyed a large installed base when they entered the cloud markets, this situation turn into a competitive advantage

Due to the way in which the cloud services evolved, companies such as Amazon, Google and Microsoft, can therefore enjoy a significant advantage compared to new entrants as they could leverage the installed base they already have for their core businesses to develop their cloud offerings.

Similarly, customers would be more akin to adopt a cloud suite developed by a company they already know and whose products they are already using. It is for this reason that providers such as Amazon, Google or Microsoft could more easily offer their cloud products to their current customers than it would be for a new entrant to convince users to use the new service. In addition, those providers can try to lock-in their installed base by offering products which integrate the on-line cloud service and the off-line product ensuring a higher level of integration and interoperability compared to the one which a new entrant may be able to produce²¹⁷.

Installed base is relevant because, even in the absence of switching costs, users can be reluctant to move to another operator when a provider, which they know already, offer easily accessible new services. Accessibility and interoperability can be particularly relevant for enterprises which, most likely, would tend to prefer cloud products offered by the same operator providing the off-line IT infrastructure as this may be perceived as a guarantee of a higher degree of compatibility between on-

rather to the features of the specific virtualized service: by way of example, those initial costs may be related to advertisement, branding, etc.

²¹⁶ Please refer, inter alia, to what indicated under footnote 214 above. More on this point, Kushida K.E., Murray J., Zysman J., *Diffusing the Cloud: Cloud Computing and Implications of Public Policy*, cited above at 39.

²¹⁷ By way of example: Microsoft on-premises applications are compatible with Azure, its cloud PaaS: this allows users to edit, save and store documents created on-premises over the Microsoft cloud and vice versa. Similarly, users with a Gmail account can have easy access to Google Drive - which incorporates other Google cloud service such as Google suite for editing and modifying documents, spreadsheets and presentation, Google Photo - to Youtube, Google maps, etc.

premises and online files. When that is the case, a potential entrant would find a major obstacle in attracting users up to a level to make its entrance profitable and, for this reason, it could be deterred from entering the market in the first place.

iii) Switching costs

Closely related to the issue of the installed base is the possible barrier to entry (expansion) represented by switching costs.

Switching costs are defined as the cost which a user would face should it decides to change supplier of service²¹⁸: such costs are not always relevant in antitrust terms but they can become so when they are sufficiently high to deter users from switching supplier; when that is the case, users become locked-in to the product of their first choice and entry may be impaired by the difficulty to attract users.

Switching costs may be of different nature: they could be either of an economic nature (e.g. penalty applied for earlier termination of a contract) or non-economic nature (e.g. knowledge cost, possible loss of information, cost of research of new supplier)²¹⁹; switching costs can be either intrinsic to the nature of a product or they can be strategically created by a company.

Inherent to the nature of the product are those costs which derive from the need to adapt to the new supplier in term of mechanical adaptation or as learning cost²²⁰. An example can be found in the communication sector before the introduction of the EU Service Directive²²¹. As it could probably be recalled, up until few years ago, the decision to switch telecom operator was not without consequence for a consumer because it implied the need to abandon the old telephone number and be assigned a new one, in certain cases, it also determined the loss of the credit not exhausted while still with the old operator, etc. These obstacles froze competition between the current operators of the market and impeded or, at least, made very hard to enter the market.

Switching cost can however be artificially raised by a company trying to protect its position on the market against potential entrants. To continue with the

²¹⁸ European Commission, Guidance on art. 82, § 17.

²¹⁹ Gonzalez-Diaz F., Enrique Snelder R., EU Competition Law, Vol. V, Abuse of Dominance Under Art. 102 TFEU, cited above 152.

²²⁰ *Ibidem*. See also Weber R.H., Competition Law Issues in the Online World, cited above at 14.

²²¹ Directive 2006/123/EC of the European Parliament and of the Council of 12 December 2006 on services in the internal market, OJ L 376, 27.12.2006, p. 36–68.

previous example, a telecom operator can unreasonably delay the switching of users to its competitor in order to finally dissuade them from moving away. In the field of internet based company, reference is sometimes made to the attempt of online companies to raise switching costs by making harder on user to move their data away: this is a point which has been often raised against Facebook with respect to data (being it, information, photograph, videos) which members of its networking posted on their wall. The extent to which the absence of data portability can in practice deter users from switching operators is highly debated²²², however regulatory authorities took this point very seriously and the European Commission expressly introduced a right to portability of data in its Data Protection Regulation²²³.

It is not unlikely that switching costs may operate as a barrier to entry (or expansion) in cloud computing services as well.

Similarly to other industrial sectors, switching costs can be inherently linked to the characteristics of the service or artificially raised by cloud providers.

One aspect to remark is that cloud solutions are built using specific tools, protocols and standards chosen by each provider. When a user opts for a certain cloud solution, it also indirectly choose the tools, protocols and standards of the cloud supplier. To the extent that the tools, protocols and standards employed by cloud providers differ, migration from one cloud solution to another may be impossible, or anyhow extremely difficult, for users which may found themselves locked-in to a particular cloud supplier.

In addition, cloud providers can implement policies aimed at avoiding the moving away of their users simply by raising obstacles which are not directly

²²² Relevance of data portability to lower switching cost has been particularly considered when analyzing competition among online platforms with particular reference to social networks. In this respect, the position expressed at EU level by the regulator has been in the sense of considering data portability as fundamental to ensure that competition is not altered - see Almunia J., Competition and Personal Data Protection, speech given at the Privacy Platform event: Competition and Privacy Markets of Data, 2012, where Almunia stated that data portability “*goes to the heart of competition policy*” since “*customers should not be locked in to a particular company just because they once trusted them with their content*”; he also added that “*whether this is a matter for regulation or competition policy, only time will tell*”.

Certain authors have pointed out that switching costs for users are not the result of absence of data portability but are rather imputable to other factor, such as for instance to network effects: in this sense, see Graef I., Mandating portability and interoperability in online social networks: regulatory and competition law issues in the European Union, available at www.ssrn.com; Yoo C., When Antitrust Met Facebook, available at www.ssrn.com where the author considered that the reason why users tend to remain with a certain social network is not the absence of data portability but rather the number of friends they could reach thanks to that platform.

²²³ Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC.

connected with the functioning of the services. Similarly to what already occurred with other online services, a cloud provider may decide to subject the downloading of the data stored in a cloud subject to a complex procedure in an attempt to dissuade users from moving away or it could make more difficult to implement update on the application written using a cloud platform after the switching took place.

Switching costs, at least those stemming from the technical characteristics of a service, can be controlled thanks to the introduction of standards²²⁴ which foster interoperability between different services and therefore render easier for users to move away from operators they once choose.

Standardization could be a viable solution for cloud computing services as well²²⁵, however due to the relatively early stage of the development of cloud markets no actual standardization proposal is in place²²⁶. Further point to note is that user rarely evaluate interoperability when deciding which cloud service to opt for, although, business users may provide to be more attentive than consumers towards this aspect.

Switching costs can be of different nature and extent depending on the different layer of cloud considered.

In the absence of any previous analysis, it is possible to infer that in the case of IaaS, switching costs may be a consequence of the need to integrate the cloud space with on-premises computing resources. At least in the first phase of the development of IaaS service and up until the moment in which all computing resources will be moved to the cloud, users would need to integrate the on-premise IT resources with the cloud ecosystem. This need is likely to influence the choice of the cloud service by privileging that suite which is capable to grant the highest degree of interoperability and compatibility with the current system. For the same reason it is also likely that once the choice is made, a user would be reluctant to switch to

²²⁴ Standards have been introduced in the telecommunication sector with the introduction of standards for the transmitting technology (i.e. GSM/GPRS, UMTS, LTE). More simply, standards have concerned several aspects of every day life starting from A4 paper size to keyboards, to name a few.

²²⁵ Standardization is however not necessarily without inconvenience in antitrust term; reference is made in this respect to the recent cases decided at EU level and concerning abuse realized with reference to essential patent and the standardization process. Please see, recent European Commission decisions, Case AT. 39985, Motorola - Enforcement of GPRS Standard Essential Patents, 29 April 2014 and Case AT. 39939, Samsung - Enforcement of UMTS Standard Essential Patents, 29 April 2014.

²²⁶ In this respect, please note that in 2012 the European Commission published its cloud strategy as part of the wider Digital Agenda where it identified standardization as a fundamental step to unleash the potential of cloud computing. The initiative which should lead to definition of standard is still on going (see <http://csc.etsi.org/>).

another IaaS provider if that procedure bears the risk to experience disruption in the dialogue between cloud and physical infrastructure, lost or corruption of records, risk to impair the security and stability of the IT system. Besides possible flaws connected with the switching procedure, a user may be deterred from switching supplier simply by the need to develop a specific knowledge to use the new cloud service and/or by the length in time of the portability procedure.

In respect of PaaS, possible risk connected with the switching from one platform to another is that of being unable to run the applications in the new platform or to be unable to modify, upgrade, fix such applications or of losing some of the features attached to apps. Indeed, should an app developer decide to move its applications to a different PaaS, the first obstacle it would have to face is whether such applications can actually be run in the new platform in the light of the tools and services there available.

Assuming applications can be run, the second point is to verify whether the delivery of the apps is the same in the new platform; if the delivery is not the same, the developer would need to verify whether it is possible, or not, to fix the application so as to restore the original functionality. In addition, even if the switching of the apps can be made to the new platform without any major encumbrance, updating and enhancing the app may not be possible or easy in the new platform. To conclude on this point, the extent to which portability may be deterred depends on the compatibility between the different languages and tools made available by PaaS provider to design and run the applications.

Analyzing switching costs in SaaS is more complicated as those costs would probably vary depending on the type of applications considered. In general terms, it is however possible to indicate that in SaaS, as with the other cloud services, the issue of integration can play a major role in determining the success of portability procedure. Indeed, especially when SaaS solutions are employed by businesses, one aspect which would heavily count on the decision of a user to switch supplier is that of interoperability with other SaaS solutions²²⁷: if SaaS solutions available on the market are not such to grant interoperability with the other suite in use by a

²²⁷ By way of example, when Groupon decided to move its activity to the cloud opted for a SaaS solution which granted ease of integration with existing IT solutions (ref. <https://support.rackspace.com/white-paper/understanding-the-cloud-computing-stack-saas-paas-iaas/>).

certain business, then, it is possible to infer that the user would stick with the SaaS of first choice even when such solution is not the best available on the market.

Last point to consider is that it is not unlikely that the same cloud provider is active in all the three fields of services offering at the same time IaaS, PaaS and SaaS solutions: this is arguably the case of the leading operators on the market. When that is the case, and in particular when a user employs the cloud service offered by the same operator in all the three layers, the costs of switching supplier for just one of the cloud solutions, in term of loss of interoperability, could be even higher.

Finally, switching costs can probably be higher in private cloud where the distinguish characteristics is that of being tailored around the need of a specific user: when that is the case, it is likely that a user would be reluctant to switch away to another provider unless this other provider is capable to replicate the requested features.

b) Characteristics of the market

i) Network effects

Network effects can also operate as a barrier to entry.

Applying the general theory, network effects are distinguished into direct and indirect network effects. Direct network effects arise when the value of a product increases with the number of other customers using the same product. A good example of this effect is the telephone whose utility increases with the number of people using it. In the digital sector, a very good example could be that of social networks: as it is sometimes indicated being a member of a social network is only valuable if other people are members as well and such value increases with the number of people the social network is capable to connect.

Indirect network effects occur when the utility derived from usage of a certain product or service grows with the number of available complementary products²²⁸. A good example of this is the interrelation between applications and operating system: users prefer operating system offering a wide array of apps running on it, app developers are induced to write applications for the leading OS which, as a

²²⁸ Haile N., Altmann J., Value Creation in IT Service Platforms through Two-Sided Network Effects, in K. Vanmechelen, J. Altmann, and O.F. Rana (Eds.): GECON 2012, LNCS 7714, pp. 139–153, 2012.

consequence, expands the range of apps running on an operating system which in turn makes the operating system all the more attractive for users²²⁹.

Network effects may have a material impact on competition as they tend to favor the largest network, which grows larger, over the smaller network, which shrinks. When this mechanism is particularly strong, the market tips towards dominance as all the consumers of a market tend to opt for the product of one company or for a certain technology²³⁰.

Network effects are particularly strong when they are self-reinforcing, i.e. when they are a function of the installed base of users rather than being activated by the higher quality of the service provided²³¹. In such case, network effects may be particularly detrimental for the competitive structure of the market and for innovation as they may favor one technology over the other even when such technology is not the best available on the market. Many are the examples of how network effects can shape the market and determine the win or loss of a certain product/service: this was, for instance, the case of Betamax and VHS technology - where Betamax was largely considered as a superior technology albeit the market tipped in favor of VHS²³²; similarly, Mac computers were deemed of a higher quality but the market favor nonetheless personal computer installing Windows operating system due to the wide array of applications available.

It is generally considered that direct and indirect network effects consolidate the position of the dominant company and make entry particularly difficult; indeed, when network effects operate, the measure of the benefit which a potential entrant must offer to attract users or producers of complementary product is significantly higher than it is otherwise the case as it must overcome the negative effects they face in leaving the previous supplier. As intuitive, the stronger the network effects the higher the benefit that the new entrant would need to offer to the users²³³.

²²⁹ Whish R. Bailey D, Competition Law, cited above at 28; Gonzalez Diaz, cited above at 152§ 2.67; OECD, Competition and Barriers to entry, cited above at 208.

²³⁰ *Ibidem*; Werden G.J., Network Effects and Conditions of Entry: Lessons from the Microsoft Case, in 69, Antitrust Law Journal, 2001, p. 87; OECD, Competition and Barrier to entry, cited above.

²³¹ Gonzalez Diaz, Enrique Snelder R., EU Competition Law, cited above at 152 § 2.68.

²³² Whish, Bailey Competition Law, cited above at 28. Gonzalez-Diaz F., Enrique Snelder R., EU Competition Law, cited above at 152, § 2.67.

²³³ OECD, Competition and Barriers to entry, cited above at 208. Werden G.J., Network Effects and Conditions of Entry: Lessons from the Microsoft Case, cited above 230.

In traditional computing, the primary example of network effects as barrier to entry is provided by the Microsoft case²³⁴. There the European Commission observed that *“the more popular an operating system is, the more applications will be written to it and the more applications are written to an operating system, the more popular it will be among users”*²³⁵. This being the case, the European Commission observed that, although possible, it would be very risky and expensive for a potential competitor to build a new PC operating system with no application running on it since the beginning: indeed, in such case, users very unlikely would buy an operating system without a wide range of applications already available on it²³⁶. In Microsoft, the European Commission found that network effects were particularly strong as they were self-reinforcing: applications developers had an economic compelling incentive to continue developing applications for Windows platform because they know that the potential market will be larger than for other platforms. This effect protected Microsoft high market shares in the client PC operating system market from competitive pressure by potential new entrants²³⁷.

In addition of being reinforced by the presence of a wide installed base, network effects gain strength when switching costs are in place. When that is the case, a user would be further discouraged from moving away to its provider of first choice by the costs which such decision would entail.²³⁸

This said about the general principles, let's now turn to analyze the impact, if any, that network effects may have in competition between cloud providers.

It is usually considered that network effects can impact competition among cloud computing providers as well²³⁹. The extent to which such is true, however, is

²³⁴ European Commission, Case 37.792, Microsoft, cited above at 21, § 448-472. Network effects played a major role in the finding of Microsoft's dominance also in the US.

²³⁵ European Commission, Case 37.792, Microsoft, cited above at 21, § 449.

²³⁶ As a consequence, the European Commission observed that for a new operating system to enter the market it would be necessary that it is able to support a critical mass of existing Windows-dependent applications or a compatible critical mass of application already written for the new platform.

²³⁷ European Commission, Case 37.792, Microsoft, cited above at 21, § 459. The relevance and strength of network effects in the Microsoft case was similarly underlined by the District court of Columbia (U.S. v. Microsoft Corp. 84 F. Supp. 2d 9(D.D.C. 1999), § 39.

