DECLARATION FOR THE PhD THESIS

The undersigned

SURNAME	GRAZZI
NAME	MATTEO
Registration number	1125632

Thesis title:

FDI and Bilateral Economic Agreements: Lessons from Chile

PhD in	International Law and Economics
Cycle	XXI
Candidate's tutor	Laura Resmini
Year of discussion	2010

DECLARES

Under his responsibility:

1) that, according to the President's decree of 28.12.2000, No. 445, mendacious declarations, falsifying records and the use of false records are punishable under the penal code and special laws, should any of these hypotheses prove true, all benefits included in this declaration and those of the temporary embargo are automatically forfeited from the beginning;

2) that the University has the obligation, according to art. 6, par. 11, Ministerial Decree of 30th April 1999 protocol no. 224/1999, to keep copy of the thesis on deposit at the Biblioteche Nazionali Centrali di Roma e Firenze, where consultation is permitted, unless there is a temporary embargo in order to protect the rights of external bodies and industrial/commercial exploitation of the thesis;

3) that the Servizio Biblioteca Bocconi will file the thesis in its 'Archivio istituzionale ad accesso aperto' and will permit on-line consultation of the complete text (except in cases of a temporary embargo);

4) that in order keep the thesis on file at Biblioteca Bocconi, the University requires that the thesis be delivered by the candidate to Società NORMADEC (acting on behalf of the University) by online procedure the contents of which must be

unalterable and that NORMADEC will indicate in each footnote the following information:

- thesis 'FDI and Bilateral Economic Agreements: Lessons from Chile';
- by Grazzi Matteo;
- discussed at Università Commerciale Luigi Bocconi – Milano in2010;
- the thesis is protected by the regulations governing copyright (law of 22 April 1941, no. 633 and successive modifications). The exception is the right of Università Commerciale Luigi Bocconi to reproduce the same for research and teaching purposes, quoting the source;

5) that the copy of the thesis deposited with NORMADEC by online procedure is identical to those handed in/sent to the Examiners and to any other copy deposited in the University offices on paper or electronic copy and, as a consequence, the University is absolved from any responsibility regarding errors, inaccuracy or omissions in the contents of the thesis;

6) that the contents and organization of the thesis is an original work carried out by the undersigned and does not in any way compromise the rights of third parties (law of 22 April 1941, no. 633 and successive integrations and modifications), including those regarding security of personal details; therefore the University is in any case absolved from any responsibility whatsoever, civil, administrative or penal and shall be exempt from any requests or claims from third parties;

7) that the PhD thesis is not the result of work included in the regulations governing industrial property, it was not produced as part of projects financed by public or private bodies with restrictions on the diffusion of the results; it is not subject to patent or protection registrations, and therefore not subject to an embargo;

Date 31/01/2010

Signed MATTEO GRAZZI

UNIVERSITÀ COMMERCIALE "LUIGI BOCCONI"

PHD IN INTERNATIONAL LAW AND ECONOMICS

FDI and Bilateral Economic Agreements: Lessons from Chile

Matteo Grazzi

January 2010

Mat. 1125632

Tutor: Prof. Laura Resmini

AKNOWLEDGMENTS

First and foremost, I wish to thank my supervisor, Professor Laura Resmini, for the continuous support, her patience and guidance. Her friendly advice and constant encouragement have been invaluable during these years.

I am also very grateful to the other members of my Thesis Committee, Prof. Antonella Mori and Prof. Alberto Brugnoli, who have provided me with insightful comments, which have considerably improved the quality of this work. Moreover, I would like to acknowledge the backing of Prof. Fabrizio Onida and Prof. Giorgio Sacerdoti, who have been the coordinators of the PhD program in International Law and Economics of Bocconi University during these years. I am also particularly thankful to the Chilean Foreign Investment Committee, in the person of Daisy Kohan, which provided me with the data I used in the empirical analysis.

This thesis has accompanied me across five countries and three continents in the last four years. I want to thank colleagues and friends at the Center for Latin American Studies and Transition Economies of Bocconi University, in Milan; at University of Sussex, in Brighton; at the Asian Development Bank, in Manila; at the UN Economic Commission for Latin America and the Caribbean, in Santiago de Chile; and at the Inter-American Development Bank, in Washington D.C.. In each of these places, I have been engaged in useful discussions and I have received comments that have significantly contributed to this work.

A special thank goes to Elisa Calza, not only for her help, but especially for her friendship. Finally, I would like to acknowledge the constant support and encouragement of my family and friends. This thesis would not have been possible without them.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

APEC	Asia-Pacific Economic Cooperation
BIT	Bilateral Investment Treaty
DTT	Double Taxation Treaty
ECLAC	UN Economic Commission for Latin America and the Caribbean
EU	European Union
FDI	Foreign Direct Investment
FTA	Free Trade Agreement
IADB	Inter-American Development Bank
ICSID	International Centre for the Settlement of Investment Disputes
IMF	International Monetary Fund
M&A	Mergers and Acquisitions
MERCOSUR	Southern Common Market
MIGA	Multilateral Investment Guarantee Agency
MNE	Multinational Enterprises
NAFTA	North America Free Trade Agreement
OECD	Organisation for Economic Cooperation and Development
UNCTAD	United Nation Conference on Trade and Development
US	United States
WB	World Bank
WDI	World Development Indicators – World Bank
WTO	World Trade Organization

INTRODUCTION

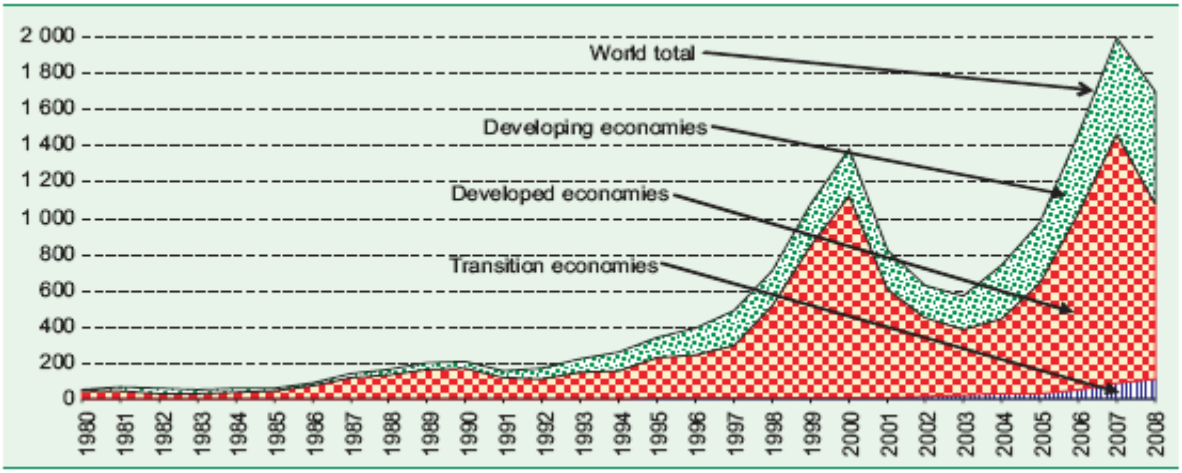
Since 1980, global Foreign Direct Investment (FDI)[1] flows have grown at remarkable rates. From 1991 to 2000 the outflows averaged a yearly rise of over 28%. The trends slowed considerably in the 2000s, but since 2003 FDI started to increase again at substantial rates, reaching a record high of $ 1,979 billion in 2007. In the latest years this growth in FDI activity has registered a sudden stop caused by the explosion of the global financial crisis. Total flows decreased by 14% to 1,697 billion in 2008 and are expected to fall to $900 - $1200 billion in 2009 (See Figure 1). However, despite the current global downturn, FDI still play a key role in the global economy. Worldwide, there are some 82,000 Multinational Enterprises (MNEs) with 810,000 foreign affiliates and with 77 million of total employed people in 2008 (UNCTAD, 2009).

FDI activity has been traditionally concentrated in developed country, but flows into developing countries have progressively increased their relevance. Although developed countries are still the largest recipients of global FDI, their share fell from 69% of global flows in 2007 to 60% in 2008, offset by the growth in the share of investment destined to developing and transition economies in the same period. In fact, the crisis affected unevenly developed and developing countries: while FDI inflows in developed countries fell 29% in 2008 with respect to the previous year, FDI towards developing countries increased by 7%, reaching a new record high of

1 Foreign direct investment (FDI) is defined as an investment involving a long-term relationship and reflecting a lasting interest and control by a resident entity in one economy (foreign direct investor or parent enterprise) in an

$621 billion[2]. Therefore, FDI flows not only have been confirmed as the most important external financing channel for developing countries, but have proved to be more resilient than other capital flows, such as portfolio investments and capital lending which have considerably decreased in 2008 (See Figure 2).

Figure 1 FDI inflows, global and by groups of economies, 1980–2008
(Billions of dollars)



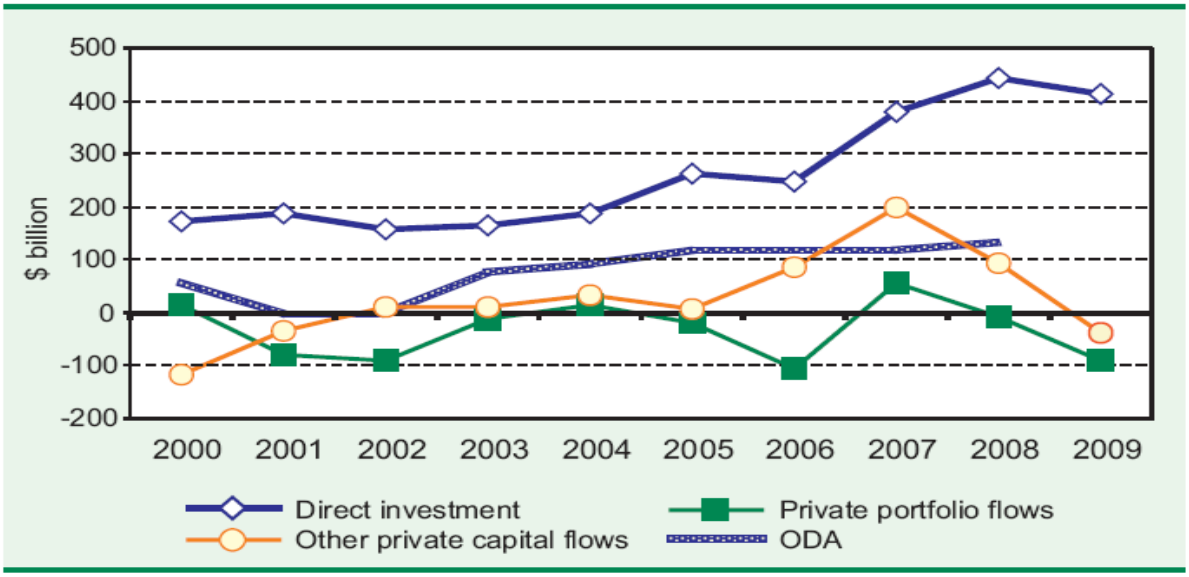
Source: UNCTAD (2009)

Furthermore, the overall potential benefit of FDI is well documented in literature. Given a correct host-country policy and a minimum level of development, most scientific work shows that FDI can trigger technology spillovers, help to create human capital, contribute to international trade integration, lead to a more competitive business environment and enhance enterprise development. All these factors stimulate economic growth, which is a pre-requisite for alleviating poverty in developing countries. Furthermore, beyond the strictly economic benefits, if addressed correctly, FDIs may help to improve environmental and social conditions in the host

[2] Even if preliminary figures for 2009 suggest the effects of the financial crisis on FDI flows into developing countries have arrived with a time lag, the projected figures are expected to remain relatively high overall (UNCTAD, 2009)

country, for example by transferring less polluting technologies and leading to more socially responsible corporate policies (OECD, 2002).

Figure 2 Net Capital Flows to developing countries, 2000-2009
(Billions of dollars)



Notes: Figures for 2009 are preliminary

Source: UNCTAD (2009)

In the global situation described above, it is of primary importance for developing countries to find ways to look more and more attractive in the eyes of investors, in order to receive higher FDI flow amounts, especially of the kind that will bring the greatest benefit to a country in terms of investment levels, job creation, higher-value-added activities and innovation. Consequently, an urgent research topic for the development economist is to analyze the foreign investment flows into developing countries and clearly identify their main determinants, in order to offer useful indications for policy-makers.

The aim of this thesis is to offer a comprehensive analysis of the determinants of FDI inflows into Chile from 1985 to 2005 through the estimation of a gravity equation. Chile is a relatively small and resource-rich country, and has been highly successful in attracting FDI over the last 30 years. In fact, FDI has represented an important contribution to the sustained economic development of Chile in the last decades. Since the return to democracy in 1990, Chile has undertaken an active foreign policy targeted to a deeper integration in the international arena. A main pillar of this strategy has been constituted by the signature of a high number of bilateral economic agreements, such as Bilateral Investment Treaties (BITs), Double Taxation Treaties (DTT) and Free Trade Agreements (FTAs). The validity of such treaties as useful instruments to raise the level and quality of FDI into a country has been questioned by several scholars and, to date, there is still controversial empirical evidence. This study contributes to this debate by evaluating their effects on FDI into Chile at both aggregate and sectoral level.

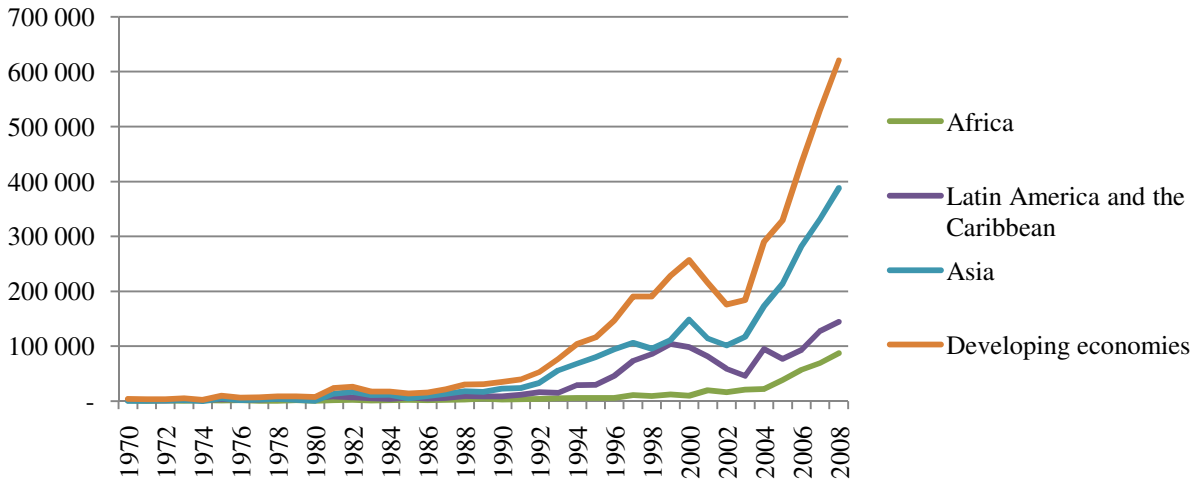
The thesis is structured as follows. Chapter 1 analyzes trend and characteristics of FDI inflows into Chile and provides an overview of foreign investment regulation of the Country. In Chapter 2 the relevant literature on the application of the gravity model to investment flows is reviewed. Chapters 3 and 4 contain the empirical analysis of the determinants of FDI flows, respectively at aggregate and sectoral level. In the conclusive section the policy implications of the obtained results are discussed, some open issues are highlighted and possible future extensions are identified.

CHAPTER 1: FDI IN CHILE: FACTS AND FIGURES

1.1 Introduction: the Regional Context

Similarly to the global trend, after many decades of sluggish growth, FDI inflows in Latin America and the Caribbean have been rapidly increasing for the last 20 years (See Figure 1.1) and FDI is nowadays the major source of foreign capital in the region, greatly exceeding the value of financing obtained through emerging stock markets, bank borrowing and other forms of external finance[3]. In 2008, despite the international financial crisis, FDI flows in the region soared to US$ 128.301 billion, 13% higher than in the previous year. It means that 8% of the World FDI flows are directed in Latin America and the Caribbean (ECLAC, 2009).

Figure 1.1 FDI inflows in Developing Countries (US$ millions), 1970-2008



Source: author's elaboration on data from UNCTAD (2009)

[3] Another important source of foreign capital for developing countries is constituted by remittances, which recorded 338 US$ in 2008 (World Bank, 2009).

Figure 1.2a FDI inflows in Latin America and the Caribbean (%), 2008

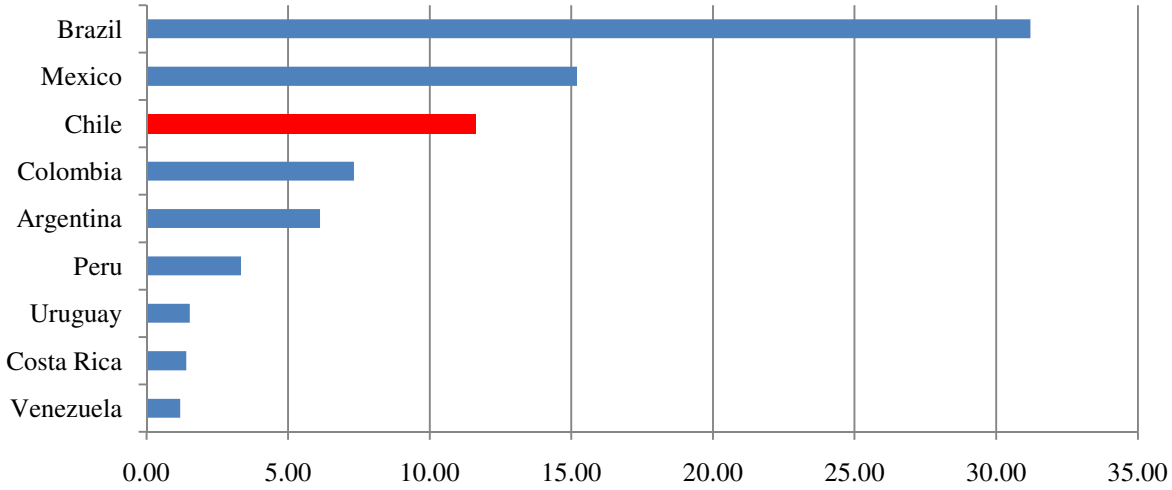
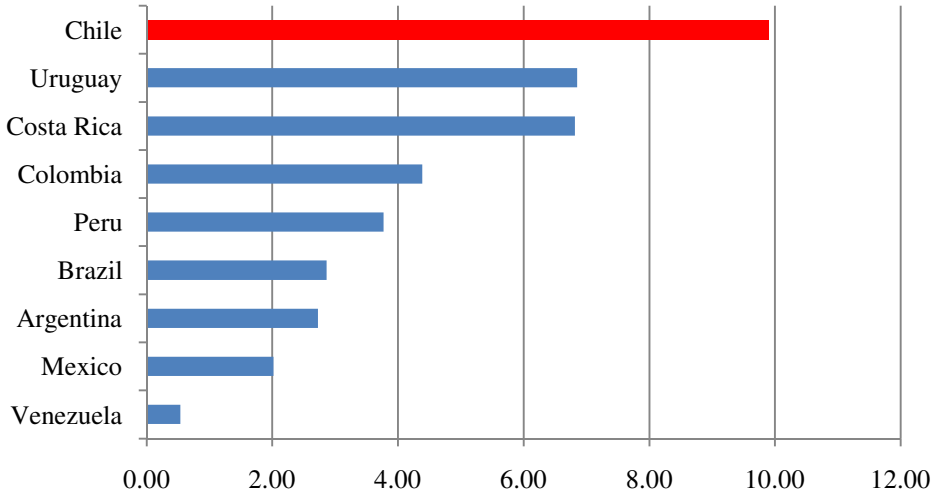


Figure 1.2b FDI inflows in Latin America and the Caribbean (% of GDP), 2008



Note: The countries included in Figure 1.2b are those with the highest absolute FDI inflows, i.e. those indicated in Figure 1.2a, and not those with the highest FDI/GDP ratio.
Source: Author's elaboration on data from UNCTAD (2009)

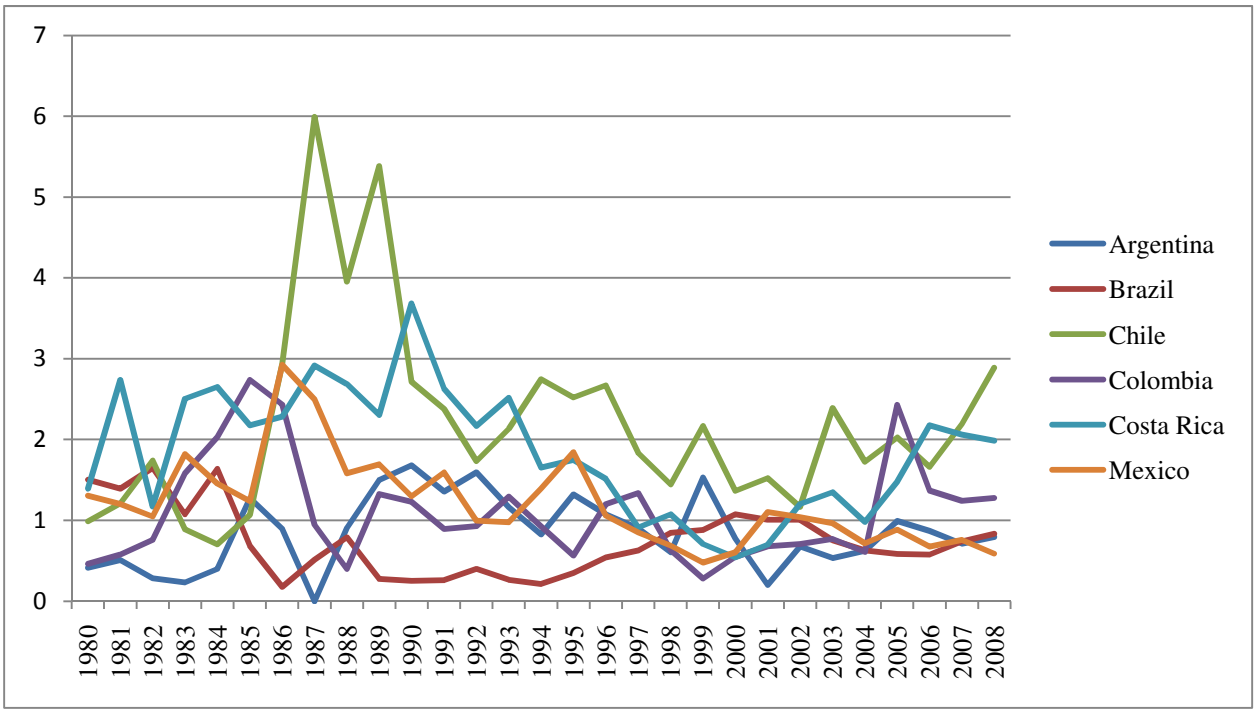
In absolute terms, the main regional recipients of FDI are Brazil, where in 2008 has arrived the 31.21% of the total foreign investment of the region, Mexico (15.20%) and then Chile (11.63%) (See Figure 1.2a). But, if we evaluate FDI inflows as a proportion of GDP, Chile attracted the highest investment value in relation to its economic dimension (See Figure 1.2b).

A different way to compare the evolution of FDI in Chile with that of other regional countries is by using an index of inward FDI developed by UNCTAD[4] in which a country's share in regional FDI flows is divided by its share in regional GDP. A value of 1 in this index indicates that the country attracts FDI in exact proportion to its GDP. The value of the index for Chile increased dramatically over the years, from below 1 in the early 1980s to 2.88 in 2008. In other words, Chile nowadays receives 188% more FDI than what would be warranted by its share in regional GDP (See Figure 1.3).

These figures clearly show the success of Chile in attracting FDI in comparison with other countries in the regional context. In this Chapter we analyze various aspects related to foreign investment in Chile, in order to provide with an adequate background the empirical analysis on the determinants of FDI contained in the thesis. First, in Section 1, the main features of the Chilean economy are presented. Next, in Section 2, we describe the regulatory framework that allows, disciplines, and guarantees foreign investment in Chile. Then, Section 3 contains a qualitative analysis about FDI historical trends in Chile and Section 4 presents a detailed disaggregation of inflows by country of origin, sector and region of destination. Finally, Section 5 concludes.

[4] $Index\ country_j = [\frac{FDI\ country_j}{FDI\ World}]/[\frac{GDP\ country_j}{GDP\ World}]$

Figure 1.3 Index of FDI inflows in Latin America and the Caribbean, 1980-2008



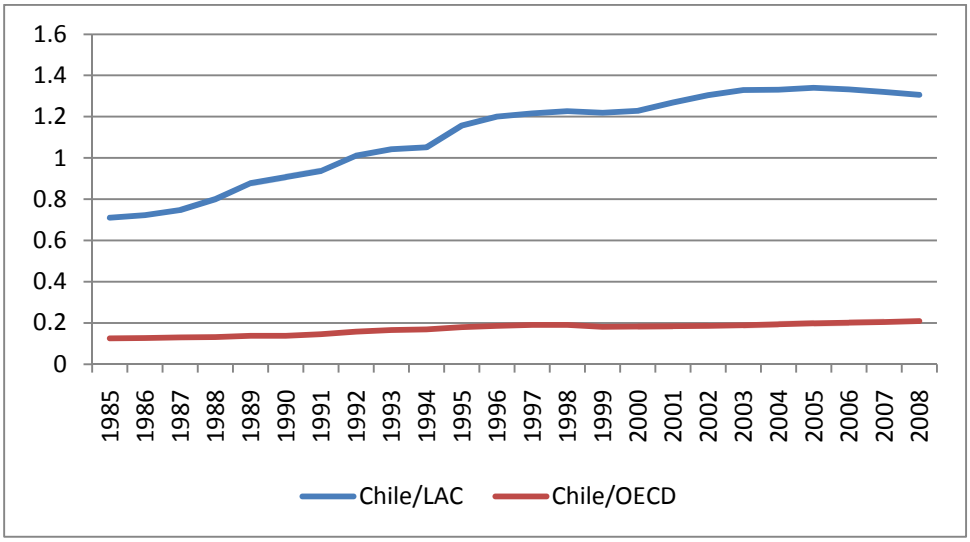
Source: author's elaboration on data from UNCTAD (2009)

1.2 Chile Economic Outlook

With a population of 16.7 million people, a GDP of 169.5 US$ billions and a GDP per capita of 16,758 US$ in 2008 (WDI), Chile is often referred to as one of South America's most stable and prosperous nations. Since democracy was restored in 1990, the country has undertaken a phase of legal and political stabilization, economic consolidation and international integration that made it the Latin America's fastest-growing economy during the 1990s. From Figure 1.4, where it is shown the GDP per capita ratio between Chile and Latin America and between Chile and the OECD countries, it is possible to notice how Chile , from a starting point of 0.71 in 1985, i.e. a GDP per capita lower than the Latin American average, managed to reach 1,3 in 2008. It means

that today the Chilean GDP per capita is 30% higher of the regional average. Moreover, also the GDP ratio with OECD countries has increased over the years, from 0.12 in 1985 to 0.21 in 2008 meaning that Chile is also reducing the gap with developed countries.

Figure 1.4 GDP per capita ratio, 1985-2008



Source: Author's elaboration on WB World Development Indicators

Chile's excellent economic performance is well recognized by the international community, as showed by the fact that Chile will join OECD in 2010, but the clearest proof of its economic soundness is probably the increasing interest showed by trading partners and international investors, as demonstrated by trade records and by the relevant amounts of FDI flows directed towards the country. However, getting progressively more involved in the world economy meant also being more vulnerable to international downturns: Chile experienced moderate economic slowdowns at the end of the past decade, as a result of the unfavourable economic conditions caused by the Asian crisis, and the country has been severely hit by the current international financial crisis.

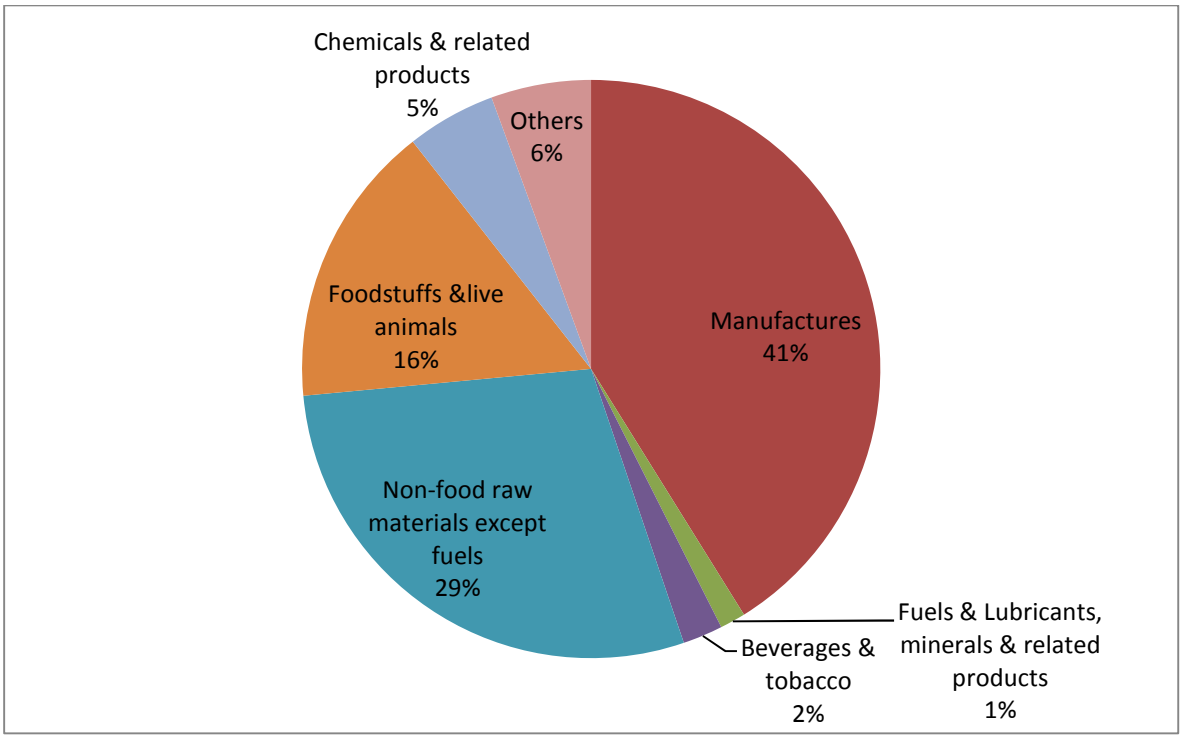
Chile's economic pattern is strongly characterized by the fact of being a natural-resource rich country. This feature deeply influences its economic structure, and it represents both a relevant source of revenues (especially since 2003, with the dramatic rise of primary commodity prices) that allows the country to finance public expenditures, and a channel through which international instability may be canalized towards the country, making it quite vulnerable to international prices volatility. Mining is the dominant sector of the national economy, accounting for the largest share of GDP: in 2006, copper mining alone[5] contributed for 21.6% of GDP while manufacturing industry for 12.8%. The agricultural sector accounts for a mere 5.5 percent of GDP, while services and the industrial sectors account respectively for 47.7 percent and 46.8 percent of GDP (World Bank, 2005). Over the last 15 years, services industries have generated around half of Chile's GDP. In 2008, the sector as a whole represented 43.5% of output.

