THE FDI AND THE REGIONAL DEVELOPMENT IN CHILE

BY

JOHANNA D. ROBLES

DISSERTATION

Submitted in partial fulfillment of the requirements
for the degree of Doctor of Philosophy in Regional Planning
in the Graduate College of the
University of Illinois at Urbana-Champaign, 2010

Urbana, Illinois

Doctoral Committee:

Professor Geoffrey J.D. Hewings, Chair
Professor Edward Feser
Professor Werner Baer
Professor Bruce Hannon

ABSTRACT

This is a comprehensive study of regional Foreign Direct Investment in Chile and its relationship with the development of Chilean regions. Following a process of steady foreign capitals flows to Chile, the link of this phenomenon with the growth of Chilean Regions are explored in three main chapters. The first part explores the main determinants in attracting FDI using a set of variables in a panel data econometric regression, finding that the most commonly used variables are determinants in attracting FDI in Chile depending on the type of investment and the sector in which this investment takes place, the investment in primary sectors in Chile are highly localized in regions characterized by having large quantities of natural resources and the significant variables are macroeconomic variables such as growth of GDP, unemployment rate, level of exports and public expenditure, whereas the investment in the services sector is concentrated in metropolitan regions where there were not significant variables from the set studied, only public investment and public expenditure (these variables were separated because they are channeled differently from the government). The second part will also use an econometric technique (panel data regression) to survey the bi-directional causality between FDI and GDP at regional level in Chile, the Granger tests performed in this chapter have an inconclusive outcome in determining bi-directional causality or uni-directional causality and its direction, but it can be inferred that it was the lack of enough time series to test further lags of causality. The third part will take a different approach on this relationship looking for the direct effect of FDI and domestic investment in the

community, where large multinational firms are located in conjunction with a state-owned company in the same sector for a specific region of Chile, using an exploratory analysis, secondary data and the Corporate Social Responsibility (CSR) framework, the results showed that first, the direct contributions of these companies must have to be known in order to increase the positive perceptions of the community about the company, second, the community will respond positively towards these firms when they show interest in development of the region, third, there is a mutual benefit for the company, (state or foreign owned) and the community as a result of these contributions and fourth, for policy makers, it is important to encourage the responses from local companies, foreign companies and the community, that are product of policies towards CSR, because this can lead towards growth in the region and a source of profitability for multinationals and also the domestic firms.

For my Parents and my late uncle

TABLE OF CONTENTS

Chapter I: Introduction

This work will focus on Chile and its spatial, sectoral and community dependence on Foreign Direct Investment. In the1930s, Chile had a strong socialist movement that lasted for around 5 decades, culminating in the formation of a socialist government for a brief period of time. This movement was characterized by the establishment of state-owned enterprises in order to boost the economy and manage state resources, regardless of the political tendencies of the different governments during this period of time.

The only form of foreign investment made during the 1930-1960 period was in the mining industry. Nevertheless, 80% of the country revenues in Chile came from copper exports, and the copper industry was managed by US Mining firms (Kennecott – Guggenheim Exploration Co. and Anaconda).

In the period from1950 to 1970, Import Substitution Industrialization (ISI) policies were adopted during a democratic regime, a major difference with other countries of the region, where the ISI took place under authoritarian governments. For Chile, this difference in the application of the ISI policies was due to the fact that many of the companies were state-owned, thus, the transition to industrialization was a smooth process, and only the mining industry was not "touched."

In 1966 and 1967, under Eduardo Frei's government, Chile bought 51% of the mining operations from Kennecott and 25% of the operations from Anaconda, in an effort to control a larger share of the benefits of the mining industry, but it was under Salvador Allende's government (early 1970s) that the state forcibly took over the market and nationalized all the copper industry and the other main industries (for example, the finance sector, - banking -, the textile industry, nitrates, the iron mining industry, and petro-chemical industry) that were in the hands of private companies either foreign or domestic. The years 1970 to 1973 were characterized by a controlled economy, where the capital flows were restricted and the economy was closed to international trade.

In 1973, there was a military coup that sought to reverse the socialist economy policies and imposed a series of measures in the political and economic spheres; the new regime opened the doors to international trade, privatized many industries, and developed a mechanism to attract foreign investments. In the last years of the 1970s decade, Chile issued the Decree Law 600, a mechanism that regulates the conditions for entrance, investment and remittances of capital of foreign firms. The particular features of this Decree that made it attractive for foreign companies to invest in Chile, was that investors had the right to repatriate all capital and earnings. In addition, they had access to a banking system that allowed them to purchase foreign currency for remittances at market exchange rates or maintain accounts in US dollars, and a fixed income-tax rate. This tax was fixed at a maximum rate of 42% on profits (instead of a variable additional tax of 35% on profits), regardless of the amounts of profits declared (Chilean Copper

Commission, 2007).