²³⁸ More in details on network effects, switching costs and their relation, please see Farrell J., Coordination and Lock in: Competition with Switching Costs and Network Effects, 2007.

²³⁹ Da Correggio L. Laize, Walden I., Ensuring Competition in the Clouds: The role of Competition Law?, 2011, available at www.ssrn.com; Fershtman C. & Gandal N., Migration to the Cloud Ecosystem: Ushering in a New Generation of Platform Competition, in Digiworld Economic Journal, no. 85, 1st Q. 2012, p. 109; Sluijs J.P., Larouche P., Sauter W., Cloud Computing in the EU Policy Sphere: Interoperability, Vertical Integration and the Internal Market, cited above at 12; Jaeger T.P., Lin J. Grimes J.M., Cloud Computing and Information Policy: Computing in a Policy Cloud? 5 (3), Journal of Information Technology and Policy, 2008, vol. 35; Cusumanno M.,

not entirely clear. In the traditional computing sector, as widely known, the operation of network effects was largely the result of the close link between operating system and software running on it²⁴⁰ and, as a consequence, of the fact that software were written bearing in mind the underlined operating system²⁴¹. Cloud computing differs from traditional computing exactly because of the absence of such a close link between the different layers. Indeed, the basic idea around cloud computing services is that of being accessible regardless of the operating system installed in the device used to access the internet and regardless on the layer on which a certain cloud service is designed. Actually, from users' perspective, it could very well be the case that a user does not know on which infrastructure/platform a certain cloud service is running²⁴². The peculiarity of cloud computing, the way in which it operates, and in particular the absence of a close link between one layer and the other, render network effects less strong than it was the case in traditional computing industry. In addition, users do not necessarily derive an added value from the fact that others use the same cloud service; to provide an example, cloud storage is perfectly valuable for a user regardless of the number of other people using the same cloud suite, similarly the benefit deriving from IaaS does not vary depending on how many people also use the same service. Indeed, the main benefits users gain from cloud services - namely saving in cost, flexibility and scalability - do not depend on users base.

This said, cloud computing services may not be completely immune from operation of network effects, however the extent to which network effects would play a role may vary depending on the cloud service at issue. Operation of network effects can probably be foresaw in the case of SaaS: users of Google Docs would probably

Cloud Computing and SaaS as New Computing Platforms, in *Communication of the ACM*, Apr. 2010, Vol. 53, No. 4; Cowen T., Gawer A., *Competition in the Cloud, unleashing investment and innovation within and across platforms*, in *Communication & Strategies*, 2012, Issue 85.

²⁴⁰ As mentioned already, the best example of how network effects operate in the traditional computing sector is the Microsoft case. There the network effects were linked to the fact that the vast majority of applications were written for Windows OS and, most of them, run only in that operating system; even when the same application was available for a different operating system, it was sometimes the case that not all the features were made available. As a consequence the sharing of files between users of different operating systems was very difficult and, sometimes, impossible. Users therefore enjoyed both a direct and indirect benefit from joining Windows operating system because this meant being able to share files with a larger base of users and, at the same time, to have available a growing set of applications.

²⁴¹ It is so that software companies usually make different version of their products depending on whether they are supposed to run on windows or mac computer.

²⁴² In this way, users are also completely indifferent to the operating system installed in the device as long as it supports an internet browser, as well as to the device itself. If cloud computing is going to become the only way in which users (either consumers and companies) would use computing resources, this would materially change the competition structure of more traditional computing resources as well.

gain higher benefits from their service the more they could share their documents with other users. The same reasoning can apply for cloud storage service which, although perfectly valuable for a user by itself, can probably increase their utility when the possibility of sharing stored file increases. Network effects can operate in other layers as well and in particular in PaaS and IaaS where network effects may be activated by an increased number of available complementary products. It cannot be excluded that, increasingly, specific features or functionalities would be developed only for certain cloud service, probably the most successfully or those released by leading companies. When that is the case network effects may favor only certain cloud providers and make more difficult for a new operator to attract users.²⁴³

ii) Multi-homing and one-way compatibility

When considering potential barriers to entry and, in particular the impact that switching costs and network effects may have in deterring entrance, account must be taken of the possible mitigating effect generated by tendency of users to multi-home. Multi-homing refers to the ability of users to contemporarily use more than one service for the same purpose²⁴⁴. Multi-home is possible when it entails no cost (or very limited cost) for users, in traditional industries this is, for instance, the case credit cards, of internet browsers and media players.

The relevance of multi-homing as a mitigating factor has been recently acknowledged in the Facebook/WhatsApp merger where the European Commission first recognized that the consumer communication sector is characterized by network effects, in as far as the utility that a user derives from using a communication application increases with the number of friends it could reach, and then noticed that such network effects do not necessarily negatively impact competition especially when their potential effect as a barrier to entry is mitigated by certain factors, among which by the ability of users to use contemporaneously more than one communications apps²⁴⁵. Similarly, in closing the investigation on Google acquisition

²⁴³ See also, Cusumano M., Cloud Computing and SaaS as New Computing Platforms, in Communication of the ACM, 2010, Vol. 53, No. 4.

²⁴⁴ European Commission, Microsoft/Skype, § 33.

²⁴⁵ European Commission, Facebook/WhatsApp, cited above at 142, the European Commission noticed that the sector exhibits a high degree of multi-homing, § 133.

of Admeld, the DoJ indicated that the tendency to multi-home advertising platform lessen the risk of the market tipping to a single dominant platform²⁴⁶.

Ability of users to multi-home depends on several factors among which the cost of services (multi-homing would be easier and more likely when the services are provided for free, as it is the case of communication apps, or anyhow when they are available at minor costs), accessibility of services (multi-homing may be restrained if access to services is subject each time to complex procedure), ease of downloading/installation activity and limited capacity requirement²⁴⁷.

Multi-homing can occur in cloud computing services as well, to a degree which may differ depending on the type of cloud service considered. Multi-homing is particularly likely in SaaS considering that most of the applications can be easily downloaded usually free of charge. Actually, it is not unlikely that users may employ more than one cloud storage²⁴⁸ to get advantage from the free offer that cloud providers usually make as well as to diversify the risk of data being lost; similarly users may decide to multi-home word processors, photo storage system, etc. Multi-homing can probably occur also in respect of other layers of cloud services, namely PaaS and IaaS, although probably to a lesser extent in the case of IaaS.

Tendency to multi-home in cloud services has been detected also by market reports on the cloud world. Indeed, the RightScale Report²⁴⁹ indicates that many enterprises tend to use more than one cloud provider; an example which is made by the report is the tendency by users to use at the same time Amazon AWS and Microsoft Azure as a plan of a diversified portfolio of cloud provider²⁵⁰.

Multi-homing is strictly linked to another aspect which, likewise, can reduce the impact of barriers to entry: one-way compatibility. One-way compatibility can be described as the ability of a provider to grant compatibility of its products with that of the leading provider on the market although the opposite may not occur. A different example of one way compatibility is found in those software which, for instance, allow

²⁴⁶ Statement of the Department of Justice's Antitrust Division on Its Decision to Close Its Investigation of Google Inc.'s Acquisition of Admeld Inc., 2 December 2011: "*The investigation determined that web publishers often rely on multiple display advertising platforms and can move business among them in response to changes in price or the quality of ad placements. This use of multiple display advertising platforms, commonly called "multi-homing," lessens the risk that the market will tip to a single dominant platform*".

²⁴⁷ European Commission, Facebook/WhatsApp, cited above at 142, § 133.

²⁴⁸ There is sometimes a bit of confusion on whether cloud storage service can be qualified as SaaS or PaaS; it seems however more appropriate to qualify services such as Dropbox, Google Drive as SaaS.

²⁴⁹ RightScale, State of the Cloud Report, 2015.

²⁵⁰ RightScale Report 2015, p. 21.

user to read documents written in a different format but not to modify them. One-way compatibility is something less than full interoperability, but anyhow it can decrease the lock-in effect deriving from operation of network effects and, depending on the case, switching costs.

One-way compatibility has been used by companies to enter the market in the cloud area as well, as it is the case of Glide, an online platform offering cloud services on the market. In particular, Glide grants compatibility of its applications with the dominant platforms (Windows, Apple and Linux) so as users of Windows products can easily use their product in the Glide environment as well. The compatibility is only one-way since it is not granted that, for instance, documents created with the Glide suite can be exported to the Windows area. In any case, by ensuring this one-way compatibility Glide increased its chance to compete with the leaders of the market despite it having a smaller installed base²⁵¹.

A similar path was followed by Google which, through its Drive suite allows user to import documents written in Office format, save them on Drive, modify and export them back to Microsoft. Google Drive grants users with the possibility to save and modify documents written in a different language in the Google Drive although the opposite is not possible, i.e. it is not possible for users to use Google Doc in the Office suite²⁵².

c) Access to an essential input

Privileged access by a company to an input essential to the provision of a certain service is generally enumerated among material barriers to entry for its competitors²⁵³. Many are the examples of essential inputs: it could be a raw material²⁵⁴, an infrastructures²⁵⁵, a protected right²⁵⁶, etc.

²⁵¹ These examples are taken from Fershtman C. & Gandal N., Migration to the Cloud Ecosystem, cited above at 119.

²⁵² Actually when a Google Doc is exported outside the cloud it is automatically converted into a .doc document.

²⁵³ O'Donoghue, R., Padilla J., The Law and Economics of Article 102 TFEU, § 4.2. cited above 159, § 4.2.3.3.

²⁵⁴ See for instance ECJ, Cases 6 and 7/73 Istituto Chemioterapico Italiano S.p.A. and Commercial Solvents c. Commission, 6 March 1974, in ECR 1974, p. 223.

²⁵⁵ Please see, inter alia, European Commission, Case IV/ 34.174, Sealink/B&I Holyhead, interim measure, 11 June 1992, European Commission, Case IV/34.689 - Sea Containers v. Stena Sealink - Interim measures, 21 December 1993.

²⁵⁶ Recent examples in this respect are the many cases related to IP rights, recently please see European Commission Case AT. 39985 Motorola - Enforcement of GPRS standard essential patents, 29 April 2014 and similarly, European Commission Case AT. 39939 Samsung - Enforcement of UMTS standard essential patents, 29 April 2014.

In cloud computing services, the essential input is the internet: indeed, as frequently noted cloud services are delivered through the internet which means that both users and cloud provider need to have access to the internet in order to access their services (the users) or to provide them (the cloud provider). The peculiarity of cloud computing services, compared to previous cases already analyzed by competition authorities and judges, is that the essential input is usually not owned by any cloud computing provider but by third parties, the internet service provider (“ISP”)²⁵⁷. The fact that the essential input is owned by a party third does not eliminate the issue usually related to possible barriers to entry consisting in the ability by actual or potential competitors to access essential input but it merely shapes differently the way in which such issue can take place. Indeed, in this case, a barrier can exist should ISPs allow access to such essential input on different footing depending on the cloud provider. A barrier to entry here can arise, therefore, when leading operators are able to obtain from ISP better conditions for their access to the internet, in both economic terms and in respect of the quality of the internet connection compared to the conditions applied to potential new entrant²⁵⁸. It is in fact evident that the quality of the internet connection plays a major role in the quality of the service that, in turn, a company is able to offer to users on the market.

The ability of all operators offering services based on the internet to have equal access to this resource has been the object of a lively debate at legislative level around the concept of net neutrality on both sides of the ocean. The fundamental idea behind the concept of “net neutrality” is that every content provider must be able to offer its content over a high quality open internet; conversely ISPs should not block, throttle or discriminate internet traffic with few and well identified exceptions.

Net neutrality has been the object of an extensive debate between scholars fostering opposite views on whether ISP should be obliged, by regulation, to be neutral or whether, to the contrary, they should be free to negotiate different terms with content providers. Considering that the outcome of this debate and the solution

²⁵⁷ In traditional computing, the link between the central and non-central units was part of the computing architecture and under the control of either the provider or the consumer: depending on the case it was a mere conduit (mainframe-terminal) or a local area network (server-client).

²⁵⁸ On this, please also see Gentzoglani A., *Evolving Cloud Ecosystems: Risk, Competition and Regulation*, in *Digiworld Economic Journal*, no. 85, 1st Q. 2012, p. 87; Sluijs/Larouche/Sauter, *Cloud Computing in the EU Policy Sphere: Interoperability, Vertical Integration and the Internal Market*, cited above at 12.

which will be adopted by legislators can impact the way in which competition could develop in cloud computing services as well, few remarks will be made on this point in the following subsection.

i) Net neutrality

The debate around net neutrality²⁵⁹ is somehow the by-product of the crescent relevance that internet and, more precisely, internet services play in our life.

In the early days, when few services were conveyed over the internet, ISPs provided internet connection based on “one size fits all” terms and conditions. At the origin, due to the still limited activity, there was no attention devoted to data volume being transmitted on the net. However as the internet evolved, and the quantity of services deployed over the internet started to increase, certain concerns arose around the increasing demand for broadband network capacity and users request for higher quality of services (a good example for this is the recent increased request for streaming which posed the need for a higher quality of internet connection). These two factors induced ISPs to rethink the way in which they offered internet connection in the market and to differentiate their offer based on the data volume and quality of service. In this way, the net stopped to be neutral towards content providers. This determined the raise of an intense debate between those scholar in favor of a neutral net and those who, to the contrary, considered perfectly fair the application of different terms and services depending on the type of service offered. Those fostering a neutral net underlined that any type of traffic management is incompatible with online freedom as it leads to discrimination among certain type of content. They expressed concerns that ISP could diversify service requirements in order to favor their own contents or that of companies with which they have a partnership relation; absence of net neutrality would allow price and service discrimination which, in turn, may hamper competition and reduce the possibility for

²⁵⁹ There is no clear definition of what is meant by "net neutrality". This term has been used in the context of a broad range of activity including blocking certain type of traffic, applying different termination fees, offering differentiated services and taking measure of network management. The literature on net neutrality is quite vast, including, *inter alia*, Wu T., Network Neutrality, Broadband Discrimination, Journal on Telecommunications and High Technology Law, 2003, Vol. 2, page 141-179; Wu T., Wireless Carterfone, International Journal of Communications, Vol. 1, page 389-426; Yoo C. Beyond Network Neutrality, Harvard Journal of Law and Technology, Vol. 1, page 2-77; Sylvain O., Network Equality, Fordham Law Legal Studies Research Paper No. 2588053, 2015, also published in 67 Hastings Law Journal 443 (2016). Net neutrality is also analyzed by Haucap J., Stuhmeier T., Competition and Antitrust in Internet Markets, Discussion Paper, Dusseldorf Institute for Competition Economics, Oct. 2015.

new start-up companies to exert competitive pressure over existing leading companies. Those opposing the introduction of a net neutrality principle consider that the ability of ISPs to apply different conditions is justified by the difference in costs connected to the different type of service offered (high/low speed, low/high data volume); that such differentiation is justified by the investment costs borne by the ISP and, therefore, that ability to differentiate the service condition is necessary to pursue innovation²⁶⁰.

The position of the operators also differ largely, mainly depending on which position they have on the market: network operators are usually against the introduction of a net neutrality principle, so are vertically integrated operators; to the contrary content providers are most likely in favor of a regulation imposing neutrality²⁶¹. Notable are also the examples of those operators changing their view on this topic as their positions on the market change: reference is made, among the others, to Google which at the beginning of the debate was enrolled in the group of the net neutrality fighter, but then changed its position in 2010 after signing an agreement with Verizon, the US telecom operator²⁶².

Although the debate around net neutrality was first developed in the US where it saw a strong opposition by those fostering net neutrality and those opposing it²⁶³, it was actually the European Union to first decide on which side of the table to sit. Indeed, in October 2015, an EU Regulation was issued introducing measures concerning open internet access where the principle of net neutrality was expressly adopted²⁶⁴. Relevant in this respect is the provision of art. 3.3 according to which *“Providers of internet access services shall treat all traffic equally, when providing internet access services, without discrimination, restriction or interference, and*

²⁶⁰ For a general overview on the debate around net neutrality please see Strowel A. Net Neutrality in Europe – La neutralité de l'internet en Europe, 2013.