The process of economic liberalization, combined with prudent state regulation, has came along with a deliberate policy of increasing openness to international trade aimed at consolidating its position as an active international partner. In fact, Chile has been one of the first Latin American countries to open its economy to the world and to establish a competitive free-market economy. Consistently with its economic structure, mining products are the main export products, as they account for about half of the total export value. Although the mining sector remains prevalent, with a dominating copper industry (which alone represented the 43% of merchandise export earnings in 2002-2006), the diversification of trade has stimulated the developing of new export-oriented industries. Consequently, the share of export of goods and services of Chilean GDP has impressively increased in recent years (from 26.3% to more than 40% between 1998 and 2008), growing not only in quantity but also in variety (Economist Intelligence Unit, 2007). Manufactured exports currently represent 41% of good exports, mainly composed by wood

[5] Chile is the World's largest producer of copper. In addition, Chile is also one of the main world producers – and exporters – of molybdenum.

products (wood pulp and cellulose), fish and fishmeal (salmon), fruits, wine and ethanol (See Figure 1.5).

Figure 1.5: Export of goods by main products (2008)



Source: Central Bank of Chile

Services exports have been increasing steadily and grew at an average annual rate of 6% between 2000 and 2007, rising to 10.8% in 2008. The largest increase has been registered in transport services, which now represent over half of total services. Main imports are petroleum, wheat, capital goods, spare parts, and raw materials. However, in the past decades Chile has always been able to generate surpluses of the trade balance, which in 2007 corresponded to US$8.8 billion. Main trading partners are the European Union, the United States, Japan, and Brazil.

A main pillar of this trade opening strategy has been constituted by the signature of free trade agreements with the world's main economic powers and the promotion of public-private partnerships in different areas, particularly in infrastructure concessions. Thus, Chile's open economy, combined with its active policy of bilateral, regional and multilateral trade agreements, has underpinned the steady increase in foreign trade in goods and services and in the country's international competitiveness. Since 1990, Chile has developed a wide trade network based on the signature of numerous bilateral economic agreements, among which Free Trade Agreements (FTAs) with Panama, China, United States, Canada, Mexico, South Korea, Central America, EFTA (Norway, Switzerland, Iceland and Liechtenstein), Australia and Peru. More recently, FTA negotiations with Turkey were successfully completed by March 2009. Other important trade agreements to be mentioned are: Association Agreements with the European Union (EU), Japan and among the so-called P4 (with New Zealand, Singapore and Brunei Darussalam); Economic Complementation Agreements with Bolivia, Colombia, Ecuador, MERCOSUR and Venezuela; and Partial Scope Agreements with Cuba and India. Furthermore, from 1994 Chile is member of the Asian-Pacific Economic Cooperation (APEC), is a forum for 21 Pacific countries to cooperate on regional trade and investment liberalization and facilitation. The trade agreements that Chile has established by March 2009 with a total of 55 countries have, in practice, expanded its domestic market of just 16.6 million inhabitants to one of 3.8 billion potential clients around the world.

Beyond trade opening, since the return of democracy in 1990, Chile has enjoyed a period of great political stability during which the rule of law and the civil liberties have been consolidated. The country has been implementing public policies to foster serious and responsible macroeconomic management, allowing its economic growth to be accompanied by a sharp drop in public debt, the stabilization of the country’s external accounts and an increase in its international reserves.

This effort has been recognized by the international financial community with high foreign-currency sovereign ratings. For example, despite the economic slowdown caused by the international financial crisis, in 2008 Fitch Ratings has maintained Chile's long-term foreign and local currency ratings at A and A+, respectively. Also Standard & Poor's maintained Chile's long-term foreign-currency sovereign rating at A+, and held its long-term local-currency rating at AA (January 2009). In the agencies' view, the economic deceleration will be only temporary and, because of its sound economic policies and strong institutions, its prospects for medium and long-term growth remain very good.

Thanks to the legal security and the economic stability it offers, Chile has offered an attractive and dynamic business climate over the past twenty years, as demonstrated by the country' s excellent scores in international economic and business risk ratings. According to the Risk Ranking published by the Economist Intelligence Unit (EIU) in January 2010, Chile is one of the world's lowest-risk countries[6], ranking 16th out of 120 countries. This evaluation is fully confirmed by another EIU publication, the Business Environment Rankings which ranks Chile the 15th most attractive country where to do business and invest over the next five years[7]. Moreover, the Global Competitiveness Index 2009-2010 ranks Chile 30th out of 132 World Countries, and first in Latin America.

[6] The EIU's country-risk rating takes account of indicators of political, regulatory, tax, labor and macroeconomic stability, and other measures of creditworthiness.

[7] Chile achieved a score of 7.69 on a scale of 1 to 10 in the ranking led by Finland, Singapore and Canada. This ranking, which includes 82 of the world's largest economies, is based on over 90 factors that affect business development and it assesses a country's performance across ten categories: political and institutional environment, macroeconomic stability, market opportunities, policy towards free enterprise, policy towards foreign investment, foreign trade and exchange controls, taxes, financing, the labor market and infrastructure. According to the EIU, Chile continued to lead Latin America and will remain an attractive place to invest among emerging markets in the period 2009-2013.

Furthermore, in the Index of Economic Freedom (published by the US-based Heritage Foundation and The Wall Street Journal), it took the 11th place in 2009[8]. Similarly, in the Economic Freedom Ratings of Canada's Fraser Institute, Chile took 6th place in 2008 after Hong Kong, Singapore, New Zealand, Switzerland and the United Kingdom. Finally, Chile's economic freedom and stability seems to come along with good quality of institutions and a low rate of corruption. In fact, in the Transparency International's 2008 Corruption Perceptions Index Chile obtained a score of 6.9 on a scale from 0 (highly corrupt) to 10 (highly clean). This means that Chile is ranked 23rd out of 180 countries, tying with Uruguay as the best-ranked Latin American country.

1.3 The Regulatory Framework

The Chilean regulatory framework for FDI is presented in this section. The first part describes the relevant legislation at national level, which is analyzed in terms of three different features: investment facilitation, investment promotion, investment protection and investment limitation. Then, some limitations to foreign investment contained in the Chilean domestic regulation are highlighted. Finally, the rest of the section is devoted to international investment agreements at bilateral, regional, and multilateral level.

National level

The regulatory framework pertaining to foreign investment at the national level is based primarily on:

- The Chilean Constitution
- Chapter XIV of the Central Bank's Compendium of Foreign Exchange Regulations
- The Foreign Investment Statute (Decree Law 600)

[8] With a score of 78.3 points, Chile ranked immediately behind the United Kingdom. The Index of Economic Freedom considers ten components of economic freedom: business, trade, fiscal, monetary, investment, financial and labor freedom as well as freedom from corruption, government size and property rights.

The principles enshrined in the Chilean Constitution include equality before the law, economic freedom, non-discrimination against foreigners. More specifically, economic freedom means that foreigners are guaranteed free access to all sectors of the economy, and only the law can, in exceptional circumstances, reserve a certain sector for domestic investment; the non-discrimination principle ensures that, on economic matters, foreign investors receive the same, or not less favourable, treatment from the State and its agencies as local investors (national treatment); finally, non-discretionary treatment principle states that the procedures relating to foreign investment must be clear and transparent, and administrative decisions cannot be in any way subjective, providing a guarantee that investors will receive fair treatment.

Investment Facilitation

Foreign investment is regulated in Chile by two different mechanisms: Chapter XIV of the Central Bank's Compendium of Foreign Exchange Regulations (CFER) and The Foreign Investment Statute (Decree Law 600). A third alternative mechanism is represented by Chapter XIX of the CFER, a debt conversion mechanism which played a certain role between 1985 and 1991 but which is no longer in place.

Chapter XIV establishes regulations applicable to credits, deposits, investments and capital contributions from abroad, and requires the foreign investor only to register. However, it does not provide all the guarantees included in Decree Law 600, which imposes the principles of non-discrimination and non-discretion.

However, until the 1970s, Chilean law did not provide all the guarantees to foreign investors; for example, it did not contemplate the non-discrimination and non-discretion principles. It was only in the 1970s that Chile decided to radically modify its foreign investment policy, abandoning a restrictive regime established within the framework of the Andean Pact in favor of one anchored in non-discrimination and limits on the discretionary powers of the administrative authorities.

This represented the origins of the Foreign Investment Statute (DL 600 hereinafter), whose original text came into force in 1974 and was ratified by Congress in March 1993, with only minor modifications.

One of the advantages of the DL 600 is that it can be used by a wide range of economic actors, which includes: a) foreign individuals; b) foreign legal entities (companies, corporations and foundations, foreign states and international organizations); c) Chilean individuals and legal entities domiciled abroad. Moreover, the DL 600 mechanism was innovative in providing also legal certainty and stability - in addition to the already mentioned principles of non-discrimination, non-discretionary treatment and economic freedom.

In fact, under this optional regime the foreign investor signs a binding a Foreign Investment Contract, which is a solemn contract signed by a foreign investor and the Chilean State. The contract establishes the rights and obligations of both parties: it sets out the commitment of the state of Chile to authorize the transfer of foreign capital under the terms of this law, and it assigns a set of specific guarantees and obligations to the investors. The contract cannot be modified unilaterally by the State or by changes in the law. The intending investor must submit an application to the Foreign Investment Committee,[9] which establishes the terms and conditions of the investment. In particular, the Committee defines the period in which the investor must transfer the capital.[10] The Foreign Investment Committee may set a minimum amount for applications for a Foreign Investment Contract; as of August 2008, this limit stood at US$5 million for investments in currency and US$2.5 million for investments taking other forms.

[9] The Foreign Investment Committee consists of the President of the Central Bank and the Ministers of Economy, Finance, Foreign Affairs, and Planning, and the relevant Minister in the case of applications filed with Ministries not otherwise represented in the Committee.

[10] A maximum period of three years may be requested by the investor to transfer the capital. Investments of more than 50 million dollars can obtain a time limit of up to eight years. In case of mining projects the limit is also eight years and, if a previous exploration is required, the Foreign Investment Committee can extend it to twelve years.

Foreign investors have the right to remit profits freely, but they may repatriate capital only after at least one year of operation in the country. This repatriation is devoid of tax, duty or charges up to the amount of the original investment. Moreover, after the payment of the relevant taxes, investors have access to freely convertible foreign currency without limits for both capital and profits remittances.

The certainty and the wider scope of the guarantees it offers are one of the main reasons at the basis of the demonstrated preference of international investors for the DL 600. In fact, since 1974, when DL 600 came into force, the large majority of investments have entered the country under this mechanism[11]. Indeed, between 1974 and 2008, 67.3% of total foreign investment entered Chile under DL 600, against 29.2% under Chapter XIV[12]. However, latest FDI inflow data reveal a tendency (although quite volatile and unstable) towards the application of Chapter XIV mechanism, showing that the investors' preference order between Chapter XIV and DL 600 may have started to invert.

In fact, given a set of reforms of the CFER enacted in 2000-2002[13], the situation seems to have started to evolve towards a different pattern. In 2003 FDI inflows in Chile under Chapter XIV (53.8 per cent) for the first time exceeded that under DL 600 (46.2 per cent). Then, since 2005 (with the exception of 2006, when DL 600 FDI still represented more than 53% of total materialized FDI) the relationship seems to have turned upside-down: in 2005 and 2007 FDI entering thorough Chapter XIV represented respectively the 54.2% and 81.7% of total FDI inflow, while DL 600 shares symmetrically shrank to 45.8% and 18.3%. 2008 figures confirm

[11] FDI statistics distinguish between materialized and authorized FDI. The difference among the two figures may be quite large, with total materialized FDI between 1974 and 2008 being slightly more than 1/3 of the total amount of authorized FDI. In the rest of the work (as well as in the study) only figures corresponding to materialized FDI will be considered, since these represent the actual FDI inflow in Chile.

[12] The residual 3.5 per cent entered the country under Chapter XIX of the CFER, which between 1985 and 1991 was used for investments totaling US$3,600 million, mainly in the manufacturing and services sectors.

[13] In May 2000, for example, the Central bank lifted the one-year withholding period requirement for capital entering the country under Chapter XIV.

that the traditional preference for DL 600 mechanism has not yet been fully re-established: US$12,157 million of materialized FDI in Chile (an increase of 64% on 2007), 43.1% (equivalent to US$5,243 million) was channelled through the DL 600 Foreign Investment Statute, while the remaining 56.9% (US$6,914 million) through Chapter XIV.

Table 1.1: **FDI by entrance mechanism, percentages (1974-2008)**

Investment Mechanism	1974-2008	1985-2005	2002	2003	2004	2005	2006	2007	2008
DL 600	67,3	76.4	67,1	46,2	68,6	45,8	53,5	18,3	43,1
Chapter XIV	29,2	18.9	32,9	53,8	31,4	54,2	46,5	81,7	56,9
Chapter XIX	3,5	4.7	0,0	0,0	0,0	0,0	0,0	0,0	0,0

Sources: Author's elaboration on data from Foreign Investment Committee and Central Bank of Chile

Moreover, even if in aggregate figures and over large periods, DL 600 still represents the preferred FDI channel, the same figures confirm its relative "loss of appeal". Between 1974 and 1984, more than 89% of FDI entered Chile through the DL 600 mechanism; but if we consider flows between 1974 and 2004 this percentage decreases to 71% (corresponding to US$64.7 billion), and if we extend the time-period between 1974 and 2008, it arrives to a further lower 67.3% (equivalent to US$69,900 million). However, considering the period from 1985 to 2005, which is the object of the empirical analysis contained in Chapter 3 and 4, DL600 flows accounted for the 76.4% of the total investment.

Investment promotion and incentives

The Chilean regulation model for foreign investment does not provide a large set of incentives, this being in line with the country's commitment to free-market oriented economic policies. All persons domiciled in Chile must pay taxes on income, wherever it is generates, while non-residents are liable to tax only on income generated in Chile. All Chilean companies must pay

17% corporate tax. Foreign investors are liable for an additional tax on profit remittances and may chose between an additional tax on profit remittances of 35% (against which investors can credit the 17% corporate tax, so that the additional tax paid by an investor cannot exceed 35%), or use an invariable tax regime under which the rate of additional tax on profit remittances is 45%.

Under DL 600, no "tax break" or "tax holidays" are provided to investors, although Article 8 allows them to opt for a mechanism which provides a stable tax horizon and basically guarantees the invariability of the regime, of both direct and indirect taxation, prevailing at the time when the investment is made. Besides this article, some benefits, such as tax rebates and grants, are provided by the government only for investments, both foreign and domestic, in isolated geographical zones and in the information technology sector. However, recent legislation[14] provides certain benefits, such as tax-free status on earnings from international operations, for multinational enterprises which choose to use Chile as their regional bases.

Investment protection

Foreign investors have full access to the Chilean judiciary system, and under Article 9 of the Foreign Investment Statute they must not be discriminated against either directly or indirectly. If any juridical rule is deemed discriminatory against foreign investors, the latter are entitled to submit a complaint to the Foreign Investment Committee.

The judicial environment in Chile is generally transparent and efficient, and it constitutes an important factor in attracting foreign investment into the country. According to World Bank Doing Business, 36 steps and 480 days are necessary to enforce a contract in Chile, at a cost of

[14] See 2002 Investment Platform Law (Law N. 19.840).

28.6 per cent of the claim. Chile's performance is therefore considerably better than the regional average (39 steps and 707 days with a cost of 31.3 per cent of the claim).

The 1980 Political Constitution and the Expropriatory Procedures Law (Decree Law N.2186) permits the Government to expropriate private property only for the public and national interest, on a non-discriminatory basis and under due process of law. Compensation must be provided without delay and at market value, any applicable interest having been considered. Moreover, practically all foreign investment is also protected by the several BITs signed by Chile, which generally guarantee that expropriation can only be enacted in accordance with a law based on public or national interest, on a non-discriminatory basis and with prompt, adequate and effective compensation. However, no nationalizations have been enacted in Chile since 1973.

Investment limitations

Although Chilean legislation is generally "foreign investor friendly", some sectors are still subject to exceptions from the national treatment. In particular, foreigners are not allowed to invest in media or fishing companies unless a reciprocity agreement exists between Chile and their country.

Besides the approval of the Foreign Investment Committee, some investments require additional authorizations from other institutions. For example, investment projects in the particularly important mining sector are subjected to the scrutiny of the Chilean Copper Commission. In addition, since 2005, the Finance Ministry's Law 20.026 established a specific tax on mining activities; this modified DL 600 by incorporating Article 11 ter, locking in the rate of this tax for investors signing new Foreign Investment Contracts for mining projects worth at least US$50 million. Some similar limitations exist in other sectors: for example, the Undersecretariat of Fishing reports on projects in this field, and operations in the banking sector are approved by the Banks and Financial Institutions Regulatory Agency, while activities in the insurance and

investment fund field are evaluated by the Securities and Exchange Commission. Finally, operating in the telecommunications sector requires a license, and the number of licenses is often limited.

About labour legislation, temporary entry for foreigner workers is defined as a stay in the country for up to 90 days; necessary for longer periods is a temporary residence permit (one year renewable) which requires a more complex procedure. Nevertheless, visas are easy to obtain and procedures are quite smooth. However, the Chilean Labour Code provides that at least 85% of the workforces of companies with more than 25 employees must be Chileans.15

Bilateral level

In 1991, Chile became a signatory of the Washington Convention of 1965 that created the International Center for Settlement of Investment Disputes (ICSID). Since then, the country began to negotiate Bilateral Investment Treaties (BITs), a mechanism through which Chile provides additional protection both to inward and outward foreign investment flows.

In these agreements, each Contracting State commits itself to provide fair and equitable treatment to investments legally materialized in its territory by investors of the other Contracting State. They also guarantee the principles of National Treatment and Most Favored Nation status. BITs also guarantee investors rights and define dispute settlement mechanism in case of controversies that might arise between an investor of a Contracting State and the other Contracting State. In fact, BITs protect private property rights through the establishment of basic principles and minimum standards in case of expropriations (that is, any expropriatory measure must be accompanied by the provisions of prompt, adequate and effective compensation). This mechanism also assures that controversies will be settled through friendly consultations; if no agreement is reached, the investor will be entitled to submit, at his own decision, the case before

15 This limit does not apply to high-specialized workers which cannot be replaced by Chilean staff.

the domestic jurisdiction of the host State of the investment or to international arbitration. In most BITs, this jurisdictional option is definitive. BITs, however, do not apply to disputes which arise prior to their entry into force or to disputes directly related to events which occurred prior to their entry into force.

The principle of subrogation is also included in BITs. This means that if one Contracting State - or an agency authorized by it- grants any kind of insurance against non-commercial risks to an investment in the territory of the other Contracting State, the latter shall recognize the rights of the former to subrogate for the rights of the investor in case it has paid the insurance. The protection provided by these agreements applies both to investments made after the agreement comes into force as well as to those made before that date.

In almost fifteen years between 1991 and November 2005, Chile had signed 54 BITs (39 of which were in force at that time) covering all the foreign investment stock in the country. Classifying them on a geographical basis, there are 15 agreements with EU countries,[16] as well as treaties with the Netherlands (1998) and Hungary (1997) which have been signed but not yet ratified by both parties. Among major countries in the Euro area, one notes that Chile has not signed an investment treaty with Ireland[17]. Also in force are investment agreements between Chile and Croatia (1994), Norway (1993), Iceland (2003), Switzerland (1999) and Ukraine (1995). Moving to Latin America, Chile has signed 14 agreements currently in force.[18] Treaties with Brazil (1994), Colombia (2000), Ecuador (2000) and Dominican Republic (2000) have been signed but are not yet in force. Furthermore, by virtue of Chile's membership of the APEC,

[16] With Austria (1997), Belgium (1992), Czech Republic (1995), Denmark (1993), Finland (1993), France (1992), Germany (1991), Greece (1996), Italy (1993), Poland (1995), Portugal (1995), Romania (1995), Spain (1991), the United Kingdom (1996), Sweden (1993).

[17] Within Europe, Chile has signed BITs also with Croatia (1994); within EFTA, with Iceland (2003) and Norway (1993).

[18] Argentina (1991), Bolivia (1994), Costa Rica (1996), Cuba (1996), El Salvador (1996), Guatemala (1996), Honduras (1996), Mexico (1992), Nicaragua (1996), Panama (1996), Paraguay (1995), Peru (2000), Uruguay (1995), Venezuela (1993).

several BITs have been signed with countries in the Pacific area: Australia (1996), China (1994), Indonesia (1999), Malaysia (1992), New Zealand (1999), Philippines (1995) and Vietnam (1999). The treaties with Indonesia, New Zealand and Vietnam are not yet in force. Finally, treaties with Egypt (1999), Lebanon (1999), South Africa (1998), Tunisia (1998) and Turkey (1998) have been signed but not yet ratified[19].

Moreover, many issues normally covered by BITs are regulated by the Free Trade Agreements that Chile has signed with important investor countries like Canada, Mexico and the U.S. Chapter 10 of the US-Chile Free Trade Agreement (which entered into force in 2004) is modelled on the NAFTA investment chapter and guarantees the following to foreign investors: a non discriminatory treatment through national treatment and MFN treatment; a minimum standard of treatment; no performance requirements; free transfers of funds related to the investment; expropriation only in accordance with customary international law; permission to hire key personnel without regard to nationality. Section B of Chapter 10 also provides a mechanism for the settlement of investor-State disputes based on international arbitration.

Issues related to profit taxation are not covered by BITs, and they are regulated by Double Taxation Treaties (DTTs). These agreements establish, among others, the rules to determine to which State taxation profits are entitled, which tax rates have to be applied and to whom. The transparency of these rules is crucial in reducing the uncertainly related to investment opportunities. Chile has subscribed 21 bilateral DTTs to avoid the double taxation and the tax evasion of the taxes[20]. Treaties with Belgium, Colombia, Russia, Thailand and Switzerland have been signed but not yet ratified[21], while other 14 agreements are under negotiation.

[19] A summarizing table with BITs signed by Chile is presented in Appendix.
[20] A table with details about DTTs signed by Chile is presented in the Appendix.
[21] Moreover, the negotiation process of a DTT with South Africa has been concluded, and the treaty needs to be signed and then ratified from parliamentary authorities.

The EU-Chile Association Agreement

On 18 November 2002, Chile and the EU signed an Association Agreement which entered into force in March 2005. It consists of a complex body addressing political, economic and cooperation issues. As regards foreign investment regulation, Part IV, on Trade and Trade-related Matters, contains some provisions on establishment. Article 132 of the agreement grants national treatment to investors of both parties, although article 135 lists numerous possible exceptions to this general principle. Some exceptions allow the host country to adopt or to enforce measures necessary to protect public health and security, the environment, and the artistic and historic heritage in order to avoid problems arising from Chapter XI of NAFTA. Together with this treaty the EU also signed, on behalf of the Member States, an investment agreement which, for the moment, deals only with the admission phase.

Multilateral level

Chile is a member of the Multilateral Investment Guarantee Agency (MIGA) of the World Bank and, since 1991, of the International Centre for the Settlement of Investment Disputes (ICSID) as well as of the WTO (since 1995) and the WIPO. Moreover, Chile has signed and ratified the New York Convention on the Recognition and Enforcement of Foreign Arbitral awards, and the Inter-American Convention on International Commercial Arbitration.

1.4 The Historical Trend

Since the 1970s, Chile has based its national development strategy on openness to foreign investment. However, it is since the 1990s that the country's business-friendly environment, based on certainty of law and transparency, coupled with the return to democracy, political stability and the signing of numerous investment treaties has started to effectively attract a large amount of foreign capital. To get an idea about how dramatic was the rise in FDI inflows, it is

enough to note that the 89% of the total gross materialized FDI in Chile between 1974 and 2005 entered the country after 1990.

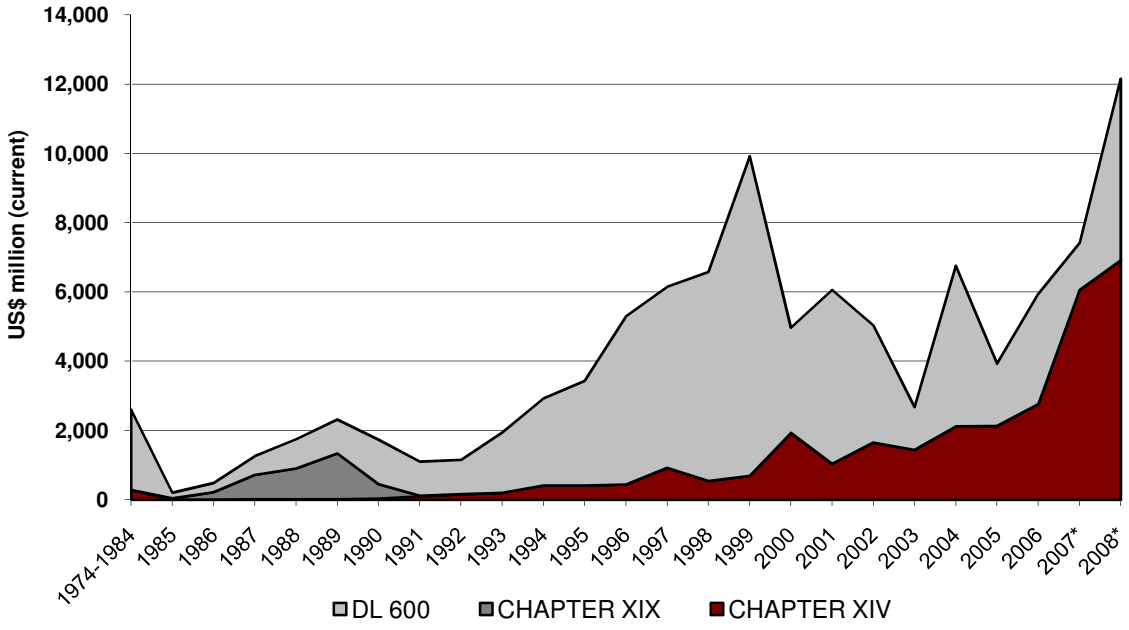
Over the past 25 years, incoming FDI has maintained a generally upward trend. In 1980 FDI inflow was US$ 287 million[22], rising to US$ 1,733 million in 1990, US$ 4,971 million in 2000, US$ 6,755 million in 2004, and up to US$ 7,413 million in 2007. Until 2007, the highest peak of FDI inflow corresponded to US$ 9,919 million recorded in 1999; however, the new historical maximum has been recently registered in 2008 and its amount corresponds to US$ 12,157. As aggregate figure, between 1974 and 2008, materialized FDI in Chile correspond to US$ 103,791 million[23].

These trends are confirmed when FDI are considered relatively to GDP. During the 1990s, FDI flows represented an annual average 6.4% of Chile's GDP, rising to an annual average of 8% between 1995 and 2000. In terms of FDI stock, they passed from 30.0% of GDP in 1990 to 59.6% in 2008. These numbers are impressive, especially if compared with the average world percentage of 24.5% in 2008 and that for developing countries, 24.8% (UNCTAD, 2009).

From the Figure 1.6, it is evident that, despite its overall rising pattern, the historical record of FDI inflows in Chile does not follow a smooth and regular behaviour; on the contrary, its path is characterized by periods of significant slowdowns, alternated with peaking phases. A first relevant contraction in FDI inflow is observed at the end of the 1990s, when, after the uninterrupted surge during the decade, FDI amounts entering Chile dramatically fall from the record high of US$ 9.9 billion in 1999 to a negative peak of US$ 4,9 billion in 2000

[22] FDI data are reported in nominal US$.
[23] Nominal and considering all possible FDI mechanism (DL 600, Chapter XIV and Chapter XIX).

Figure 1.6: **FDI inflows in Chile 1974-2008 (by entrance mechanism)**



Sources: Foreign Investment Committee, Central Bank of Chile

However, this did not reflect a change in Chile's attractiveness but was the consequence of a sharp downturn in international economic conditions, which affected FDI in almost all countries. In fact, between 2001 and 2003 the mergers and acquisitions (M&A) market - previously the driving force of FDI around the world and in Chile - collapsed globally, while a drop in share prices and weaker corporate earnings led many multinational companies to suspend or cut back expansion plans. To some extent, this trend represented a sort of return to more sustainable and realistic FDI levels, after the so-called "investment bubble" of the 1990s during which global capital flows reached record levels. Furthermore, in these years deep financial crises have shaken some important Latin American countries and caused heavy losses to a broad range of investors. Consequently, the region as a whole was perceived as high risk investment area exactly in the moment when risk-adverse shareholders were pushing multinational firms to perform safer investments. The result was a further decrease in FDI flows into Latin America.