However, while this mechanism attracted investments it also increased foreign indebtedness, due to an increase of "false demand." (i.e, the loans and capital inflows that entered at that time were not used for investments, but rather were diverted to consumption loans to the public and small firms). By the first years of the 1980s decade, a new mechanism entered: the debt-equity-swaps, also known as Chapters XVIII and XIX of the *Compendio de Normas de Cambios Internacionales del Banco Central de Chile*, such mechanisms allowed firms to transform debts into capital and the investors were benefited with an implicit subsidy (ECLAC, 2000) .

The application of these measures implied the abandonment of former ISI policies. The industries were specialized, many of them privatized and those that were non-profitable (such an automobile industry) were closed. By the beginning of the 1990s decade, the military removed itself from government and a new democratic regime was installed.

The transition from an authoritarian to a democratic government did not result in any change to the new laws for international trade, especially, the attraction of Foreign Direct Investment (FDI) under the Decree Law 600 and the Chapters XVIII and XIX. The level of foreign investment was enhanced during the last decade of the 20th century,

presenting a steadily growing flow during this time period as can be seen in figure 1.

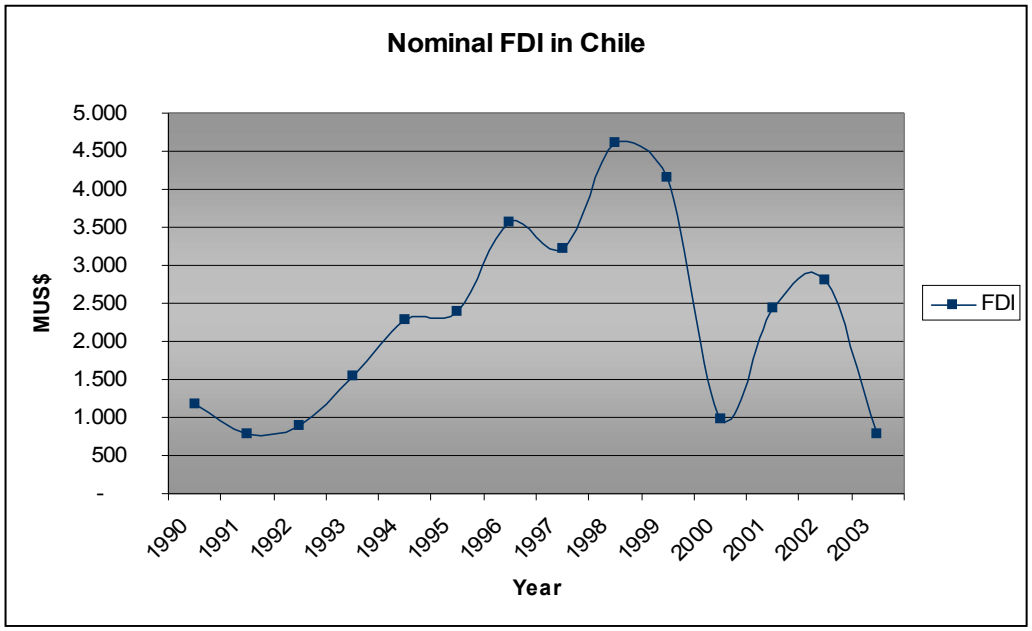


Figure 1: Total FDI in Chile, years 1990-2003. Source: Foreign Investment Committee

Before the year 1990, the amount of FDI was noticeably smaller, and the main sector where FDI was targeted was the mining industry, although over the years, the investment in the mining industry gave way to investments in sectors such as electricity and basic supplies sectors as well as telecommunications and financial services sectors (see figure 2)