²⁶¹ Strowel A. Net Neutrality in Europe – La neutralité de l'internet en Europe, cited above at 260.

²⁶² Strowel A. Net Neutrality in Europe – La neutralité de l'internet en Europe, cited above at 260.

²⁶³ Notably in favor of net neutrality is professor Tim Wu of Columbia University who also first talked of net neutrality, please see Wu T., Network Neutrality, Broadband Discrimination, cited above at 259.

²⁶⁴ Regulation (EU) 2015/2120 of the European Parliament and of the Council of 25 November 2015 laying down measures concerning open internet access and amending Directive 2002/22/EC on universal service and users' rights relating to electronic communications networks and services and Regulation (EU) No 531/2012 on roaming on public mobile communications networks within the Union.

*irrespective of the sender and receiver, the content accessed or distributed, the applications or services used or provided, or the terminal equipment used*²⁶⁵.

In the US, the path to net neutrality was less easy but ultimately ended up in establishing such principle²⁶⁶.

Having briefly recalled the position adopted in the EU and the US towards net neutrality, it may be reasonable to argue that access to the essential input should not represent a barrier to entry for potential cloud providers. This does not necessarily mean that the position of all cloud providers is the same towards the internet. As it is usually the case when dealing with fast moving markets, the regulation on net neutrality arrived when the main players on the market had already moved to the next step. Indeed, some of the leading online companies have developed their own network: this is notably the case of Google, Microsoft and

²⁶⁵ Art. 3.3. of the Regulation cited above at 264. The Regulation also introduces certain exceptions to the general principle relating to the possibility of introducing traffic management measures which are necessary to comply with provision of law, preserve the security and integrity of the network, prevent traffic congestion.

²⁶⁶ In the US the regulatory debate on net neutrality was largely one concerning the jurisdiction of the FCC to apply that principle to telecom operators. In brief, in the period following the passing of the Telecommunication Act 1996, the FCC tried to impose non discrimination rules over cable operators grounding its authority on the "ancillary authority" doctrine, according to which the FCC can impose common carrier obligations on non-common carriers when necessary to achieve the purposes of the Telecommunication Act 1996. This attempt was challenged by cable operators which argued that they were not subject to the non-discrimination rules only applicable to telecommunications common carrier, since they fell outside such category (despite their offering of public internet access service similarly to telecommunications companies). This dispute was partially resolved by the Ninth Circuit Court of Appeals which, in a dispute between the City of Portland, Oregon and AT&T (AT&T Corp. v. City of Portland, 216 F.3d 871, 879 (9th Cir. 2000)), ruled that Internet access service is a telecommunications service and therefore should be subject to the non-discrimination rules regardless of the category to which the providing operator falls (see Kimmelman G., Cooper M. Antitrust and Economic Regulation: Essential and Complementary Tool to Maximise Consumer Welfare and Freedom of Expression in the Digital Age, in Harvard Law & policy Review, 2015, Vol. 9, p. 403); in other terms, the court of appeal conferred more relevance to the kind of service which is provided rather than to the facility (cable or telecoms network) used to provide the service. In 2005, the FCC issued a Policy Statement (FCC, Internet Policy Statement, 5 August 2005, FCC 05-151) where the principle of net neutrality was further spelled out and where the FCC affirmed its jurisdiction to ensure that providers of telecommunications for internet access or internet protocol-enabled (IP-enabled) services are operated in a neutral manner. The FCC then tried to implement the net neutrality principles against cable operator in the famous Comcast case (the FCC claimed that Comcast had deployed deep packet inspection equipment throughout its network to monitor content of its customers' internet connections and to block specific type of p2p connections (Complaint of Free Press & Public Knowledge Against Comcast Corp. for Secretly Degrading Peer-to-Peer Applications, 23 FCC Rcd. 13,028 (2008) (FCC Order)) and that this activity was carried out outside the exception of reasonable traffic management); however, on appeal, the D.C. Circuit Court of Appeal rejected the FCC order arguing that the FCC could not prevent Comcast from blocking content under the authority of the statute (it was therefore - again- a matter of jurisdiction). After the Comcast case and in the attempt to reaffirm the principles of the open internet, the FCC issued a new order – the Open Internet Order – in 2010 (FCC, Preserving the Open Internet, December 2010, FCC 10-201) where the FCC tried to write an order that would enable it to prevent discrimination under the D.C. Circuit's interpretation of the 1996 Act. In early 2014, the D.C. Circuit overturned the FCC order, although it concluded that the FCC had authority to deal with discrimination under Section 706 of the Act (Kimmelman G., Cooper M. Antitrust and Economic Regulation: Essential and Complementary Tool to Maximise Consumer Welfare and Freedom of Expression in the Digital Age, in Harvard Law & policy Review, 2015, Vol. 9, p. 403). Lastly in 2015, the FCC lastly reaffirmed the net neutrality principle by reclassifying broadband as a common carrier under Section 706 of the Telecommunications act of 1996. On April 13, 2015, the FCC published the final rule on its new "Net Neutrality" regulations.

Facebook²⁶⁷. Although the network developed by those operators is not, at the moment, able to reach out directly to users it is possible to envisage that such result will be obtained shortly. When that would be the case, it could not be excluded that access to the internet would again become a material differentiated factor which may call for a close analysis on whether such infrastructure could amount to a barrier to entry.

3.3. How are currently shaped cloud services markets?

As mentioned the relative youth of the cloud services industry is such that no detailed analysis or inquiry has been carried out to evaluate the level of competitiveness of the market.

A preliminary idea on how markets for cloud services are shaped can be derived from market reports currently available although the outcome of those reports need to be considered with care. Indeed, from one side, market reports are designed regardless of any market definition, from the other they are based on different assumptions and criteria which means that the results are not necessarily comparable.

This said, a quite comprehensive study on cloud markets can be found in the recent RightScale²⁶⁸ Report on cloud services which provides a general picture on adoption of cloud computing and major players in public cloud.

In general terms, the RightScale Report indicates that the use of cloud services is constantly growing and, interestingly to note, it indicates that the percentage of smaller companies heavily using cloud services is higher than that of larger enterprises in so, de facto, confirming the general feeling that cloud services

²⁶⁷ One possible example is that of Google: the intention of Google to build its own infrastructure has been voiced for long time and it now appears that it has finally become reality. Based on certain information reported in the Google Cloud Platform Blog, the company has finally built a network capable of connecting several servers; more info is available at <https://cloudplatform.googleblog.com/2015/06/A-Look-Inside-Googles-Data-Center-Networks.html>.

Google is not alone; as it appears Facebook and Microsoft are also working to create their own network: more info is available here <https://www.wired.com/2016/05/facebook-microsoft-laying-giant-cable-across-atlantic/>. In all the mentioned cases, the need is that of being able to move and process enormous amount of data and to connect several servers. In so doing, Google, Facebook, Microsoft, etc. started to behave similarly to telecom operators, so much so that some of them and namely Google is moving its network in a direction which will finally lead directly to users.

²⁶⁸ RightScale, State of the Cloud Report, 2016. This report is the result of a survey carried out among 1,060 cross-section technical professionals of small (less than 1,000 employees) and large (more than 1,000 employees) businesses at worldwide level and concerned the extent to which their organizations make use of cloud computing. The survey was carried out in January 2016.

can play a significant role in festering the growth especially of smaller sized companies²⁶⁹.

Another very interesting point noted in the mentioned report is that cloud users tend to use more than one cloud solution: based on RightScale Report, cloud users leverage on average 6 cloud services (3 public cloud and 3 private cloud)²⁷⁰. As mentioned above, the distinction between public and private cloud relates to the deployment mode of cloud services rather than to the type of services themselves; the data on the report can nonetheless be significant in showing the ability and incentive of users to multi-home. Another remark is that larger enterprises are more inclined to use private cloud while smaller enterprises prefer public cloud²⁷¹; also very relevant is the fact that concerns around security flaws are decreasing as companies gain more experience in using cloud services²⁷².

Besides general considerations on the development of cloud markets and the most recent tendency towards usage of cloud services, the RightScale Report also provides interesting insight on the position of current cloud operators.

In particular, it is indicated that Amazon AWS continues to be the leading public cloud provider with 57% of the respondents using Amazon suite²⁷³ with Microsoft's Azure suite (IaaS and PaaS) increasing their adoption in so narrowing the gap with Amazon; Google cloud adoption appears to have increased in 2016 compared to the previous year²⁷⁴.

²⁶⁹ RightScale, State of the Cloud Report, 2016, cited above at 268, p. 7. The Report distinguishes between Cloud Watchers (organizations that are developing cloud strategies and plans but have not yet deployed applications into the cloud), cloud Beginners (organisations which are starting to use cloud computing solutions and want to gain experience with cloud in order to determine future projects), Cloud Explorers (organizations which have multiple projects or applications already deployed in the cloud), Cloud Focused (organisations which are heavily using cloud infrastructure). Small companies are classified for 32% among the Cloud focused companies while the percentage in that category of larger enterprises is 25%.

²⁷⁰ RightScale, State of the Cloud Report, 2016, cited above at 268, p. 11. Please see also page 29 of the Report where it is confirmed clearly that participants to the survey use more than one cloud.

²⁷¹ RightScale, State of the Cloud Report, 2016, cited above at 268, p. 14.

²⁷² RightScale, State of the Cloud Report, 2016, cited above at 268, p. 19-20. In particular, the report indicates that central IT team for larger enterprises still marks security as a high concern surrounding the employment of cloud solution however the rate for such concerns has been steady declining from 2014, where it was indicated by the 47% of respondents, to 2016 where it is flagged by 37% of the respondents to the survey.

²⁷³ RightScale, State of the Cloud Report, 2016, cited above at 268, p. 29. The percentage of respondents making use of AWS is steady compared to last year (please see RightScale, State of the Cloud Report, 2015).

²⁷⁴ As indicated in the RightScale, State of the Cloud Report, 2016, cited above at 268, Rackspace was not included in 2016's survey due to its change in strategy while other operators, such as DigitalOcean and Oracle Cloud, were included in the survey.

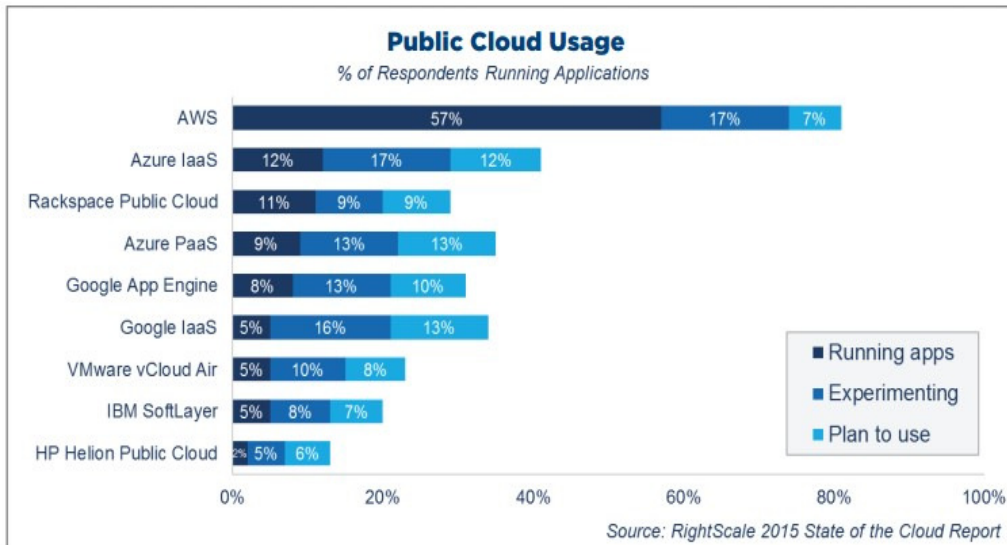


Table 1 Public Cloud Usage 2015

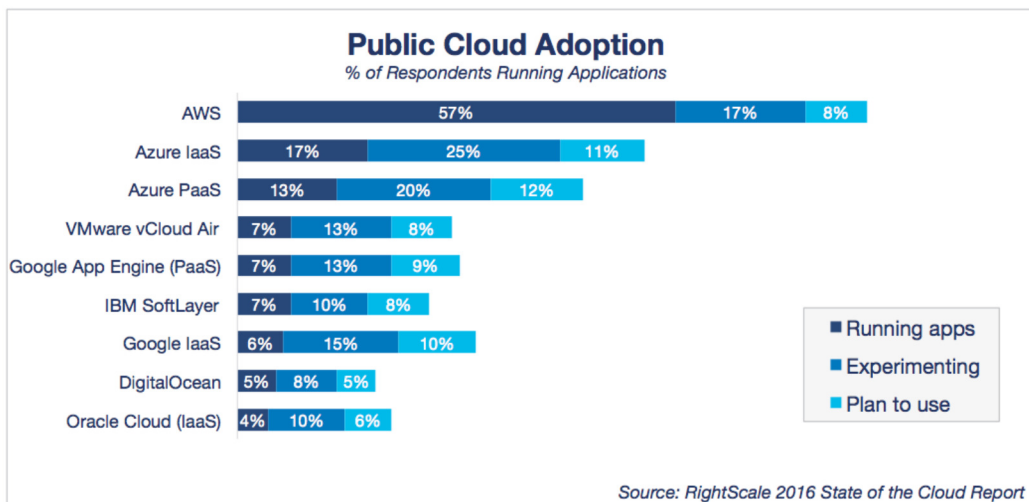


Table 2 Public Cloud Usage 2016

The tables reported above also show other interesting data concerning the increase in the number of users which are experimenting the usage of cloud services: the percentage of users experimenting Azure is increasing in 2016 compared to 2015, and this could be a sign that in 2017 the percentage of users adopting Azure can further increase in so further narrowing the gap with the market leader.

The situation, in term of relation between operators, does not change when the focus is on enterprises (i.e. business with more than 1,000 employees), since also in that case, Amazon AWS remains the leading operator; this notwithstanding that users are showing more interest in experimenting Microsoft suite than Amazon's: a sign again that the distance between these operators may decrease.

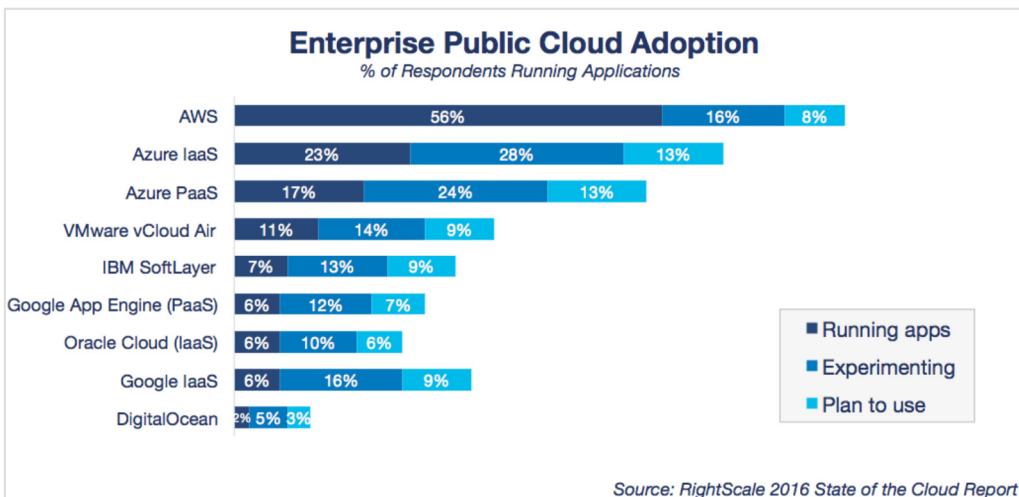


Table 3 Public Cloud usage among enterprises

AWS is still the first operator even among smaller companies (i.e. companies with less than 1,000 employees).