Another point may contribute to clarify the origin of the slowdown in FDI inflow recorded at the beginning of 2000s. The Chilean Foreign Investment Committee indicated that, in the case of Chile, a greater use of the local capital market by foreign investors could have further distorted FDI figures. The high liquidity and the dynamism of the Chilean financial sector, combined with historically low interest rates, encouraged a growing number of foreign companies to raise finance locally, through either borrowing from local banks, issuing bonds on the domestic market or reinvesting locally their profits. Such a trend could be reflected negatively in the FDI inflows into the country. Moreover, since 2002 a significant marked increase in reinvestment of profits by foreign investors in Chile has been recorded. According to figures published by the Central Bank of Chile, this became the single most important component of FDI: in 2002, it represented 53.6% of FDI and then showed a sustained increase through to 2006, when the figure reached almost 98%, before dropping back to 81% in 2007. In 2008, it then fell to 44%, due mainly to the impact of lower copper prices on the earnings of mining companies.

After few years of decreasing records between 2000 and 2005, since 2006 FDI inflows into Chile has returned to rise, reflecting a renewed interest in mergers and acquisitions and the development of new projects concentrated in some sectors (mining, telecommunications and infrastructure). This renewed interest is confirmed by the high amounts reached by most recent FDI inflows (2007 and 2008 records), well above the yearly average inflow between 1995 and 2008 (US$ 6,166 million).

1.5 Geographical Origin, Sectoral Destination, and Regional Distribution

As for geographical origin of the investment, in the period between 1974 and 2006, materialized FDI through DL 600 mechanism[24] has been mainly originated in the European Union (41%), in the United States (25%), in Canada (16%), Australia (5%) and Japan (3%) (See Figure 1.7). The geographical origin of FDI towards Chile has always been highly concentrated, since these few countries have originated more than 95% of total materialized FDI between 1974 and 2006, and their contribution has rarely gone below the 90% even if shorter sub-periods are considered.

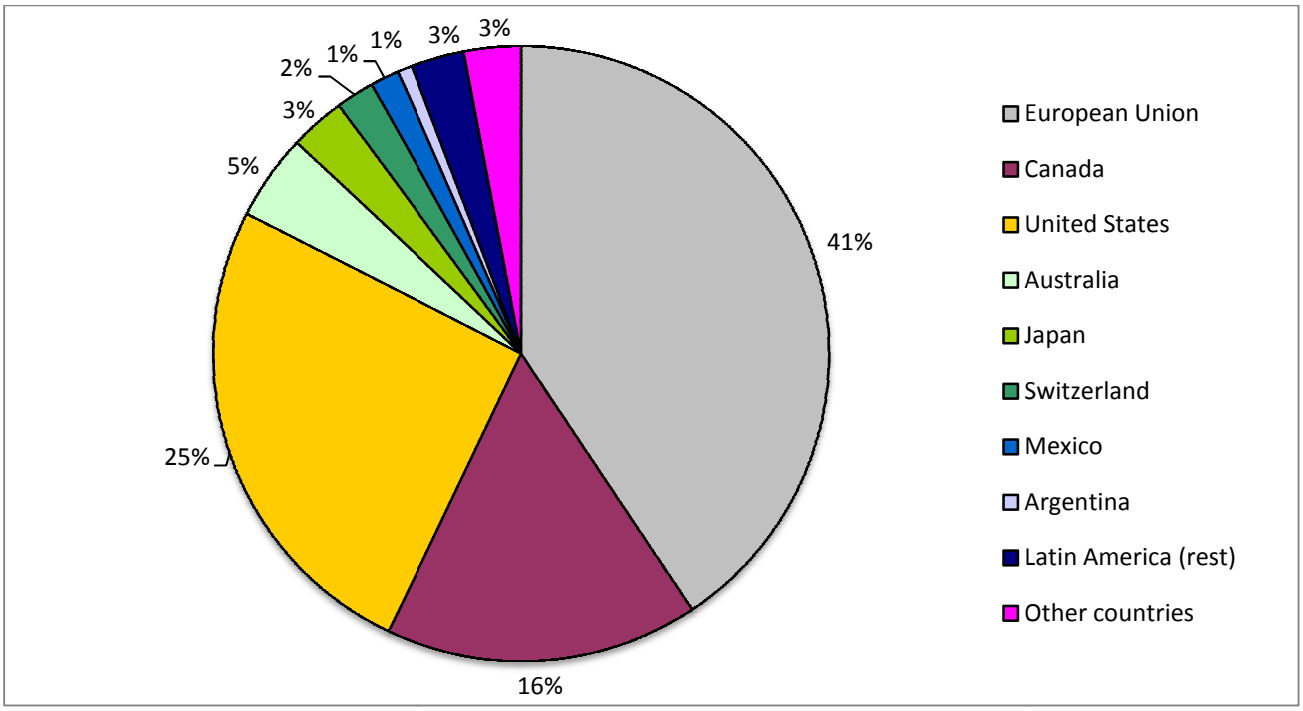
Within the European Union, the main investor is Spain (which originates almost 50% of FDI flows from the EU over the considered period and more than 20% of the general figure), followed by the United Kingdom (20% of EU flows), while the Netherlands, Italy and France account between 5% and 7% each. It is worth to note that the investment originated from other South American countries has always been very low, below 5% of total flows. Over the total period 1974-2006, only the contributions of Mexico and Argentina exceeded the level of 0.5%, originating respectively the 1.5% and the 0.8% of FDI inflows in Chile.

Across the same time period (1974-2006), the relative weights of different origin countries have changed in favour of the EU, while the relative participation of the Unites States has progressively declined. In fact, between 1974 and 1984 the United States originated more than 50% of materialized FDI in Chile, while the European Union could not reach even the 30%. This picture considerably changed after 1985, when the United Stated started to lose relative weight as investor in favour of Canada, whose participation rose up to a 24.2% in the 1990-1994, exceeding the level of the European Union. Between 1995 and 1999 the situation turned upside-down and the gap between United States and United Europe started to widen dramatically, with a

[24] Disaggregated data about FDI flows in Chile are available only for investment that entered the country through the DL 600 and until 2006.

participation of 45.3% for the EU against 26% for the US (and of 13.5% for Canada). In 2000-2006, while EU maintained its investment level (46.7%), the United States accounted only for 17.9% of the total investment arrived in the country (See Table 1.2). As for 1985-2005, the period considered in the empirical analysis, European Union accounted for 42.9 of the total inflows, while United States only for 25.2% and Canada for 14.7%.

Figure 1.7: FDI inflows by geographical origin (1974-2006)



Source: author's elaboration on data from data provided by the Foreign Investment Committee

Between 1974 and 2006, the mining sector received 34% of total FDI materialized in Chile. Services accounted for 19% (which includes financial services, insurance and other services), and it was followed by electricity, gas and water (together) for another 21%; manufacturing for 12.7%; transport and communication for 12%; construction for 2% and agriculture, forestry and

fishing for 1%. Within the services sector, the most important segments were investment companies (21.8%), banks (20.0%), insurance (15.9%), retail (11.9%) and other financial services (10.1%). (See Figure 1.8)

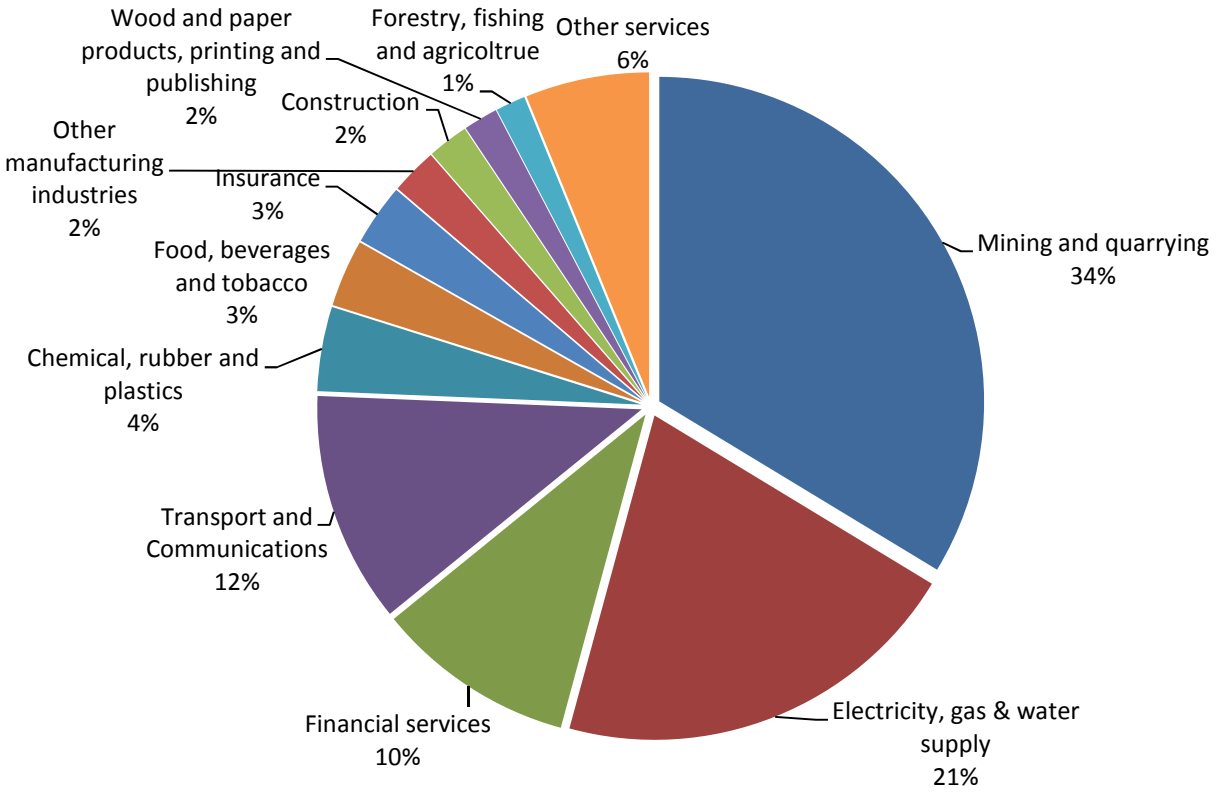
Table 1.2: **FDI inflows by geographical origin over different sub-periods (%)**

	1985-2005	1974-1984	1985-1989	1990-1994	1995-1999	2000-2006
Total FDI inflow (US$ thousands)	**57,800,324**	**2,317,432**	**2,794,722**	**7,510,666**	**28,378,176**	**22,298,017**
European Union	42.9	27.6	26.6	17.5	45.3	46.7
Canada	14.7	2.5	15.8	24.2	13.5	19.2
United States	25.2	50.7	36.4	33.6	26.0	17.9
Australia	4.5	1.5	9.2	3.9	2.7	6.8
Japan	3.0	2.0	3.5	4.6	3.3	1.8
Latin America	3.6	9.7	3.1	4.9	2.5	4.7
Other countries	6.0	5.9	5.5	11.4	6.6	3.0

Source: author's elaboration on data from data provided by the Foreign Investment Committee

Due to Chile's decision to eliminate restrictions on private investment in exploration and exploitation of mining deposits, the mining sector accounted for 59% of investment through DL 600 in the early 1990s. However, considering the evolution of the sectoral destination pattern over time, the mining sector, traditionally the most important recipient sector by far, has progressively reduced its relative weight in favour of other sectors, in particular the services involved in the privatization and deregulation process that occurred in Chile since mid-1990s.

Figure 1.8: FDI inflows by sector of destination (1974-2006)



Note: Materialized investments include amounts authorized each year and in all forms accepted under the DL 600. The definition of "other services" includes: engineering and business services; wholesale and retail trade; sewage, sanitation and similar services.

Source: author's elaboration on data from data provided by the Foreign Investment Committee

Table 1.3: FDI inflows by sector of destination over different sub-periods (%)

	1985-2005	1974-1984	1985-1989	1990-1994	1995-1999	2000-2006
Total FDI inflow (US$ thousands)	**57,800,324**	**2,317,432**	**2,794,722**	**7,510,666**	**28,378,176**	**22,298,017**
Mining and quarrying	32.4	42.9	50.3	58.6	29.0	26.1
Transport and communications	12.1	0.8	10.2	2.5	6.0	22.7
Electricity, gas & water supply	20.1	0,0	0,0	0.5	24.2	26.4
Other Services	5.8	4.5	3.7	4.6	6.8	5.9
Chemical, rubber and plastics	4.7	8.8	11.5	4.0	4.8	3.3
Food, beverages and tobacco	3.6	6.4	2.4	3.1	4.0	3.2
Construction	2.3	44.	0.7	1.6	2.4	2.2
Insurance	3.5	1.6	0.0	1.6	4.9	2.5
Financial services	10.1	17.4	13.4	11.0	14.1	3.4
Wood and paper products, printing and publishing	1.9	1.5	2.3	5.6	0.9	1.6
Other manufacturing industries	2.2	8.8	4.0	3.9	1.8	1.7
Forestry, fishing and agriculture	1.3	2.9	1.5	2.8	1.2	0.8

Note: Materialized investments include amounts authorized each year and in all forms accepted under the DL 600. The definition of "other services" includes: engineering and business services; wholesale and retail trade; sewage, sanitation and similar services.

Source: Author's elaboration on data from data provided by the Foreign Investment Committee

Since the late 1990s, mining's share has gradually diminished to an average of 26.1% in 2000-2006. This relative decrease in the preminence of mining investments has been counterbalanced by higher investment in other sectors, which have symmetrically raised their relative importance as FDI destination.

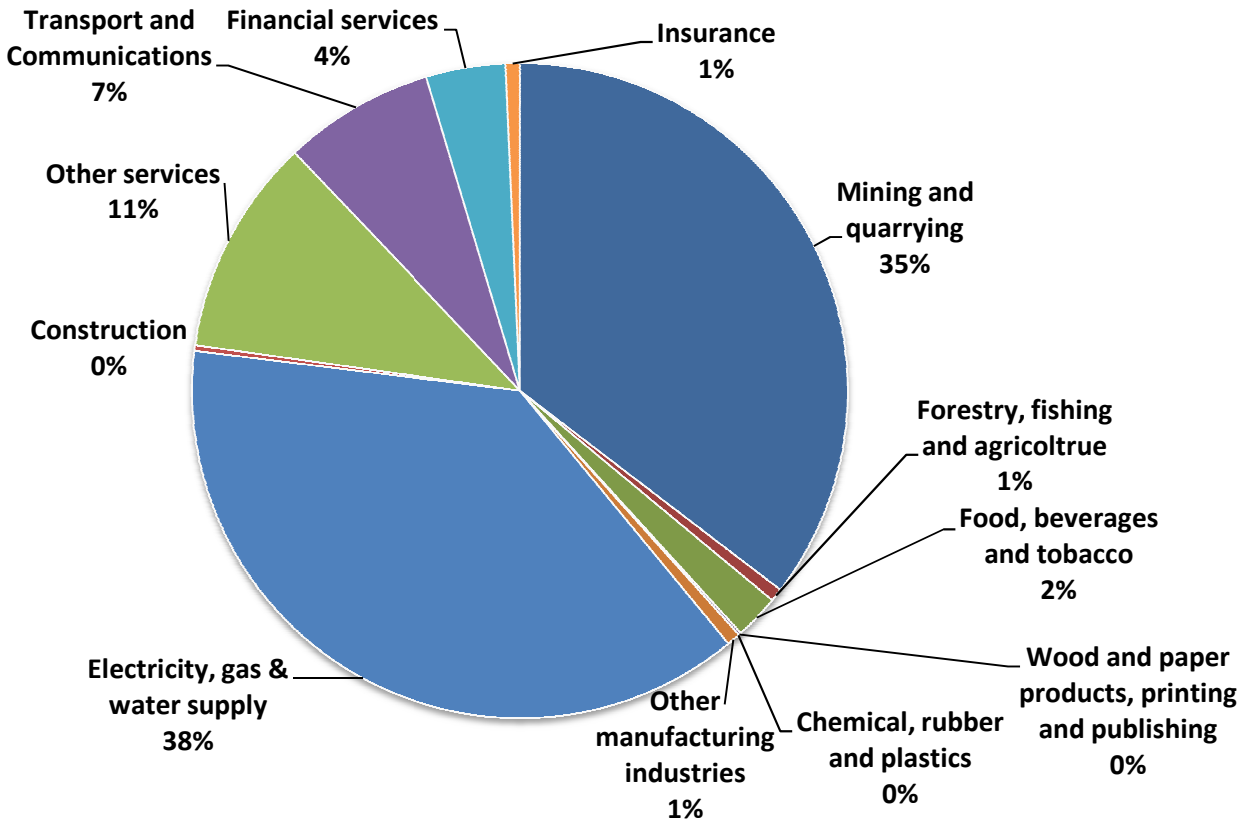
In fact, between 1997 and 2001, Chile experienced a dramatic surge in mergers and acquisitions activity, mainly in the services, electricity, gas and water sector and in the transport and communications industries. This was mainly the result of privatizations in these sectors and of the intense competition that followed the deregulation of mobile and long-distance telephone services. Hence, the fall in mining share has been off-set by higher inflows into the industries involved in the privatization process: the transport and communication sector (whose share rose from 2.5 in 1990-1994 period, to 26.4% in the 2000-2006), and the electricity, gas and water sector (24% in the 1995-1999 and 26% in 2000-2006).

Similarly, investment in financial services began to increase following the sector's deregulation. In addition, an infrastructure concessions program, launched in 1995, opened the way for the participation of private capital, mostly from abroad, in the construction and operation of highways and airports. In recent years, water distribution and treatment privatizations have also captured important inflows of FDI and, most recently, foreign investors have also been attracted by a number of new incentives introduced for the development of alternative renewable energies.

Clearly, the evolution in sectoral FDI trends has also entailed the change in the geographic origin of capital flows. In fact, the prevalence of North American (United States and Canadian) firms in the development of mining megaprojects has given way to a strong market presence on the part of European (particularly Spanish) firms in the services sector (ECLAC, 2001).
In 2006, the mining sector confirmed its positioning as main FDI receiving sector, attracting 35.1% of FDI through DL 600. However, electricity, gas and water sector confirmed their rising pattern and received an amount of FDI even higher than the one directed towards the mining

sector (38%). Transport and communications lost relatively importance (just 7%), while services sector has maintained quite a stable figure (16%, which included, among other services, also insurance, financial services).

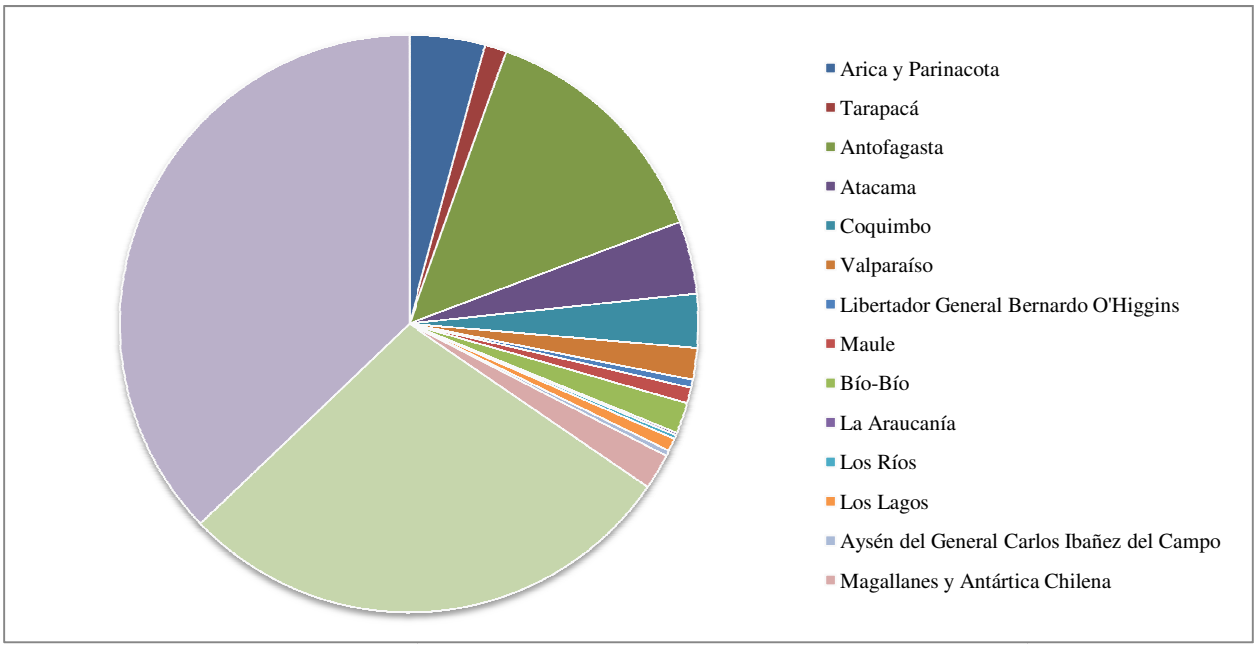
Figure 1.9: **FDI inflows by sector of destination in 2006**



Note: Materialized investments include amounts authorized each year and in all forms accepted under the DL 600. The definition of "other services" includes: engineering and business services; wholesale and retail trade; sewage, sanitation and similar services.

Source: Author's elaboration on data from data provided by the Foreign Investment Committee

Figure 1.10: FDI inflows by region of destination (1974-2006)



Note: Multi-regional (1): includes multi-regional projects and non-classified investment as to the date of this thesis.

Source: Author's elaboration on data from data provided by the Foreign Investment Committee.

Since 2001, not only the sectoral composition of FDI flows directed to Chile has changed, but also the nature of the realized investments has started to show different features. As noted in the previous section about general FDI historical trend in Chile, between 2000 and 2004 FDI inflows notably decreased, following a global tendency, due to an abrupt shrink in M&A activities of multinational and transnational corporations. This change in FDI inflow trend signed a reduction of large investments and acquisitions by multinationals but also a parallel increase in the relative importance of projects requiring smaller amounts of capital but with a high impact in terms of job creation and the transfer of technology. These smaller, high-impact projects are numerous and diverse, ranging from software development, call centers and shared services centers to new investment in the manufacturing and agribusiness sectors. Projects of this type have reinforced Chile's position as a business center from which to export goods and services to other countries.

This has, in turn, attracted new investment in services sectors such as the hotel and real estate markets.

Table 1.4: FDI inflows by region of destination (by sub-periods)

	1985-2005	1974-1984	1985-1989	1990-1994	1995-1999	2000-2006
Total FDI inflow (US$ thousands)	**57,800,324**	**2,317,432**	**2,794,722**	**7,510,666**	**28,378,176**	**22,298,017**
Multi-regional (1)	**37.4**	**12.2**	**14.7**	**11.0**	**36.7**	**52.0**
Metropolitana de Santiago	**27.7**	**63.3**	**43.9**	**32.2**	**29.5**	**19.8**
Antofagasta	**14.4**	**4.2**	**20.3**	**21.6**	**12.4**	**13.3**
Atacama	3.2	1.6	3.0	12.7	1.7	4.5
Bío-Bío	1.7	0.9	1.2	2.0	1.2	2.5
Arica y Parinacota	4.6	0.6	1.0	3.9	6.9	1.7
Valparaíso	1.8	3.6	0.2	0.6	2.3	1.5
Magallanes y Antártica Chilena	2.2	0.3	10.6	0.5	2.2	1.4
Los Lagos	0.7	1.3	1.9	1.3	0.2	1.0
Coquimbo	3.0	6.9	1.8	2.9	4.6	0.7
Maule	0.8	2.9	0.6	2.3	0.5	0.7
Libertador General Bernardo O'Higgins	0.4	0.7	0.1	0.5	0.5	0.3
Tarapacá	1.3	0.7	0.3	7.1	0.5	0.3
Aysén del General Carlos Ibañez del Campo	0.3	0.2	0.0	0.1	0.5	0.2
Los Ríos	0.2	0.2	0.2	0.4	0.2	0.1
La Araucanía	0.1	0.4	0.0	0.9	0.0	0.0

Note: Multi-regional (1): includes multi-regional projects and non-classified investment as to the date of this thesis.

Source: Author's elaboration on data from data provided by the Foreign Investment Committee.

As regards the geographic destination of FDI within Chile, 37.4% of the investment materialized between 1974 and 2006 was devoted to multi-region projects, while 26.9% went to the Santiago Region, followed by northern Chile's Antofagasta Region (II), Atacama Region (III) and Arica and Parinacota Region (XV), which accounted for 14.2%, 5.9% and 3.8% of the total inflow, respectively. (See Table 1.4).

The amounts invested in these regions are consistent with the FDI pattern of sectoral destination highlighted in the previous paragraphs. In fact, the investment directed to Antofagasta Region, Atacama and Arica regions reflects the importance in the mining industry, while multi-region investments corresponded mainly to projects in the energy, telecommunications and financial services sectors.

1.6 Conclusions

This Chapter contains an overview of FDI flows to Chile, both in terms of their composition and dynamics and in terms of their legal framework. In fact, since the end of Pinochet dictatorship, Chile has been extremely successful in attracting foreign investment and today it is the third FDI recipient in Latin America in absolute terms and the first in proportion to its GDP.

As showed in this Chapter, beyond the availability of natural resources, the country's attractiveness is due to the political and economic stability it offers, together with its favorable legal framework and its good communication network. These conditions have stimulated the interest of overseas companies in investing in Chile and enabled the country to gain a reputation among foreign investors as a safe and reliable FDI destination.

This implies that Chile has managed to ground its international competitiveness on sound bases, limiting in this way the influence that international economic volatility may have on FDI flows.

This has turned into a clear advantage in particular during crisis episodes, as in the case of the Asian crisis of 1997-1998, which did not leave significant traces on the amount of FDI inflows in Chile, as it can be noted in Figure 1.6: between 1996 and 1999 FDI flows continued to rise. In the same way, in 2008, when the recent international financial reached its apex, the amount of materialized FDI in Chile reached the historical record of US$ 12 million.

In both examples, despite negative circumstances in the international economy, FDI in Chile maintained high levels and played a key-role in sustaining economic growth, even in difficult times: to fully appreciate the contribution of these flows to the economic development of the country, it is sufficient to notice that nowadays FDI stock represents over 40% of the country's gross fixed capital formation (2008) and since 1996, this figure has never gone under 20% (UNCTAD, 2009). Therefore, to empirically identify the drivers of FDI flows in the country is crucial to understand better the reasons of the Chilean success-story and to provide policy-makers of developing countries with useful indications.

CHAPTER 2: THE GRAVITY MODEL FOR FDI

Introduction: the Gravity Model for Trade

The so-called "gravity equation" is a popular formulation for statistical analyses of bilateral flows between different geographical entities (Head, 2003). It is based on the relationship described in the "Law of Universal Gravitation" postulated by Isaac Newton in 1687, which states that the attractive force between two point masses is proportional to the product of the two masses and inversely proportional to the square of the distance between them. Since the 1860s, when Henry C. Carey (1858) applied for the first time Newtonian Physics to the study of human behavior, the gravity equation has been widely used in the field of social sciences[25] (Cheng and Wall, 2005). Before analyzing the employment of the gravity model to predict Foreign Direct Investment flows, it is necessary to briefly describe its application to trade flows, the field where it has been most successful.

Tinbergen (1962) was the first to propose that roughly the same functional form could be utilized to describe international trade flows and, since then, the gravity equation has increasingly gained popularity thanks to its remarkable explanatory capacity. Its most commonly used version (Bergstrand, 1985) is presented in equation (2.1):

$$X_{ij,t} = \alpha_0 (Y_{i,t})^{\alpha 1} (Y_{i,t})^{\alpha 2} (D_{ij})^{\alpha 3} (A_{ij})^{\alpha 4} \zeta_{ij,t} \qquad (2.1)$$

[25] In 1931, for instance, William J. Reilly used the gravity equation to formulate his popular Law of Retail Gravitation, which calculates the point at which customers will be attracted to one or the other of two competing commercial centers.

where $X_{ij,t}$ is the amount of exports from country (i) to country (j), at time (t). The variable $Y_{i,t}$ is the GDP of country (i) at the time (t), while $Y_{j,t}$ is the GDP of country (j) at the time (t). D_{ij} is the distance between the two countries (i) and (j). The variable A_{ij} represents various factors that may either stimulate or reduce trade between country (i) and country (j). α_0, α_1, α_2, α_3 and α_4 are the coefficients to estimate, where α_2 is supposed to be negative[26]. Finally, $\zeta_{ij,t}$ is a log-normally distributed error term, with E (ln ($\zeta_{ij,t}$)) = 0.

In this simple specification, the volume of export between two countries depends positively on their economic size and negatively by the transport costs, captured by the absolute distance between their economic centers. This specification is usually presented in a logarithm format, where logarithms are all natural logarithms. Therefore, the coefficients of the independent variables represent the elasticities of the export flows to host and source country's GDPs and distance between the countries. Moreover, in order to refine the estimation and to increase its explanatory power, most scholars "augment" the gravity equation, adding other variables which capture factors facilitating or obstructing flows between countries, such as same language, border sharing, common colonization or law system, trade agreements in force.

The empirical success of the gravity tool in explaining trade flows has compensated for many years its lack of a reliable theoretical foundation. In fact, the gravitational hypothesis was not seen as compatible with the international trade models prominent at that time, which indicate either differences in technology across countries (the Ricardian model) or differences in factor endowments among countries (the Heckscher-Ohlin model) as the basis for trade. (Piermarini and Teh, 2005)

[26] Note that, in absence of other variables (A_{ij}), if α_1 and α_2 are equal to 1 and α_3 is equal to -2, we return to Newton's Law.