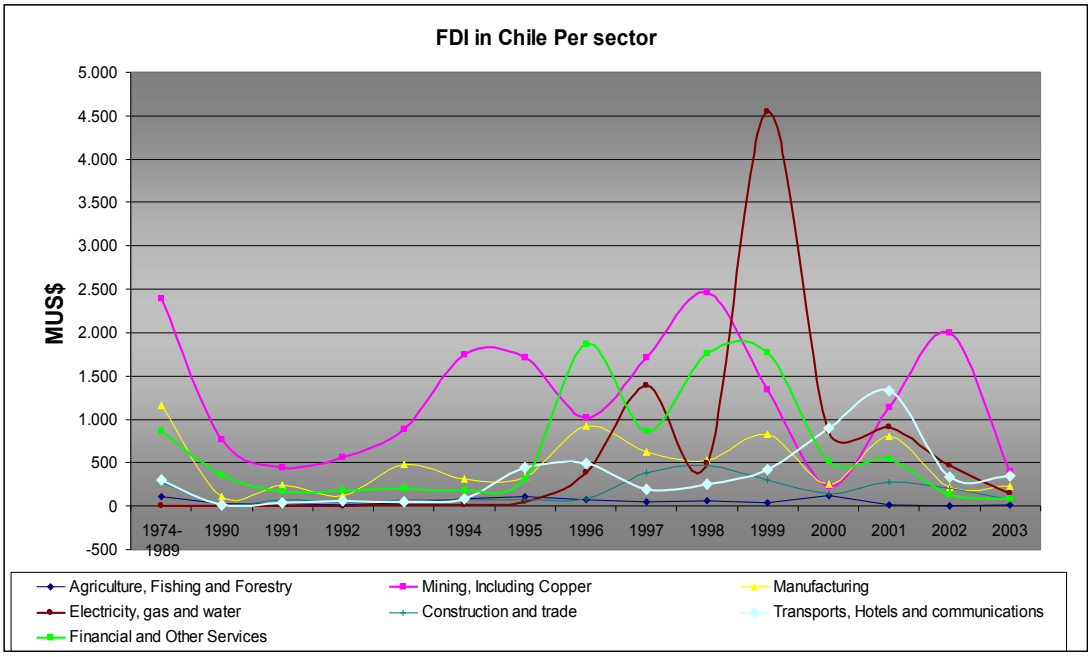


Figure 2: FDI in Chile by sector 1974-2003. Source: Foreign Investment Committee.

The mining industry attracted a steady flow during this period; however, its importance over the years decreased due the increase of the investment in the basic supplies and the telecommunications sectors, as shown in figures 3 and 4. The mining industry was still the leader in attracting FDI during the first half of the 1990s decade, representing 53% of the total FDI, whereas the electricity, water, telecommunications sectors were predominant in the second half of the 1990s decade, representing 58% of the total FDI.

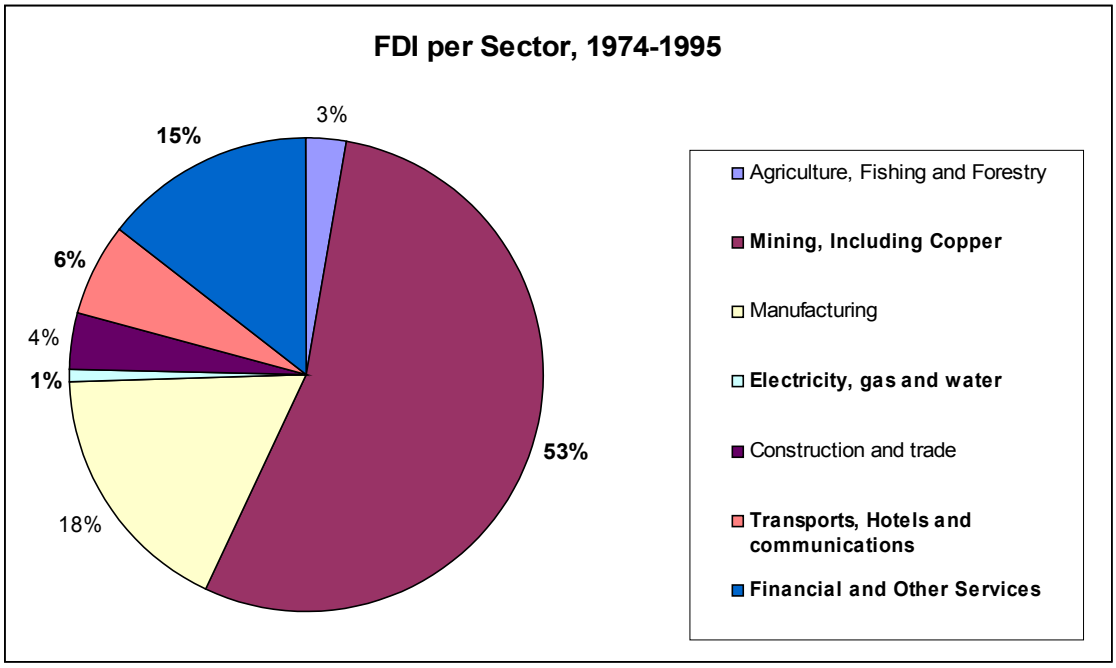


Figure 3: FDI per sector, years 1974-1995. Source: Foreign Investment Committee.