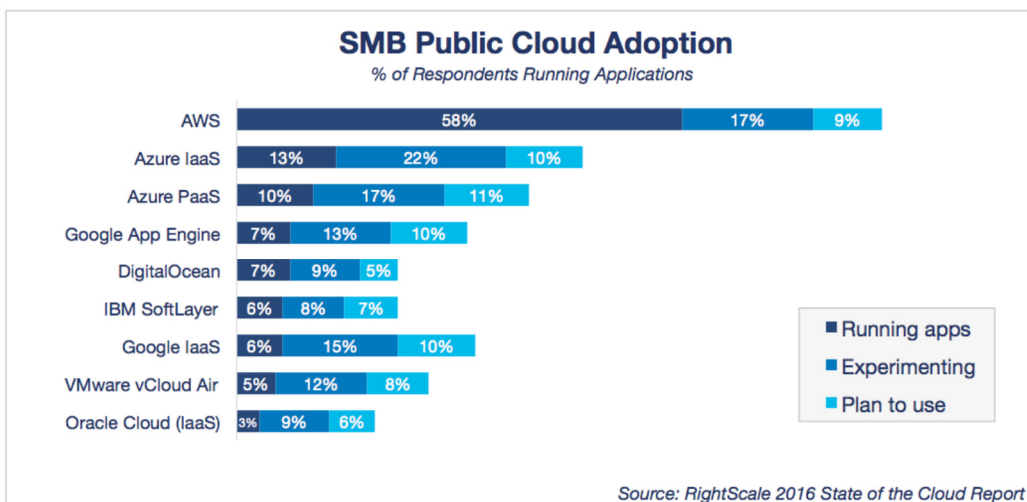


Table 4 Public Cloud Usage in smaller companies

However, also in respect of smaller companies, Amazon competitors are gaining consensus among operators as a comparison with the percentage of usage in 2015 demonstrates.

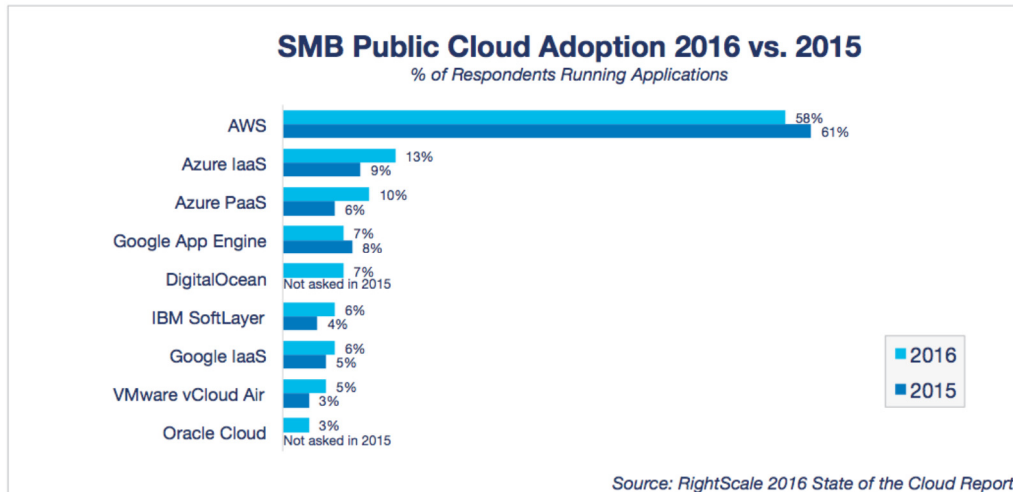


Table 5 Comparison in the adoption of public cloud by smaller companies

The above tables show that Amazon and Microsoft are the two main operators in public cloud both by larger and smaller enterprises, with Amazon being the leader and Microsoft gaining more consensus each year. As for the other operators, larger and smaller companies present difference in their preferences: indeed, among larger enterprises, VMware Cloud and IBM cloud are the next in line while smaller enterprises prefer Google Cloud.

Moving to private cloud, RightScale Report for 2016 indicates that the usage of private cloud is growing compared to the previous year²⁷⁵ with a wider use of private cloud by larger enterprises compared to smaller one.

RightScale is not the sole report providing interesting view on cloud markets, albeit from a general perspective. Other reports are also available providing an insight more focused on the performance of cloud providers in public cloud services²⁷⁶.

Based on Wikibon Report, in the provision of Public Cloud SaaS solution, none of the operators achieves a market share above 10%, as shown in the table below:

²⁷⁵ RightScale, State of the Cloud Report, 2016, cited above at 268, p. 35-36.

²⁷⁶ Wikibon, Public Cloud Market Shares 2014 and 2015, August 2015. As Wikibon report for 2016 is not publicly available, reference is made to results for 2014 and 2015.

	SaaS Market Share ²⁷⁷ 1H 2015 (\$M)	
Salesforce	2633	10.8%
Microsoft	1940	7.9%
Adobe	1487	6.1%
SAP	1201	4.9%
Oracle	762	3.1%
IBM	664	2.7%
Workday	425	1.7%
AthenaHealth	407	1.7%
Cisco	407	1.7%
ServiceNow	343	1.4%
Citrix	347	1.4%
Others	13812	56.6%

Table 6 SaaS Market Share

The panorama is not much different in respect of the Public Cloud PaaS solution:

²⁷⁷ SaaS Vendor Revenue. Source: Wikibon 2015. Revenue indications are drawn from reported revenue of - 100 lines of business of cloud providers. When the vendor is important and the revenue information is ambiguous, Wikibon has applied estimates.

	PaaS Market Share 1h 2015 (\$M) ²⁷⁸	
Salesforce	293	24%
Amazon	203	16.8%
Microsoft	119	10%
IBM	42	3.4%
ServiceNow	38	3%
Netsuite	28	2.3%
Oracle	24	2%
Google	22	1.9%
Others	440	36%
Total	1209	

Table 7 PaaS Market Share

As for Public Cloud IaaS, Wikibon indicates Amazon as the leading company albeit the relevant market share appears in a lower range compared to the outcome of the RightScale Report, ranging around 27% (see below).

	IaaS Market Share 1H 2015 (\$M) ²⁷⁹	
Amazon	3153	27.2%
Microsoft	1874	16.2%
IBM	1370	11.8%

²⁷⁸ Wikibon Report 2015, based on PaaS vendor revenue. Revenue indications are drawn from reported revenue of - 100 lines of business of cloud providers. When the vendor is important and the revenue information are ambiguous, Wikibon has applied intelligent estimates.

Relevance is also made to the findings of 451 Research Vendor Window, 2015.

²⁷⁹ Wikibon Report 2015, based on IaaS vendor revenue. Revenue indications are drawn from reported revenue of - 100 lines of business of cloud providers. When the vendor is important and the revenue information are ambiguous, Wikibon has applied intelligent estimates.

The position of the operators in the market appears to be confirmed by the latest 451 Research Vendor Window (April 2015), according to which Amazon Web Service (AWS) is the leader in the IaaS market. The 451 Research Vendor Window is based on a survey conducted among 1,500 global IT professionals; the assessment is based on both overall enterprise adoption rates and customer ratings of vendor performance. The second important companies is Microsoft with its Azure suite; furthermore the survey indicates that Rackspace is the leader on the host private cloud market. Also VMware's vCloud Air are becoming competitive challengers.

Google	420	3.6%
Oracle	318	2.7%
Rackspace	282	2.4%
Other	4160	35.9%
Total	11576	

Table 8 IaaS Market Share

The findings of a different report²⁸⁰ indicates that Amazon hold a market share of around 57% in term of adoption among large enterprises, with Microsoft Azure holding around 20% among large enterprises.

Where the outcome of those reports used as a starting point to assess dominance, the impression which a competition authority would have is that, with the possible exception of IaaS, no dominant player can be detected. Indeed, in general term, market shares are never above the "attention level". The only exception, as anticipated, could be represented by Amazon AWS, in the IaaS market which, depending on the market report considered, is sometimes accredited of market share above 50%. Still, even when high market shares can be detected, the reports show that cloud markets are dynamic and users tend to experiment different type of services determining the growth also of smaller providers. The reports also indicate that users tend to multi-home, an aspect which as mentioned can help to decrease any possible barrier to entry and foster the expansion or entry of new operators.

If we were to judge based on past and recent experience, the conclusion could be that dominance appears as an unlikely phenomenon. A word of caution is however necessary: first, previous episodes of entry or expansion of operators do not necessarily mean that entrance is easy or that it would happen again²⁸¹, secondly antitrust authorities would need to remain vigilant in any case as it could nor be excluded that a position of leadership may turn into one of dominance²⁸².

²⁸⁰ 451 Research Vendor Window, 2015.

²⁸¹ OECD, Competition and Barriers to entry, 2007.

²⁸² In this respect, it is to remark the position expressed in Da Correggio Luciano L., Walden I., Ensuring Competition in the Clouds: the Role of Competition Law?, 2011, available at www.ssrn.com, according to which antitrust enforcement should not withhold until the moment in which a company establishes itself as dominant in a certain market as, by that time, competition may have already been distorted. This position is however hardly reconcilable with the current art. 102 Tfeu system which requires that a dominant position is detected before any conduct can be captured in the net of antitrust rules.

3.4. Preliminary conclusions

Similarly to market definition, the analysis shows that current competition rules remain valid when it comes to dominance assessment in cloud computing services as well, they need however to be adapted to the peculiarity of the sector.

Indeed, assessment of market power can still move from a consideration of the position enjoyed by a given company on the relevant market however, more than to market shares, attention need to be devoted to contestability of market.

While high market shares are not necessarily a symptom of market power, low market shares may still result in a company holding strength when product are highly differentiated or users are particularly loyal to a certain cloud services.

Evaluation of barriers to entry (or expansion) are likely to keep competition authorities busy. While the macro-categorization can still be employed, they would need to be shaped around cloud service peculiarities.

Switching costs, interoperability and portability will likely play a major role in determining whether a company is dominant in the market; authorities would however need to assess them in light multi-homing and one way compatibility consideration.

To this panorama, it should be added that the analysis may be impacted by regulatory choices by legislators. Ensuring neutrality of the net is generally considered key to the health development of digital services and likely play a role especially in safeguarding the ability of smaller operators to offer their service on the market.

In the absence of comprehensive studies, developed specifically for competition purposes, it is hard to say whether dominance is likely in cloud markets. The few market reports available are not tailored around competition rules; however the outcome of their analysis show fragmented sector with the only possible exception of IaaS.

4. Abuse of dominance in cloud computing services

4.1. Introduction

Assuming dominance can be established, this does not entail automatically a violation of art. 102 Tfeu nor a violation of Sec. 2 of the Sherman Act: indeed, neither jurisdiction punishes the mere holding of a dominant position (monopoly power in the US) but only its abuse.

Art. 102 Tfeu contains an illustrative and non-exhaustive²⁸³ list of conducts which may amount to an abuse as those consisting in:

- (a) directly or indirectly imposing unfair purchase or selling prices or other unfair trading conditions;
- (b) limiting production, markets or technical development to the prejudice of consumers;
- (c) applying dissimilar conditions to equivalent transactions with other trading parties, thereby placing them at a competitive disadvantage;
- (d) making the conclusion of contracts subject to acceptance by the other parties of supplementary obligations which, by their nature or according to commercial usage, have no connection with the subject of such contracts.

In general, under EU competition law, abuse of dominance occurs every time a company tries to exploit the dominant position it holds on the market to the aim of extracting supra competitive profits from customers (so called exploitative abuses) or of excluding current rivals from the market or of foreclosing access by potential competitors (so called exclusionary abuses)²⁸⁴. In practice, exploitative abuses are quite rare and the decisional practice of the European Commission and European Courts has mainly captured exclusionary practices. Unlike Art. 101 Tfeu, Art. 102 Tfeu does not contain a paragraph 3 expressly contemplating situation where an abusive conduct could be justified in principle in light of prevailing pro-competitive

²⁸³ The fact that the list is non- exhaustive was clearly indicated by the Court of Justice in Case C-333/94P, Tetra Pak International v. Commission.

²⁸⁴ O'Donoghue R., Padilla J., The Law and Economics of Article 102 TFEU, cited above at 73; Gonzalez-Diaz E. F., Snelders R., EU Competition Law, cited above at 152.

effects; the Guidance however indicates that the Commission would consider whether prima facie abusive conducts could be justified in light of their objective necessity or the produced efficiencies to the market in as far as those efficiencies outweigh any anticompetitive effects on consumers²⁸⁵.

Turning to US Sec. 2 discipline, first point to note is that such provision does not contain an indication, not even illustrative, of potential violating conducts. More than that, Sec. 2 does not catch exploitative abuse: the reasoning behind this choice is that the decision of a company to raise price well above the competitive level should not be considered as an illicit conduct but merely as the expression of the success of a company in the market. Further difference is in the range of conducts which can be captured by Sec. 2: in addition to monopolisation, which is as indicated the US homologous for abuse of dominance, Sec. 2 also extends to tentative to monopolise and conspiracy to monopolise.

The range of conducts identified in the decisional practice of the European Commission and the Courts is quite wide but in general a distinction can be made between price-based and non-price-based abuse.

Price-based abuses refer to illicit where the abuse involve the price of a product, be it the final product or a raw material: examples are the imposition of excessive pricing, predatory pricing, margin squeeze²⁸⁶. Non price-based abuses to the contrary are all those abuses where the illicit does not concern price: this is the case of exclusive dealing, refusal to supply, tying and bundling²⁸⁷. This distinction has no legal implication but it is usually made to help categorize possible illicit conducts although certain conducts can belong to both categories as it is notably the case of refusal to supply which can also take the form of excessive pricing or margin squeeze.

In the field of cloud computing, it is more likely that possible abuse would be those classified as non-price based, since - with the only possible exception of IaaS markets - price does not appear to be a decisive competitive factor in the competition between cloud providers nor in the choice of users.

²⁸⁵ Guidance, § 28 and followings.

²⁸⁶ Guidance, § 23.

²⁸⁷ Guidance, § 32 and following.

4.2. Abusive conducts in the EU

The range of potential abusive conducts which may occur in cloud markets can be envisaged taking into account the features of cloud computing, their intended use as well as the cases which have so far involved IT companies. In this regard, it is likely that potential abuse may concern the ability of users to move from one cloud to another or the possibility for two cloud services to talk with each others; similarly potential abusive conducts can impact the contractual and economic conditions attached to the provision of the services.

4.2.1. Lock-in of users

A possible abuse of dominance may be realised with respect to portability of data. Data portability refers generally to the ability of users to transfer their data/information from one platform to another. When portability is easy and does not entail complicated activities or procedures, users can quickly switch from one provider to another in so operating as an activator of concurrence between current operators in the market as well as an attractor of potential new entrants. When users can easily move from one provider to another they would be tempted to do so in order to take advantage of a better economic offer or of a higher quality of the service provided by competitors. Seen in the provider's perspective, this also means that it could rely on the possibility to win users from other providers in order to expand its current activity or to enter the market.

Portability can take different forms in the cloud environment: it can concern data stored by users on the cloud, ability to move applications created with a certain PaaS to a competing platform or setting information to operate a certain cloud. Portability of data/information/applications can be particularly relevant in the case of private cloud where the characteristics of the cloud are set around the specific needs of a user which, therefore, may want not to lose them when switching to a competing provider. Since, as mentioned, portability makes easier for users to switch provider, cloud providers may have an incentive to hinder such ability in order to lock-in users and avoid losing them in favor of rivals on the market.

Lock-in may be the result of unfair contractual terms. Cloud providers may, for instance, make particular appealing offers to users in exchange for their commitment

not to move away before a certain period of time has expired. In other terms, cloud providers may try to impose exclusive obligations over users which, even when limited in time, may induce a loyalty link on users and so limiting their possible tendency to move away. Exclusive obligation, although certainly effective in term of preventing portability, may however not be the preferred choice of cloud provider as its effect could be easily detected by potential users which, at the moment of choosing their first cloud service, may decide to opt for those providers not imposing such obligation. It could therefore be the case that a cloud provider, instead of imposing exclusivity, would more simply introduce complex procedures to move data away; or it could implement mechanisms causing a decrease of the quality of the data when moved away. These kind of conducts are certainly less easy to discover and users can accidentally find themselves locked-in to the cloud service of first choice.