It has been possible to fill such theoretical gap only when different trade models appeared. Anderson (1979) provided a first important attempt in the context of the Armington assumption, i.e. a model where goods are differentiated by country of origin (Armington, 1969). In this model, consumers have preferences over all the differentiated products, and every good is consumed in every country. In an equilibrium where all goods are traded and all countries trade, national income will be the sum of home and foreign demand of the only good produced by the country. Consequently, larger countries import and export more. Trade costs - proxied by distance - are modeled as "iceberg costs": only a fraction of the shipped goods arrive at the final destination, while the rest has melted during the travel.

Later on, several scholars showed that the gravity equation can be derived also from the traditional theories of international trade. A key contribution in this direction was the work of Bergstrand (1989), who introduced an alternative general equilibrium model for the gravity equation, developing a theoretical structure where the economies are characterized by two differentiated product industries in a context of monopolistic competition. Each sector utilizes two factors of production (labour and capital) and each country has different relative endowments. So, the model shows how the gravity approach could be compatible with both the Heckscher-Ohlin model of inter-industry trade and the Helpman-Krugman-Markusen models of intra-industry trade.

Finally, in recent years, a large literature has provided a wider range of theoretical foundations for the application of the gravity equation to model international trade (e.g. Deardorff, 1995; Eaton and Kortum, 2001; Anderson and Van Wincoop, 2003), such that the accusation of being just an econometric tool without a theoretical basis seems nowadays overcome[27].

[27] See Feenstra (2003) for a complete overview of the advances in the theoretical foundation of gravity equation for trade flows.

However, even if in the last 40 years the gravity equation has been one of the most popular techniques to analyze bilateral trade flows, only recently it has been applied to the empirical analysis of cross-border capital movements[28] or cross-border multinational activities (Kleinert and Toubal, 2005). A plausible reason may relate to the fact that, similarly to its earliest application in trade literature, a robust theoretical foundation for the use of the gravity model for the case of FDI is still missing. In Section 1, the recent attempts in laying the theoretical underpinning of the gravity equation applied to cross-border investment are presented. Section 2 contains a comprehensive review of the empirical FDI literature using the gravity model, while Section 3 focuses on some relevant methodological issues. Finally, some conclusions are given.

2.1 The Theoretical Foundation

"The gravity equation explains bilateral FDI empirically quite well…but why?"
(Bergstrand and Egger, 2007)

In the last decade, the gravity equation has been commonly employed in analyzing FDI flows (see e.g. Eaton and Tamura, 1994; Wei, 2000; Bevan and Estrin, 2004). Despite that, its application still seems somewhat *ad hoc* (Stein and Daude, 2007). In fact, common justifications for its use are either the good empirical results obtained or the similarity of FDI to trade flow patterns (Stone and Jeon, 1999)[29], but a convincing theoretical foundation has not yet been

[28] Portes and Ray (2005) have first applied the gravity framework to the analysis of determinants of cross border equity flows. In their work significant coefficients for the variables distance and market capitalization are reported, showing a substantial success in the estimation strategy. Later, Martin and Ray (2004) have developed a formal theoretical foundation for gravity model applied to bilateral portfolio investment flows.
[29] Barba Navaretti and Venables (2004) state that "the cross-country pattern of FDI is quite well approximated by the gravity relationship".

provided by the economic literature[30]. However, although Multinational Enterprises (MNE) and FDI behavior is likely much more complicated to model than trade flows (Blonigen, 2005), some studies aiming to provide a more convincing theoretical basis have appeared in recent years.

An important contribution in this field is constituted by Bergstrand and Egger (2007), who answered to their own question by extending the 2 x 2 x 2 "knowledge capital" model of multinational enterprises[31] in two ways. First, they add a third factor of production – physical capital – to unskilled and skilled labor. Assuming that labor is internationally immobile, while physical capital is mobile, i.e. that MNEs decide the optimal location of physical capital between home and foreign countries to maximize profits, this distinction allows them to explain the coexistence of national exporting enterprises (NE) with horizontal MNEs. Second, they introduce a third country in the model, in order to explain the empirical complementarity of bilateral trade and FDI flows to GDP similarity.

Another possible answer is developed by Head and Ries (2008), who use a model for FDI stocks in which heterogeneous investors bid to obtain control on existing overseas assets. In their simple model, a trade-off exists between the benefits of a foreign affiliate and the costs of its remoteness, such as transaction and monitoring costs. In order to grasp this trade-off, an "inspection game" is introduced, where two players are involved: the *employer* - the headquarter manager (hereafter HQ) - and the *employee* - the subsidiary manager (hereafter Sub). In the game, HQ always contributes to the gross profits, while Sub contributes only if he exerts an effort. Then, Sub chooses whether to work or not, while HQ decides whether to trust Sub or to verify if he has worked or not, with an inspection cost. Given that also the effort is costly, Sub is induced to shrink as much as possible. However, shirking is risky, because sub will be paid only

[30] See, for example, the call of Stone and Jeon (1999) for a stronger theoretical foundation for the gravity model applied to FDI.

[31] The 2 x 2 x 2 "knowledge capital" model of MNEs, synthesized in Markusen (2002), implies that horizontal multinationals' foreign affiliate sales between two countries with identical absolute and relative factor-endowments displace completely national firms (with identical productivity) and trade between the two countries.

if HQ is not monitoring him. Consequently, a country's probability of bidding successfully for assets in another country depends both on the distance between the two countries and their location relative to bidders in another countries. In this way, it is possible to derive an equation for bilateral FDI which is similar to the gravity equation used to analyze bilateral trade, providing it with a set of micro-foundations.

De Sousa and Lochard (2004) consider the case of an headquarter who selects an overseas project among different competing locations and generalize the research of Head and Ries in order to consider not only cross-border mergers and acquisitions (M&A). Moreover, they introduce *third-country effects*, i.e. the role played by the attractiveness of different locations in modeling FDI choices. Indeed, the more attractive other locations are, the less a country invests in a given bilateral partner.

An interesting attempt to provide a convincing theoretical foundation for the use of the gravity instrument in modeling transnational investment - even if limited to MNEs' foreign affiliate sales - is constituted by the contribution of Kleinert and Toubal (2005), who have derived gravity equations from three different general equilibrium models.

The first model is based on the proximity-concentration theory (Brainard, 1993, 1997), where firms face a trade-off between the concentration of the production and the creation of affiliates abroad to reach arm-length consumers. In the model, bilateral trade costs affect negatively foreign affiliate sales because affiliate production is assumed to require intermediate inputs that are imported by the domestic country. It causes foreign production costs to rise with distance. In the model, firms are considered symmetric with respect to their variable production costs, although this might be not consistent with the empirical evidence found in firm-level databases on multinational sales.

The second model considered - also derived by the proximity-concentration theory - shows that the mode of entry into a foreign market depends on a threshold value of productivity. Hence, in equilibrium, multinational firms, exporters and domestic firms coexist (Helpman et al., 2004). The most productive firms become multinationals, the less productive ones exporters, while the least productive serve just the domestic market. The multinational foreign affiliates' sales depend on a set of home and host country characteristics, such as market sizes and price indexes. If we assume that the fixed costs of market entry increase with distance, the threshold value of productivity will be also influenced by distance. The result is that, in equilibrium, the derived gravity equation should present positive effects of home and host country's market size and a negative effect of distance on aggregate sales of foreign affiliates.

The last model presented in the Kleinert and Toubal paper is a two-country factor proportion model of fragmentation, where multinationals break up their production process into stages on the basis of factor intensities and decide the location of each stage depending on international differences in factor prices. The investment abroad is intended to reduce the overall cost of production and affiliates' sales are consequently stimulated by low trade costs. As in the other models, the derived gravity equation shows a positive influence of home and host countries' market size on FDI flows, while distance affects them negatively.

However, even if in recent years the scholar's attempts to provide a convincing answer to the question posed at the beginning of the Section have multiplied, the theoretical literature on the application of the gravity framework to FDI is still relatively scarce. It still has to come the moment when someone will be able to say about FDI: "the gravity equation has gone from an embarrassment of poverty of theoretical foundations to an embarrassment of riches", as Frankel (1998) did referring to trade.

2.2 The Empirical Literature

In this section we review the main FDI empirical literature using the gravity equation. Given the considerable number of scholars who have employed this instrument, we selected only the studies that we consider as the most relevant in terms of research issues, methodological innovation or obtained results.

Even if some contributions date back to the 1990s, most of the studies have been recently produced. In fact, in the last few years the gravity tool has been progressively gaining popularity in modeling FDI flows, and many investigations are contributing to improving its specification and interpretation. The first well known paper that has applied the gravity framework to transnational investment flows is the seminal work by Eaton and Tamura (1994). In order to analyze Japanese and U.S. foreign direct investment and trade patterns, both with other countries and bilateral, they perform a Tobit estimation on a balanced panel of annual data for the period 1985-1990. The country factors taken into account are population, income, average level of education, regional dummy variables and the land-labor ratio, in order to incorporate a measure of factor endowment in the model. Their results confirm the hypothesis that the features of a country associated with higher levels of trade can influence positively also the level of FDI, opening the path to a new strand of empirical literature.

The relationship between FDI and trade and the role played by distance are also at the basis of the research purposes of Egger and Pfaffermayr (2005). Basing their theoretical set-up on a three-factor (physical capital, human capital and labor endowment) proximity-concentration model, they consider distance as a common impediment of trade and FDI, with its impact depending on the relative importance of fixed plant set-up costs versus transport costs. In fact, distance affects both export and outward FDI in a not straightforward way: if distance raises enough plant set up costs, it may actually increase exports. In other words, the direct negative

effect on exports may be outweighed by an indirect one induced by strong reduction of outward FDI. Their empirical results, obtained using bilateral trade and FDI stocks from OECD countries in the period 1986-1997, confirm that distance has a significant, negative effect on bilateral FDI stocks, whereas the effect on trade is insignificant and smaller in size.

A different picture of the relationship among trade, FDI and distance is given by Gopinath and Etcheverria (2004). Applying a gravity-type equation on a dataset of eighty-five pairings of bilateral trade and FDI in 1998, they estimate the determinants of the trade-FDI ratio, and, using a basic cross sectional OLS estimation, they find that the host country's relative demand for imports and FDI-produced goods is negatively affected by physical distance and by institutional quality. It means that these factors cause home countries to switch from export to FDI-based production. On the other hand, GDP per capita and regional trading agreements seem to encourage trade over FDI.

Stone and Jeon (1999) investigated more in details whether and to which extent the gravity equation could be applied to bilateral FDI flows. In their contribution, they provide a clear specification of the gravity equation applied to FDI. Based on a general form of the model as for trade flows, they specify the following gravity-type equation to model bilateral FDI flows in the Asia-Pacific region:

$$FDI_{ij} = \beta_0 + \beta_1 GDP_i + \beta_2 Pop_i + \beta_3 GDP_j + \beta_4 Pop_j + \beta_5 Distance_{ij} + \beta_6 Trade_{ij} + \beta_7 APEC + \\ + \beta_8 ASEAN + \beta_9 DAE + \varepsilon_{ij} \qquad (2.2)$$

where GDP and Pop are the Gross Domestic Product and the Population of the two countries (where the subscripts *i* and *j* identify the home and the host country respectively); FDI_{ij} and $Trade_{ij}$ represent bilateral FDI and trade flow between the two countries; $Distance_{ij}$ is the geographical distance between the two countries. Moreover, some dummies variables

representing the membership of two countries in the same regional group are included (APEC, ASEAN, DAE[32]). Using about 200 yearly observations of bilateral FDI flows in the Asia-Pacific region between 1987 and 1993, the obtained OLS cross-sectional estimation results show that the coefficients of GDP and population of the home country are constantly highly significant, while the coefficients of the host GDP and population are often not significant, and vary in sign and magnitude. Distance and regional dummies are not significant. On this basis, they argue that FDI flows are driven more by supply conditions of the home country than by demand condition of the host country. Geographic location factors, in their analysis, are neither obstructing nor promoting bilateral FDI flows.

Razin, Rubinstein and Sadka (2004) developed a model of FDI flows with fixed setup costs of new investment. The investment decisions of the representative firm are two-fold: whether to perform a FDI (depending on total profitability) and - if so - how much has to be invested (depending on marginal profitability). Employing a sample of 24 OECD countries over the period 1981-1998 the authors estimate a two-step gravity model, constituted by a participation equation (whether to invest or not) jointly with a flow equation (how much to invest). Key determinants of FDI flows, after having corrected for participation and controlled for time and country fixed effects, are found to be source country GDP per capita, common language, education and financial risk ratings. In this framework, a positive productivity shock in the host country may increase the level of the FDI flows towards the host country, but, at the same time, lower the likelihood of making new FDI by the source country. In fact, given the existence of fixed setup costs, it may well be the case that a positive productivity shock increases the marginal productivity, but at the same time lowers the total profitability of new investments.

[32] DAE (Dynamic Asian Economies) was a group composed by the nine most dynamic countries of the region at the time: Honk Kong, Indonesia, Japan, South Korea, Malaysia, Philippines, Singapore, Taiwan and Thailand

The role played by fixed cost is highlighted also in the contribution by Davies and Kristjánsdóttir (2006). The authors apply the Heckman two-step procedure on a 1989-2001 panel of FDI flows into Iceland, in order to examine the determinants of fixed costs and to understand how these may influence aggregate patterns of investment. In the authors' perspective, the comparison of the obtained results with those obtained by using a standard OLS estimation, shows that the latter incorrectly links the quantity of FDI to source country variables, while in fact their role is mainly related to determining whether FDI would take place at all.

Wei (2000) uses the gravity model to study the impact of corruption and taxes on FDI level, performing both simple OLS and Tobit regression on a sample covering bilateral investment from fourteen source countries to forty-five host countries during 1990 and 1991. Augmenting the classic gravity equation with indicators of tax rate on multinational firms and of corruption level in the host country, he not surprisingly finds that both taxation and corruption reduce inward FDI[33]. Moreover, Wei tests the hypothesis of different effects of corruption, depending either on different source or host country. A further interesting finding, consistent with theories highlighting the importance of networks[34], is the fact that countries which share a common language have higher bilateral FDI flows.

Since Wei's study, the gravity equation has been frequently used to evaluate the effect of both the taxation level and the quality of institutions on the operations of MNEs. Mutti and Grubert (2004) faced the issue by shifting the analysis to firm-level. Their empirical analysis is based on

[33] An increase in the corruption level from that of Singapore to that of Mexico is found to be equivalent to raising the corporate tax rate by over 20%.

[34] The Network Theory contends that firms can gain access to desired strategic capabilities by linking to firms with complementary capabilities, or by pooling their internal resources with firms possessing similar capabilities (Porter and Fuller, 1986; Nohria and Garcia-Pont, 1991). Through FDI an enterprise can tap into strategic resources in a foreign market, such as market intelligence, technological know-how, management expertise, or simply reputation for being established in a prestigious market. Strategic linkages as such enable investors to gain economies of scale and scope, to improve the efficiency of operations, to reduce the vulnerability to market fluctuations, and most of all, to pave the way for further growth in the future (Chen and Chen, 1998)

two different measures of MNE activity by US owned foreign affiliates: panel data for aggregate real gross product in manufacturing that originates in a given host country and micro-data (for a single year) regarding the probability of a firm to locate in a given host country. Applying the gravity equation to a panel dataset of 728 U.S. MNEs who have the option to locate in 60 different countries, they confirm the importance of taxation as a crucial factor in determining the location decisions of the MNEs. However, the sensitivity to taxes is different, depending on the investment purpose, i.e. export-oriented production is more sensitive to taxes if compared with production destined to the host country internal market.

Back to country-level analysis, Bénassy-Quéré, Fontagné, and Lahrèche-Révil (2005) test the assumption that, due to size effects and agglomeration economies, corporate tax competition does not necessary lead to a "race to the bottom", because attractive countries may exploit their location rent to maintain higher taxation rates. Using a panel of bilateral FDI flows across 11 OECD countries over the 1984-2000 period, they find that high relative corporate taxation reduces FDI inflows, even after having controlled for gravity factors and the provision of public goods. Moreover, they found non-linearities in the impact of tax differentials.

In 2005, Razin, Rubinstein and Sadka used the model built in their 2004 paper in order to evaluate the special mechanism through which taxation influences bilateral FDI. Their results indicate that the source country tax rate works primarily on the selection process: higher the taxation level, higher the probability that a FDI is performed. On the contrary, the host-country tax rate affects mainly the dimension of the FDI flow, if it occurs.

Also Wolff (2007) employs the Razin, Rubinstein and Sadka model and empirical methodology, but he performs it in order to analyze the effect of taxation on bilateral FDI flows within the European Union over the period 1994-2003. His analysis is particularly interesting, because he use four different measures of bilateral FDI as dependent variables: total FDI flows, equity

capital flows, reinvested earnings, and other FDI. This allows him to estimate four gravity equations and to analyze the impact of gravity variables and taxation, differentiating by flow typology. In the specification without time and country dummies, the empirical results obtained by Razin, Rubinstein and Sadka for OECD countries are confirmed in the case of total FDI and equity FDI, but for retained earnings and other FDI, Wolff's outcomes are different. In fact, while the coefficients of the control variables are essentially the same, source and host country tax levels are found to reduce the amount of retained earnings, and - as for other capital - host country taxes appear to lower both the probability and the amount of FDI. However, after controlling for source and host country characteristics and common time effects, the significance of tax measures disappears for Total FDI and Equity FDI, while high source country taxes increase the probability of firms to re-invest profits abroad and lower the percentage of debt-financed FDI. Overall, Wolff's analysis does not support the hypothesis of significant tax effects on FDI in the EU. On the other hand, source country's GDP per capita and population size determine a large part of total and equity FDI, while they are found to be insignificant for re-invested earnings.

The role played by the quality of institutions is the main research focus of several other papers. Bénassy-Quéré, Coupet and Mayer (2007) study in depth the issue, using the detailed institutional database of the French Ministry of Finance. They find that host country's institutions matter independently of GDP per capita, pointing out that public efficiency is a major determinant of inward FDI. The concept of public efficiency involves: tax system, easiness of the procedures, lack of corruption, transparency, clear contract law, security of property rights, efficiency of justice and prudential standards. On the other hand, there is no evidence that "good institutions" in the source country may increase the amount of FDI outflows. Finally, panel data

regressions show that institutional distance between two countries tends to reduce bilateral FDI[35].

In an original contribution by Stein and Daude (2007) find that differences in time zones may have a significant and negative effect on FDI location. Moreover, once it is controlled for the time zone effect, the distance coefficient is significantly reduced. That means that for FDI, the East-West component is the most important component, as it is a main factor in increasing transaction costs between headquarters and affiliates.

Brenton, Di Mauro and Lücke (1999) employed the gravity tool to study the effect of economic integration between the EU and the Central and Eastern European countries (CEECs) on FDI flows, in terms of three main issues: i) the expected long-term level of FDI in the CEECs, ii) the relationship between trade and FDI (complements or substitutes), and iii) whether an increase in the attractiveness of the CEECs to foreign investors has diverted FDI directed to other European countries. First, they estimate a "normal pattern" of bilateral FDI stocks of 11 major investing countries through a gravity equation and they compare the forecasted FDI stocks with the actual stocks in CEECs, finding that they do not significantly diverge. So, a long-term level of FDI was not expected to surge in the following years. They even introduce dummy variables for two different groups of CEECs (first and second round candidates for EU membership) to test for possible divergences from this pattern. The results show that the countries belonging to the first group have been more successful in attracting FDI from Europe, but not from U.S. and Japan. Second, they estimate gravity equations for the export and imports of each FDI source country. If trade and FDI are linked, the residuals from the export or import regression should be correlated with the residuals from the corresponding FDI regression. The correlation found is generally positive, meaning that trade and FDI are complements. Finally, using a gravity model of bilateral

[35] The empirical evidence is much less clear in the cross-sectional regressions.

FDI flows over time, they find no evidence that increased investment in particular countries or regions has diverted FDI flows from other European countries.

Also Bevan and Estrin (2004) applied the gravity model to CEECs, in order to establish the determinants of FDI in transition economies. Using a panel dataset containing information on FDI flows from 18 established market economies to 11 transition economies over the period 1994 to 1998, they develop an eclectic empirical framework, where FDI is determined by expected profitability, which is influenced by demand and cost factors, transaction costs and an evaluation of country risk, proxied by the host country credit rating. They found that FDI inflows are significantly influenced by perceived risk, unit labor costs, host market size and distance between countries.

Buch, Kokta and Piazolo (2003) used the gravity model to test the possible correlation between the parallel decline of FDI flows to Southern Europe and the increase of FDI flows to CEECs. In order to address this issue, the authors compare actual figures with expected FDI long-term levels predicted by using a two-stage panel cointegration technique, not finding any convincing evidence about the hypothesis that a process of FDI redirection from Southern to Eastern Europe had occurred.

While, due to data availability and magnitude of flows, most of the literature presented in this Section is dedicated to the study of FDI either across or from developed countries, it is still missing a comprehensive analysis focused on developing world. However, some contributions, especially focused on emerging Asian countries, are appearing. Gao (2005) offers a different perspective, comparing the determinants of FDI outflows from East and Southeast Asian developing economies to those from OECD countries. Using cross sectional OLS and Tobit estimation for 1994-1997, he finds that FDI from developing Asian countries is less sensitive to host country income but more negatively affected by distance.

Tong (2005) studies the role of ethnic Chinese networks in promoting FDI. Her work uses a bilateral gravity specification including in the equation as independent variables: nominal GNP and population of the two countries; distance; adjacency; a remoteness index[36]; EU and EFTA dummies; common language; colonial linkages; the host country's average tariff rate; trade to GDP ratio; previous 5 years GDP growth rate and; the product of the number of ethnic Chinese living in the two countries. Separated estimations are performed for FDI flowing from developed or developing countries and to countries with either strong or weak institutions. The results show that ethnic Chinese networks play a crucial role in facilitating direct investment, regardless the origin or the destination of the investment. Moreover, some evidence is found that ethnic networks have a decreasing marginal effect on bilateral FDI. As for determinants of FDI, the empirical findings do not seem in line with Gao's results. In fact, investments from developing countries are found to be driven basically by large market size and low labor cost in the host countries, similarly to those from developed countries. Furthermore, distance does not seem to affect more investment flows from developing countries. Finally, investment and trade seem to complement each other, as FDI is positively related to the host countries' trade intensity. Table 4.1 presents a summary of the key FDI empirical literature about the Gravity Model discussed in this Section.

2.3 A Methodological Issue: Dealing with Zeros

Given the empirical success of the gravity model in analyzing bilateral trade patterns and the increasingly satisfying theoretical underpinning developed in recent years, many scholars have contributed to further refining its correct empirical estimation both for trade and investment

[36] The remoteness index is the weighted sum of the distances of the two countries from all the other countries in the sample, where the weights are the nominal GNPs of the other countries.

flows. However, some methodological issues regarding the correct specification of the gravity equation remain to be fully investigated[37].

In this section we focus on a problem particularly relevant for our analysis: the presence of zero values, reviewing the different solutions offered by both the trade and FDI economic literature. In fact, the original gravity model predicts that flows between countries are always positive, although they may be small. Furthermore, the natural logarithm transformation cannot operate on zero values. Hence only positive flows would be considered, losing in this way a lot of information. In the analysis of bilateral investment flows, this problem is even bigger: not only FDI flows are more often equal to 0, but they may be also negative (e.g. due to repatriation of profits). Because of this reason, many scholars prefer to use FDI stocks, which cannot be negative, instead of flows.

Several strategies have been suggested in the literature to handle the presence of zero-flows. In this Section, the main possible options are presented.

A common solution is to simply reduce the considered sample to just positive observations, in order to avoid the estimation problem related to zero and negative values (e.g. Rose, 2000; Stone and Jeon, 1999). Nevertheless, omitting these observations in log-linear transformation is a non-random screening of the data and the resulting bias is inversely proportional to the share of the sample included in the regression (Greene, 1981). In other words, the risk is to lose important observations for the problem under consideration. Zero observations, for instance, could be more frequent among countries that are far apart in terms of distance and it could lead to a serious estimation bias (Stein and Daude, 2007).

[37] Main issues are, among others, how to deal with countries' unobserved heterogeneity or with potential endogeneity.

A second possible approach suggests substituting the non-positive values with a relatively small positive constant, in order to be able to utilize these observations in the log-linear model. Wang and Winters (1991), Eichengreen and Irwin (1995) and Raballand (2003), among others, followed this strategy and worked with log(1+*flow*) instead of log(*flow*) as dependent variable. Such a transformation allows them to set to zero the dependent variable when there is a zero-flow. Also Bénassy-Quéré, Coupet and Mayer (2005) use this methodology, but they add 0.3 (which corresponds to the first decile of their distribution of strictly positive FDI values) instead of 1, in order to not compress the distribution of FDI. This approach has the advantage that the coefficients can be interpreted as elasticities when the values of the flows tend to be large, because in this case log(1+*flow*) is approximately equal to log(*flow*). However, it seems generally unsatisfactory, because it is somewhat ad hoc (Stein and Daude, 2007) and because the inserted value is arbitrary and does not necessarily reflect the underlying expected value (Linders and de Groot, 2006). Moreover, when applied to FDI flows, it ignores the existence of negative flows, which are simply considered as equivalent to zeros.

A third, popular way to handle these FDI zero flows is the threshold Tobit estimation, which has been introduced to fit bilateral trade and FDI in Eaton and Tamura (1994) and, since then, used to study both trade (e.g. Rauch and Trinidade, 2002) and FDI (e.g. Wei, 2000; Gao, 2005; Stein and Daude, 2007). In the formulation of Wei (2000), the modified specification of the gravity model is:

$$\begin{aligned} \text{Ln}\,(FDI_{ij} + A) &= X\beta + u_{ij} && \text{if } X\beta + u_{ij} > \ln(A) \\ &= \ln(A) && \text{if } X\beta + u_{ij} \leq \ln(A) \end{aligned} \qquad (2.3)$$

where A is a threshold parameter to be estimated and *u* is a i.i.d. random variable with mean zero and variance σ^2. In the specification, when $X\beta + u_{ij}$ exceeds a threshold value - ln(A) - ,there will

be a positive flow of FDI; on the contrary, when $X\beta + u_{ij}$ is below this value, the realized level of foreign investment is equal to zero. The estimation is then performed with maximum likelihood, where the maximum likelihood function is constructed using a threshold Tobit model. Today, the Tobit estimation is the most popular technique to deal with zero flows in estimations of gravity equations for FDI.

However, the use of this approach for estimating trade flows has been recently criticized by an influential paper of Silva and Tenreyro (2006), where the authors argue that Eaton and Tamura's method can yield highly biased estimates in presence of heteroskedastic errors. Their solution is a variation of the traditional gravity-model that does not require a log-transformation of the dependent variable. The model is then estimated by Poisson pseudo-maximum likelihood. Proceeding in this way, they claim to produce consistent estimators even in presence of heteroskedasticity. This solution has been spreading in recent years among researchers and it has been progressively used in FDI literature for robustness check (e.g. Head and Ries, 2007; Busse, Königer and Nunnenkamp, 2008; Stein and Daude, 2007).

An alternative and theoretically convincing approach address as solution of the problem the use of the Heckman selection model (Heckman, 1979). In this model, a selection equation determines whether or not it is possible to observe a positive flow between the countries, while the regression equation determines the potential size of the bilateral flow, corrected for the selection bias through the inclusion of a correction term (the inverse Mill's ratio). The model to be estimated is then formalized as follows:

$$FDI^*_{ij} = X_{1ij}\beta_1 + \varphi\lambda_i + u_{1ij} \qquad (2.4)$$

$$h^*_{ij} = X_{2ij} + u_{2ij} \qquad (2.5)$$

$$FDI_{ij} = FDI^*_{ij} \text{ and } h_{ij} = 1 \quad \text{if} \quad h^*_{ij} > 0 \tag{2.6}$$

$$FDI_{ij} = 0 \text{ and } h_{ij} = 0 \quad \text{if} \quad h^*_{ij} \leq 0 \tag{2.7}$$

where h^*_{ij} is a variable equal to 1 if FDI flows between the country *i* and *j* are positive and equal to 0 otherwise; λ correspond to the inverse Mill's ratio (*Heckman correction term*). In this specification, the dependent variable of the regression equation (FDI^*_{ij}) is observed only if $h^*_{ij} > 0$. Empirically, the procedure follows these steps. First, the selection equation is estimated by maximum likelihood. Then, this estimation is used to construct the inverse Mill's ratio [$\lambda = \phi(X'i\theta)/\Phi(X'i\theta)$] by using the pseudo residuals. Finally, the selection correction term λ is included in the regression equation, which is also estimated by maximum likelihood. The main issue regarding this methodology is the identification of the selection equation (Greene, 2003). In fact, consistent estimation in the Heckman model requires using, at least, one variable that affects the probability of participation but not the level of the flow, in order to permit the proper identification of the estimated coefficient on the selectivity term. The problem lies basically in the fact that it is not easy to find a variable that does influence the probability of establishing a FDI flow, but that at the same time does not affect the dimension of the same flow. The relevant literature that has applied this methodology has used different variables in the attempt to deal with the issue, such as: past FDI liquidations (Razin, Rubinstein and Sadka, 2004); existence of previous FDI (Razin, Sadka and Tong, 2005) and Source Country Financial Risk Rating (Razin, Rubinstein and Sadka, 2005); lagged worldwide price of oil and the lagged hydropower output of the source country[38] (Davies and Kristjansdottir, 2006).

[38] The assumption here is that, when the world electricity price increase, the probability of FDI in Iceland is higher, because of the attractiveness of the country in terms of low energy prices.