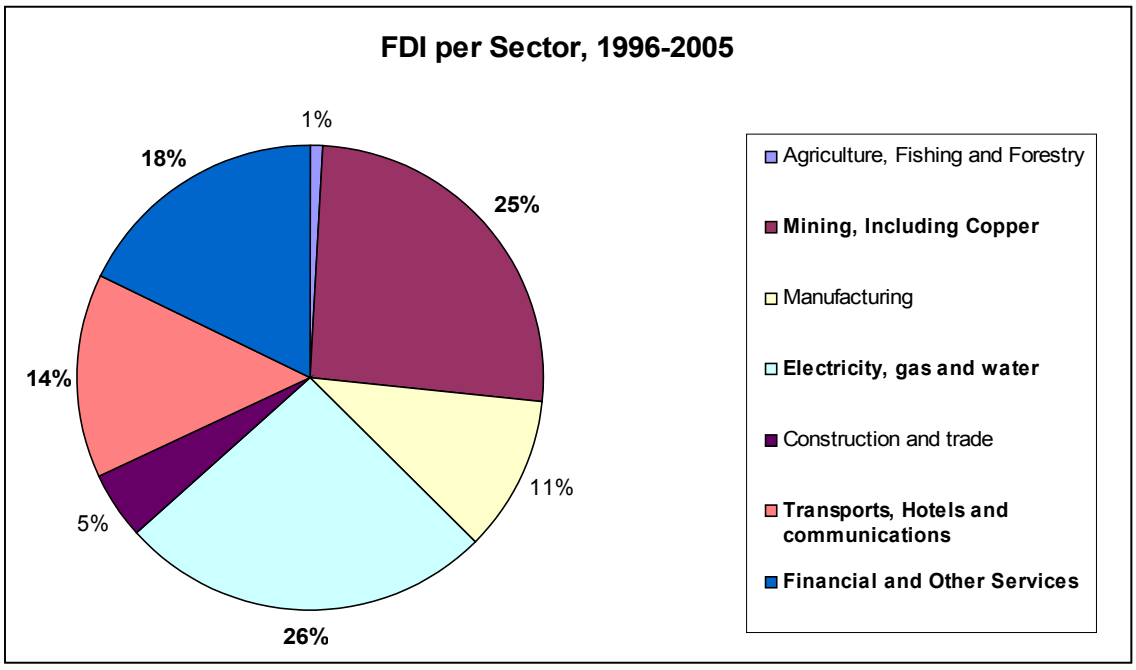


Figure 4: FDI per sector, years 1996-2005. Source: Foreign Investment Committee.

On the other hand, the evolution of the Gross Domestic Product (GDP) in Chile during this period presented a pattern with positive growth with exception of the year 1999, when the prices and the demand of export products fell, due to the Asian financial crisis (see figure 5):