Lock-in practices, when implemented by a dominant cloud provider, can integrate a violation of art. 102 Tfeu, unless justified. In particular, lock-in conducts may artificially raise rivals cost. This is so because, in order to attract users, potential competitors would need to compensate them for the inconvenience they suffer to switch provider; compensation which would need to increase with the complexity of the switching procedure. As a result, potential competitors may be deterred from entering the market while current competitors may be forced outside the market. This situation could be particularly detrimental to the market at large if it could result in a limitation of variety of products/services available to users and/or it can have a chilling effect on innovation and technical development of the market in breach of the express provision of art. 102, let. b) Tfeu²⁸⁸.

The potential risk for competition is not unknown to the European Commission which recognized that portability is important *“for those markets where effective competition requires that customers can switch by taking their own data with them. In those markets that build on users uploading their personal data or their personal content, retention of these data should not serve as barriers to switching. Customers*

²⁸⁸ Portability of data has been extensively addressed in the current debate around big data, although mainly with respect to the specific position of Google in online search market or with respect to Facebook in social networking area. On this topic, please see Gerardin D., Kuschewsky M., Competition Law and Personal Data: Preliminary Thoughts on a Complex Issue, 2013, available at www.ssrn.com; Graef I., Verschakelen J., Valcke P., Putting the Right to Data Portability into a Competition Law Perspective, 2014, available at www.ssrn.com.

*should not be locked in to a particular company just because they once trusted them with their content*²⁸⁹.

In more recent time, conducts adverse to data portability have been the object of closer investigation by the European Commission. Indeed, the European Commission opened in 2010 an investigation against Google to evaluate the potential anti-competitiveness of restrictions allegedly imposed on portability of online advertising campaign data to competing online advertising platforms²⁹⁰. The European Commission noted that the cost of reproducing advertisement campaign is particularly high and, as a consequence, restrictions imposed to the ability of advertisers to move their data from AdWords - Google advertising platform - to rival platforms induced them to exclusively use Google platform, capable thanks to its large installed base to ensure a wide reachability for advertising campaigns²⁹¹.

Limitation to data portability has been found as a potential restriction to competition in the US as well. The FTC, likewise the European Commission, raised concerns about the restrictions that Google imposed on the ability for advertisers to move their advertising campaign data as those could make more difficult for an advertiser to contemporarily manage a campaign on AdWords and competing platform and this could restrict competition. Google eventually agreed to remove such

²⁸⁹ Almunia J., Competition and Personal Data Protection, Speech for the Privacy Platform event: Competition and Privacy in Markets of Data, 26 November 2012, available at http://europa.eu/rapid/press-release_SPEECH-12-860_en.htm

²⁹⁰ European Commission, Press Release, Antitrust: Commission probes allegations of antitrust violations by Google, 30 November 2010, available at http://europa.eu/rapid/press-release_IP-10-1624_en.htm?locale=en. The investigation was carried out for four years during which Google proposed commitments to solve the European Commission's competitive concerns; among the others, Google proposed to remove the current restrictions on the ability to migrate advertising campaign data (European Commission, Press Release, Antitrust: Commission seeks feedback on commitments offered by Google to address competition concerns, 25 April 2013, available at http://europa.eu/rapid/press-release_IP-13-371_en.htm). After the market test, Google modified the commitments proposed; such amendments however did not concern portability (see European Commission, Press Release, Antitrust: Commission obtains from Google comparable display of specialized search rivals, 5 February 2014, available at http://europa.eu/rapid/press-release_IP-14-116_en.htm). Eventually, the European Commission sent to Google a Statement of Objections concerning a possible abusive conduct in the display of search results aimed at favoring the own Google Shopping service. Interestingly enough, however, it appears that the Statement of Objection does not cover the portability of data (see European Commission, Press Release, Antitrust: Commission sends Statement of Objections to Google on comparison shopping service; opens separate formal investigation on Android, 15 April 2015, available at http://europa.eu/rapid/press-release_IP-15-4780_en.htm). For a wider description of the Google case, please see O'Donoghue R., Padilla J., The Law and Economics of Article 102 TFEU, cited above at 73, §5.3.7. Please also note that Google offered commitments relating to data portability also in the US, on a voluntary basis, in the context of Motorola acquisition. Please see <https://www.ftc.gov/news-events/blogs/business-blog/2013/01/ftcs-settlement-google-brief>.

²⁹¹ Geradin D., Kuschewsky M., Competition Law and Personal Data: Preliminary Thoughts on a Complex Issue, cited above at 288.

restrictions within the scope of a wider settlement agreement²⁹².

4.2.2. Interoperability

Interoperability refers to the ability of technical devices to communicate with each others, as such it implies the removal of technical and physical restraints which can, otherwise, limit that dialogue. Interoperability plays a pivotal role in cloud computing: as users would start to increasingly use cloud services they would need, and require, the different range of cloud services to be able to interoperate smoothly and efficiently.

Interoperability is sometimes defined with respect to a vertical and a horizontal dimension. Applied to cloud computing, vertical interoperability refers to ability of users to use cloud services through different platforms so that a cloud service is deemed vertically interoperable when it could be accessed through any device the user owns (cloud services are device agnostic). When cloud computing services are vertically interoperable a further peculiar feature manifests as services are also location independent, that is users are able to access data from an internet based device while moving from one place to another²⁹³. Horizontal interoperability refers to interoperability among different cloud services or platforms; in particular, it refers to the ability of a user to use complementary products.

Both vertical and horizontal interoperability is necessary for a user to enjoy the full experience of cloud computing however in an antitrust perspective it is the horizontal side of interoperability which matters the most. Indeed, while a cloud provider has an interest in ensuring that its service can be accessed through different devices, it would have little, if any, incentive to ensure interoperability with cloud services offered by competing providers since this would, ultimately, make easier for users to switch provider should they wish so. It is not hard to see that cloud providers can therefore try to implement strategies to hinder interoperability with the purpose, again, to raise the switching costs incurred by users to move away and conversely the costs for rival to attract new users. Conducts against interoperability can take

²⁹² FTC, Press Release, Google Agrees to Change Its Business Practices to Resolve FTC Competition Concerns In the Markets for Devices Like Smart Phones, Games and Tablets, and in Online Search, January 2013.

²⁹³ Becker M.B., Interoperability Case Study, The Berkman Center for Internet & Society Research Publication Series, Research Publications, No. 2012.11, April 2012.

several forms such as refusal to provide interoperability information and that of predatory product change.

4.2.2.1. Refusal to provide interoperability information

The general principle is that a company, even if dominant, is free to choose its commercial partners; in exceptional circumstances, however, such general principle may not be applicable and the company may be imposed a duty to contract with a competing company unless it commits a violation of art. 102 Tfeu.

Being an exception to a general principle, a duty to deal can be imposed only after a careful evaluation of the circumstances of the case. Here again the question is one of balance with the legitimate incentive of the dominant undertaking to invest, to innovate and to avoid free riding from less innovative and efficient companies. As indicated in the Guidance, a too wide application of the duty to deal can ultimately result in a harm to competition and consumers greater than the one cause by the anticompetitive conduct²⁹⁴.

Finding the balance between the innovative stance of dominant companies and the prevention of their abusive conducts against competitors may be fundamental in the cloud computing area where innovation is a key factor so that companies may be particularly discouraged by the fear of being imposed a duty to share their innovative ideas and where, at the same time, competition need to evolve unaltered.

In the practice of the competition authorities, a duty to deal has been imposed when a dominant company is active in an upstream market, where it produces an input which is essential to compete in a downstream market where the dominant company is also active and provided that a refusal to supply such essential input could not be objectively justified. The Guidance clarifies that the European Commission may intervene imposing a duty to deal provided that: i) the refusal relates to a product or service which is objectively necessary to compete effectively in the downstream market²⁹⁵; ii) the refusal is likely to lead to the elimination of effective

²⁹⁴ Guidance, § 75.

²⁹⁵ Guidance, § 83 where it is specified that an input is deemed objectively necessary where there is no actual or potential substitute on which competitors in the downstream market could rely so as to compensate the negative impact of the refusal to deal.

competition on the downstream market; and iii) the refusal is likely to lead to consumer harm.

With respect to this last point, the Guidance further specifies that consumer harm is likely when foreclosed competitors are prevented from bringing innovative goods or services to the market and/or where that prevents the appearance of follow-on innovation²⁹⁶. This could be the case, in particular, when the competing company does not intend to merely duplicate the product or service offered by the dominant company on the downstream market but aims at introducing new or improved product/service for which a potential demand from customers exists and which is likely to contribute to technological development²⁹⁷.

The practice of the European Union knows several cases relating to dominant company refusal to deal. Relevant to our analysis is the case concerning Microsoft's refusal to provide interoperability information to Sun Microsystems²⁹⁸. In that case, Microsoft refused to communicate to Sun Microsystems data concerning the technical specifications of its protocols which were needed to render Sun's operating system for group computing interoperable with Microsoft's. This case is peculiar because the denied information was not essential to the launch of a new product or service but merely to ensure interoperability of Sun's products with Microsoft operating system; nonetheless, the General Court indicated that Microsoft's refusal to provide interoperability information was an abuse of dominance as it impeded the appearance of a technological development.

The decision adopted in the Microsoft case is particularly relevant for cloud computing services where interoperability issues may also arise.

In fact, similarly to data portability, interoperability is likely to make easier for users to switch provider or to use complement products of a rival company. It is for this reason that cloud providers may try to avoid interoperability by refusing to provide information or data which could allow the creation of complementary product. The extent to which such conduct could amount to a violation of art. 102 Tfeu would depend on the specific facts of the case, however, it could not be excluded that the

²⁹⁶ Guidance, § 87.

²⁹⁷ *Ibidem*.

²⁹⁸ European Commission, Case n. C-3/37.792, Microsoft, 24 May 2004.

conclusion adopted by a competition authority would be similar to the one taken in Microsoft.

Similarly to Microsoft, cloud providers may try to justify a denial to allow interoperability based on security reasons. Security concerns are quite common in IT area and especially so in cloud services where users maintain a very low (and sometimes null) control over the IT apparatus and the information stored there in. Markets reports mentioned in previous section actually indicate security as one of the main concern still slowing down the migration towards the cloud; similarly authorities at EU and national level have sometimes shew apprehension for potential security and data breach²⁹⁹. The extent to which interoperability can actually threaten security is therefore something that competition authorities would likely be asked to ponder each time this point would be raised by a cloud provider to resist a charge of abuse of dominance.

4.2.2.2. Predatory product changes

Instead of outright refusing to provide interoperability information, a cloud provider may adopt a different practice to preclude the dialogue with complementary or competing products; in particular it can modify the characteristics of its product to limit interoperability with rivals' products³⁰⁰. This conduct is sometimes referred to as predatory designs or innovation and it produces an outcome akin to a refuse to provide interoperability information except that it targets products which are already compatible with the dominant product and which, as a result of the change introduced, would cease to be so.

²⁹⁹ By way of example, concerns around security (and data protection) have been expressed by the European Data Protection Supervisor (<https://secure.edps.europa.eu/EDPSWEB/edps/EDPS/Dataprotection/QA/QA10>). Similarly the Italian Agency for Communication (AGCOM - Autorità per le garanzie nelle comunicazioni) has also indicated security as one of the issues connected with cloud computing (Cloud computing, opportunità, cautele e aspetti regolamentari available at <https://www.agcom.it/documents/10179/539715/Studio-Ricerca+29-12-2011+26/05454a95-8474-4b6f-acdd-011f7ab5ed82?version=1.0>).

³⁰⁰ By way of example, Amazon Web Service Customer Agreement (available at <https://aws.amazon.com/it/agreement/>, lastly accessed on 13 March 2016), establishes that the company can "change, discontinue or deprecate any APIs for the Services from time to time but will use commercially reasonable efforts to continue supporting the previous version of any API changed, discontinued, or deprecated for 12 months after the change, discontinuation, or deprecation (except if doing so (a) would pose a security or intellectual property issue, (b) is economically or technically burdensome, or (c) is needed to comply with the law or requests of governmental entities)" (sec.2.2.). The AWS Customer Agreement poses the general terms and conditions applicable to Amazon cloud services which are sometimes integrated by specific service level agreements.

Antitrust authorities have generally been reluctant to finding an abuse in the decision of a company to change the design or the technical characteristics of its own products or to create a new product. The reason is clear: product innovation is usually considered as a key factor of competition and one which ultimately results in consumer welfare enhancement. In addition, antitrust authorities and courts may find it particularly difficult to distinguish between cases where the innovation introduced in a product is legitimate from those cases where, to the contrary, innovation has the only aim of excluding rivals or foreclosing entrance by new competitors. The risks to adopt a wrong decision is therefore very high with potential negative impact on innovation and competition as well³⁰¹.

Predatory design and improvement has been the object of a good stream of decisions in the US³⁰². Among the most recent examples are the decisions adopted in cases concerning respectively Microsoft, LiveUniverse and Intel. In the first case, the conduct at issue concerned Microsoft's attempt to impede the development of technologies capable to threat the monopoly power it enjoyed in the operating system markets³⁰³. Microsoft's conduct was in particular directed against Java which was a technology developed by Sun. More in details, Sun had licensed its technology to both Netscape, Microsoft rival in the internet browser sector, and Microsoft for the distribution of Java technology³⁰⁴. As Java technology made portability of applications easier for users, in so de facto threatening Microsoft's position, this latter used its license to create its own Java development tools and its own Windows compatible

³⁰¹ O'Donoghue R., Padilla J., *The Law and Economics of Article 102 TFEU*, cited above 159, Ch. 12, p. 648. Jones A., Sufrin B., *EU Competition Law*, cited above at 19.

³⁰² For a recollection of the relevant practice please see Falk D.M., Goodman J.W., *Innovation in the Balance? Courts and Agencies Take Another Look at Product Innovation and the Competition Law*, in LexisNexis, June 2010.

³⁰³ US Court of Appeal, *United States v. Microsoft Corp.*, 253 F 3d34, 76-77 (D.C. Cir. 2001).

³⁰⁴ To give some more details, Sun Microsystems was deploying a technology to enable applications written in the Java language to run on a variety of platforms with minimal porting. This technology was equally able to threaten Microsoft position, since the easier it was for application developers to port their apps to different operating systems, the more applications would be written for operating systems other than Windows. At the time, it was not possible to develop in Java language applications capable of running on multiple operating systems, it was however Sun ambition to reach such a result: an outcome which would ultimately lower the barrier to entry. When Sun announced in May 1995 that it had developed the Java programming language, Microsoft started to get worried about the potential of Sun's Java technologies to diminish the applications' barriers to entry. Sun's strategy could only succeed if a Java runtime environment that complied with Sun's standards found its way onto PC systems running Windows. As Sun could not count on Microsoft to ship with Windows an implementation of the Java runtime environment (solution which would have threatened the applications barrier to entry), it concluded an agreement with Netscape in May 1995 to include a copy of Sun's Java runtime environment with every copy of Navigator. In this way, Navigator quickly became the principal vehicle by which Sun placed copies of its Java runtime environment on the PC systems of Windows users. The combined efforts of Netscape and Sun threatened to hasten the demise of the applications barrier to entry, opening the way for non-Microsoft operating systems to emerge as acceptable substitutes for Windows.

Java runtime environment which presented characteristics which made them incompatible with the products developed by Sun. In particular, Microsoft developed its own Java Virtual Machine³⁰⁵ which run applications faster on Windows operating system compared to the JVM developed by Sun; furthermore, Java application designed to operate on Microsoft JVM did not work with Sun JVM and vice versa. Microsoft further developed a set of development tools to create applications for Microsoft JVM. In addition to that, Microsoft deceived Java developers with regard to Windows specific tools for developments by letting them believe that those tools could be used to develop cross-platform applications. The US Court found that Microsoft's alterations of Java product have the only purpose of thwarting the threats raised by Sun to Microsoft platform and, as a consequence, it found that Microsoft conduct amounted to a violation of Sec. 2 of the Sherman Act.