Finally, Kristjánsdóttir (2005) has recently proposed an original solution applicable in gravity modeling and still not fully explored in the literature. It includes the application of the so-called "Inverse Hyperbolic Sine Function" to the dependent variable, instead of the natural logarithm function. Such a transformation, firstly proposed by Johnston (1949), does not truncate or eliminate values of the dependent variable, allowing performing the regression on the entire available sample. This way of imposing the inverse hyperbolic sine (IHS) function to the dependent variable while imposing natural logarithm on the dependent variables has been also used in studies on household wealth (Burbidge, Magee and Robb, 1988; Carroll, Dynan and Krane, 1999).

2.4 Conclusions

Inspired by the Newton's Law of Gravitation and commonly used to model international trade flows, this model has been increasingly applied also to describe and explain FDI flows. Its application to international capital movements has been normally justified by the similarity of FDI to trade patterns and the good empirical result, rather than by a solid theoretical underpinning.

However, in the economic literature several studies that propose new interpretations of the gravity model in the framework of different MNEs theories have recently appeared. In the first part of this Chapter we have reviewed these new contributions. In the second Section we presented a summary of the relevant empirical FDI literature which employs this instrument. It is interesting to notice how the gravity model has been used not only to evaluate the role played by distance and market dimension in shaping FDI flows, but also to address a wide range of other relevant issues, such as the effect of the taxation level, quality of institutions or economic integration on the operations of MNEs. Unfortunately, due to data availability and magnitude of

flows, most of the literature refers to flows across or from developed countries, while it is seldom focused on developing countries. Finally, we focused on a methodological issue particularly relevant for our empirical analysis: the problem deriving from the presence of zero and negative flows. In Section 3 we reviewed the alternative solutions proposed by the empirical literature.

In conclusion, even if its theoretical underpinning is still not fully satisfying, the Gravity Equation seems a valuable and flexible empirical tool for estimating FDI drivers. We might be not so far from the moment when we will refer to the gravity Model as the workhorse to describe and explain variation in bilateral direct investment, as Linders and De Groot (2006) did in relation to its application to trade flow.

Table 2.1 Summary of Key FDI empirical literature using the Gravity Model

Author(s)	Data	Estimation Methodology	Dependent Variable	Main Independent Variables	Main Results
Bénassy-Quéré, Coupet, Mayer (2007)	Bilateral FDI from OECD countries to 58 host countries (1985-2000)	Cross-sectional and pooled OLS, panel	FDI stocks	GDP, GDPpc, distance. Adjacency, common language, institutional quality, institutional distance	Host country's institutions matter independently of GDP per capita. Public efficiency is a major determinant of inward FDI. There is no evidence that "good institutions" of the source country increase the amount of FDI outflows. Institutional distance between two countries tends to reduce bilateral FDI
Bénassy-Quéré, Fontagné, and Lahrèche-Révil (2005)	FDI flows across 11 OECD countries; 1984-2000	Fixed effect Panel, OLS	FDI flows	GDP, distance, common language, host country market potential, tax differentials	High relative corporate taxation reduces FDI inflows. There are non-linearities in the impact of tax differentials.
Bevan and Estrin (2004)	FDI flows from 18 established market economies to 11 transition economies (1994- 1998)	Random effect panel, OLS	FDI flows	GDP, distance, labor cost, credit rating, specific country dummies	FDI inflows are significantly influenced by perceived risk, unit labor costs, host market size and distance between countries

Author(s)	Data	Estimation Methodology	Dependent Variable	Main Independent Variables	Main Results
Brenton, Di Mauro and Lücke (1998)	FDI stocks and flows from 11 major source countries to CEECs; 3 subperiods: 1982-1986, 1987-1991, 1992-1995;	OLS with sub-period dummies	FDI stocks and flows	GDP, population, distance, economic freedom, adjacency dummy, regional organization membership dummies	CEEC Countries belonging to the first group of EU candidates have been more successful in attracting FDI from Europe, but not from U.S. and Japan. Trade and FDI are complements and not substitutes. No evidence that increased investment in particular countries or regions has affected FDI flows to other European countries.
Buch, Kokta and Piazolo (2003)	FDI outflows from Germany (1981-1998); FDI outflows from 7 reporting countries to 55 host countries (1997)	Yearly cross-sectional OLS	FDI stocks	GDP, GDPpc, distance, common legal system, common language, FDI restrictions, EU dummy	There is no convincing evidence of a process of FDI redirection from Southern to Eastern Europe.
Davies and Kristjánsdóttir (2006)	FDI inflows to Iceland 1989-2001	Heckman selection	FDI flows and stocks	GDP, GDPpc, distance, trade openness, source country skill	Because of the role played by fixed costs, OLS estimations often incorrectly links the quantity of FDI to source country variables, while most of their role is in determining whether FDI takes place or not.

Author(s)	Data	Estimation Methodology	Dependent Variable	Main Independent Variables	Main Results
Eaton and Tamura (1994)	FDI position of Japan and the U.S. with a balanced panel of 110 countries (1985-1990);	Tobit with year dummies.	FDI flows	GDP, population, regional dummies land-labor ratio, average level of education	Features of a country associated with more trade tend to be associated also with more FDI.
Egger and Pfaffermayr (2005).	Bilateral Trade and FDI outflows from OECD countries (1986-1997)	Hausman-Taylor SUR	Trade flows, FDI stocks	GDP, distance, factors endowment, institutional quality	Distance has a significant, negative effect on bilateral FDI stocks, whereas the effect on trade is insignificant and smaller in size.
Gao (2005)	FDI outflows from 4 Asian developing economies and 24 OECD countries to 63 host countries; (1994-1997)	3-year cross-sectional OLS, Tobit	FDI flows	GDP, distance, common language, adjacency, common colonization, previous GDP growth, FTA dummy	FDI from developing Asian countries is less sensitive to host country income but more negatively affected by distance.

Author(s)	Data	Estimation Methodology	Dependent Variable	Main Independent Variables	Main Results
Gopinath and Etcheverria (2004)	85 pairings of bilateral trade and FDI in 1998	Cross-sectional OLS	Trade-FDI Ratio	GDPpc, distance, population, institutional quality, EU dummy	Host country's import-FDI ratio is negatively affected by physical distance and by institutional quality. On the other hand, GDP per capita and regional trading agreements encourage trade over FDI.
Mutti and Grubert (2004)	728 U.S. MNEs who have the option of locating in 60 different countries; 1982-1989-1994	Random effect panel ,OLS, probit	gross product originating (GPO), probability of locating	GDP, GDPpc, taxation level, host country's wage level, trade policy variables, adjacency, language, affiliate's characteristics	Taxation is an important determinant of the location of the MNE activity. The sensitivity to taxes depends on the investment purpose, i.e. export-oriented production is more sensitive to taxes if compared with production destined to the host country internal market.
Razin, Rubinstein and Sadka (2005)	FDI flows across 24 OECD countries; 1981-1998	Heckman selection	FDI flows	GDPpc, population, distance, taxation level, difference in education levels, common language, financial risk ratings, past FDI flows (as a selection variable)	The source country tax rate works primarily on the selection process: higher the taxation level, higher the probability that a FDI is performed. On the contrary, the host-country tax rate affects mainly the dimension of the FDI flow, if it occurs.

Author(s)	Data	Estimation Methodology	Dependent Variable	Main Independent Variables	Main Results
Razin, Rubinstein and Sadka (2004)	FDI flows across 24 OECD countries; 1981-1998	Heckman selection	FDI flows	GDPpc, population, distance, difference in education levels, common language, financial risk ratings, past FDI flows (as a selection variable)	Because of the presence of lumpy setup costs, the investment decisions are two-fold: whether to perform a FDI (depending on total profitability) and, if so, how much (depending on marginal profitability). Source country GDP per capita, common language, education and financial risk ratings are key determinants of volume of FDI flows.
Stein and Daude (2007)	Bilateral FDI from OECD countries to 58 host countries (1997-1999)	Cross-sectional OLS, Tobit	FDI stocks	GDP, GDPpc absolute difference, distance, adjacency, common language, colonial links, common legal origin, FTA, BIT, DTT dummies, time zone differences	Differences in time zones have a significant and negative effect on the location of FDI. Having controlled for the time zone effect, the distance coefficient is significantly reduced.

Author(s)	Data	Estimation Methodology	Dependent Variable	Main Independent Variables	Main Results
Stone and Jeon (1999)	FDI flows in the Asia-Pacific region (1987-1993);	Yearly cross-sectional OLS	FDI flows	GDP, population, distance, trade, regional organization membership dummies	FDI flows are driven more by supply conditions of the home country than by demand condition of the host country. Geographic location factors are not significant.
Tong (2005)	Bilateral FDI from 54 source countries to 69 source countries (1990)	Cross-sectional Tobit	FDI flows	GNP, population ,distance; adjacency; remoteness index; EU and EFTA dummies; common language; colonial linkages; average tariff rate, trade to GDP ratio, previous GDP growth ,ethnic Chinese networks	Ethnic Chinese networks play a crucial role in facilitating direct investment, regardless the origin or the destination of the investment, but have a decreasing marginal effect on bilateral FDI. Investments from developing countries are found driven basically by a large market size and low labor cost in the host countries, similarly to those from developed countries. Investment and trade seem to complement each other

Author(s)	Data	Estimation Methodology	Dependent Variable	Main Independent Variables	Main Results
Wei (2000)	FDI flows from 14 main source countries to 45 host countries (1990-991)	Cross-sectional OLS and Tobit	2-years FDI flows	GDP, population, distance, linguistic ties, corruption level, taxation level, host country's wage level, OECD dummy for host country, source country dummies	Taxation and corruption reduce inward FDI. There is only little evidence of different effects of corruption, depending either on different source or host country Countries with common language present higher bilateral FDI flows.
Wolff (2007)	FDI flows across EU 1994-2003	Heckman selection	4 different measures of FDI flows: total FDI flows, equity capital flows, reinvested earnings, and other FDI	GDPpc, population, distance, border, wage level, taxation level, public expenditure level	Taxation level is not significant for Total FDI and Equity FDI, while high source country taxes increase The probability of firms to re-invest profits abroad and lower the percentage of debt financed FDI. Source country's GDP per capita and population size determine a large part of total and equity FDI, while they are insignificant for re-invested earnings.

CHAPTER 3: THE DETERMINANTS OF FDI IN CHILE

Introduction: the Theoretical Background

Identifying the theoretical determinants of Foreign Direct Investment has been a popular academic issue since the beginnings of economic science. The origin of theoretical studies could be dated back to the work of Adam Smith and Stuart Mill, although Ohlin (1933) has been the first to address the problem in modern economic theory. Instead, as regards empirical analysis, only recently the international economics literature has begun to investigate the nature of different FDI drivers (Nonnemberg and Cardoso, 2004). In fact, multinational enterprise activity in the form of foreign direct investment has grown in the latest years at a faster rate than most other international transactions, particularly in comparison with trade flows. Consequently, this trend in the real-World "forced" the academic world to become interested in the phenomenon (Blonigen, 2005).

In his 1933 work, Ohlin interpreted foreign direct investments as basically motivated by the high profitability of such investments linked with the possibility of financing them at low interest rates in the host country. Other determinants identified were also the necessity to overcome trade barriers (in an early formulation of the tariff-jumping concept) and to obtain sources of raw materials. A second milestone in the study of multinational enterprises (MNEs) is constituted by the work of Hymer (1960), who introduced a new perspective in dealing with this issue. According to his contribution, MNEs are able to compete with local firms (which know much better the local market, in terms of regulations, consumer preferences…) because they can

benefit from "compensatory" advantages[1]. Then, in presence of these advantages, MNEs would prefer to supply the foreign market through a direct investment instead of using the export channel. Similarly, MNEs would prefer the direct investment rather than licensing production to local firms if the value of the production license is not certain or the know-how transfer costs are too high.

The contribution of Kindleberger (1969) develops Hymer's analysis, slightly modifying it. In his work, it is not the MNE behaviour that shapes market structure, but it is the market structure itself (monopolistic competition) that determines the behaviour of the firms, which will consequently be induced to internalize the production. Basically, FDI will be performed in sectors dominated by oligopolies (Caves, 1971). In presence of product differentiation, a firm may invest horizontally, i.e. in the same sector, while, if there is no product differentiation, a firm may invest vertically, i.e. in sectors that are part of the production chain. Furthermore, FDI are a way to avoid uncertainty in supplies, when the existence of trade barriers hampers normal trade flows. The hypothesis of FDI being determined by specific assets which apparently compensate the disadvantage faced by foreign firms in comparison with local firms became the so-called HKC tradition, named after Hymer, Kindleberger and Caves[2].

A different perspective about FDI drivers is based on the concept of transaction cost internalization. Buckley and Casson (1976, 1981) developed this hypothesis, relying on the assumption that intermediate product markets are imperfect: they present higher costs if managed by different firms, while these costs are minimized when MNEs create integrated markets. In fact, the transfer between different firms of intangible assets - such as patents, property rights, trademarks, innovative capacity, marketing, and design expertise - may be costly, mainly

[1] Possible examples of such advantages are an easier access to patented or proprietary knowledge; internal or external economies of scale, including those which derive from vertical integration; governmental trade policies such as restriction on imports or subsidies to export.

[2] Some studies have criticized this argument for its failure to account for the role that technological competition plays in transnational production (e.g. Cantwell 2000).

because of the difficulties in estimating their economic value. The cost internalization theory emphasizes that the existence of intermediary product markets is the main reason for the creation of international production networks. This approach is effective in addressing the firm's alternative between licensing production to a foreign agent or keeping its own production line. Not only location, but also corporate governance is crucial: when production and control are located in the home country, the firm exports; when production and control are located in the host country, the firm licenses its production; when production is delocalized but control remains in the home country, a FDI takes place.

John Dunning (1977, 1981) contributed to the debate with the design of a comprehensive framework, which states that firms decide to perform a foreign direct investment (*i*) if they have market power arising from the ownership of products or production processes, (*ii*) if they have a location advantage in establishing their plant in a foreign country rather than in their home-country, and (*iii*) if they have an advantage form internalizing their foreign activities in fully owned subsidiaries, rather than carrying them out through arm's length agreements in the market (Barba Navaretti and Venables, 2003). The framework elaborated by Dunning is known as the OLI (Ownership, Location, Internalization) Paradigm, because it brings together previously different conflicting theories. On this basis, Dunning outlines four main reasons for a firm to invest abroad: the search for resources, for markets, for efficiency, and for new strategic assets.

Depending on the motivation and the form of the firm's investment decision, FDI can be classified as *horizontal* (*market-seeking*), *vertical* (*efficiency-seeking*) or *resource-seeking*. On one hand, Horizontal Foreign Direct Investment (HFDI) refers to the foreign manufacturing of products and services similar to those the firm produces in its home market, i.e. the firm maintains the whole production process in both home and host countries with the headquarter in the home country. This form of investment is called "horizontal" because of the duplication of the same activities in different countries. On the other hand, Vertical Foreign Direct Investment

(VFDI) is connected with the geographical fragmentation of the production. In fact, Multinational firms tend to separate the production chain by outsourcing some stages abroad. The basic idea behind the analysis of this type of FDI is that a production process consists of multiple stages with different input requirements. If input price or availability varies across countries, it could become profitable to split the production chain. Finally, *resource-seeking* FDI, as the name suggests, aims to exploit the availability of natural resources in the host country.

TABLE 3.1 Determinants of FDI: theoretical predictions

Determinants	Prediction by type of investment	
	Horizontal	Vertical
Determinants related to types of firms or industries		
Firm-level economies of scale	+	+
Plant-leve	-	?
Product-specific trade costs	+	-
Costs to disintegrate stages of production	-	-
Difference in factor intensity between stages of production	?	+
Determinants related to types of countries		
Trade costs (distance, trade barriers,...)	+	-
Market size	+	?
Factor cost differentials	?	+

Source: Barba Navaretti and Venables (2003)

In Table 3.1 some predictions concerning the main empirical determinants of FDI for horizontal and vertical investment - both related to types of firm and industries, and related to types of country - are summarized. It is possible to notice how the predicted signs are often opposite, depending on the type of investment.

Focusing on FDI determinants at country-level, trade costs (which are often proxied by geographical distance) play a very important role. But, depending on the type of investment performed, they can have either a positive or a negative impact. If the analysis considers aggregate flows (where HFDI between industrialized countries are the large majority), it focuses on the trade-off between supplying a market through export and trough a FDI. In this perspective, the expected sign of an increase in trade costs is positive. In fact, higher trade costs make relatively more expensive for a firm to export in the foreign market, and consequently the possibility of investing directly will become more attractive (Brainard, 1997; Markusen and Maskus, 2002). By contrast, where VFDI are performed, the evidence shows that investment declines with higher trade costs, as they increase the costs of trading components between production stage units.

The size of the host market is generally assumed to be a fundamental factor of attraction for FDI (Brainard, 1997; Markusen, 2002). This is certainly true with respect to horizontal flows, because a firm will be more willing to sustain the high entrance cost in a foreign market if the prospected sales are larger. A good example is offered by the creation of the European Single Market: reducing the trading costs in the region, and, consequently, expanding the size of the European market made Europe more attractive for foreign investors. Finally, VFDI takes place, by definition, between countries with different relative factor endowments and, consequently, different factor costs. The impressive increase of North-South investment (or, in the European case, West-East investment) in the 1990s and in the 2000s are a clear confirmation of this prediction.

As regards resource-seeking investment, particularly relevant in the case of Chile, the main determinant is obviously the existence and extractability of natural resources: *the mine goes where the minerals are* (Barba Navaretti and Venables, 2003). However, availability of mineral deposits is a necessary requirement to attract FDI but not a sufficient condition. Other relevant characteristics of the host country are, for instance, the conditions of physical infrastructure, the overall economic environment, the quality of institutions or the distance from relevant markets (which is not necessarily the same of the country's headquarter).

Furthermore, beyond differences in factor endowments and trade costs, other country-pair characteristics may be considered as possible important FDI drivers between two countries independently from the investment motivation. Possible examples are a common language, similarity or differences in the legal systems, bilateral trade or monetary agreements, common security arrangements, and so on (Razin and Sadka, 2007).

This Chapter contains an empirical analysis on the determinants of FDI inflows into Chile through the estimation of a gravity model. It aims to provide a benchmark empirical study about the determinants of investment flows entering the country by testing the presented theoretical predictions on country-level drivers. Moreover we want to evaluate the role played by the "Chilean Foreign Economic Policy" discussed in Chapter 1 in promoting FDI flows into the country. Section 1 presents a review on the motivations and the determinants of FDI in Chile in the economic literature. In Section 2 the empirical model and the estimation strategy are described. Section 3 illustrates the data used in the chapter and Section 4 discusses the econometric results. Finally, Section 5 concludes.

3.1 FDI in Chile: motivations and determinants in the literature

The strategies of MNEs operating in Chile have taken different forms depending on the changes occurred in the country. The earliest foreign enterprises, mainly US-based, arrived in the country at the beginning of the XX Century, attracted by the large metal deposits. In the 1950s, in addition to these traditional flows, increasing flows went to the manufacturing sector in the context of the Import-substitution Industrialization process (ECLAC, 2001). Following the previous classification, investment in the country in this period were basically resource-seeking and market-seeking.

However, the changed political conditions and the nationalization of large-scale mining in the 1960s and early 1970 created an extremely unfavourable environment for FDI and caused the exit from the country of most MNEs. The Pinochet military coup in 1973 ended dramatically and violently this period of the Chilean history and opened the way to a period of economic liberalism which encouraged the return of foreign investment. However, while resource-seeking FDI in the mining sector quickly returned in the country, the change of economic paradigm caused the end of market-seeking ISI-driven investment.

It is with the return of the democracy in 1990 that FDI inflows in the country increased dramatically (See Section 1.3). In fact, the new regime combined the broad principles of economic liberalism with good macroeconomic performances and political stability, creating in this way a particularly favourable environment for foreign investors. The 1990s saw also major changes in the sectoral composition and the motivation of FDI. First, beyond traditional resource-seeking FDI in the primary sector, foreign investment started to be directed also to other natural-resource-related export-oriented activities in the manufacturing sector. In particular, since the early 1990s, MNEs played a key role in the strong development of the fresh

fruit, forestry, fisheries and wine sectors, with investors in this area gradually shifting towards segments offering greater value added.

Moreover, since the second half of the 1990s, as showed in Section 1.4, FDI inflows into services sectors drastically increased. This phenomenon was the direct consequence of the new interest of worldwide MNEs in becoming global services providers by gaining access to new domestic and regional markets, particularly in the developing world (UNCTAD, 2004). This trend was particularly marked in Chile, especially in the sectors of electrical energy, telecommunications, water and sanitation, and financial services. In conclusion, foreign investment in Chile in the last decades has been highly driven by resource-seeking and market-seeking motivations, while efficiency-seeking FDI seems to have played a more limited role.

Few studies have empirically investigated the determinants of FDI flows to Chile in a country-specific perspective. Among them, in a pioneer investigation, Riveros, Vattel and Agosin (1995) analyzed total FDI inflows in Chile for the 1975-1992 period, finding that the country risk (proxied by the debt-to-exports ratio), the real exchange rate and the introduction of the Chapter XIX mechanism had played a significant role in shaping the inflows. In a recent work, Ramirez (2009) deepened the analysis, by using cointegration analysis and error-correction modelling on an extended dataset, which includes FDI inflows during the 1960-2002 period. The results show that Chilean market size, real exchange rate, debt-service ratio, secondary enrolment ratio, physical infrastructure, and institutional reforms are statistically significant in explaining the variation in FDI inflows to the country.

3.2 Empirical Model and Estimation Strategy

The empirical approach used in this Chapter to analyze the determinants of FDI inflows to Chile is based on the following equation, where the investment flows depend on *(i)* the characteristics of the source country; *(ii)* its distance from Chile; *(iii)* the characteristics of the relation between the source country and Chile; *(iv)* the Economic Treaties signed between the source country and Chile; and *(v)* the belonging of source countries to different trade blocs. With respect to the traditional formulation of the gravity equation, we do not include host market (i.e. Chilean) specific variables. In fact, in the framework of a single host country panel model, they are exclusively time-variant regressors and it makes difficult to identify their real impact on FDI inflows. Consequently, we decided to exclude such variables from our direct estimation. However, through the inclusion of time-dummies in our specification, we control for the effect of modified conditions of the host market over time. Formally:

$$FDI_{j,t} = \alpha\,(Source\ Country\ Variables)^{\beta 0}(Distance)^{\beta 1}(Country\text{-}Pair\ Variables)^{\beta 2}\ \exp(\beta_3\ Economic\ Treaties + \beta_4\ Trade\ Blocs\ Dummies + \beta_4\ Time\ Dummies + \varepsilon) \quad (3.1)$$

Substituting actual variables to variable groups, the equation can be written as:

$$FDI_{j,t} = \alpha\,(GDP_{j,t})^{\beta}\,(Population_{j,t})^{\gamma}\,(Distance_{j})^{\delta}\,(GDP\ Difference_{j,t})^{\zeta}\exp(\theta\ Common\ Language_{j} + \kappa\ Adjacency_{j} + \lambda\ Colonial\ Link_{j} + \mu\ BIT_{j,t} + \nu\ DTT_{j,t} + \xi\ FTA_{j,t} + \pi\ APEC_{j,t} + \rho\ EU_{j,t} + \tau\ NAFTA_{j,t} + \varphi\ MERCOSUR_{j,t} + \psi\ Time\ Dummies_{t} + \upsilon_{j,t}) \quad (3.2)$$

where subscripts j and t denotes the source country and the time period to which the variable is referred, respectively. In order to smooth the variables over business cycles and to reduce the proportion of zeros over total observations, we grouped years in three-year averages, so that we

obtain 7 time periods (each period consisting of three years). In the case of continuous variables, each observation corresponds to the average of the three-year observations. In the case of dummy variables, they take a value of 1 only if we observe a value of 1 in all the three years.

$FDI_{j,t}$ is the value of total FDI flows from Country *j* to Chile in period *t*; $GDP_{j,t}$ represents the GDP of country *j* in period *t*. $Population_{j,t}$ denotes the total populations in country *j* in period *t*; $Distance_j$ is the geographical distance between country *i* and Chile. $GDP\ Difference_{j,t}$ is the absolute value of the difference in GDP per capita between country *j* and Chile in period *t*. $Common\ Language_j$ equals 1 if the official language of country *j* is Spanish and 0 otherwise. $Adjacency_j$ equals 1 if country *j* and *Chile* share a land border and 0 otherwise. $Colonial\ Link_j$ equals 1 if country *j* and *Chile* share a colonial link and 0 otherwise. In practice, it corresponds to a fixed effect for Spain. $BIT_{j,t}$, $DTT_{j,t}$, $FTA_{j,t}$ are dummy variables which equal 1 if respectively a Bilateral Investment Treaty, a Double Taxation Treaty or a Free Trade Agreement are in force with Chile in period *t* and 0 otherwise. $APEC_{j,t}$ equals 1 if country *j* and Chile were both members of the Asian-Pacific Economic Cooperation (APEC) in period *t* and 0 otherwise. $EU_{j,t}$, $NAFTA_{j,t}$, $MERCOSUR_{j,t}$ equal 1 if country *j* was member respectively of the European Union, of the North American Free Trade Agreement and of the Southern Cone Common Market in period *t* and 0 otherwise. Finally, 6 $Time\ Dummies_t$ are added, each of them is equal to 1 when the observation takes place in the respective 3-year period and 0 otherwise. $\upsilon_{j,t}$ is the error term[3].

$GDP_{j,t}$ and $Population_{j,t}$ represent the main characteristics of the source country. We expect the level of GDP to have a positive effect on FDI flows, while the size of population to have a negative effect. In other words, richer countries are expected to promote higher foreign investment flows. $GDP\ Difference_{j,t,}$ should proxy differences in labour costs between the source country and Chile. Therefore it is supposed to have a positive coefficient in the case of vertical

[3] See Table 3.2 for a complete description of variables.

investment, while it should not be influent in the case of horizontal ones[4]. $Distance_j$ proxies for trade costs and then should present a negative coefficient. $Common\ Language_j$, $Adjacency_j$ and $Colonial\ Link_j$ should facilitate the investment between countries, and consequently are expected to have a positive impact on FDI flows. It is also expected that the *Bilateral Economic Treaties* dummies may have a positive effect. *Trade Blocs Dummies* control for unobserved time-invariant fixed effects across countries belonging to different trade agreements. Finally, *Time Dummies* control for specific unobservables that vary over time but not across FDI partners, such as changing condition of the Chilean market or of the World Economy.

In order to check the robustness of our estimations through different econometric approaches, we estimate equation (3.2) both with a panel OLS and a panel TOBIT regression model. In the case of OLS, in order to handle the problem constituted by the logarithm transformation of non-positive investment flows[5], we add a small constant (equal to 1[6]) to the dependent variable. This solution makes possible to perform the log transformation on all the observations and to employ them all in the log-linear model. Consequently, after the log-transformation the equation to be estimated simply becomes:

$$Ln\ (FDI_{j,t}+1) = \ln \alpha + \beta * \ln (GDP_{j,t}) + \gamma * \ln (Population_{j,t}) + \delta * \ln (Distance_{j,t}) + \zeta * \ln (GDP\ Difference_{j,t}) + \theta * CommonLanguage_i + \kappa * Adjacency_j + \lambda * Colonial\ Link_j + \mu * BITj,t + \nu * DTT_{j,t} + \xi * FTA_{j,t} + \pi\ APEC_{j,t} + \rho\ EU_{j,t} + \tau\ NAFTA_{j,t} + \varphi\ MERCOSUR_{j,t} + \psi\ Time\ Dummies + \upsilon_{j,t} \quad (3.3)$$

[4] Given the construction of the variable and its close relations with $GDP_{j,t}$ and $Population_{j,t}$, we cannot exclude that it could raise issues of multicollinearity.

[5] For a comprehensive discussion on the possible approaches used to deal with the zero flows problem, see Section 2.3.

[6] We decided to use a one-dollar value (with the log equalling zero) as a common low value in the case of zero or negative FDI flows (e.g. Razin, Rubinstein and Sadka, 2003). Negative values are considered as zeros.

On the other hand, in the case of the TOBIT estimation model, we assume the dependent variable bounded below by zero. So, following Eaton and Tamura (1994) and Tong (2005), we consider a modified gravity equation, where the actual FDI is strictly positive only when the right-hand side achieves a minimum threshold value A. Thus, in this case, the equation to be estimated becomes:

$$FDI_{j,t} = \max [-A+ \alpha(GDP_{j,t})^{\beta} (Population_{j,t})^{\gamma} (Distance_{j})^{\delta} (GDP\ Difference_{j,t})^{\zeta} \exp (\theta\ Common\ Language_{j} + \kappa\ Adjacency_{j} + \lambda\ Colonial\ Link_{j} + \mu\ BIT_{j,t} + \nu\ DTT_{j,t} + \xi\ FTA_{j,t} + \pi\ APEC_{j,t} + \rho\ EU_{j,t} + \tau\ NAFTA_{j,t} + \varphi\ MERC \quad OSUR_{j,t} + \psi\ Time\ Dummies + \upsilon_{j,t}), 0] \tag{3.4}$$

And, taking natural logarithms and assuming the threshold value A equal to 1:

$$Ln\ (FDI_{j,t} + 1) = \max [\ \ln \alpha + \beta * \ln (GDP_{j,t}) + \gamma * \ln (Population_{j,t}) + \delta * \ln (Distance_{j,t}) + \zeta * \ln(GDP\ Difference_{j,t}) + \theta * CommonLanguage_{i} + \kappa * Adjacency_{j} + \lambda * Colonial\ Link_{j} + \mu * BITj,t + \nu * DTT_{j,t} + \xi * FTA_{j,t} + \pi\ APEC_{j,t} + \rho\ EU_{j,t} + \tau\ NAFTA_{j,t} + \varphi\ MERCOSUR_{j,t} + \psi\ Time\ Dummies + \upsilon_{j,t}, 0] \tag{3.5}$$

Equation (3.5) is then estimated by maximum likelihood, where the maximum likelihood function is built using a threshold Tobit model.