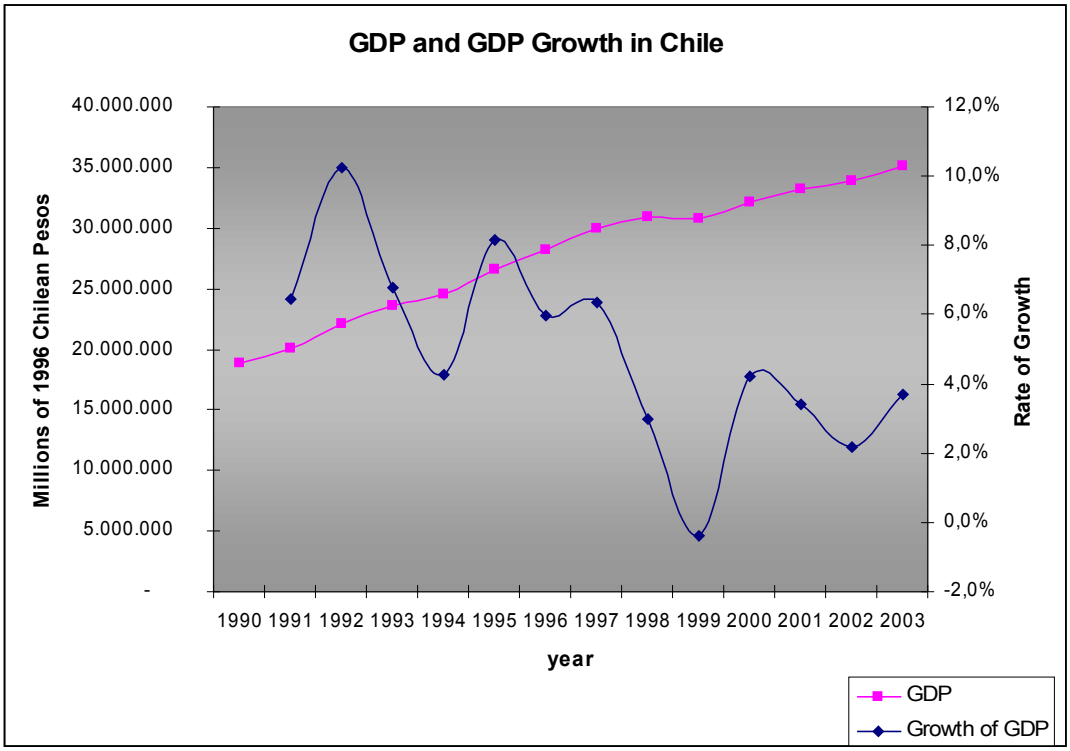


Figure 5: Gross Domestic Product in Chile & Growth of GDP years 1990-2003. Source: Chilean Central Bank Bulletin.

For FDI, there are also important distinctions in terms of the region where the FDI took place; note that in the first half of 1990s decade, it was mostly placed in the northern regions of Chile, whereas for the second half, it increased in the central regions, where

the Metropolitan region is located (see figure 6)

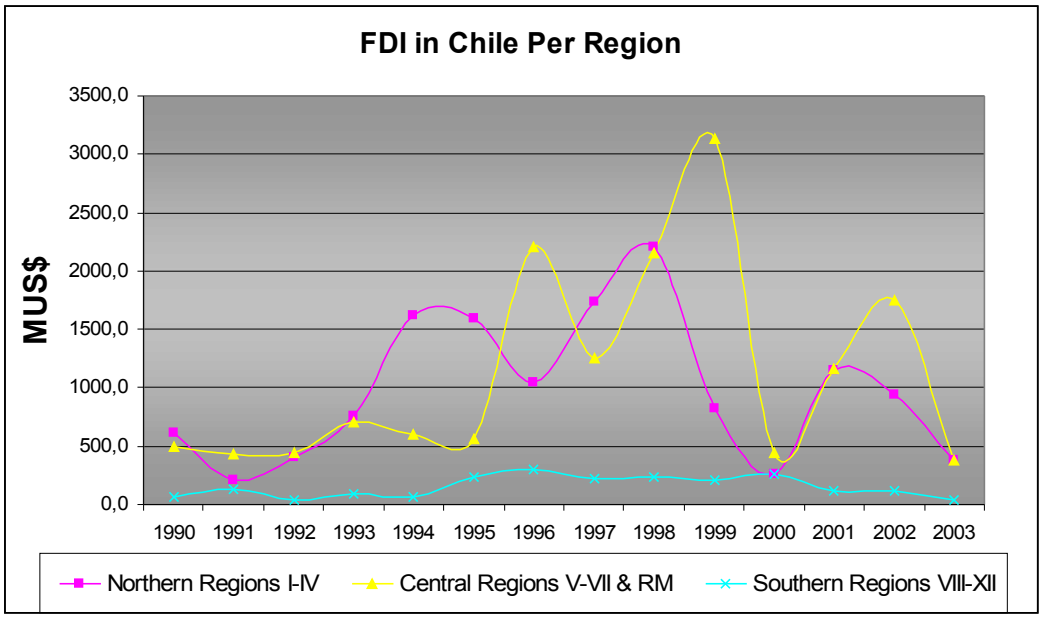


Figure 6: FDI per geographical location in Chile (North, Center and South), Source: Foreign Investment Committee.