Product change was also part of the allegations that LiveUniverse raised against Myspace. In 2007, LiveUniverse, a company operating a social networking website available at www.vidilife.com, accused MySpace, before the district court of California of violating Section 2 of the Sherman Act³⁰⁶. LiveUniverse claimed that MySpace prevented its users from watching vidiLife videos loaded into their MySpace pages, from mentioning [vidilife.com](http://www.vidilife.com), and in addition that MySpace deleted any reference to [vidilife.com](http://www.vidilife.com). According to LiveUniverse, MySpace's conduct was part of a pattern and practice of anticompetitive behaviors against other social networks which also consisted in changing the design of its site in order to prevent uploading of rival links. LiveUniverse contended that the conduct of MySpace precluded new competitors from entering the market and ultimately harmed consumers. Following LiveUniverse's contentions, absent the possibility to integrate the two sites, consumers had the only option of either maintaining their MySpace personal profiles without using rivals product or using rival's products while being however cut off from MySpace and therefore from the overwhelming majority of the content and viewers in the market³⁰⁷.

The District Court of Columbia dismissed LiveUniverse's claim in all respects. With specific reference to product change, the court first recalled the general

³⁰⁵ Java Virtual Machine translated byte code into instructions to the operating system.

³⁰⁶ LiveUniverse, Inc. v. MySpace, Inc., No. CV 06-6994 AHM (RZx), 2007 WL 6865852, at *1 (C.D. Cal. June 4, 2007), *aff'd*, 304 F. App'x 554 (9th Cir. 2008).

³⁰⁷ *Ibidem*, page 16; FAC § 37-38.

principles according to which a company holding monopoly power is free to change the design of its products not less than any other company; furthermore, as a general rule, a company has no duty to constraint product developments so as to make easier for rivals to sell their products or to help rivals to survive competition. The Court went on to say that, contrary to LiveUniverse's allegations, MySpace conducts did not prevent consumers from using rivals products, it only prevented them from doing so through MySpace site. In addition, although users may be prevented from viewing and creating links to the vidiLife site through MySpace site, they can still do so elsewhere.

Intel's conduct was also considered in breach of the law, this time being represented by Sec. 5 of the FTC Act³⁰⁸. In this case, Intel was accused of having changed the design of its software for no legitimate technical reasons and with the only aim of reducing the performance of compatible CPUs realized by rivals with Intel's CPUs. In particular, the FTC found that Intel redesigned and distributed software products such as compilers³⁰⁹ and libraries³¹⁰ to undercut the performance of non-Intel x86 CPU relative to Intel x86 CPU, by making them running slower. Intel did not disclose such changes and instead fed the idea among developers that the slow running was due to non-intel CPU rather than to the change of the design of Intel software. This deceptive practice then proved to be material in harming the reputation of non-Intel CPU³¹¹. The FTC found that Intel conduct has the purpose and the effect of harming competition and this enhanced Intel monopoly power³¹².

At EU level, predatory design or improvement has never been addressed directly but for one case opened by the European Commission against Decca Navigator System³¹³. The case concerned the changes introduced by Racal Decca - the only provider of transmission signals in certain Member States which also produced receivers of signals - to its transmission signals which in fact rendered rivals' receivers unusable. The European Commission concluded that such conduct

³⁰⁸ FTC Complaint, In the Matter of Intel Corporation, Docket No. 9341, 14 December 2009 available through the FTC website.

³⁰⁹ A compiler is a software which translates the source code (that is the language written by the software developers) into object code (which is the language understood by a CPU).

³¹⁰ Libraries are collection of code for performing certain functions that can be referred to by software programmers.

³¹¹ FTC Complaint, In the Matter of Intel Corporation, cited above, §59.

³¹² FTC Complaint, In the Matter of Intel Corporation, cited above, § 71.

³¹³ European Commission, Case IV/30.979 and 31.394, Decca Navigator System, 21 December 1988, OJ 1989 L 43/27.

amounted to an abuse of dominance since the change introduced to the transmission signals was only made to cause rivals' receivers not to function properly. This conclusion was evidenced by the fact that the alternations of transmission signals did not mark an improvement compared to the existing products so much so that customers of Racal Decca complained about the change.

The decision adopted in AstraZeneca case also contains a consideration of the predatory nature of a change introduced in the formulation of the drug. Among other anticompetitive conducts, AstraZeneca switched the formulation of its drug from capsules to tablets: the drug was exactly the same but this switching allowed AstraZeneca to ask for the withdrawal of market authorization for capsule of its drug while at the same time launching on the market a tablet version of the drug³¹⁴. The switching of formulation served no other purpose than precluding the possibility for generics producers to avail of the simplified procedure to obtain a market authorization³¹⁵ and was therefore considered as part of wider abusive strategy in violation of art. 102 Tfeu.

Predatory product change as a way to avoid interoperability can very well occur in cloud services. As mentioned above, usually the definition and control over the setting of cloud services is completely in the hands of cloud providers which can therefore decide to change them in order to impede or, anyhow, make more difficult the dialogue with complementary products.

There are many ways in which such target could be achieved: by way of example, providers can operate on security or privacy setting for their services to disguise the insertion of obstacles to portability of data or interoperability with complementary products: in this case, competition authorities would have the difficult

³¹⁴ Indeed, EU relevant legislation provides that generic companies can sell their products without supplying independent pharmacological tests and clinical trials in so relying on the test and trials submitted by the originator provided that, *inter alia*, the originator's product is still on the market at the time in which the generic drug is marketed. This rule aimed at simplifying the procedure which generic producers have to follow to commercialize their drugs and, as a consequence, to foster their market entry.

³¹⁵ European Commission, Case n. 37507, Generics/AstraZeneca, 15 June 2005. This case is rather complicated as it concerns the difficult relationship between intellectual property rights and competition law. The point which is here relevant to consider is that, based on the relevant legislation, producers of generic drug can use the simplified procedure to obtain a market authorization only if the patented drug were still on the market. By withdrawing the capsule from the market, in substance, AstraZeneca precluded the possibility for generics producers to use the simplified procedure as the patented formulation was not still on the market. For a detailed summary of this case, please see Muselli A. *I diritti di proprietà intellettuale e l'abuso di posizione dominante - Rassegna delle decisioni comunitarie (1988-2010)* in *Concorrenza e Mercato* 2012, p. 425; for a comment on the Astra Zeneca case, see also Maggolino M., Montagnani M.L., *AstraZeneca's abuse of IPR-related procedures - A hypothesis of antitrust offence, abuse of rights and IPR misuse*, *World Competition*, 2011, page 245-259.

task to evaluate the extent to which such alterations could be justified by legitimate reason against mere anticompetitive purpose.

4.2.3. Unfair contractual terms

Abuse of conduct can also result from the implementation of contractual terms and obligations favoring the product of the dominant company or the product of its partners to the detriment of those of competitors. A cloud provider may condition the use of its service to the acceptance of certain terms and conditions imposing, for instance, the employment of only certain software or other specific tools in its cloud.

Abusive conducts in the context of the contractual relationship with users can take different forms. Cloud providers can try to tie or bundle together product complementary to their cloud services or necessary for a user to employ the cloud; cloud providers can also impose to users the adoption of certain software or tools provided by third parties when subscribing for cloud services or, in a similar way, forbid the employment of certain software or tools in their cloud.

Imposition of unfair contractual terms in the relationship with users can also answer the intention of certain cloud providers to leverage the position they may enjoy in certain on-line market in order to gain market power in another cloud market.

Based on EU general principle, in fact, it is possible that abuse of dominance occurs in a market different than the one where a company enjoys a dominant position. This could happen when a company is vertically integrated (on this, see below) or when a company is active in the production of two products which are complementary or which are sold to the same group of users³¹⁶. In this latter case, abuse can take several forms such as, namely, tying/bundling or rebates when price is a key factor to competition.

In EU decisional practice, the theory of abuse through leverage has been applied in the famous Tetra Pak case where dominance was only established in the market for aseptic packaging machines and aseptic cartons while abuse was found in both markets for aseptic packaging machines and aseptic cartons and in that of non-septic packaging machines and cartons³¹⁷. In the IT sector, the leverage theory was

³¹⁶ Faull J. Nikpay A., *The EU Law of Competition*, cited above at 196; Whish R. Bailey D., *Competition Law* cited above at 28.

³¹⁷ ECJ, Case C-333/94P *Tetra Pak International SA v. European Commission*, 14 November 1996, in ECR 1996, I-5951, confirming the decision of the European Commission already upheld by the General Court. In this respect,

also called into question in the operating system case against Microsoft where the European Commission accused the tech giant of leveraging the position of dominance in the OS markets into the work server group and media players markets³¹⁸.

The abuse through leverage theory can find a particularly prolific area in cloud services. As mentioned in the sections above, some of the current leading cloud providers are companies already active in the provision of online services and, even more, they have sometimes developed their cloud suites from their non-cloud core services. Those companies can easily find themselves active in different markets populated by the same category of consumers, competitors, suppliers or producers of complementary products.

4.2.3.1. Tying and bundling

Tying refers to a situation where customers which purchase one product are required also to purchase another product. Tying can take place on a technical or contractual basis. In particular, technical tying can occur when the tying product is designed so as to work properly only with the tied product (and not with the product of the competitors); tying is reached through contractual terms when a customer undertakes with the contract to purchase also the tied product and not the products of the competitors³¹⁹. Bundling refers generally to the practice of a dominant company to sell together products which can be efficiently sold separately. As more clearly specified in the Guidance, a dominant company can implement a pure bundling which is the case where two products are only sold jointly, or a mixed bundling where the products are available also separately but the price applied to the bundle is more convenient than the sum of the prices for the single products. A tying practice can amount to an abuse if the tying and tied products are distinct products and the tying is

it is to be noted that certain authors have sometimes warned against a too relaxed use of the Tetra Pak approach especially when neither the conduct or the anticompetitive effects occur in the non-dominated market; Faull J. Nikpay A., *The EU Law of Competition*, cited above at 196. Similarly cautious is Wood D. Article 81 and Leveraging, in *Competition Law Insight*, 2005 available online.

³¹⁸ General Court, Case T-201/04, *Microsoft Corp. v. European Commission*, 17 September 2007, in ECR 2007, II-3601 where the General Court upheld the decision adopted by the European Commission finding a violation of (then) art. 82 EC.

³¹⁹ Guidance, § 48.

likely to give rise to anticompetitive foreclosure³²⁰. This could notably be the case when the tying practice reduces the number of customers which can be reached by a potential competitors of the dominant company in the tied market. In practice, tying can operate as a barrier to entry in the tied market and, as a result, can contribute to leverage the market power in the tying product in the tied market as well. In the case of bundling, relevance is given to the fact that a company may be dominant for more than one of the bundled products: the greater the number of the product in the bundle the stronger the foreclosure effect³²¹. The key point to assess in this case is whether competitors may be able to replicate to the offer made by the dominant company.

Important to note is the fact that tying may be objectively justified and beneficial for consumers as well. Tying two products can be necessary to preserve the efficiency of the tying product; it could also be justified in light of the peculiar enhanced quality deriving from using together the tying and the tied product; it could, in addition, enact economy of scale and scope which ultimately results in lower prices applied to consumers. When that is the case, tying does not amount to an anticompetitive practice.

Tying and bundling can likely occur in cloud computing services as well. A cloud provider holding a dominant position in a relevant market could be tempted to extend its market power in connected markets or, anyhow, to implement tying strategies in order to protect its position in the tying market with respect to threats coming from actual or potential competitors.

As noted, cloud services in all layers are composed of different products and services. By way of example, PaaS services are made up of an infrastructure section, such as a database or data storage, and a software side contemplating the software necessary for the designing of the application, the development, test and maintenance. All these components can be produced by the cloud provider or by third parties, or by both. The thing with cloud computing in general, and PaaS in particular, is that the service is customized and the user is left with few choices. In PaaS, the infrastructure which the user is employing is defined by the provider and the user has no option or choice on that. Infrastructures are realized based on certain

³²⁰ Guidance, § 50. As the Guidance specifies, in the case of tying, a company need to be dominant in the tying market while it is not necessary that it is also dominant in the tied product market; where the practice at issue is bundling, the company need to be dominant in any of the bundled markets.

³²¹ Guidance, § 53.

solutions which then influence the type of software which can be employed to run the PaaS. As mentioned, a user can choose the software necessary to design and run applications but the choice is limited to those software's solutions which are supported by such infrastructure. Being that the context, a cloud provider may decide to opt for the solutions which is more efficient and ensure the highest level of its services but it could also happen that a cloud provider may decide to favor certain infrastructure's solutions with the only aim of favoring its own software. In other terms, a cloud provider can tie technically certain products in so discriminating against products made by competitors.

Tying can also occur contractually when the cloud provider, although formally leaving the possibility for a user to choose between different software solutions, in practice induces the user to go for its own. This could happen when a cloud provider conditions the guarantee of quality of the services or their correct functioning or the guarantee against risks to the use of certain software's solutions.

4.2.3.2. Exclusivity clauses

Exclusivity is also likely to play a role in competition between cloud computing services.

Exclusive obligations require a customer to purchase all, or almost all, the products she needs from the dominant company. Depending on the fact of the case, and the conditions, mainly economical, attached to the agreement, exclusive purchase obligation can have a negative impact on the market by preventing expansion or entry of competitors and, therefore, can be considered in violation of art. 102 Tfeu. Exclusivity agreements may be relevant under an antitrust perspective when they preclude to rivals access to the customers in the downstream market or access to a key input in the upstream market. In the first case, exclusivity obligations preclude the possibility for competitors to compete for an individual's customer entire demand; in the second case, the situation is akin to a refusal to deal.

Several factors have been considered in the practice of the European Commission and the European Courts as relevant when assessing the impact on competition of an exclusivity obligation: the percentage of the market covered by the exclusivity agreement, the duration of the agreement, the ability of customers to

terminate the contract, the duration of the termination period and the related penalty, etc.³²².

None of these factors is alone enough to conclude on the anti-competitiveness of the obligation and, as mentioned, such outcome largely depends on the fact of the case. Some indications can however be derived from the practice of the European Institutions. In general, the longer the duration of an exclusivity obligation, the greater the likelihood of a foreclosure effect on the market; however, where the dominant company is an unavoidable trading partner for all or most of the customers, also a short term obligation can lead to anticompetitive foreclosure³²³. Similarly, when the exclusivity obligation is applied to a high percentage of customers in the relevant market the likelihood increases of it being found in breach of art. 102 Tfeu. There is no established threshold marking the lawfulness or unlawfulness of an exclusivity obligation. As it has been pointed out, where the exclusivity covers a small percentage of the market, it is safe to assume that no anticompetitive foreclosure arises³²⁴; conversely, there is no assumption as for the percentage above which an exclusivity obligation triggers anticompetitive foreclosure. As indicated in the Guidance, sometimes customers do not have an effective choice but to deal with the dominant company for a significant portion of their requirements: in such cases, it is relevant to assess whether customers remain free to deal with rivals for a non-trivial portion of their needs³²⁵. Lastly, it is important to note that often exclusivity obligations are coupled with discounting policies implemented by the dominant company in order to convince them to accept the exclusivity obligations³²⁶: these policies may be beneficial for customers and their impact need to be considered, together with other potential efficiencies, when assessing the impact of the exclusivity clause in the relevant market.

³²² O'Donoghue R., Padilla J., *The Law and Economics of Article 102 TFEU*, cited above at 73 p. 438. The authors indicate that early termination was considered as a positive factor in some cases by the EU courts, while in other past cases it was considered as irrelevant in reducing the foreclosure effect. Now the European Commission appears to accept that short duration or early termination as positive factors in decreasing the likelihood of market foreclosure stemming from exclusivity obligations. See also Jones A., Sufrin B., *EU Competition Law*, cited above at 19.

³²³ Guidance, § 36.

³²⁴ O'Donoghue R., Padilla J., *The Law and Economics of Article 102 TFEU*, cited above at 73, p. 438. According to the authors, a good proxy is provided by the indications contained in the European Commission's Vertical Restraints Block Exemption Regulation where a safe harbor is provided for agreements not exceeding 30% of the relevant market (absent hardcore restriction to competition), although such regulation does not apply to dominant firms. See also Jones A., Sufrin B., *EU Competition Law*, cited above at 19.