Although the large majority of studies estimate the gravity equation using either cross-sectional or pooled cross-sectional data, panel data offer several advantages (Hsiao, 1985). First, by capturing both cross-sectional and time-series variation of the dependent variable, they allow obtaining a more accurate inference of model parameters. In fact, panel data usually increase the number of data points availability and reduce collinearity among the explanatory variables, thus improving the efficiency of the econometric estimates. Second, dynamic effects cannot be estimated by using cross-sectional data. Third, Panel data models can take into account a greater

degree of the heterogeneity that characterises observation units over time. Finally, the use of longitudinal data allows the measurement not only of the effects that observable variables have on the dependent variable, but also of the effects of relevant unobservable or non-measurable variables.

While observable variables are normally considered into the model, the unobservable variables are incorporated into the model depending upon whether a fixed-effects (FE) or random-effects (RE) model is used in estimation. If the effects of the omitted variables either stay constant through time for a given cross-sectional unit or are the same for all cross-sectional units at a given point in time, these effects can be absorbed into the intercept term of a regression model. This is the case of a Fixed Effects Model (FE). Alternatively, if the effects of the numerous omitted individual and time varying variables are each individually unimportant but collectively comprise a significant random variable, this effect is assumed to be uncorrelated with the set of included or excluded variables, and this interpretation is consistent with specifying what is referred to as a Random Effects Model (RE). In other words, in the RE model, the unobservable factors that differentiate cross-section units are assumed to be characterized as randomly distributed variables.

Concerning the gravity equation, Matyas (1997) and Egger (2000) claim that the correct econometric specification implies FE rather than RE. However, given the fact that cross-sectional units of our analysis are a large set of World countries and that these partners vary considerably by culture, religion, political system and many other factors, it seems quite reasonable to assume here that the differences between them are randomly distributed. Among others, Bevan and Estrin (2004) used random effects to estimate a gravity equation for FDI flows.

To test the hypothesis of the presence of RE in the OLS application, we performed the Breusch-Pagan test and in all cases the result is a rejection of the null hypothesis of no-random effects. Furthermore, we have performed also the Hausman test to verify the independence of the random effects from the explanatory variables and the result is the acceptance of the null hypothesis[7]. These results justify the adoption of a random-effects estimation model. In the case of the TOBIT model in a short panel setting, there are no simple consistent estimators for fixed effects models (Cameron and Trivedi, 2005), so the random effects estimation is somehow obliged.

3.3 Data Description

Data on Foreign Direct Investment (FDI) flows used in this thesis have been provided by the Chilean Foreign Investment Committee. These data cover inflows into Chile from 165 different world countries over a 21 years period, from 1985 to 2005, covering almost 98% of the total inflows through the DL 600 Mechanism[8]. Inflows from Bahamas, Barbados, Bermuda, Cayman Islands and Netherlands Antilles have not been considered, because they are presumably not the real source of the investment but just a channel used for fiscal reasons. The FDI values are reported in current US dollars, which should approximate a correction for the different exchange rates across countries. In order to obtain real figures, these values have been deflated by using the US GDP deflator furnished by the Global Development Finance database of the World Bank, whose base year is 2000.

Population and GDP data have been obtained from the World Bank's *World Development Indicators*. Distance refers to the geographical absolute distance between the most important city/agglomeration (in terms of population) of the source country and Santiago, the capital and

[7] The results of both the Breush-Pagan and the Hausman tests are contained in Table 3.3.
[8] For a description of the DL 600 mechanism, see Section 1.2.

most populated city in Chile. It has been obtained from the CEPII (Centre d'Etudes Prospectives et d'Informations Internationales) database[9]. Information on common borders, common language and colonial links has been obtained from the same database.

As for the list of Bilateral Investment Treaties (BITs), Double Taxation Treaties (DTTs) and Free Trade Agreements (FTAs) signed by Chile, it has been obtained directly from the Chilean Foreign Investment Committee (See Annex 1 for a list of the treaties signed by Chile).

3.4 Econometric Results

This Section presents the results of the estimated coefficients of the determinants of FDI inflows into Chile. Once set the econometric framework as defined in Section 3.1, we based our estimation strategy on three different specifications of equation (1), which have been estimated both by OLS panel and TOBIT panel, for a total of six estimations. Results are displayed in Table 3.3[10].

In the first specification [Columns (1) and (2)], a baseline equation is estimated, where only GDP and Population of the Source Country and Distance are included as explanatory variables. A first important remark is that even this basic version of the gravity equation has good explanatory power[11]. Besides, the results obtained from estimating this basic model are generally consistent with the theoretical expectations and independently from the adopted estimation methodology. Coefficients of source countries' GDP are positive and highly significant, while the coefficients

[9] For a description of the CEPII dataset and variables, see Mayer and Zignago (2006).
[10] As for TOBIT estimations, in Table 3.3 are showed OLS equivalent estimates, i.e. censored tobit coefficients scaled by the proportion of uncensored observations in the sample.
[11] Overall R-squared in the OLS estimation is 0.506 and Pseudo R-squared (computed as the squared correlation between the observed and predicted FDI) is 0.509, indicating that these three predictors accounted for over 50% of the variability in the outcome variable.

Table 3.2 Data Summary

Category	*Variable*	*Description*	*Source*
Source Country Characteristics	$GDP_{i,t}$	Log of GDP of the partner country *i* (trillions of USD, 2000 base)	World Bank
	$Population_{i,t}$	Log of population of the partner country *i*	World Bank
	$Distance_{i,t}$	Log of distance between Chile and the partner country *i* (in Km)	CEPII
Bilateral Idiosyncratic Variables	$GDP\ difference_{i,t}$	Log of Absolute Value of the difference between GDP per capita of Chile and of the partner country *i* at time *t*. (USD, 2000 base)	World Bank
	$Common\ language_{i}$	Dummy Variable. 1 if the language of the partner country *i* is Spanish. 0 otherwise.	CEPII
	$Adjacency_{i}$	Dummy Variable. 1 if the partner country *i* shares a border with Chile. 0 otherwise.	CEPII
	$Colonial\ link_{i}$	Dummy Variable. 1 if the partner country *i* has a colonial link with Chile. 0 otherwise.	CEPII
Economic Treaties Dummies	*BIT*	Dummy Variable. 1 if the partner country *i* has a Bilateral Investment Treaty signed with Chile at time *t*. 0 otherwise.	Chilean Foreign Committee
	DTTi,t	Dummy Variable. 1 if the partner country *i* has a Double Taxation Treaty signed with Chile at time *t*. 0 otherwise.	Chilean Foreign Committee
	$FTA_{i,t}$	Dummy Variable. 1 if the partner country *i* has a Free Trade Agreement signed with Chile at time *t*. 0 otherwise.	Chilean Foreign Committee
	APECi,t	Dummy Variable. 1 if both Chile and the partner country *i* were members of the Asian Pacific Economic Cooperation at time *t*. 0 otherwise.	APEC website
Trade Blocks Dummies	*EUi,t*	Dummy Variable. 1 the partner country *i* was member of the European Union at time *t*. 0 otherwise.	EU website
	NAFTAi,t	Dummy Variable. 1 the partner country *i* was member of the North American Trade Agreement at time *t*. 0 otherwise.	NAFTA website
	MERCOSURi,t	Dummy Variable. 1 the partner country *i* was member of the Southern Cone Common Market at time *t*. 0 otherwise.	MERCOSUR website
Time Dummies	*Time Dummies*	6 Time Dummy Variables. 1 for each three-year time-period.	-

of source countries' population and distance are negative and significant. The theoretical assumption that more developed economies tend to engage more in foreign direct investment

seems therefore to be confirmed by the data. As we would expect, international investments tend to be sourced by richer countries, i.e. with higher GDP and lower population *ceteris paribus*.

The variable *Distance* is statistically significant at the conventional level and negative in all the estimations. The estimates suggest that a 1% increase in distance leads, *ceteris paribus* and on average, to a decline in FDI that varies between 1.29% and 1.63%, depending on the estimation methodology. Distance has been traditionally seen as a proxy for transport costs between the headquarter and the affiliates and the theoretical suggestion for the negative sign of the coefficients is that FDI in Chile has "vertical" dimension, rather than "horizontal" (see Table 3.1). Moreover, transport costs may negatively affect also the component of "resource-seeking" investment[12] when the foreign investment in the extractive industry is aimed at directly controlling the supplies of raw materials to minimize transaction costs and risks due to international pricing. And this has traditionally been a feature of metal mining TNCs (UNCTAD, 2007).

In the second specification [Columns (3) and (4)], we estimate an "augmented" version of the basic model, in order to evaluate the impact of the entry into force of different models of international economic agreement, such as Free Trade Agreements (FTAs), Double Taxation Treaties (DTTs) and Bilateral Investment Treaties (BITs), and the common membership of APEC (Asian-Pacific Economic Cooperation). Beyond *Economic Treaties* dummies, in order to control for other characteristics of the relation between Chile and the source country, we include in this specification also *Country-pair Variables*, such as common language, sharing a common border, colonial link and GDP per capita difference.

Also in this augmented specification, the coefficients for GDP and population of the Source country maintain the same direction and high statistical significance of the baseline specification,

[12] It is particularly important in Chile where mining is one of the main recipient sectors (See Chapter 1).

independently of the estimation methodology adopted. Moreover, the dimension of their impact on FDI flows is very similar to that estimated for the basic model: for example the coefficient for source country GDP, which in the first specification varies from 1.03 to 1.25, now varies from 0.95 to 1.23. Also the negative and significant effect of distance is confirmed, with a potential reduction of 1.11 - 2.16% of FDI flows for every percentage point increase in distance.

As for *Country-pair Variables*, the coefficients for source-host difference in GDP per capita are not significant at the conventional level in both OLS and TOBIT estimations. The lack of significance of *GDP Difference,* which proxies for labour costs differences and should control for *vertical* FDI between the source country and Chile may seem surprising. However, a possible explanation refers to FDI structure in Chile, where investment in the mining sector and investment driven by the privatization of public service are major components.

Also the coefficients for *Common language* and *Adjacency* dummies are not significantly different from zero in both regressions. While it is quite puzzling not to find a language effect, it seems reasonable to assume that in the case of capital flows, adjacency is not as important as in trade flows. On the contrary, the *colonial link* dummy[13] is positive and highly significant in the OLS estimation, but not significant in the TOBIT one.

Furthermore, we analyze the coefficients related to the "Chilean Economic Foreign Policy". The signature of a BIT between Chile and a FDI source country is found to have a considerable positive impact in both estimation methodologies, significant at 10%. The predicted positive variation is given, on average and ceteris paribus, by [exp (coefficient)-1]*100. Thus, the size of this impact is then computed to be either an increase of 58.41% or 32.84% in FDI flows.

[13] Given the nature of our dataset, the *colonial link* dummy corresponds to a dummy variable for investment originated in Spain, the colonial power linked to Chile.

Table 3.3 **Determinants of FDI flows in Chile: Panel OLS and Tobit Estimations.**

Estimation Method	***Panel OLS***	***Panel TOBIT***	***Panel OLS***	***Panel TOBIT***	***Panel OLS***	***Panel TOBIT***
Dependent Variable	Ln(1+FDI)	Ln(FDI*)	Ln(1+FDI)	Ln(FDI*)	Ln(1+FDI)	Ln(FDI*)
Variables	(1)	(2)	(3)	(4)	(5)	(6)
GDP	1.253***	1.028***	1.226***	0.950***	1.150***	0.926***
	(0.119)	(0.443)	(0.106)	(0.484)	(0.115)	(0.498)
Population	-0.452***	-0.448***	-0.447***	-0.391***	-0.403**	-0.374***
	(0.169)	(0.500)	(0.148)	(0.513)	(0.143)	(0.519)
Distance	-1.632***	-1.299***	-2.160***	-1.119***	-2.216***	-1.264***
	(0.484)	(1.045)	(0.418)	(1.641)	(0.393)	(1.682)
GDP difference	.	.	0.161	0.092	-0.179	0.088
			(0.128)	(0.454)	(0.127)	(0.450)
Common language	.	.	-0.908	0.460	-0.896	0.341
			(0.792)	(2.267)	(0.722)	(2.271)
Adjacency	.	.	-0.784	-0.521	0.445	-0.526
			2.247	(3.641)	(2.167)	(3.628)
Colonial link	.	.	7.384***	1.007	6.684***	0.925
			(1.963)	(5.545)	(2.181)	(5.597)
BIT	.	.	0.460*	0.284*	0.731**	0.394**
			(0.288)	(0.705)	(0.292)	(0.714)
DTT	.	.	-0.078	0.074	-0.308	0.057
			(0.836)	(1.227)	(0.783)	(1.205)
FTA	.	.	0.108	0.419*	-0.471	0.210
			(0.562)	(1.021)	(0.543)	(1.034)
APEC	.	.	0.036	-0.050	-0.763	-0.348
			(0.462)	(0.930)	(0.498)	(1.040)
EU	.	.	.	.	0.869	0.182
					(0.909)	(1.263)
NAFTA	.	.	.	.	4.687***	1.096**
					(1.041)	(1.840)
MERCOSUR	.	.	.	.	-1.248	-0.767**
					(0.830)	(1.509)
Time Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Constant	-5.472	-6.832***	-1.167	-8.215**	0.179	-6.560*
	(4.736)	(10.759)	(4.482)	(16.314)	(4.230)	(16.503)
Log-Likelihood	.	-827.809	.	-822.208		-815.633
Wald Chi^2	227.03	167.21	344.67	182.47	461.65	192.94
(Prob> Chi^2)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Breusch-Pagan	1217.80		810.69		779.70	
(Prob> Chi^2)	(0.000)	.	(0.000)	.	(0.000)	.
Hausman	22.48		49.42		81.27	
(Prob> Chi^2)	(0.192)	.	(0.152)	.	(0.128)	.
Overall R-Squared	0.506	.	0.554	.	0.581	.
Pseudo R-Squared	.	0.509	.	0.524	.	0.531
Uncensored observations	.	241	.	241	.	241
Censored observations	.	838	.	838	.	838
Total observations	1,079	1,079	1,079	1,079	1,079	1,079

Notes: robust standard errors in parenthesis, * Significant at 10%; ** Significant at 5%, *** Significant at 1%. ; for TOBIT estimations, OLS-equivalent estimates displayed

FDI* = FDI if FDI $\geq$1
= 1 if FDI <1

In the literature, an increasing amount of papers has empirically assessed the impact of BITs on FDI flows, with inconclusive results. In one of the first study to evaluate the issue, the UNCTAD (1998) using a cross-section analysis based on about one hundred countries has not found any statistical evidence that these treaties could attract FDI in addition to traditional determinants of institutional quality. Also Hallward-Driemeier (2003), using a 20 years panel dataset, confirmed the lack of an independent effect of BITs of FDIs, after having controlled for other determinants of country attractiveness. However, in recent years, many empirically studies provided more optimistic perspective (e.g. Egger and Pfaffermayer, 2004; Busse, Königer and Nunnenkamp, 2008), even if most authors agree that the strength of the impact of the BITs on FDI inflows are not uniform but depends on several political, regulatory economic factors, both within the host country and globally[14].

In our analysis, given the single-country approach adopted, the variation in the institutional quality is not as important as in a multi-country analysis[15], and our results seem to confirm the optimistic vision on the role played by BITs. With regards to other economic treaties, no statistical significance has been found neither for the entry into force of a DTT, nor for the common membership in APEC. As for the signing of a FTA, there is little statistical evidence of a positive impact in the TOBIT estimation, but not in the OLS one.

Finally, we estimated a full specification of equation (1), where, in order to control for regional fixed effects, we include also *Trade Blocs Dummies*, which indicate the membership of the source country in a regional economic agreement (EU, NAFTA and MERCOSUR). The results [Columns (5) and (6)] do not change dramatically with respect to the second specification.

[14] Neumayer and Spess (2005), for example, suggested that BITs may function as substitutes for poor host country institutional quality and therefore countries with particularly poor institutional quality stand the most to gain from BITs.

[15] However, in regressions not included in this analysis, we have controlled also for changes in different measures of institutional quality in Chile over time and the results do not change significantly. Moreover we included also a dummy to control for the return to democracy of Chile in 1990 and it does not show significant coefficients.

However, some interesting points need to be highlighted. First, there is a significant and positive coefficient associated to NAFTA countries in both OLS and TOBIT estimation. On the contrary, the MERCOSUR dummy has a negative coefficient. Second, the positive impact of the signing of a BIT is confirmed, even after having controlled for trade blocs dummies. Moreover, both the size and the statistical significance of the coefficients increase in this last specification. Third, the coefficients associated with the signing of a FTA are no longer significant.

3.5 Conclusions

In this chapter an empirical analysis of the determinants of FDI inflows into Chile from 1985 to 2005 is presented, through the estimation of a gravity model by both a panel OLS and a panel TOBIT model. The obtained results confirm the validity of the gravitational instrument as a valuable tool to analyse not only bilateral trade flows but also bilateral capital flows. FDI is found to be positively affected by the source country GDP and negatively affected by distance and source country population.

Moreover, we have used the gravity instrument to evaluate the impact on the amount of FDI flows of the signature of bilateral economic agreements, such as BITs, DTTs and FTAs, and of the joint membership to APEC. Independently of the preferred estimation methodology, the entry into force of a BIT is found to have a positive and significant impact on the FDI inflows, while there is little or no evidence of a significant effect of DTTs , FTAs and APEC common membership.

The finding that the signature of a BIT with a country increases the investment flows originated from that country is particularly interesting due to the connected strong policy implications, not only for developing countries, but also for industrialized countries devoted to global development. In fact, “rich countries do not have many direct policy instruments to improve the

amount of FDI received by poor" (Mayer, 2006), because it usually implies policy measures that need to be implemented in the host country rather than in the source country. On the contrary, the signature of a BIT does not require much internal policy effort by the host country and consequently it represents an effective instrument for developed country to boost private investment flows towards developing countries.

CHAPTER 4: THE SECTORAL ANALYSIS

Introduction: FDI for development

There is a broad consensus among international policy-makers and academics that foreign direct investment may constitute a key positive contribution to the development effort of host countries belonging to the developing word. In this optimistic view, FDI is seen not only as an important channel of external financing, less volatile respect to others, but it is also considered to be a source of valuable technology and know-how for local firms.

However, such positive link between FDI inflows and economic growth is still far from being consolidated in the existing empirical literature. In fact, most previous studies at aggregate level failed to find robust evidence corroborating this hypothesis, once endogeneity problems and the heterogeneity of host economies are taken into considerations (Nunnenkamp and Spatz, 2004). Only after having considered host-economy characteristics, the empirical picture seems to get clearer. In 2002, the OECD claimed that, in order to be able to capture the benefits of FDI, developing economies must have reached a minimum level of economic development and must offer an adequate business environment. Several empirical studies supported this hypothesis. Among others, Blomstrom, Lipsey and Zejan (1994) found that the positive impact of FDI on economic growth is limited to higher-income developing countries. Borensztein, De Gregorio and Lee (1998) argued that FDI stimulates growth only in countries with a sufficiently skilled labour force. Balasubramanyam, Salisu and Sapsford (1996) suggested that openness to trade is essential for receiving benefits from FDI inflows. Alfaro et al. (2004) showed how FDI is to be associated with faster economic growth only in those economies with sufficiently well developed financial markets.

Chile is without doubt a country that gathers all these characteristics: it is a high-income developing country, open to trade, relatively technologically advanced and with sufficiently qualified labour force. However, even in a host country where the potential link between FDI and economic development seems empirically verified, an analysis with highly aggregated data can still fail to capture other important aspects of this relationship.

In fact, depending on the investment motivation and on the sector of destination, FDI flows show different features and may have different impacts on the host country economy. Alfaro (2003) argues: "Although it might seem natural to argue that FDI can convey great advantages to host countries, such gains might differ widely across primary, manufacturing and services". Actually, investment in different sectors is characterized by a different connection with host countries. For instance, resource-seeking FDI in the primary sector typically involves large up-front transfer of capital, technology and know-how and implies the generation of high government revenues. On the other hand, they are often concentrated in enclaves with few linkages to local firms and the domestic market, implying that their contribution to local value creation may be limited (UNCTAD, 2007). On the contrary, efficiency-seeking investment in manufacturing is less likely to contribute significantly to government revenues, but it usually brings in technology compatible with the host country's development level, and it enables local firms to benefit from spillovers through both adaptation and imitation. Moreover, FDI in manufacturing industries with higher technological intensity seems to have a higher impact on development (Dutt, 1997; Marasco, 2002). Finally, market-seeking FDI in service or manufacturing can benefit consumers by introducing new products and a more efficient level of service provision or innovating local production and marketing. At the same time, it may lead to the crowding out of local firms and to the potential deterioration of the balance of payment of the host country through profit repatriation.

Then, sectors of destination of FDI are likely to shape the benefits of FDI in various way and, depending on the host country development level and idiosyncratic characteristics, a country will benefit more or less from different forms of investment. But investment in different sectors is driven by different factors (see, for example, Resmini, 2000 and 2007) Therefore, an analysis at disaggregated sector level is crucial to understand which are the determinants of different forms of foreign investment and to provide key elements for policy-making.

Using the estimation model introduced in the previous chapter, this Chapter presents an empirical analysis on the determinants of FDI inflows into Chile by sector of destination and by technology intensity. In Section 4.1 the data disaggregation used is presented and analyzed. Section 4.2 adapts the econometric framework to the sectoral analysis and Section 4.3 discusses the results. Finally, Section 4.4 concludes, focusing on the policy implications of the results.

4.1 Disaggregating the data

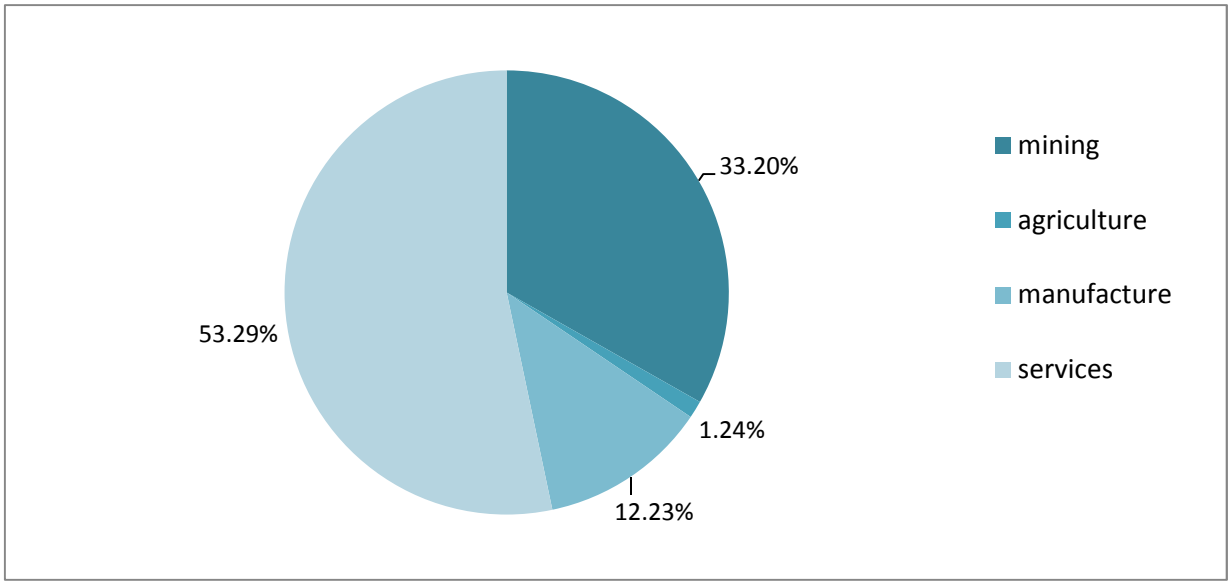
In order to develop a sectoral-level analysis, the foreign investment data described in Chapter 3 have been disaggregated by their destination towards four macro-sectors: mining, agriculture, manufacturing and services[16]. Even if it would have been interesting to perform an industry-level study, the number of observations and the frequency of zeros do not allow obtaining reliable results at a more disaggregated level.

As described in Chapter 1, the foreign direct investment into Chile has been mainly concentrated in mining and services. In Figure 4.1 it is shown the percentage composition of total materialized FDI inflows in Chile from 1985 to 2005 by macro-sector of destination. Foreign investment in

[16] The sectors have been defined following the ISIC rev.3 classification.

services accounted for 53.29% of global investment. Mining accounted for 33.20%, while investment in manufacturing and agriculture were respectively 12.23% and 1.24% of the total. However, if we consider the number of yearly positive observations included in our dataset, we find a different picture: we observe 470 positive observations in the service sector, 402 in manufacturing, 208 in agriculture and only 173 in the mining sector[17] (See Figure 4.2). Moreover, the analysis of the number of partners for each sector shows that FDI in mining has arrived in Chile from only 22 countries, compared with 26 partner countries in agriculture, 36 in manufacturing and 46 in the service sector (See Figure 4.3).

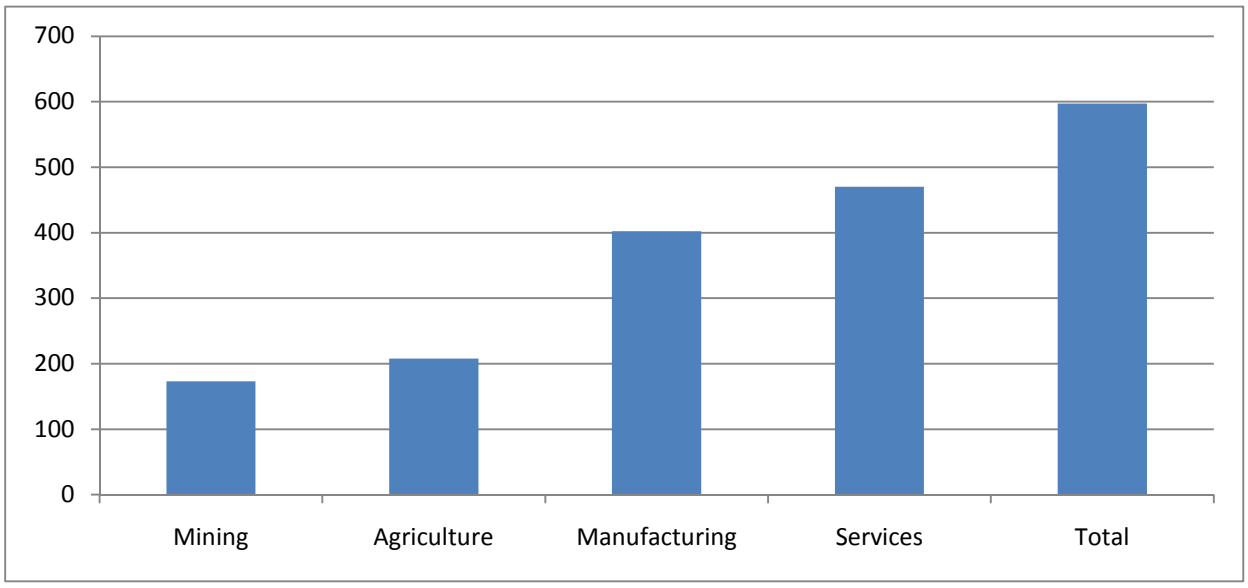
Figure 4.1 Materialized FDI in Chile by macro-sector of destination (%), 1985-2005



Source: author's elaboration on data provided by Chilean Foreign Investment Committee

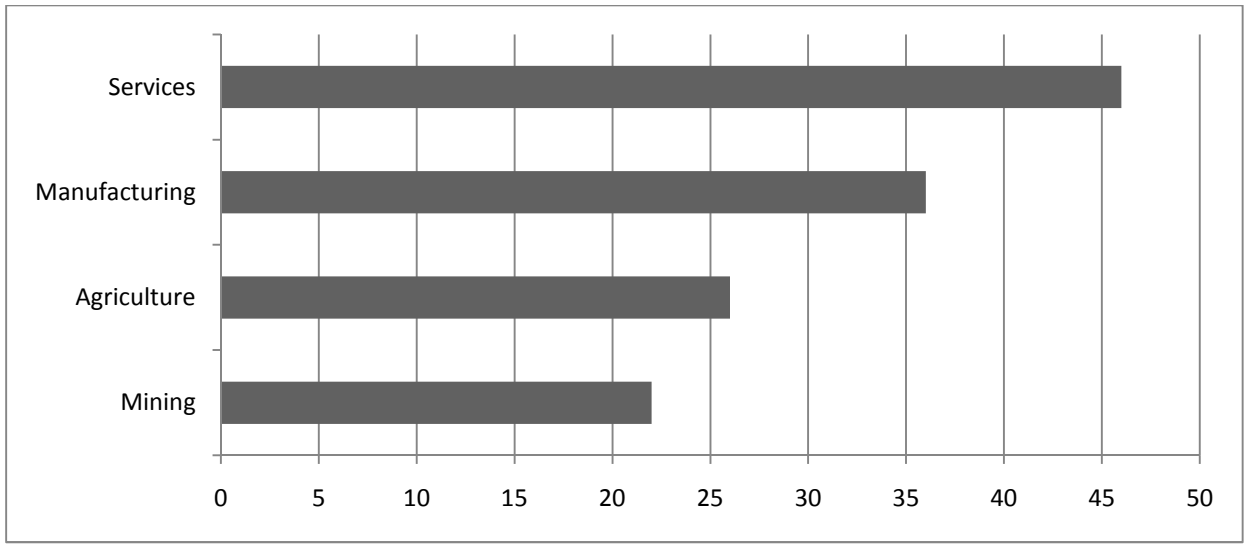
[17] The total number of yearly observations in our dataset is 3465, given by 165 partner countries multiplied by 21 years (1985-2005).