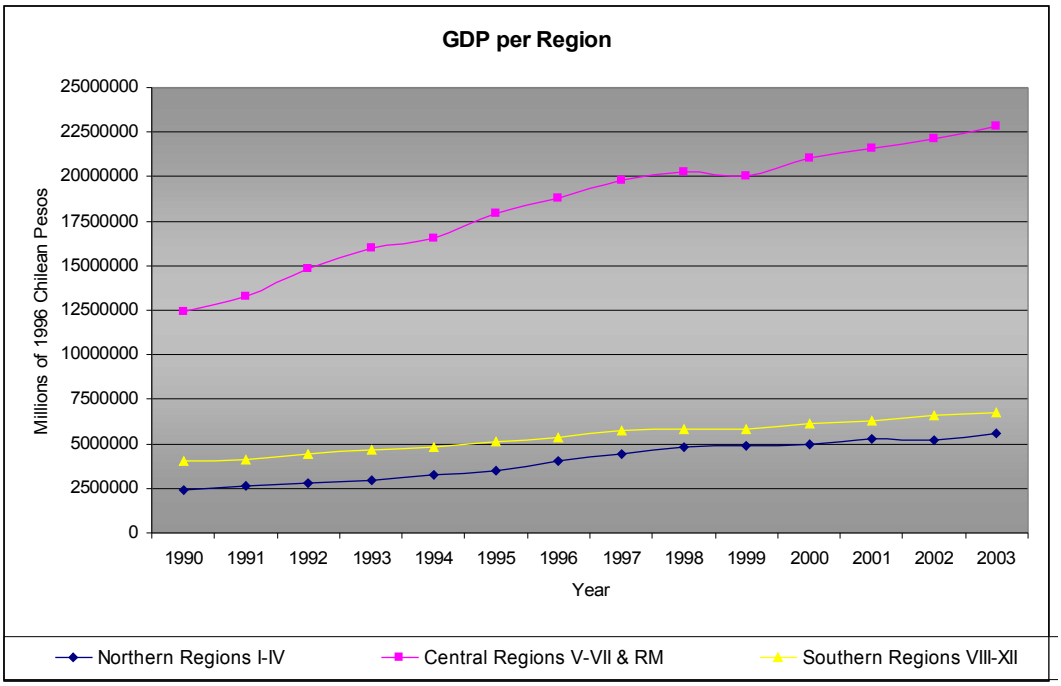


Figure 7: GDP in all three major regions of Chile (North, Center, South). Source: Chilean Central Bank Bulletin.

In the case of the spatial distribution of GDP, it is not only non-uniformly allocated across region but there is also a difference across time in terms of the evolution of this indicator. All three major regions have a growing GDP (with exception of 1999). Comparing figures 6 and 7, this positive growth might be related to the evolution of FDI. Hence, the relationship between the FDI and the growth in Chile, with special emphasis of this relationship at a regional level, will be explored in chapter III.

Research on FDI is extensive; however, when the focus is restricted to issues of regional FDI, growth and spillover effects, the results revealed a modest but important literature. The received theory about the relationship of FDI and GDP has also examined the nature of spillover effects and the transfer of technology that comes with FDI in the different regions of the world, but with special attention to transition and developing economies, since it is expected in many of these studies that the spillover effects will lead to enhanced growth and development. There are also studies related examining the link between FDI, CSR (Corporate Social Responsibility) and Growth, but they are relatively recent.[1] These studies differ in the approaches and models utilized in their research, in such way that it seems that there is no general consensus for the use of one methodology.

Analysis of the determinants or location factors for FDI have also been prominent

[1] By recent, the author means since the year 2006.

in the literature from the 1980s; these articles tend to relate FDI to growth or macroeconomic policies as some of the most featured determinants. For example, Montiel and Reinhart (1999) explored the influence of macroeconomic policies and capital controls on the compositions of capital flows during the 1990s, where developing economies experienced FDI inflows in their countries, especially those in Asia and Latin America. Montiel and Reinhart, first detected differences in the type of investment attracted in Asian versus Latin American countries in the early 1990s, but this difference proved to be false in the sense that both regions attracted FDI as short-term investment. This feature was well illustrated a during the 1997 Asian crisis, indicating that capital controls influence the composition of flows but not their volume. The attraction of capital inflows was made at the beginning (1990s) through specific policies that were oriented to attract larger volumes of FDI, but did not consider the composition of these flows.

However, "custom-made" policies designed for inviting FDI in developing countries are not the only factors of FDI attraction; for example, in their study, Noorbakhsh *et al.* (2001), explored the effect of human capital on FDI, for a similar period of time (1990s decade). They noted that, even though there was a large amount of FDI in developing countries, this FDI was placed in a limited number of countries, especially those that had policies that raised the level of local skills and built the capability of human resources. Their empirical findings yielded three main conclusions: human capital is a determinant in attracting FDI, that it is one of the most important determinant and finally, that its importance is increasing over time.