³²⁵ Guidance, O'Donoghue R., Padilla J., *The Law and Economics of Article 102 TFEU*, cited above at 73 p. 438.

³²⁶ Guidance, § 34.

As mentioned already, exclusivity clauses can play a role in cloud services as well, and this role can be twofold. A cloud provider can ask their users to commit to exclusive using its service; a cloud provider can also impose to user the implementation and usage of certain software as a result of an exclusivity agreement concluded by the cloud provider and a third party.

Cloud provider may ask its users to conclude exclusivity agreements according to which a user commits not to search and implement similar service from another provider in exchange, usually, from special prices or other economic conditions. Exclusivity commitments are particularly likely when users are represented by businesses; businesses present a larger need for IT services and therefore it is more likely that cloud providers try to link them to their own services. There is also another aspect to consider. As mentioned in the premises, one of the characteristics of cloud services is that they are largely communized; however, cloud services may also allow certain degrees of customization. Business users, having the experience of IT outsourcing contracts, may ask a cloud provider to introduce some customization in order to better adapt the cloud service to their specific needs or to the peculiar feature of their business. Customization is particularly likely in IaaS and PaaS, to a different extent depending on the customization possibilities available on each layer; in addition, since IaaS represents the evolution of traditional outsourcing contract, it is particularly likely that business users may ask IaaS provider to introduce special features, although, as indicated, this layer is less open to possibility of customization. When that is the case, a cloud provider may ask the user to abide by an exclusivity agreement in exchange for the special customization introduced to the service.

In addition, as mentioned, a cloud provider may conclude an exclusivity agreement with a third party producing software or other components necessary to run the cloud service or complementary to it. When this happens, such exclusivity agreement may also influence the relationship between cloud provider and user: indeed, in such case, the cloud provider may then be induced to impose to its users the employment of the software and/or products which are the object of the exclusivity agreement³²⁷.

³²⁷ Da Correggio Luciano L., Walden I., Ensuring Competition in the Clouds: The Role of Competition Law?, cited above 239.

Depending on the evaluation of the factors indicated above, exclusivity clauses can be in violation of art. 102 Tfeu. As it emerges from the paragraphs above, there could be objective justifications for the introduction of exclusivity clauses. Indeed, an exclusivity agreement may be justified in light of the customization introduced by the cloud provider based on the request of the single user. In other terms, the cloud provider may be requested to do specific investments which can then justify the imposition of exclusivity commitment. Similarly, the obligation to exclusively use certain software or similar tools can be justified by the need to guarantee a certain performance level or by security reasons in as far as the preferred software is capable to grant a high level of security compared to competing product.

Even when exclusivity agreements do not violate art. 102 Tfeu, they could still have an impact on competition in as far as they influence the mobility of users. To be more precise, the point with exclusivity agreements is that they can create a condition of technical dependence of the user from the cloud solution which can persist even after the termination of the exclusivity obligation. Indeed, once a user has made economical and know how investments on a certain cloud service it would be less inclined to change provider even after it could contractually do so. As mentioned already, exclusivity agreement can therefore increase the probability of users being locked-in to a particular provider even when the exclusivity commitment is short-termed and, as mentioned already, even after the duty is terminated. This point is rather relevant as this situation can entrench the creation of a dominant position and, as such, be not caught under the net of competition law, at least in the EU.

4.2.3.3. Other unfair contractual terms

Even when not directly traceable to tying/bundling strategies or exclusivity obligation, certain clauses may, nonetheless, be anticompetitive. This is the case of those clauses included in license agreements limiting the options available to users in the choice of complementary products. The risk is that a situation similar to the one investigated by the European Commission in 2010 and concerning Apple may take place in respect of cloud services as well.

In particular, in 2010, the European Commission opened an investigation into Apple's policy relating to terms and conditions applied to the license agreements with app developers. Based on the preliminary investigation, the European Commission

found that Apple obliged app developers to use only Apple's native programming tools and approved language when writing applications for the iPhone. Evidently, this precluded the ability for app developers to use third party programming tools as well as the ability for app developers to design applications capable to run also in platforms different than Apple's. These restrictions were eventually removed and no formal investigation was commenced by the European Commission³²⁸.

Cloud providers can introduce and implement restrictions to the ability of users to choose complementary products while making use of their cloud service in a way similar to Apple's mentioned strategy. As evident, this could be the case with PaaS service where, similarly to Apple's strategy, a cloud provider can impose to its users to use only its own, or anyhow, previously selected and approved programming languages: this would preclude access to the market by competing third party programming tools and, at the same time, it would preclude to app developers the possibility to design application capable of being run in other PaaS, replicating the foreclosure effects preliminarily detected by the European Commission. Restrictions to users' choice can be introduced in other layers too, such as IaaS where the cloud provider can impose the use only of approved virtual machines, being that its own or the virtual machine produced by a third party partner company. Due to its nature of virtualized applications, SaaS appears less likely to experience restrictions in license agreements with users.

4.2.4. Vertical integrated cloud providers

A situation which deserves a close look is the one concerning vertically integrated cloud providers. As we have indicated in the introductory note, cloud services are delivered and accessed through the internet.

In particular, content providers and users interact with each other at the level of what is usually described as content and applications markets. Each of the content providers and the users need also to conclude contracts with ISPs to buy connectivity. ISPs then interact with each other in the wholesale interconnection markets in order to allow data flow between their respective customers³²⁹. This

³²⁸ European Commission, Press release, Antitrust: Statement on Apple's iPhone policy changes, 25 September 2010.

³²⁹ For a more detailed description, please see BEREC, An Assessment of IP Interconnection in the context of Net Neutrality, 6 December 2012, available at

synthetic description of the relationship between the actors in the internet ecosystem can usefully be replicated also when dealing with cloud services. Indeed, cloud providers interact in the downstream market with users, represented by consumers, business, content providers; cloud providers and users need, each, to conclude contracts with ISP in order to make use of cloud services.

ISPs can limit their activities to provision of internet access or they can be active also in the provision of cloud services, either directly, through a corporate division, or indirectly, by way of partnership contracts concluded with cloud providers. When ISPs are both active in the upstream market for the provision of internet access and in the downstream market for provision of cloud services, they could be tempted to implement strategies aiming at benefitting their own services over those of the rivals. These practices can be either price or non-price based but they can nonetheless be harmful to competition as they could foreclose access to the market by potential competitors or, in any case, slow down or annihilate innovation in the market, in so resulting in violation by ISPs of art. 102 Tfeu. The EU practice provides examples of both categories of anticompetitive conducts.

4.2.4.1. Margin Squeeze

Margin squeeze is a practice involving a vertical integrated company active both in the upstream and downstream market. The abuse may originate by the fact that the vertically integrated company produces, at the upstream level, an input which is necessary to compete at the downstream level where, in addition to self-supply, that input is also sold to third parties competing with the vertical integrated company in the downstream market. In such situation, the vertically integrated company can raise the price of the input to a level in which competitors in the downstream market cannot make profits. In other terms, the vertically integrated company can use its position as an essential input supplies to constraint the margins of its rivals in the downstream market.

For margin squeeze to occur it is necessary that the vertically integrated company holds a dominant position in the upstream market for the input and further

http://berec.europa.eu/eng/document_register/subject_matter/berec/reports/1130-an-assessment-of-ip-interconnection-in-the-context-of-net-neutrality.

that it sets a price in downstream market at a level that its competitors cannot compete for the supply of product or service to consumers³³⁰. This last factor is usually verified applying the "equally efficient competitor" test, which requires to evaluate whether the dominant company would be able to offer its product in the downstream market without loss if it had to pay the same price for the input that it charged to third parties. If the answer to that question is in the negative then it means that the competitors' margins were illicitly squeezed and the conduct of the dominant company is anticompetitive unless it could be objectively justified.

At EU level, margin squeeze has taken place particularly in liberalized sectors where the previous state-owned company found itself in a dominant position in the market for the provision of an essential input while, at the same time, being active at downstream level³³¹. Notable cases of margin squeeze were realized in the telecommunications sector. In *Deutsche Telekom*³³², the European Commission found that Deutsche Telekom has abused the dominant position it held in the German market for broadband access to local fixed networks by charging its competitors more for unbundled access at wholesale level than it charged its subscribers for access at retail level. This conduct amounted to a margin squeeze since, due to the price that the competitors have to paid for the essential input (i.e. broadband access), they were forced to charge to their subscribers prices higher than those applied by the dominant company.

Margin squeeze can potentially take place in cloud computing services as well. ISPs which are also active in the provision of cloud services may be tempted to discriminate against other cloud providers and in favor of their own cloud providers when it comes to the definition of the network access prices. The extent to which such conduct can amount to an abuse of dominant position in violation of art. 102

³³⁰ O'Donoghue R., Padilla J., *The Law and Economics of Article 102 TFEU*, cited above at 73, Ch. 7, p. 364. The authors indicate that one of the debated issue is whether the input need to be "essential" as per the essential facility doctrine and, secondly, whether the vertically integrated company need to be dominant also in the downstream market. On the first point, the authors' position is that the input need not to be essential although the finding of essentiality may affect the assessment of the anticompetitive effects. On the second point, the authors are of the opinion that dominance in the downstream market is required for a finding of margin squeeze abuse; indeed, only in this case a company has the ability to influence prices also in the downstream market. See also Jones A., Sufrin B., *EU Competition Law*, cited above at 19, Ch. 7 page 407.

³³¹ Jones A., Sufrin B., *EU Competition Law*, cited above at 19, Ch. 7 page 407.

³³² European Commission, Case n. 37451, *Price Squeeze Local loop Germany*, 21 May 2003. The decision was appealed by the company but the General Court dismissed the appeal.

Tfeu depends, primarily, on the finding of dominance on the market for the access to the network.

Margin squeeze can occur also in a different situation and in particular when vertical integration involves the two layers of cloud which appears to be more connected, namely IaaS and PaaS or IaaS and SaaS. As mentioned in the premises, IaaS refers essentially to the provision of virtual infrastructure services (networking, servers, storage); PaaS refers to a higher level in the cloud “chain” where in addition to servers capacity and storage space, the user is also provided with the software and tools which run over the infrastructure; while SaaS refers to the highest level and concern applications.

PaaS and SaaS services can be built on infrastructures owned by the same company providing the PaaS or SaaS service to users or they can be built relying on IaaS provided by a third party. When they rely on IaaS provided by a third party, they would need to negotiate term of access to IaaS resources in a way similar to the negotiation which takes place with an ISP. When IaaS provider is also active in the provision of PaaS or SaaS, it may be tempted to squeeze the margins of competitors in order to favor its own PaaS or SaaS. This conduct can amount to an abuse of dominant position if the other requirements for margin squeeze are present. By way of example, let’s consider IaaS and assume that a dominant position is likely to arise in the market: in such case, conditioning the access to IaaS service to pricing that would make unprofitable for a company to provide PaaS or SaaS can amount to an abuse unless objective justifications are brought forward. Indeed, although price is not the determinant for the choice of users, it could become so if the difference between the costs of two cloud service reaches a certain degree of materiality.

4.2.4.2. Refusal to deal

Similarly to margin squeeze, when a company is dominant in the upstream market and supplies its input in the downstream market where it is also active, it can use its market power to exclude competitors from the market by refusing to supply its input to rivals. As mentioned, refusal to provide access to an input can sometimes amount to an abuse of dominant position, in particular when such input is indispensable for companies being able to supply their products in the downstream market. This requirement is usually interpreted in the sense that the input cannot

duplicated or can only be duplicated at an uneconomic cost. Provided that the input is found to be essential, then the refusal must be such to eliminate competition on the second market and lastly, the refusal must not be objectively justified.

Where the input in question is the internet, it could actually be difficult to find the presence of an essential facility due to the existence of competition between the ISP. Based on the general doctrine, a facility is essential where, *inter alia*, a competitors cannot compete in the downstream market without the use of such facility. The net, as such, could hardly be classified as an essential facility since, as mentioned, there are many ISPs operating in the market which a cloud provider can enter into agreement with to offer its services to users. Likewise for users. While cloud providers and users have the possibility to choose among several internet access providers, once the choice is made, the preferred ISP represents the main, and sometimes the only, gateway to reach, respectively, the cloud provider or the user. The situation appears to be somehow similar to the one experienced in the telecommunication sector in respect of call termination, where each of the telecommunication operator was found to be dominant over the relevant market represented by its own mobile network³³³.

As mentioned, the case of internet access is similar, although not exactly coincident, with the one occurred in the market for call termination. The element in which internet access differs from the case of call termination relates to the fact that a user may have the possibility to access to the internet through its own ISP or by making use of a Wi-Fi connection. In practical terms, this means that a user can access the internet either through the internet access operator with which he concluded a contract or using a Wi-Fi connected made available by the public institution or private parties. The net of the ISP does not represents, therefore, the only gateway for the cloud provider and user to get in contact; however, the Wi-Fi connection can hardly be considered as a substitute for the connectivity granted by the ISP. The main reason is that the Wi-Fi connection is not available everywhere

³³³ The Italian Competition Authority analyzed the call termination market in the decision A357 - Tele2/Tim-Vodafone-Wind, August 2007. In such decision, the Italian Competition Authority identified the markets for call termination in each of the mobile net. In particular, the national antitrust authority found that each of the mobile net constituted a distinct market considering that no demand substitutability was found between the nets once the choice is made by the user (§102 -104). As a consequence of the way in which the market was defined, each of the mobile operators was found to be dominant on the respective market.

and it is not always accessible for free which implies that a user cannot decide to switch to Wi-Fi connectivity as a substitute for its ISP³³⁴.

Based on what indicated above, the net owned by each of the ISP can indeed amount to an essential facility and the refusal to grant access to such net can give raise to an abuse of dominant position in violation of art. 102 unless it could be objectively justified.

4.3. Further observations on abusive conducts: a comparative look at the US

The sections above provided an illustration of possible abuse conducts in cloud markets in light of EU principles and decisions. To briefly recap, finding of abuse of dominance at EU level implies the necessary previous establishment of a dominant position; dominance is not easy to establish in cloud markets albeit companies may still enjoy a certain degree of market power. As a consequence, conducts which may nonetheless be restrictive and, somehow, detrimental for the development of the market can go unpunished. This considered, interesting suggestions on how to approach anticompetitive conducts in the absence of a dominant position may be drawn from the analysis of Sec. 2 of the Sherman Act and its difference with art. 102 Tfeu.

Sec. 2 of the Sherman Act recites:

“Every person who shall monopolize, or attempt to monopolize, or combine or conspire with any other person or persons, to monopolize any part of the trade or commerce among the several States, or with foreign nations, shall be deemed guilty of a felony, and, on conviction thereof, shall be punished by fine not exceeding \$100,000,000 if a corporation, or, if any other person, \$1,000,000, or by imprisonment not exceeding 10 years, or by both said punishments, in the discretion of the court”.

Sec. 2 of the Sherman Act has, at least formally, a wider reach than art. 102 Tfeu since it covers conducts put in place in the absence of a significant market power. In fact, Sec. 2 applies not only to monopolization conducts - which can be

³³⁴ In this sense, also, Sluijs J.P., Larouche P., Sauter W., Cloud Computing in the EU Policy Sphere, cited above at 12, according to the authors, considering the ubiquitous nature of cloud computing, at any given point in time and location, there is only one ISP reaching a customer.

considered as the US homologous for abuse of dominance - but also to attempt to monopolize and conspiracy to monopolize. In addition, monopolization in itself is drafted widely than art. 102 Tfeu; lastly Sec. 2 applies to any persons and, therefore, not only to the conduct of undertakings but also to that realized by individuals.

4.3.1. Monopolisation

Based on the decision adopted by the Supreme Court in the Grinnell case³³⁵, a finding of monopolisation requires proof of possession of monopoly power and willful³³⁶ acquisition and maintenance of that power through improper means, that is through means different than growth or development as a consequence of a superior product, business acumen or historic accident.

Similarly to the EU approach, monopoly power is not relevant *per se* since being a monopolist does not in itself violate Sec. 2³³⁷ in the absence of an anticompetitive conduct³³⁸.