Figure 4.2 Number of positive observations by macro-sector of destination, 1985-2005



Source: author's elaboration on data provided by Chilean Foreign Investment Committee

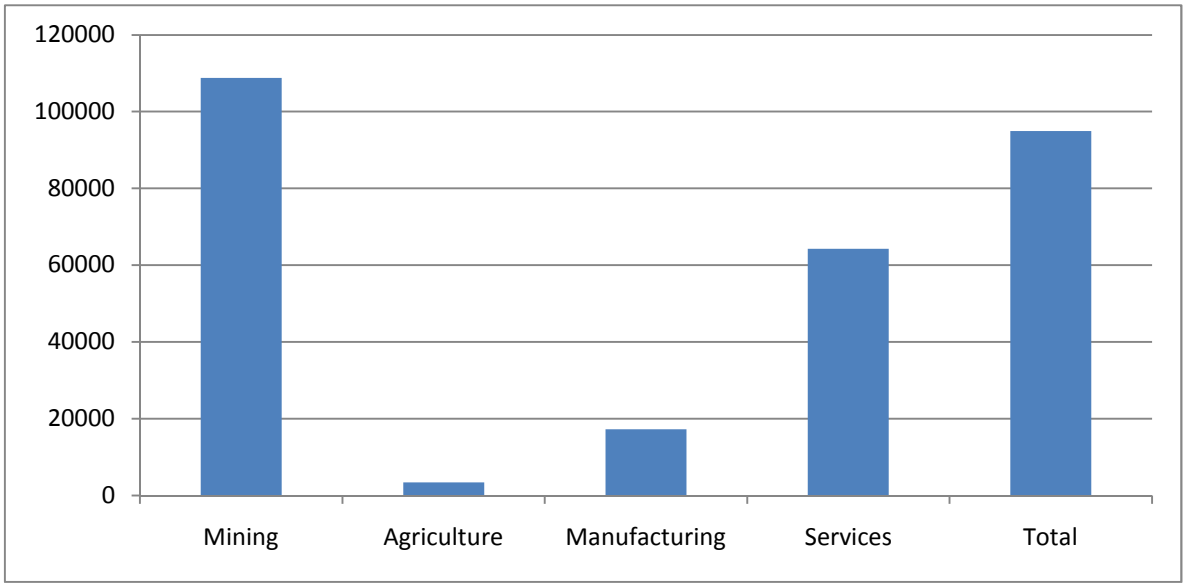
Figure 4.3 Number of FDI-source countries by macro-sector of destination, 1985-2005



Source: author's elaboration on data provided by Chilean Foreign Investment Committee

So, considering the average amount of investment, in the mining sector the positive observations averaged over one hundred million dollars; the same figure for services amounts to 64.2 million dollars, while in manufacturing (17.2 millions) and agriculture (3.3 millions) we observe a much more fragmented investment structure (See Figure 4.4). As in the case of the extractive industry, the concentration of the investment both in terms of frequency and in terms of partner countries is explained by the fact that this sector is largely dominated by large-scale, capital-intensive investment (UNCTAD, 2007). The figure for services may be justified by the relatively recent opening of many sectors to foreign investment and by the participation of foreign investors in the privatization process of public services in the 1990s, which has caused inflows of relevant magnitude concentrated in few years.

Figure 4.4 Average amount of observed investment by macro-sector of destination (US$ thousands), 1985-2005



Source: author's elaboration on data provided by Chilean Foreign Investment Committee

On the contrary, the aggregate investment in the manufacturing sector is characterized by a number of observations relatively high with respect to the total amount of the investment. This, together with good data availability, allows us to deepen the analysis about this sector, disaggregating the recipient industries by technology intensity.

Table 4.1 Classification of FDI sector destination based on technology

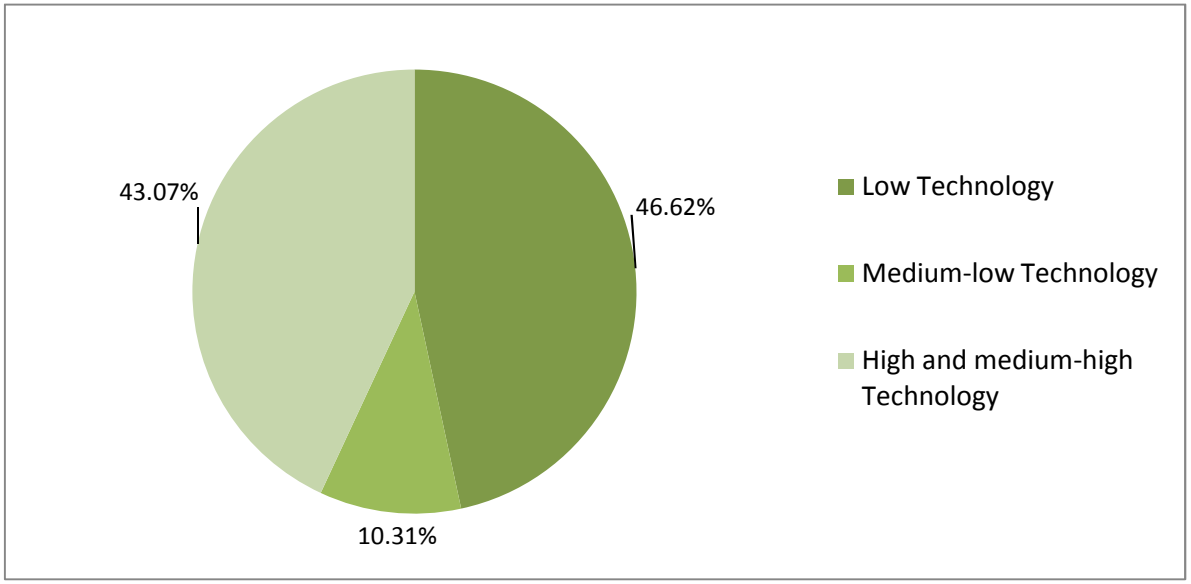
Sector		*Industry*	*ISIC Rev.3*
Agriculture		Agriculture, hunting and forestry	1-2
		Fishing	5
Mining		Mining and quarrying	10-14
Manufacturing	High and Medium-High Technology	Chemicals	24
		Machinery and Equipment, n.e.c.	29
		Office, accounting and computing machinery	30
		Electrical machinery and apparatus, n.e.c.	31
		Radio, TV and communications equipment	32
		Medical, precision and optical instruments	33
		Motor vehicles, trailers and semi-trailers	34
		Transport equipment, n.e.c.	35
	Medium-Low Technology	Coke, refined petroleum products and nuclear fuel	23
		Rubber and Plastics products	25
		Other Non-metallic mineral products	26
		Building and repairing of ships and boats	351
		Basic metals and fabricated metal products	27-28
	Low Technology	Food products, beverages and tobacco	15-16
		Textiles, textile products, leather and footwear	17-19
		Wood, pulp, paper, paper products, printing and publishing	20-22
		Manufacturing, n.e.c.; recycling	36-37
Services		Post and Telecommunications	64
		Financial Intermediation	65-67
		Renting and Business Activities	71-74
		Education, Health and social work	80,85
		The rest of services	40-45, 50-63, 70,75,90-99

Source: OECD (2005)
Note: respect to the original classification, it has been impossible maintain the distinction between Manufacturing High Technology and Medium-High Technology Sectors because of the Chilean data aggregation. Consequently these two categories have been merged.

In order to classify the manufacturing sector according to technology intensity, we followed the criteria set by OECD (2005) with only one modification: in our analysis, because of data limitation, medium-high technology industries have been considered as high technology (See Table 4.1).

After reclassification, it is interesting to note how the investment in Chilean manufacturing is concentrated in high and medium-high technology industry and in low-technology industry, rather than in medium-low technology one (See Figure 4.5).

Figure 4.5 FDI in the manufacturing sector by technology intensity (%), 1985-2005



Source: author's elaboration on data provided by Chilean Foreign Investment Committee

4.2 Empirical Model and Estimation Strategy

The empirical analysis contained in this Chapter consists of two different exercises. First, in order to empirically test whether FDI flows towards different sectors are influenced by different determinants, and whether the gravity equation is a useful tool also after disaggregating by sector of destination, we apply the econometric model presented in Chapter 3 separately for investment in the mining, agriculture, manufacturing and service sector. Second, we further deepen the analysis in the manufacturing sector, disaggregating the investment by technological intensity. Remaining in the same analytical framework, we aim to test if investment with different technological content is influenced by different factors.

In the same way as in the case of aggregate investment flows, in our model FDI in each sector depends on *(i)* the characteristics of the source country; *(ii)* its distance from Chile; *(iii)* the characteristics of the relation between the source country and Chile; *(iv)* the Economic Treaties signed between the source country and Chile; and *(v)* the belonging of source countries to different trade blocs. Additionally, time-dummies and geographical-origin dummies (for Europe, Latin America, and North America) are included. Formally, we estimate four equations (one each macro-sector) of this form:

$$FDIs_{j,t} = \alpha\,(GDP_{j,t})^{\beta}\,(Population_{j,t})^{\gamma}\,(Distance_{j})^{\delta}\,(GDP\ Difference_{j,t})^{\zeta} \exp(\theta\ Common\ Language_{j} + \kappa\ Adjacency_{j} + \lambda\ Colonial\ Link_{j} + \mu\ BIT_{j,t} + \nu\ DTT_{j,t} + \xi\ FTA_{j,t} + \pi\ APEC_{j,t} + \rho\ EU_{j,t} + \tau\ NAFTA_{j,t} + \varphi\ MERCOSUR_{j,t} + \psi\ Time\ Dummies + \varsigma\ Regional\ Dummies + \upsilon_{j,t}) \quad (4.1)$$

where subscripts *j* and *t* represent the source country and the time period to which the variable is referred, respectively. The time unit considered is also in this case a three-year period. $FDIs_{j,t}$ is the amount of investment flow in the sector s (where s refers alternatively to mining, agriculture, manufacturing or services), while the independent variables remain the same as described in

Section 3.2. Given the higher number of observations equal to zero respect to the baseline model, we exclude the OLS methodology and apply only the TOBIT estimation model. Therefore, we assume the dependent variable bounded below by zero and consider a modified equation, where the FDI in each sector is strictly positive only when the right-hand side achieves a minimum threshold value B. Thus, the equations to be estimated become:

$$FDIs_{j,t} = \max [-B+ \alpha(GDP_{j,t})^{\beta} (Population_{j,t})^{\gamma} (Distance_{j})^{\delta} (GDP\ Difference_{j,t})^{\zeta} \exp (\theta\ Common\ Language_{j} + \kappa\ Adjacency_{j} + \lambda\ Colonial\ Link_{j} + \mu\ BIT_{j,t} + \nu\ DTT_{j,t} + \xi\ FTA_{j,t} + \pi\ APEC_{j,t} + \rho\ EU_{j,t} + \tau\ NAFTA_{j,t} + \varphi\ MERCOSUR_{j,t} + \psi\ Time\ Dummies + \varsigma\ Regional\ Dummies + \upsilon_{j,t}), 0] \quad (4.2)$$

And, taking natural logarithms and assuming the threshold value B equal to 1:

$$Ln\ (FDIs_{j,t} + 1) = \max [\ \ln \alpha + \beta * \ln (GDP_{j,t}) + \gamma * \ln (Population_{j,t}) + \delta * \ln (Distance_{j,t}) + \zeta * \ln (GDP\ Difference_{j,t}) + \theta * CommonLanguage_{i} + \kappa * Adjacency_{j} + \lambda * Colonial\ Link_{j} + \mu * BITj,t + \nu * DTT_{j,t} + \xi * FTA_{j,t} + \pi\ APEC_{j,t} + \rho\ EU_{j,t} + \tau\ NAFTA_{j,t} + \varphi\ MERCOSUR_{j,t} + \psi\ Time\ Dummies + \varsigma\ Regional\ Dummies\ \upsilon_{j,t}, 0] \quad (4.3)$$

Equation (4.3) is then estimated by maximum likelihood, where the maximum likelihood function is built using a threshold Tobit model. Given that in the case of a TOBIT model in a short panel setting there are no simple consistent estimators for fixed effects models, we perform a random effects estimation.

In the second exercise we focus exclusively on the manufacturing sector and we apply the same methodology to evaluate investment in industries with different technology intensity. Then, we estimate three equations of the form:

$$Ln\,(FDITECH_{j,t}+1) = \max\,[\,\ln\alpha + \beta*\ln\,(GDP_{j,t}) + \gamma*\ln\,(Population_{j,t}) + \delta*\ln\,(Distance_{j,t}) + \zeta*\ln(GDP\ Difference_{j,t}) + \theta*CommonLanguage_i + \kappa*Adjacency_j + \lambda*Colonial\ Link_j + \mu*BITj,t + \nu*DTT_{j,t} + \xi*FTA_{j,t} + \pi\,APEC_{j,t} + \rho\,EU_{j,t} + \tau\,NAFTA_{j,t} + \varphi\,MERCOSUR_{j,t} + \psi\ Time\ Dummies + \varsigma\ Regional\ Dummies\ v_{j,t}, 0] \quad (4.4)$$

where $FDITECH_{j,t}$ represents alternatively investment in high and medium high technology industries, in medium-low technology industries or in low technology industries.

4.3. Results and discussion

Following the estimation strategy previously described, we present in this Section the empirical results obtained for each regression. The estimation results are so organized: Tables 4.2 to 4.5 present the OLS-equivalent coefficients resulted by the TOBIT estimation of equation (4.3) in mining, agriculture, manufacturing and services. Similarly to the exercise on the aggregate flows, we proceed to estimate three different specifications of the equation for each considered sector. The first column of each set of results contains the baseline estimation, to which we sequentially add *Country-Pair Variables* and *Economic Treaties Dummies* in the second column, and *Trade Blocs Dummies* in the third column. In Table 4.6 the signs of the coefficients obtained through the estimation of the full specification of equation (4.3) are resumed. Next, in Table 4.7 the OLS-equivalent coefficients resulted by the estimation of full equation (4.4) for three different levels of technology intensity are displayed. Finally, in Table 4.8 overall results are summarized.

As expected, in all performed regressions the coefficients for the GDP of the source countries are positive and statistically significant, while those for population of the source country are negative and significant (with the only exception of the mining sector, where the coefficients are negative but not significant). Independently from the sector of destination, richer countries direct more FDI towards Chile. Moreover, also the variable accounting for distance shows negative and

significant coefficients for all the sectors. Surprisingly, the investment found to be more affected by distance is that in the services sector, where physical transportation costs is much less important than for other industries. In this case we could reinterpret transportation costs in terms of information and communication costs (Jeon, Tang and Zhu, 2005). In other words, larger distance could be an impediment because it raises the cost of getting information on the host country and because it restricts communication, monitoring and networking between headquarters and affiliates[18]. Considering the coefficient of specification (4.3), an increase of one percentage point in distance leads, on average and *ceteris paribus*, to a decline in FDI in services of 1.03%.

As regards *Country-pair Variables*, coherently with the aggregate estimations, the coefficients for *GDP Difference, Common Language, Adjacency* and *Colonial Link* variables are not statistically significant at the conventional levels in any sector[19].

However, if on one side the analysis of the coefficients of the variables included into the basic gravity equation (i.e. those of specification (1)) and of *Country-pair Variables* does not substantially diverge from the aggregate picture described in Chapter 3, on the other side we found some relevant differences when evaluating the effectiveness of different instruments of the Chilean Foreign Economic Policy.

First, while at aggregate level the signature of a BIT between Chile and a FDI source country was found to have a considerable positive impact in both estimation methodologies used, when the analysis is disaggregated by sector, a BIT between Chile and a FDI-source country is found to have a positive and significant effect only in the service sector. In this case, its effect is computed in an increase in FDI inflows, on average and *ceteris paribus,* of 47.84%. This result

[18] See, for example, Buch and Lipponer (2007) for the case of the banking sector.
[19] The only exception is the coefficient of *GDP difference* in the mining sector, which is found to be positive and significant.

seems to be explained by the fact that a large part of FDI in the service sector was brought in the country by the privatization of public services. Obviously, these industries are particularly risky for the investors in terms of direct or indirect expropriation. Consequently, it seems reasonable that investment in services may result particularly sensitive to the international protection warranted by a BIT. For the same reasons, it is surprising the lack of significance of BITs in the extractive sector. In fact, as Poulsen (2009) points out, one can expect natural resource investors to take more notice of BITs because historical experience shows that resource extraction industry has been particularly prone to discriminatory or even predatory government interference. Also FDI in the manufacturing sector as a whole does not seem to be influenced by the signature of a BIT. However, if we look at the results obtained after having disaggregated by technological intensity, the picture changes. Here we find that the BIT coefficient in the highly technological intensive industries is positive and highly significant. In particular, the signature of a BIT increases FDI inflows by 37.3%.

Second, a different and interesting finding regards the coefficients related to the signature of a fiscal treaty. In fact, from the analysis in Chapter 3, DTTs were not found to be a significant driver of aggregate FDI flows. But, when disaggregated by sector, we can observe a positive impact in the mining sector, computed in an increase of 65.69% in incoming flows. In the economic literature, taxation treaties are supposed to play four major roles in affecting FDI, two of which are likely to increase flows and two of which reduce them (Blonigen and Davies, 2004). First, tax treaties standardise definitions and jurisdictions, reducing in this way double taxation of affiliate income. Second, tax treaties lower withholding taxes and increase tax certainty. These two effects combined should increase the expected value of after-tax returns from FDI, leading one to expect the introduction of a treaty to increase FDI flows. However, this positive impact can be offset by two FDI-reducing effects of treaties. First, there is an increasing enforcement of transfer pricing regulations. Second, treaties often establish anti-treaty shopping provisions that inhibit the ability to funnel profits through low-tax treaty partners in order to minimize tax

payments. Since these effects increase the taxation of affiliate income, it could be possible that a tax treaty could in facts reduce FDI flows (Davies, Norbäck and Tekin-Koru, 2009). Given the conflicting directions of these effects, which one dominates is an interesting empirical question.

In the literature there is only a small set of studies on the issue, and, likewise the case of BITs impact, there is not unanimous consensus[20]. Focusing on the mining sector, there are two potential reasons to explain why it may be positively influenced by signing DTTs. First, most investment in the extractive industry is capital-intensive and with a long time horizon. It means that foreign investors are particularly influenced by the certainty and stability over time of the fiscal environment[21]. Second, the dimension and strategic relevance of the investment makes more difficult fiscal elusion, regardless of fiscal treaties. So, the positive effects of DTTs on FDI flows are amplified, while negative effects are cushioned and therefore fiscal treaties could actually stimulate investment flows in the mining sector.

Passing to the evaluation of FTAs, the empirical results seem to indicate a positive effect on the flows in the manufacturing and service sector. However, when disaggregated by technology intensity, signing a FTA results affecting only flows towards industries with low or medium technology intensity. The aggregate impact of trade liberalization between two countries on investment flows is theoretically ambiguous and depends on the kind of FDI. If FDI is horizontal, with tariff jumping as its motive, the reduction in trade barriers should lead to a reduction in FDI, as trade and foreign investment are alternative ways to serve the domestic market. On the contrary, if FDI is vertical, a FTA should increase FDI, as transactions costs to engage in vertical integration across international borders are reduced (Levy Yeyati, Stein and Daude, 2003). Therefore, the results seem to suggest the hypothesis of vertical FDI in Chilean

[20] For example, Egger et al. (2009) find that taxation treaties significantly reduce FDI stocks, while Neumayer (2006) find that developing countries that sign a DTT with the United States benefit from a higher FDI stock.

[21] In a survey of 39 mining TNCs on factors influencing their investment decisions, the ability to predetermine tax liability and the stability of fiscal regime were included in the top 10 highest ranked criteria (Otto, 1992)

lower-technology manufacturing. Finally, as regards the APEC membership, there is little evidence of a significant effect in any sector.

4.4 Conclusions

This chapter contains an empirical analysis of the determinants of FDI inflows into Chile, disaggregated by sector of destination, and, in the case of the manufacturing sector, also by technology intensity. The results show that, independently of the sector, FDI is positively correlated to the GDP of the source country and negatively influenced by its population. As regards distance, it is found to have a negative impact of FDI flows in all the sectors. However, the coefficients' dimension seems to suggest that distance may be seen as a proxy not only for transport costs, but also for information costs.

Moreover, the disaggregated analysis supports the hypothesis that different economic treaties are more important in certain industries than in others. In particular, BITs are found to be important in stimulating FDI flows in the service sector and in high-technology intensive manufacturing; DTTs positively influence inflows in the mining sector, while FTAs have a significant impact on inflows in low-technology intensive manufacturing and services. Common APEC membership is found not to have influenced significantly FDI inflows in any sector.

Clearly, if it is to be argued that different investment treaties may have different impacts on FDI flows in a country depending on the sector of destination, this assumption has strong policy implication. First, the cost-benefits analysis of an agreement should be modified to take in account which sectors are the most benefited and whether they are a government's priority. In other words, the potential host government has new elements to decide if the benefits of the additional FDI flows may offset the costs of signing that treaty, both in terms of direct negotiation costs and in terms of indirect economic costs. This is particularly relevant in the case

of developing countries, whose benefits from an investment treaty derive principally by higher investment flows and not by enhanced environment for their own foreign investment in the partner country.

Table 4.2: Determinants of FDI flows in Mining: Panel Tobit Estimations

Variables	**Ln(FDI_M*)** (1)	**Ln(FDI_M*)** (2)	**Ln(FDI_M*)** (3)
GDP	0.292***	0.180***	0.187***
	(1.003)	(0.965)	(0.969)
Population	-0.094	-0.018	-0.022
	(-1.319)	(1.169)	(1.160)
Distance	-0.632**	-0.870***	-0.892***
	(-8.871)	(4.631)	(4.605)
GDP difference		0.195**	0.191**
		(1.059)	(1.066)
Common language		-0.487	-0.502
		(4.624)	(4.563)
Adjacency		-0.050	-0.074
		(4.642)	(6.594)
Colonial link		0.942	0.975
		(9.348)	(9.290)
BIT		0.072	0.080
		(1.472)	(1.532)
DTT		0.503***	0.505***
		(1.993)	(2.018)
FTA		-0.010	-0.020
		(1.868)	(2.047)
APEC		0.151	0.128
		(1.730)	(2.004)
EU			-0.087
			(2.852)
NAFTA			0.023
			(3.064)
MERCOSUR			-0.094
			(2.667)
Time Dummies	YES	YES	YES
Regional Dummies	YES	YES	YES
Constant	-0.782	1.497	1.618
	(32.629)	(39.238)	(38.951)
Log-Likelihood	-324.444	-310.627	-310.426
Wald Chi^2	35.97	50.68	52.12
(Prob> Chi^2)	(0.000)	(0.000)	(0.000)
Uncensored Observations	75	75	75
Censored Observations	978	978	978
Total Observations	1053	1053	1053

Notes: OLS-equivalent estimates with robust standard errors in parenthesis
* Significant at 10%; ** Significant at 5%, *** Significant at 1%

$FDI_M^* = FDI_M$ if $FDI_M \geq 1$
$= 1$ if $FDI_M < 1$

Table 4.3: Determinants of FDI flows in Agriculture: Panel Tobit Estimations

Variables	**Ln(FDI_A*)** (1)	**Ln(FDI_A*)** (2)	**Ln(FDI_A*)** (3)
GDP	0.622***	0.568***	0.585***
	(1.111)	(1.329)	(1.345)
Population	-0.365***	-0.328***	-0.333***
	(1.010)	(1.208)	(1.210)
Distance	-0.576**	-0.545*	-0.588*
	(2.795)	(3.298)	(3.314)
GDP difference		0.003	0.031
		(0.839)	(0.843)
Common language		0.157	0.139
		(3.684)	(3.640)
Adjacency		0.175	0.149
		(5.144)	(5.054)
Colonial link		-0.133	-0.067
		(6.857)	(6.731)
BIT		-0.012	0.012
		(1.169)	(1.192)
DTT		-0.002	-0.019
		(1.847)	(1.856)
FTA		0.173	0.162
		(1.601)	(1.707)
APEC		0.264*	0.194
		(1.519)	(1.739)
EU			-0.190
			(1.854)
NAFTA			0.158
			(2.895)
MERCOSUR			-0.113
			(2.541)
Time Dummies	YES	YES	YES
Regional Dummies	YES	YES	YES
Constant	-5.016**	-4.817	-4.765
	(25.673)	(32.667)	(32.579)
Log-Likelihood	-390.084	-387.268	-386.45
Wald Chi^2	61.08	67.86	69.99
(Prob> Chi^2)	(0.000)	(0.000)	(0.000)
Uncensored Observations	101	101	101
Censored Observations	952	952	952
Total Observations	1053	1053	1053

Notes: OLS-equivalent estimates with robust standard errors in parenthesis
* Significant at 10%; ** Significant at 5%, *** Significant at 1%

$FDI_A^* = FDI_A$ if $FDI_A \geq 1$
$= 1$ if $FDI_A < 1$

Table 4.4: Determinants of FDI flows in Manufacturing: Panel Tobit Estimations

Variables	**Ln(FDI_{MAN}*)** (1)	**Ln(FDI_{MAN}*)** (2)	**Ln(FDI_{MAN}*)** (3)
GDP	0.999***	1.059***	1.026***
	(0.660)	(0.799)	(0.799)
Population	-0.518***	-0.583***	-0.562***
	(0.642)	(0.750)	(0.741)
Distance	-1.460***	-0.981***	-0.935**
	(1.856)	(2.162)	(2.204)
GDP difference		-0.047	-0.032
		(0.452)	(0.453)
Common language		0.597	0.538
		(2.316)	(2.231)
Adjacency		0.278	0.274
		(3.188)	(3.196)
Colonial link		0.178	0.070
		(4.823)	(4.828)
BIT		0.104	0.192
		(0.791)	(0.791)
DTT		0.058	0.071
		(1.128)	(1.104)
FTA		0.505***	0.313*
		(0.996)	(1.013)
APEC		-0.116	-0.443**
		(1.064)	(1.231)
EU			0.348
			(1.311)
NAFTA			1.073***
			(1.978)
MERCOSUR			-0.207
			(1.635)
Time Dummies	YES	YES	YES
Regional Dummies	YES	YES	YES
Constant	-3.590	-8.126	-8.081
	(15.764)	(21.093)	(21.288)
Log-Likelihood	-609.962	-602.813	-596.588
Wald Chi^2	134.37	143.74	153.17
(Prob> Chi^2)	(0.000)	(0.000)	(0.000)
Uncensored Observations	183	183	183
Censored Observations	870	870	870
Total Observations	1053	1053	1053

Notes: OLS-equivalent estimates with robust standard errors in parenthesis
* Significant at 10%; ** Significant at 5%, *** Significant at 1%

FDI_{MAN}* = FDI_{MAN} if $FDI_{MAN} \geq 1$
= 1 if $FDI_{MAN} < 1$

Table 4.5: Determinants of FDI flows in Services: Panel Tobit Estimations

Variables	**Ln(FDI_{SERV}*)** (1)	**Ln(FDI_{SERV}*)** (2)	**Ln(FDI_{SERV}*)** (3)
GDP	0.867***	0.749***	0.750***
	(0.509)	(0.527)	(0.528)
Population	-0.329***	-0.261**	-0.261**
	(0.537)	(0.535)	(0.521)
Distance	-1.128***	-0.885**	-1.029***
	(1.758)	(1.974)	(1.959)
GDP difference		0.103*	0.094
		(0.434)	(0.428)
Common language		0.324	-0.155
		(2.071)	(2.005)
Adjacency		-0.486	-0.578
		(3.178)	(3.075)
Colonial link		1.214	1.179
		(4.817)	(4.669)
BIT		0.302**	0.391***
		(0.726)	(0.733)
DTT		-0.125	-0.089
		(1.068)	(1.051)
FTA		0.598***	0.417**
		(0.945)	(0.969)
APEC		0.076	-0.156
		(0.976)	(1.103)
EU			0.262
			(1.326)
NAFTA			0.783**
			(1.960)
MERCOSUR			-0.812***
			(1.524)
Time Dummies	YES	YES	YES
Regional Dummies	YES	YES	YES
Constant	-6.824**	-8.025**	-6.581**
	(15.553)	(18.153)	(17.691)
Log-Likelihood	-719.660	-709.726	-703.398
Wald Chi^2	161.47	190.56	205.70
(Prob> Chi^2)	(0.000)	(0.000)	(0.000)
Uncensored Observations	207	207	207
Censored Observations	846	846	846
Total Observations	1053	1053	1053

Notes: OLS-equivalent estimates with robust standard errors in parenthesis
* Significant at 10%; ** Significant at 5%, *** Significant at 1%

FDI_{SERV}* = FDI_{SERV} if $FDI_{SERV} \geq 1$
= 1 if $FDI_{SERV} < 1$

Table 4.6 Determinants of sectoral FDI flows in Chile: resume table

Sector / *Variable*	Mining	Agriculture	Manufacturing	Services
GDP	+	+	+	+
Population		-	-	-
Distance	-	-	-	-
GDP difference	+			
Common language				
Adjacency				
Colonial link				
BIT				+
DTT	+			
FTA			+	+
APEC			-	
EU				
NAFTA			+	+
MERCOSUR				-

Notes:

+	Positive and significant coefficient
-	Negative and Significant coefficient
otherwise	Not significant coefficient

Table 4.7 Determinants of FDI flows in Manufacturing by technology intensity

Variables	$Ln(FDITECH_L^*)$ (1)	$Ln(FDITECH_M^*)$ (2)	$Ln(FDITECH_H^*)$ (3)
GDP	0.794***	0.468***	0.827***
	(1.024)	(2.241)	(1.264)
Population	-0.342***	-0.319**	-0.588***
	(0.937)	(2.187)	(1.279)
Distance	-1.101***	-0.524***	-0.508***
	(2.953)	(3.543)	(2.615)
GDP difference	0.075	-0.093	-0.066
	(0.685)	(1.034)	(0.610)
Common language	0.447	0.065	-0.063
	(2.956)	(3.141)	(2.916)
Adjacency	0.247	-0.208	0.397
	(4.057)	(5.374)	(3.657)
Colonial link	0.556	0.416	0.273
	(5.998)	(5.472)	(5.422)
BIT	0.115	-0.157	0.317***
	(1.136)	(1.857)	(0.978)
DTT	0.144	0.074	-0.180
	(1.514)	(2.649)	(1.498)
FTA	0.491***	0.285**	-0.225
	(1.437)	(2.447)	(1.411)
APEC	-0.378*	-0.270	0.088
	(1.723)	(3.616)	(1.486)
EU	-0.271	0.259	0.486***
	(2.143)	(3.398)	(1.501)
NAFTA	0.467	0.537**	0.700**
	(2.711)	(4.722)	(2.391)
MERCOSUR	-0.163	0.151	0.056
	(2.313)	(2.874)	(1.789)
Time Dummies	YES	YES	YES
Regional Dummies	YES	YES	YES
Constant	-5.636	-1.547	-6.444**
	(27.424)	(31.024)	(25.936)
Log-Likelihood	-514.169	-245.252	-439.239
Wald Chi^2 (23)	97.74	61.64	106.43
(Prob> Chi^2)	(0.000)	(0.000)	(0.000)
Uncensored Observations	138	60	129
Censored Observations	915	993	924
Total Observations	1053	1053	1053

Notes: OLS-equivalent estimates with standard errors in parenthesis
* Significant at 10%; ** Significant at 5%, *** Significant at 1%

FDI* = FDI if FDI ≥1
= 1 if FDI <1

Table 4.8: Determinants of sectoral FDI flows in Chile by technology intensity: resume table

Sector / *Variable*	Mining	Agriculture	Manufacturing			Services
			Low Technology	Medium Technology	High Technology	
GDP	+	+	+	+	+	+
Population		-	-	-	-	-
Distance	-	-	-	-	-	-
GDP difference	+					
Common language						
Adjacency						
Colonial link						
BIT					+	+
DTT	+					
FTA			+	+		+
APEC			-			
EU					+	
NAFTA				+	+	
MERCOSUR						-

Notes:

+	Positive and significant coefficient
-	Negative and Significant coefficient
otherwise	Not significant coefficient

CONCLUSIONS AND DISCUSSION

Over the last 30 years FDI has significantly contributed to the rapid and sustained economic growth of Chile. Primarily attracted by the enormous availability of natural resources of the country, foreign investors have been also stimulated by its political and economic stability, its favourable legal framework and its good communication network. As a consequence, Chile has been one of the most significant recipients of FDI flows in developing countries in the last decades and the presence of foreign investment is today a main feature of its economic structure. In fact, the investor's presence was maintained also during exogenous crisis periods, such as, for example, the financial crisis of the late 1990s, granting a large part of the country's gross fixed capital formation.