At the regional level, Escribá and Murgui (2008) studied location factors in regional industry investment in Spain for the period of 1964 to 2000. They included classic demand and cost factors such as agglomeration, transport infrastructure and human capital build up. From their results, it can be inferred that human capital and wage differentials were the factors that influenced the location and migrations of investment towards new industrial clusters, whereas wage increases and infrastructure were factors that encouraged capital utilization augmentation. Also at the regional scope, but researching FDI in the information technology industry in China, Lin (2008) found that network linkages, market expansion and incentive policies of the host country tuned out to be significant factors for intended FDI. In addition, specific characteristics of the industry such as size of the firms and a high degree of export orientation were also significant. These findings have something in common with the results found by Escribá and Murgui, in the sense that there are more than one dominant factor in the attraction of FDI and also that there are some specific characteristics of the region or the industry that will heighten the capital inflows.

However, there are only a small number of studies that explore geographical factors combined with other determinants for regional FDI. A typical example would be the study by Chen (2009), who considered the role of geographical concentration in attracting FDI, from the multinational firm's point-of-view. Chen explores this issue through the formation of preferential trade agreements in the participating countries and

the realization of clusters of these industries as proxies for geographical concentration. In her empirical test, the results implied that the formation of trade agreements will have the effect of increasing FDI, but this effect will vary if there are differences in the size of the market and if the industry in the region is export oriented. Moreover, those industries that have higher labor endowments will also attract FDI, when this human capital is shaped for labor-intensive industries.

In addition to this research, there are other articles described in chapter II, that discuss different methodologies and determinants that have been used to examine the attraction of FDI. It seems that there are many determinants for FDI, specially at regional level, some of them become "classic", such as policies made by the country or the region, the level of development, the capacity of the labor force, the size of the market and the level of trade (this latest one being measured very differently in several studies). Another interesting finding is that these factors or determinants are not constant or the same across time; for example, in Chile, it can be seen that the composition and volume of capital inflows also varied across time and the determinants may have had a significant role when studying regional FDI in Chile. This issue will be explored in chapter II.

It seems that the enhancing of regional determinants and policy-making designed to attract FDI has the main objective of enhancing growth or development. For example, Borensztein *et al*. (1998) considered whether FDI affects economic growth in 69

developing countries. Their findings suggest that FDI is a significant variable in contributing to growth though technology transfer, but also that FDI is more productive if the host country has a minimum stock of human capital of the capacity for growth in the first place, implying that there might be some kind of two-way causality between FDI and growth or human capital build up. This idea seems was further considered by Liu *et al.* (2001) when they explored the causal links between FDI and trade in the Chinese economy. Using a panel data econometric technique on data for China and 19 other countries and regions, they discovered that the growth of imports in China causes the increase of FDI inflows from these countries and, in return, FDI causes the growth of Chinese exports, thus enhancing the growth of Chinese economy.

Although these causal links are mostly researched for developing economies, King and Váradi (2002), explored the impact of FDI on the development of transition economies, particularly those that shed socialist economic policies towards market-oriented policies. In their particular case, it was the Hungarian economy that showed that FDI had positive effects on the economy, but these effects might not hold in the future because the impact of FDI on a former socialist economy might not have taken into consideration political factors. Thus the successful foreign firms located in the host country might lead to market concentration and hinder future growth. This finding is not to be discarded easily by policy makers in developing economies, especially Chinese and some Latin American countries where the political orientation was more left-leaning (as in the case of Chile itself).

Returning to the main topic of the studies that suggest that FDI is related to growth - the hypothesis that FDI facilitates growth though transfer technology in developing countries - there is evidence in the research for China by Liu and Wang (2003) and for transition economies by Damijan *et al.* (2003). For China FDI, the existence of previous research and development undertaken in the country and the size of firms that received foreign capital turn out to be significant factors for increasing total factor productivity of Chinese industries. For the case of eight transition economies, the technology is primarily transferred to local firms where FDI took place, but here FDI did not generate intra-industry spillovers or technology transfers to domestic firms.