Sec. 2 presents a however a peculiarity compared to the EU discipline since it enumerates among possible anticompetitive conduct also acquisition of monopoly power stemming from improper means³³⁹. Actually finding of attempt to monopolize has not been frequent in US practice and the vast majority of cases relate to maintenance of monopoly power. It is however interesting to have a look at the cases where acquisition of monopoly power came into question.

³³⁵ United States v. Grinnell Corp., 384 U.S. 563, 570-571 (1966), referred to in Hovenkamp H., Federal Antitrust Policy; The Law of Competition and its Practice, cited above at 190, § 6.1.

³³⁶ Despite the use of the word "willful", the general approach is that there is no need to prove subjective intent by the wrongdoer. Courts sometimes examine subjective intent in respect of ambiguous cases where, therefore, proof of subjective intent can help to understand the conduct. More details on this, Hovenkamp H., Federal Antitrust Policy. The Law of Competition and its Practice, cited above at 190, § 6.4.c); Elhauge E., Gerardin D., Global Competition Law and Economics, Hart Publishing, 2007, p. 300.

³³⁷ Sullivan L.A., Grimes W.S., Sagers C.L., The Law of Antitrust, An Integrated Handbook, 3rd. Ed., West Academic Publishing, 2016, § 3.4.

³³⁸ ABA, Monopolisation and Dominance Handbook, cited above at 154, Broader D., U.S. Antitrust Law and Enforcement, A Practice Introduction, cited above at, § 4.01. The author refers to United States v. Grinnell Corp., 384 U.S. 563, 570-571 (1966) recognizing that mere monopoly power, without more, is not a violation of § 2; Eastman Kodak Co. v. Image Technical Servs., Inc., 504 U.S. 451, 481 (1992).

³³⁹ It is generally considered that the reference to "maintenance" of monopoly power coincides with the EU concept of abuse of dominance despite it being differently formulated; Larouche P., Schinkel M.P., Continental Drift in the Treatment of Dominant Firms: Article 102 TFEU in contrast to §2 Sherman Act, available at www.ssrn.com.

Other difference as mentioned in the previous section is that US antitrust law does not catch exploitative conducts; see ABA, Monopolisation and Dominance Handbook, cited above at 154, referring to Pac. Bell Tel. Co v. Line Comm'ns, 129 S. Ct. 1109, 1118 (2009); Trinko, 540 U.S. at 407 where it was indicated that "*the mere possession of monopoly power, and the concomitant charging of monopoly prices, is not only not unlawful, it is an important element of the free-market system*".

One sector where unlawful acquisition of monopoly power was detected is that of IP rights, especially in the context of standard setting organizations. As widely known, standards applicable to a certain industry are defined by selecting the best available technology; if the technology included in the standard is covered by a patent, the standardization proceeding is likely to confer market power to the patent holder as all the companies wishing to use such standard should first obtain a license on the patented technology. It is for this reason that standard setting organizations usually require participating companies to disclose any patent they may hold over a certain technology; in addition depending on the nature of the patent, and in particular on whether the patent is declared essential to the standard, standard setting organizations require participating companies to undertake to license the patent under fair, reasonable and non discriminatory (so called "FRAND") terms³⁴⁰. It is not uncommon that companies try and take advantage of the standardization procedure in order to gain monopoly power or abuse of it. It is against this context that a violation of Sec. 2 realized through anticompetitive acquisition of monopoly power can be detected. This occurred for instance in the Rambus case³⁴¹. In 2006, the Federal Trade Commission found that Rambus deceived the standard organization by failing to disclose its holding of a patent over a technology included in a standard. As a result, Rambus patented technology was included in the standard and, by this token, Rambus acquired monopoly power; since however inclusion was the result of Rambus's deception, acquisition of monopoly power was found in violation of Sec. 2 of the Sherman Act.

Rambus case is particularly interesting because, in addition of providing an illustration of what is meant by illicit acquisition of monopoly power, it also shows the difference in approach between EU and US. Rambus' conduct was in fact investigated also in the EU³⁴² where the anticompetitive conduct analyzed was not the acquisition of dominance - which is not covered by art. 102 Tfeu - but rather a proper abuse of dominance. The reasoning followed by the European Commission is

³⁴⁰ In general on this topic please see Muselli A., *Brevetti essenziali e antitrust: False FRAND or True Enemy? Commento alle decisioni Motorola e Samsung*, in *Concorrenza e Mercato* 2015.

³⁴¹ FTC, Press Release, *FTC Finds Rambus Unlawfully Obtained Monopoly Power*, August 2006. The decision of the FTC was eventually set aside by the U.S. Court of Appeal for the District of Columbia.

³⁴² European Commission, *Case C-3/38636, Rambus*, 9 September 2009. For a summary of this case, please see Muselli A., *I diritti di proprietà intellettuale e l'abuso di posizione dominante - Rassegna delle decisioni comunitarie (1988-2010)*, in *Concorrenza e Mercato* 2012, p. 425.

the following: Rambus was in a dominant position on the relevant market due to the inclusion of its patented technology into the standard; inclusion which also the European Commission considered was the result of the fraudulent behavior of Rambus but which was not in itself illicit under art. 102 Tfeu. The European Commission was anyhow able to investigate Rambus' conduct since, after the inclusion of its technology in the standard, the company asked for very high royalty to users of the standard, a conduct which amounted to excessive pricing in violation of art 102 Tfeu (interestingly to note such conduct is not punishable under Sec. 2 of the Sherman Act)³⁴³. The outcome of the two cases is largely similar, both US and EU competition authority considered Rambus' conduct as anticompetitive but the reasoning is different and reflects a difference in the formulation of the relevant provisions: while the FTC focused on the deceptive conduct which led to the acquisition of monopoly power while the European Commission focused on the abuse following the acquisition of dominance stemming from the deceptive conduct. In other terms, as it appears, in the US a deceptive conduct before a standard organization can amount to an exclusionary conduct and be considered as a monopolization conduct in breach of Sec. 2 in as far as it determines the acquisition of monopoly power; in the EU, a violation of art. 102 Tfeu arises only when a company, which has successfully executed a patent ambush, subsequently charged excessive or otherwise unfair prices³⁴⁴.

The difference in the US and EU approach is not only one of timing: this point can be very well illustrated if we consider that should Rambus have asked for non-excessive royalty its conduct would have gone unpunished under EU law even if also the same fact that standard users were forced to pay royalty was already the result of Rambus deceitful conduct. In situation like the one in the Rambus case, EU competition law can be less effective in ensuring that competition is not distorted by abusive conducts of dominant companies as, under EU competition law, dominance which is not the result of the merit of a company but rather of its illicit conduct is not punished. In its practice, however, the European Commission has somehow circumvented this problem by considering that the conduct itself of a company can

³⁴³ The expression patent ambush refers to the conduct of a company which works to have the technology on which it holds a patent included into the standard.

³⁴⁴ Tallman R., U.S. and E.U. Antitrust Enforcement Efforts in the Rambus Matter: a Patent Law Perspective, in IDEA - The Intellectual Property Law Review, 2012, Vol. 52, No. 1.

constitute a barrier to entry, which in turn can ground a finding of dominance: this approach has somehow brought under the radar of art. 102 Tfeu those conducts which contribute to the establishment of a dominant position on the market. As mentioned this tendency has been sometimes criticized and it is in any case not always applicable. Further, the need to try and intervene before any dominant position can be detected as urged the European Commission to open a review on rules applicable to merger and in particular to rethink the thresholds triggering notification to the European Commission³⁴⁵ with the aim to catch those mergers which are currently below thresholds but could be relevant from a competition perspective: this approach certainly is not tantamount to expand the scope of application of art. 102 Tfeu to conducts put in place by non-dominant company but certainly reflect the acknowledgement of the necessity to anticipate competition law scrutiny.

4.3.2. Attempt to monopolize, conspiracy to monopolize, Sec. 5 FTC Act

Sec. 2 of the Sherman Act also applies to attempt to monopolize and conspiracy to monopolize.

Attempt to monopolize captured those conducts realized by person having a degree of market power lower than the one requested for monopolization and which are also characterized by a specific intent to reach monopolization and a dangerous probability of succeeding³⁴⁶.

Conspiracy to monopolize presents elements common to illicit agreement, as it refers to a unity of purpose or a common design and understanding, or a meeting of minds by conspirators in an unlawful arrangement³⁴⁷; it does not require the acts to be in itself illicit but it is necessary that a specific and shared intent to monopolize exists.

³⁴⁵ See above footnote 206.

³⁴⁶ Attempt to monopolize has been codified by Judge Holmes in the Swift & Co. decision. According to the Judge, attempt occurs where the acts are not sufficient in themselves to produce the results that the law aimed at preventing, such as monopoly, but an intent of the company to bring that result to pass and the consequent dangerous probability to achieve that result exists. Three elements are required for a finding of attempt to monopolize: i) specific intent to monopolize; ii) a conduct aimed at achieving that result; and iii) a dangerous probability of achieving monopolisation; see Hovenkamp H., Federal Antitrust Policy cited above at 190. The Law of Competition and its Practice, cited above at 335 § 6.5. referring to Swift & Co. v. United States, 196 U.S. 375, 393, 25 S. Ct. 276, 278 (1905).

³⁴⁷ ABA, Monopolisation and Dominance Handbook, cited above at 154 citing Rome Ambulatory Surgical Ctr. v. Rome Mem'l Hosp., 349 F. Supp. 2d 389, 420 (N.D.N.Y. 2004).

Attempt to monopolize and conspiracy to monopolize have been in practice rarely used. They however represent a potential useful instruments to catch all those conducts bearing anticompetitive effects on the market albeit not realized by companies with a significant market power.

Last instrument enjoyed by the American agencies and not available in the old continent is Sec. 5 of the FTC Act. Section 5 of the FTC Act is directed to acts that are capable to violate the Sherman Act, to those that contravene the spirit of the antitrust law and those that, if allowed to mature or complete, could violate the Sherman Act³⁴⁸. Sec. 5 confers to the FTC the power to address acts or practices that are anticompetitive but may not fall under the application of the Sherman Act³⁴⁹. As evident, Sec. 5 has a very wide and general formulation which makes it particularly difficult to identify the kind of conducts which may be caught by the norm³⁵⁰.

4.4. Preliminary conclusions

Assuming a dominant position can be traced in any of the relevant cloud markets, guidance can be derived from the decisional practice of the EU on the possible anticompetitive conducts which cloud providers can put in place to preserve their positions on the market and exclude or limit competition. Enforcement of art. 102 Tfeu in the EU is however necessarily linked to the previous finding of a dominant position, a situation which may not be likely in cloud markets due to its characteristics; when that is the case, conducts potentially very dangerous for innovation and the development of markets can go unpunished. In such situation a reflection may be necessary on whether to modify or adapt current legislation to make it more similar to the provision of Sec. 2 of the Sherman Act although this may

³⁴⁸ FTC, Statement of Enforcement Principles Regarding “Unfair Method of Competition” Under Sec. 5 of the FTC Act, 13 August 2015.

³⁴⁹ Wright J.D., Diveley A.M., Unfair Methods of Competition after the 2015 Commission Statement, in Antitrust Source, October 2015. The authors refer to the Supreme Court decision in *FTC v. R.F. Keppel & Bro.*, 291 U.S. 304 (1934) where it was expressly stated that the purpose of Sec. 5 was wider than the Sherman.

³⁵⁰ The FTC has made an attempt to clarify the approach it will adopt in the enforcement of Sec. 5 in its Statement of Enforcement Principles where it has indicated that it will adhere to the following principles. In particular it will follow the public policy underlying antitrust laws, that is the promotion of consumer welfare; the conducts will be analyzed under the framework of the rule of reason, which means that the FTC will challenge only those acts that must cause, or are likely to cause, harm to competition or to the competitiveness process, taking into account efficiencies and business justifications; the FTC further indicates that it will less likely challenge acts or conducts which amount to unfair method of competition on a stand alone basis if those acts or conducts are enforced under the Sherman Act; please see FTC, Statement of Enforcement Principles Regarding “Unfair Method of Competition” Under Sec. 5 of the FTC Act, cited above at 348.

also imply the need to rethink the general approach followed at EU level towards competition law enforcement.

Conclusion

The starting point of my research was to analyze whether EU competition rules and case law can be efficiently used to face potential competition trouble in cloud computing services. To simplify the answer to that point is in the positive: companies, practitioners and the authorities themselves can be relieved by the fact that the past experience is still useful.

This does not mean that competition rules can be merely transposed to conducts occurring in cloud services or, more widely, to online products. As underlined in the sections above, competition rules will need to be adapted to take into account of the peculiarity of cloud services. This applies to all the three stages of the analysis market definition, dominance assessment and detection of abusive conduct.

Market definition is the first stage of analysis and probably one of the most challenging. The peculiarity of these markets, their dynamic nature, the tendency to quickly grow and include different product or service require competition authorities to be fast in their analysis and to have a long term view on possible developments. In term of tools, the nature of cloud services and their genesis may induce authorities to confer more relevance than it was usually the case to supply-side substitution along with demand-side and to evaluate which of the two point of analysis should prevail.

In addition, SSNIP test may need to be redesigned so as to account for the fact that in cloud services price is not necessarily the determinative factor in the choice of users. This applies especially to PaaS and SaaS while it could be the case that, after this initial moment, IaaS would assume characteristics and competition dynamics more similar to traditional *off-line* IT infrastructures.

On top of everything is the issue of timing of decisions: authorities need to be quick in their analysis to avoid the risk that when a decision on the relevant market is reached such market has already changed shape. This consideration generally applies to enforcement of competition rules to the digital sector but specifically concern setting market boundaries.

Notwithstanding the inner difficulty of this task, my view is that reaching a correct definition of the market is of outmost relevance. In the course of my reading I have come across position fostering for a relaxation of current rules and behavior

(especially in the EU) towards market definition leveraging on the dynamic nature of the market, however I did not find this position as particularly convincing. Applying competition rules to innovative sector requires the finding of the right balance between enforcement and *laissez-faire* approach, but such balance cannot be found when competition rules are applied in a vacuum.

When market is defined, it still remains dominance to be found.

Current market reports on cloud services represents markets as quite fragmented with no operator reaching market share of some relevance with the only possible exception of Amazon in the IaaS market. These reports are however of a general nature and do not take into account competition rules on market definition.

Competition authorities would therefore need to keep an eye on how markets develop and, in the meantime, consider how current criteria to assess dominance could be applied to cloud services. As with the case of market definition, present rules and principles need to be adapted to the new reality, starting from market shares. In this respect, a first knot to untie is the method employed to calculate market share. As indicated, value based analysis may be unfit to cloud reality while market shares based on volume could be more suitable. But volume in term of what? Shall the volume be calculated based on users or storage?

Once share calculation criteria are identified then the point is how to interpret them. In cloud computing services, it could actually happen that lower market shares may need to be considered closely than higher market shares especially when services are highly differentiated and users are loyal to a certain provider.

As in traditional industries, other factors would need to be considered, first of all barriers to entry. Interoperability and portability are likely to play a major role but the extent to which their absence would determine the lock in of users may depend on the evaluation of specific features of cloud services as well as users behavior. Interoperability and portability would need to be pondered against multi-homing and one way compatibility: two factors which have been so far almost never considered by competition authorities.

Lastly, identification of abusive conducts. While some indications can certainly be drawn from current practice of abuses realized by online companies, competition authorities would also need to be vigilant towards new forms of abuse. Considering

the importance of technology in cloud services it is likely that abuses would be tech-related. Conducts could therefore concern portability and interoperability, the design of product, technological lock-in. This also implies that competition authorities need to be quick in antitrust enforcement to avoid their actions to become soon outdated and markets necessarily damaged.

The next years would certainly be challenging for authorities and professionals alike. It would be very interesting to see whether predictions towards creation of dominance and possible abuses would be satisfied or whether, to the contrary, markets would unaltered. Currently, it is not possible to envisage how cloud services would evolve. So far, as mentioned, the business model applied is that based on price but it could not be excluded that they may evolve along the line of major online companies and therefore evolve into two-sided or multi-sided market. This would imply a review of the analyses carried out in the paragraph above and a new challenge for competition authorities.

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