Therefore, identifying the relevant determinants of FDI in the country is a priority research area in order to fully understand the sustained development path of Chile and to give useful indications for domestic and international policy-makers. This thesis contributes to the comprehension of the issue, with a particular focus on the role played by different components of the so-called Chilean Economic Foreign Policy, in order to enrich the debate on the validity of bilateral economic agreements as instrument to stimulate FDI flows in developing countries.

First, we set the scenario, by describing the main features of FDI flows in the country (in Chapter 1), and by presenting the Gravity Model, our chosen methodological tool (in Chapter 2). Then, in the empirical part of the thesis, we test the validity of the gravity equation in modeling FDI inflows into a developing country and to investigate the determinants of FDI in Chile, using panel data on the flows entering the country from 165 world countries from 1985 to 2005. Our strategy consisted of three levels of analysis: first, in Chapter 3, we performed an aggregate-level analysis on total bilateral flows between each source country and Chile. Next, in Chapter 4, we repeated the exercise on data disaggregated by sector of destination. Finally, we proceed to a

further refining of the analysis, disaggregating FDI directed to the manufacturing sector by technological intensity.

Some potential limitations are present in the empirical analysis. First, the available data on investment flows disaggregated by sector and geographical origin are only those arrived in the country through the DL 600 mechanism, but a consistent part of the foreign investment into Chile has entered through other legal mechanisms (See Section 1.2). At aggregate level, the flows through the DL 600 are highly correlated with the total data in the period 1985-2005, but we cannot be sure that it stands also by geographical origin or by sector of destination. This may lead to biased estimates of the impact of the selected variables on the inflows of FDI. Also the choice of 1985 as a beginning year and 2005 as a final year for the analysis was forced by the availability of disaggregated data. A longer period would improve the accuracy of the model. Second, the model of this study does not directly consider the relation between foreign investment and trade between countries, neither the impact of the exchange rate on FDI flows. Moreover, the econometric analysis may potentially suffer of endogeneity. While signing a BIT, DTT or FTA could increase FDI flows to a country, we cannot rule out reverse causality, i.e. that heavily engaged investors may have influenced their government to sign treaties with Chile with the aim of increasing certainty about repatriation of profits, taxations and other related issues. Third, as regards bilateral treaties, we assumed the homogeneity of all the agreements of the same typology, but they can be different, depending on the partner country or on the period when they were signed.

However, these issues do not jeopardize the analysis: the overall obtained results are in line with the theoretical expectations of the gravity model and quite robust to different levels of analysis and to different econometric methodologies. FDI is found to be positively affected by the source country GDP and negatively affected by distance. Therefore, the usefulness of the gravitational instrument for estimating not only bilateral trade flows but also investment flows seems to be

confirmed by the data. However, the analysis of the coefficients' dimension in different specifications suggests an alternative interpretation of the role of the distance in the gravity model, as a proxy not only for transport costs, but also for information and communication costs. This finding has important implications for the FDI policy design in a developing host country. In fact, it implies that the development of a modern communication infrastructure system should be a priority for countries interested in attracting FDI.

Other interesting policy implications come from the results on the effectiveness of different instruments of the Chilean Economic Foreign Policy. While, from the aggregate regressions, only BITs are found to have a positive and statistically significant impact on bilateral FDI flows, the disaggregate analysis supports the hypothesis that different economic treaties are more important in certain industries than in others.

BITs are an important driver of FDI flows in the service sector and in high-technology intensive manufacturing. Considering that, according to Fernandes and Paunov (2008), FDI in services have significantly impacted productivity growth of Chilean manufacturing plants through forward linkages and that high-technology manufacturing is commonly considered as a main spillovers source, we may conclude that BITs not only increased the total amount of incoming flows, but also that they stimulated investment directed towards industries considered particularly beneficial for the host country. FTAs have a significant impact on inflows in low-technology intensive manufacturing and services and DTTs positively influence inflows in the mining sector. In conclusion, it seems possible to say that the treaty strategy of Chile has succeeded in fostering foreign investment in the country not only by signalling a favourable institutional environment for foreign investors, but also by directly stimulating flows from countries which are partners in economic treaties. Then, it seems confirmed the hypothesis that, when investing abroad, the business environment faced by MNEs is not only shaped by the quality of domestic institutions but the return on FDI may also be influenced by the quality of

interstate bilateral relations between their home and host countries (Desbordes and Vicard, 2007).

In conclusion, through the signature of different treaties, Chile has been able to increase investment in both the two sectors which mostly supported Chilean economic growth in these decades: the mining sector granted high levels of revenues, which allowed sustaining public expenditure, while the services sector has substantially contributed to the productivity gain of Chilean manufacturing firms. This result may be particularly interesting for policy-makers of developing countries. In fact, it suggests that economic treaties are not only an effective mean to promote total FDI, but that it is also possible to attract flows in different sectors through the signature of different treaties. Each developing country, depending on its economic characteristic and on the government priority, may consequently decide to engage only in those treaties that maximize their benefit.

REFERENCES

Alfaro L. (2003), "Foreign Direct Investment and Growth: Does the Sector Matter?" Harvard Business School Working Paper.

Alfaro, L., Areendam C., Kalemli-Ozcan, S. and Sayek, S. (2004), "FDI and economic growth: the role of financial markets", Journal of International Economics 64 (1):89-112.

Anderson, J. (1979), "A Theoretical Foundation for the Gravity Equation", *American Economic Review* 69 (1): 106-116.

Anderson, J. and van Wincoop, E. (2003), "Gravity with Gravitas: A Solution to the Border Puzzle", *American Economic Review* 93 (1): 170-192.

Armington, P. (1969), "A Theory of Demand for Products Distinguished by Place of Production", IMF Staff Papers 16: 159-178.

Balasubramanyam, V.N. , Salisu, M.A. and Sapsford, D. (1996), "Foreign Direct Investment in EP and IS countries", *Economic Journal*, 106: 92-105.

Barba Navaretti, G. and Venables, A. J. (2004), "Multinational Firms in the World Economy", Princeton, Princeton University Press.

Bénassy-Quéré, A., Coupet, M. and Mayer,T. (2007), "Institutional Determinants of Foreign Direct Investment", *The World Economy* 30(5): 764-782.

Bénassy-Quéré, A., Fontagné, L. and Lahrèche-Révil, A. (2005). "How does FDI React to Corporate Taxation?", *International Tax and Public Finance* 12: 1-21.

Bergstrand, J. H. (1989), "The Generalized Gravity Equation, Monopolistic Competition, and the Factor-Proportions Theory in International Trade", *The Review of Economics and* Statistics 71(1): 143-153.

Bergstrand, J. (1985), "The gravity equation in international trade: some microeconomic foundations and empirical evidence", *The Review of Economics and Statistics* 20: 474-81.

Bergstrand J.H. and Egger, P. (2007), "A knowledge-and-physical-capital model of international trade flows, foreign direct investment, and multinational enterprises", *Journal of International Economics* 73: 278-308.

Bevan, A. and Estrin, S. (2004), "The determinants of foreign direct investment into European transition economies", *Journal of Comparative Economics* 32 (4): 775-787.

Blomstrom, M., Lipsey, R. and Zejan, M. (1994), "What explains the growth of developing countries?" in Baumol, W., Nelso, R. and Wolff, E. (eds.), "Convergence of Productivity: Cross-National Studies and Historical Evidence", Oxford University Press.

Blonigen, B.A. (2005), "A Review of the Empirical Literature of FDI Determinants", NBER Working Paper 11299.

Blonigen, B.A. and Davies, R.B. (2004), "The effects of Bilateral Tax Treaties on U.S. FDI Activity", *International Tax and Public Finance,* 11: 601-622.

Borensztein E, De Gregorio, J. and Lee, J. (1998), "How does foreign direct investment affect economic growth?", *Journal of International Economics*, 45: 115-135.

Brainard, S.L (1997), "An empirical assessment of the proximity-concentration trade-off between multinational sales and trade", *American Economic Review* 87: 520-544.

Brainard, S. L., (1993). "A simple theory of multinational corporations and trade with trade-off between proximity and concentration", NBER Working Paper 4269.

Brenton, P., Di Mauro, F. and Lücke, M. (1998), "Economic Integration and FDI: An Empirical Analysis of Foreign Investment in the EU and in Central and Eastern Europe", *Empirica*, 26: 95-121.

Buch, C. M., Kokta, R. M. and Piazolo, D. (2003), "Foreign Direct Investment in Europe: Is There Redirection from the South to the East?" *Journal of Comparative Economics* 31(1): 94-109.

Buch, C. M. and Lipponer, A. (2007), FDI versus exports: Evidence from German banks", *Journal of Banking & Finance* 31: 805-826.

Buckley, P. and Casson, M. (1981), "The Optimal Timing of a Foreign Direct Investment", *Economic Journal*, vol. 91 (March).

_____ (1976), "The Future of the Multinational Enterprise", London, Mac Millan.

Burbidge, J. B., Magee, L. and Robb, A.L. (1988), "Alternative Transformations to Handle Extreme Values of the Dependent Variable", *Journal of the American Statistical Association* 83 (March): 123-27.

Busse, M., Königer, J. and Nunnenkamp, P. (2008), "FDI Promotion through Bilateral Investment Treaties: More than a Bit?", Kiel Working Paper 1403.

Cameron A.C. and Trivedi P. (2005). "Microeconometrics", Cambridge MA, Cambridge University Press.

Cantwell, J. (2000) "A survey of theories of international production", in Pitelis & Sugden ed., "The Nature of the Transnational Firm", London, Routledge.

Carey, H.C. (1858), "Principles of Social Science" Philadelphia: Lippincott.

Carroll, C., Dynan, K. and Krane,S. (1999), "Unemployment Risk and Precautionary Wealth: Evidence from Households", Federal Reserve Board, Finance and Economics Discussion Paper No. 1999-15.

Caves, R.E. (1971), "International Corporations: The Industrial Economics of Foreign Investment", *Economica* 38.

Chen, H. and Chen, T.-J. (1998), "Network Linkages and Location Choice in Foreign Direct Investment", *Journal of International Business Studies* 29(3): 445-467.

Cheng, I.H. and Wall, H.J. (2005), "Controlling for Heterogeneity in Gravity Models of Trade and Integration", *Federal Reserve Bank of St. Louis Review* 87(1): 49-63.

Davies, R. and Kristjánsdóttir, H. (2006), "Fixed Costs, Foreign Direct Investment, and Gravity with Zeros," University of Oregon Economics Department Working Papers 2006-17.

Davies, R.B. , Nörback, P. , Tekin-Koru, A. (2009), "The effect of Tax Treaties on Multinational Firms: New Evidence from Microdata", *The World Economy* 32 (1): 77-110.

De Sousa, J. and Lochard, J. (2004), "Does the single currency affect FDI? A gravity-like approach", *Mimeo,* Univ. of Paris 1 and Univ. of Rennes 2.

Deardoff, A. V. (1995), "Determinants of Bilateral Trade: Does Gravity Work in a Neoclassical World?", NBER Working Paper 5377.

Desbordes, R. and Vicard, V. (2007), "Foreign Direct Investment and Bilateral Investment Treaties, an International Political Perspective", CES Working Paper 45.

Dunning, J. H. (1981), "International Production and the Multinational Enterprise", London, Allen and Unwin.

_____ (1977), "Trade, location of economic activity and the MNE: A search for an eclectic approach", in Ohlin, B. et al. (Eds.), "The International Allocation of Economic Activity", 395–418, London, Macmillan Press.

Dutt, A.K. (1997), "The pattern of direct foreign investment and economic growth", *World development*, 25 (11): 1925-1936.

Eaton, J. and Kortum, S. (2002), "Technology, Geography and Trade", *Econometrica* 70(5): 1741-1779.

Eaton, J. and Tamura, A. (1994), “Bilateralism and Regionalism in Japanese and U.S. Trade and Direct Foreign Investment Patterns*”, Journal of the Japanese and International Economies* 8: 478-510.

ECLAC (2009), “Foreign Direct Investment in Latin America and the Caribbean 2008”, Santiago de Chile, ECLAC.

_____(2001), “Foreign Direct Investment in Latin America and the Caribbean 2000”, Santiago de Chile, ECLAC.

Egger, P. (2000), "A note on the proper econometric specification of the gravity equation", *Economics Letters* 66(1): 25-31.

Egger, P., Larch, M., Pfaffermayer, M. and Winner, H. (2009), “The impact of endogenous tax treaties on foreign direct investment: theory and empirical evidence” in Karl P. Sauvant and Lisa E. Sachs (eds), “The Effect of Treaties on Foreign Direct Investment: Bilateral Investment Treaties, Double Taxation Treaties, and Investment Flows”, Oxford, Oxford University Press.

Egger, P. and Pfaffermayr, M. (2005), "Trade, Multinational Sales, and FDI in a Three-factor Model" *Review of International Economics* 13(4): 659-675.

Egger, P. and Pfaffermayer, M. (2004), “The Effect of Bilateral Investment Treaties on FDI”, *Journal of Comparative Economics* 32(4): 788-804.

Eichengreen, B. and Irwin, D.A. (1995), “Trade Blocs, currency blocs and the reorientation of trade in the 1930s”, *Journal of International Economics* 38 (1-2):1-24.

Feenstra, R. (2003), “Advanced International Trade: Theory and Evidence”, Princeton, Princeton University Press.

Fernandes, A.M. and Paunov, C. (2008), “Foreign Direct Investment in Services and Manufacturing Productivity Growth: Evidence from Chile”, World Bank Policy Research Working Paper n. 4730.

Frankel, J. (ed.) (1998), "The Regionalization of the World Economy", Chicago, London, The University of Chicago Press.

Gao, T. (2005), "Foreign Direct Investment from developing Asia: some distinctive features", *Economic Letters* 86: 29-35.

Gopinath, M., and Echeverria, R. (2004), "Does Economic Development Impact the Foreign Direct Investment-Trade Relationship? A Gravity-Model Approach", *American Journal of Agricultural Economics* 86(3): 782-787.

Greene, W.H. (2003), "Econometric Analysis", Prentice Hall, Fifth Edition.

_____ (1981), "On the Asymptotic Bias of the Ordinary Least Squares Estimator of the Tobit Model", *Econometrica* 49 (2): 505-513.

Hallward-Driemeier M. (2003), "Do Bilateral Investment Treaties Attract Foreign Direct Investment? Only a bit …and they could bite", World Bank Policy Research Working Paper 3121.

Head, K. (2003), "Gravity for Beginners", paper available at http://www.economics.ca/keith.

Head, K. and Ries, J. (2008), "FDI as an outcome of the market for corporate control: Theory and evidence", *Journal of International Economics* 74 (1): 2-20.

Heckman, J. (1979), "Sample Selection Bias as a Specification Error", *Econometrica*, Vol.47 (1): 153-161.

Helpman, E., Melitz, M.J. and Yeaple, S.R. (2004). "Export Versus FDI with Heterogeneous Firms", *American Economic Review* 94(1): 300-316.

Hsiao, C. (1985), "Benefits and Limitations of Panel Data," *Econometric Reviews* 4: 121-174.

Hymer, S. H. (1960): "The International Operations of National Firms: A Study of Direct Foreign Investment". PhD Dissertation. Published posthumously. Cambridge, MA, The MIT Press.

Jeon, B. , Tang, L., Zhu, L. (2005), "Information technology and bilateral FDI: theory and evidence", Journal of Economic Integration, 20(4): 613-630.

Johnston, N.L. (1949), "Systems of Frequency Curves Generated by Methods of Translation", *Biometrika* 36: 149-76.

Kindleberger,C.P. (1969) "American Business Abroad: Six Lectures on Direct Investment", New Heaven, Yale University Press.

Kleinert, J. and Toubal, F. (2005), "Gravity for FDI", CEGE Discussion Paper n. 46, Göttingen University.

Kristjánsdóttir, H. (2005), "Determinants of Foreign Direct Investment in Iceland", CAM Centre for Applied Microeconometrics Working Paper 15, University of Copenhagen.

Levy Yeyati, E., Stein, E. and Daude, C. (2003), "The FTAA and the location of FDI", Inter-American Development Bank RES Working Paper n.491.

Linders, G.M. and de Groot, H.L.F. (2006), "Estimation of the Gravity Equation in the presence of Zero Flow", Tinbergen Institute Discussion Paper 2006-072/3.

Marasco, A. (2002), "High tech foreign direct investment and the impact on economic development", MPRA Paper 5390.

Markusen, J. R., (2002), "Multinational Firms and the Theory of International Trade", Cambridge, MA, MIT Press.

Markusen, J.R. and Maskus, K. (2001), "Multinational firms: reconciling theory and evidence", in 'Topics in International Economics. A Festschrift in honor of Robert E. Lipsey", ed. M. Blonstrom and L.S. Goldberg, Chicago, Chicago University Press.

Martin, P. and Rey, H. (2004), "Financial Supermarkets: size matters for asset trade", *Journal of International Economics* 64 (2): 335–361.

Matyàs L. (1997), "Proper Econometric Specification of the Gravity Model", *The World Economy* 20.

Mayer, T. (2006), "Policy Coherence for Development: A Background Paper on Foreign Direct Investment", OECD Centre for Development Working Paper 253.

Mayer, T. and Zignago, S. (2006), "Notes on CEPII's distances measures", Paris, CEPII.

Mutti, J. and Grubert, H. (2004), "Empirical asymmetries in foreign direct investment and taxation". *Journal of International Economics* 62: 337-358.

Neumayer, E. (2007), "Do double Taxation Treaties Increase Foreign Direct Investment to Developing Countries?", *Journal of Development Studies* 43 (8): 1501-1519.

Neumayer, E. and Spess, L. (2005), "Do bilateral investment treaties increase foreign direct investment to developing countries?", *World Development* 33 (10): 1567-1585.

Nohria, N. and Garcia-Pont, C. (1991), "Global strategic linkages and industry structure", *Strategic Management Journal*, 12(Special Issue): 105-24.

Nonnemberg, M. and Cardoso de Mendonça, M. (2004). "The Determinants Of Foreign Direct Investment In Developing Countries", Brazilian Association of Graduate Programs in Economics.

Nunnenkamp, P. and Spatz, J. (2004), "Foreign Direct Investment and Economic growth in developing countries: how relevant are host-country and industry characteristics?", *Transnational Corporations* 13 (3).

OECD (2005), "OECD Science, Technology and Industry Scoreboard 2005 – Towards a Knowledge-based Economy", OECD.

_____ (2002), "Foreign Direct Investment for Development – Maximizing Benefits, Minimizing Costs: Main Report, OECD.

Ohlin, B. (1933), "International and Interregional Trade", Cambridge, MA, Harvard University Press.

Otto, J. (1992), "A global survey of mineral company investment preferences", in ESCAP and UNDP eds. "Mineral Investment Conditions in the Asia-Pacific Region". New York, United Nations.

Piermarini, R. and Teh, R. (2005), "Demystifying Modeling Methods for Trade Policy", WTO Discussion Paper, N.10, World Trade Organization, Geneva, Switzerland.

Porter, M. and Fuller, M. (1986), "Coalitions and global strategy". In Michael E. Porter, ed., Competition in global industries. Boston, MA: Harvard Business School Press.

Portes, R., and Rey, H. (2005), "The Determinants of Cross-Border Equity Flows", *Journal of International Economics*, 65(2): 269-296.

Poulsen, L.S. (2009), "The Effect of Treaties on Foreign Direct Investment: Bilateral Investment Treaties, Double Taxation Treaties, and Investment Flows", Book Review, *European Journal of International Law* 20: 935-938.

Raballand, G. (2003): Determinants of the Negative Impact of Being Landlocked on Trade: An Empirical Investigation through the Central Asian Case, *Comparative Economic Studies* 45: 520–536.

Ramirez, D.M. (2009), "Foreign Direct Investment and its Determinants in the Chilean case: An error Correction Model Analysis, 1960-2002", Yale University Economics Department Working Paper 62.

Rauch, J.E. and Trinidade,V. (2002), "Ethnic Chinese Networks In International Trade", *The Review of Economics and Statistics* 84(1):116-130.

Razin, A., Rubinstein, Y. and Sadka, E. (2005), "Corporate Taxation and Bilateral FDI with Threshold Barriers", NBER Working Papers 11196.

_____ (2004), “Fixed Costs and FDI: The conflicting Effects of Productivity Shocks”, NBER Working Papers 10864.

_____ (2003), “Which Countries export FDI and How Much?”, NBER Working Paper 10145.

Razin, A. and Sadka, E. (2007), “Foreign Direct Investment. Analysis of Aggregate Flows”, Princeton and Oxford, Princeton University Press.

Razin, A., Sadka E. and Tong, H. (2005). "Bilateral FDI Flows: Threshold Barriers and Productivity Shocks," NBER Working Papers 11639.

Reilly, W.J. (1931), “The Law of Retail Gravitation”, New York, Knickerbocker Press.

Resmini L. (2007), “The determinants of FDI in Central, Eastern and South eastern Europe: lessons from the past and prospects for the future”, in Liebscher, K., Christl, J., Mooslechner, P., Ritzberger-Grünwald, D. (eds.), Foreign direct investment in Europe: a changing landscape, Edward Elgar, Cheltenham, UK and Northampton, MA, USA, pp. 207-225.

_____, (2000), “The Determinants of Foreign Direct Investment into the CEECs: New Evidence from Sectoral Patterns”, *The Economics of Transition* 8 (3): 665-89.

Riveros, L., Vatter, J. and Agosin, M. (1995), “Foreign Direct Investment in Chile, 1987-93: Utilization of Comparative Advantages and Debt Conversion” in Agosin, M. (ed.) “Foreign Direct Investment in Latin America”, Washington D.C., IADB.

Rose, A. K. (2000), “One Money, One Market: The Effect of Common Currencies on Trade”, *Economic Policy* 15 (30): 7-45.

Silva, J. M. C. and Tenreyro,S. (2006), "The Log of Gravity", *The Review of Economics and Statistics* 88(4): 641-658.

Stein, E. and Daude, C. (2007), "Longitude matters: Time zones and the location of foreign direct investment", *Journal of International Economics* 71: 96-112.

Stone, S. F. and Jeon, B. N. (1999), "Gravity-Model Specification for Foreign Direct Investment: A Case of the Asia-Pacific Economies", *The Journal of Business and Economic Studies*, 5(1), 33.

Tinbergen, J. (1962), "Shaping the World Economy", New York, NY, Twentieth Century Fund

Tong, S.Y. (2005), "Ethnic Networks in FDI and the Impact of Institutional Development", *Review of Development Economics* 9(4): 563-580.

UNCTAD (2009), "World Investment Report 2009. Transnational Corporations, Agricultural Production and Development", New York and Geneva, UNCTAD.

_____ (2007), "World Investment Report 2007. Transnational Corporations, Extractive Industries and Development", New York and Geneva, UNCTAD.

_____ (2004), "World Investment Report 2004. The Shift Towards Services", New York and Geneva, UNCTAD.

_____ (1998), "Bilateral Investment Treaties in the Mid-1990s", United Nations, New York and Geneva.

Wang, Z.K. and Winters, L.A. (1991), "The Trading Potential of Eastern Europe", CEPR *Discussion Paper* 610.

Wei, S.J. (2000), "How Taxing Is Corruption On International Investors?", *Review of Economics and Statistics* 82(1): 1-11.

Wolff, G.B. (2007), "Foreign direct investment in the enlarged EU: do taxes matter and to what extent?", *Open Economies Review* 18(3), 327-46.

World Bank (2009), "Migration and Remittances Trends, 2009", Migration and Development Brief 11.

_____ (2005), “Country Profile for Chile”, available at http://web.worldbank.org/WBSITE/EXTERNAL/COUNTRIES/0,,pagePK:180619~theSitePK:136917,00.html

ANNEX 1

BITs and DTTs signed by Chile

Country	BIT Signature	BIT entry into force	DTT signature	DTT entry into force	DTT application
Argentina	1991	1995	1976	1976	1986
Australia	1996	1999	Under negotiation		
Austria	1997	2000	Under negotiation		
Belgium	1992	1999	2007	-	-
Bolivia	1994	1999	-	-	-
Brazil	1994	-	2001	2003	2004
Canada	-	-	1998	1999	2000
China	1994	1995	Under negotiation		
Colombia	2000	-	2007	-	-
Costa Rica	1996	2000	-	-	-
Croatia	1994	1996	2003	2004	2005
Cuba	1996	2000	Under negotiation		
Czech Rep.	1995	1996	Under negotiation		
Denmark	1993	1995	2002	2004	2005
Dominican Rep.	2000	-	-	-	
Ecuador	2000	-	1999	2003	2004
Egypt	1999	-	-	-	-
El Salvador	1996	1999	-	-	-
Finland	1993	1996	Under negotiation		
France	1992	1994	2004	2006	2007
Germany	1991	1999	-	-	-
Greece	1996	2003	-	-	-
Guatemala	1996	2001	-	-	-
Honduras	1996	2002	-	-	-
Hungary	1997	-	Under negotiation		
Iceland	2003	2006	-	-	-
India	-	-	Under negotiation		
Indonesia	1999	-	-	-	-
Ireland	-	-	2005	2008	2009
Italy	1993	1995	Under negotiation		
Korea	1991	1994	2003	2003	2004
Kwait	-	-	Under negotiation		
Lebanon	1999	-	-	-	-
Malaysia	1992	1995	2004	2008	2009
Mexico	1992	1994	1998	1999	2000
Netherlands	1998	-	Under negotiation		
New Zealand	1999	-	2003	2006	2007
Nicaragua	1996	2001	-	-	-
Norway	1993	1994	2001	2003	2004
Panama	1996	1999	-	-	-
Paraguay	1995	1997	2005	2008	2009
Peru	2000	2001	2001	2003	2004

Country	BIT Signature	BIT entry into force	DTT signature	DTT entry into force	DTT application
Philippines	1995	1997	-	-	-
Poland	1995	2000	2000	2003	2004
Romania	1995	1997	-	-	-
Russia	-	-	2004	-	-
South Africa	1998	-	-	-	-
South Korea	-	-	2002	2003	2004
Spain	1991	1994	2003	2003	2004
Sweden	1993	1996	2004	2005	2006
Switzerland	1999	2002	2008	-	-
Thailand	-	-	2006	-	-
Tunisia	1998	-	-	-	-
Turkey	1998	-	-	-	-
U.S.	-	-	Under negotiation		
U.K.	1996	1997	2003	2004	2005
Ukraine	1995	1997	-	-	-
Uruguay	1995	1999	Under negotiation		
Venezuela	1993	1994	Under negotiation		
Vietnam	1999	-	-	-	-

Note: Also The Free Trade Agreements signed by Chile with the EU and with the United States and Canada contain some investment provisions.

Source: Author's elaboration based on Chilean Foreign Investment Committee and Chilean Service of Internal Taxes.