In examining Latin America countries, Bengoa and Sánchez-Robles (2003) explored the causality between FDI and economic growth adding also economic freedom into the equation, meaning that there is also an effect if the economy is also in transition. Their results suggested that for the period from 1970 to 1999, there is a positive correlation between FDI and economic growth but, in order to obtain benefits from long-term capital inflows, the country needed to have adequate human capital, economic stability and liberalized markets. Two years later, Bengoa and Sánchez-Robles (2005) researched the role of economic policy shocks on endogenous growth, particularly the removal of restrictions to the entrance of FDI in Latin American developing countries where their findings suggested that FDI promotes growth of GDP *per capita* through the underlying hypothesis that with this liberalization the developing countries may access

more advanced technology,. For the Chilean economy, Del Sol and Kogan (2007) examined the profitability of multinational firms located in Chile and the competitive advantage of Chile versus other Latin American countries. Their analysis demonstrated that the know-how of business strategy during economic liberalization was one of the sources of competitive advantage, leading to higher profits for multinationals, thus increasing FDI, but that this competitive advantage decreased over time. The result is compatible with the findings of Bengoa and Sánchez-Robles because the idea of having access to technology does not mean that there is transfer of technology.

It appears that, although there is evidence linking FDI and growth, there is not enough evidence to suggest that this growth will be evenly distributed in the host country or across its regions. In fact, the results suggested by Basu and Guariglia (2007) in their research conducted on a panel data of 119 developing countries suggest that FDI promotes growth and inequality, something similar found in the studies for transition economies noted above. Much of the research in the last two years (2008-2009) has focused on the spillover effects of FDI. For example, Kuo and Lang (2008) studied how spillovers may contribute to regional economic growth in China. They found that knowledge capital, R & D capital and technology transfer have a significant and similar impact on regional economic growth; further, the ability of the region to absorb new technologies is a critical determinant for growth. An equivalent result was found by Sembenelli and Siotis (2008) for the case of Spanish firms; in their case though, FDI had a positive long-run effect on growth. However, the impacts were limited to those R & D

intensive firms, suggesting the idea of an uneven spillover effect and inequality. This finding was replicated in the research done by Jordaan (2008) for the case of the Mexican manufacturing sector. The spillover effects of FDI are positive, but they tend to concentrate geographically to a limited number of firms and that the level of heterogeneity of the spillovers is significant large.

Even though the literature provides many studies of the spillover effects derived from FDI, they do not answer in a conclusive manner that FDI has a positive effect on growth. Recent studies are still exploring this relationship and the fact that the host country or region has to be at some specific stage of development. In many cases, these studies evolved into distinguishing the nature of spillover effects, like the case of Portuguese economy research done by Barbosa and Eiriz (2009) where there are no significant effects on firm's productivity even though there might be horizontal spillovers (foreign firms in the same industry) or vertical spillovers (the relationship between foreign firms and domestic suppliers) meaning that the issue is still not answered. This inconclusiveness was also suggested when exploring the implications of multi-national firm's strategies for economic development in less developed countries, such as the work by Yamin and Sinkovics (2009). They found that the current strategies pursued by multinational firms have a detrimental impact on development of infrastructure in LDCs, thus implying that, inasmuch as there could be some spillover effects for growth, if the host country does not have a minimum platform for development, the mutual benefits of growth and FDI strategies will eventuate only in the short term.

Growth and spillover effects of FDI were explored further at sector level by Vu and Noy (2009), one of the few studies that did not focus on developing countries, but rather on 5 OECD members. They found that FDI had positive effect on economic growth directly and through its interaction with labor, meaning that a good labor endowment will play a significant role. Also, these effects will vary across countries and sectors. Another interesting result found by Lu (2007) who developed a unified theory linking R&D, FDI and trade for the Taiwanese economy, finding that two separate "regions," North and South will migrate their industries between each other when the dominant exporter changes through FDI and R&D. For example, the high-tech industries will grow through R&D and become dominant exporters in one region and then the medium-tech industries will move to the other region and will grow through FDI. When this industry has grown enough to become export dominant, then the shift occurs to use R&D and then FDI will be directed towards the other industry, meaning that there is some kind of double causality between R&D and FDI through international trade.

There are more studies that discuss the specific issue of causality between FDI and growth, with specific attention to the econometric techniques and the variables used and their proxies used to address the issue; many of these studies will be reviewed in chapter III.

Are spillover effects the only ones that lead to growth? The literature often relates the indirect effect of a firm on a region or country, in this case, the effect of FDI on regional growth. However, there are other kinds of studies that relate a direct effect of a multinational firm on the region. In addition to production levels, employment and income effects, a multinational firm can make an influence on the community where it is located, with contributions or actions that can generate a benefit for the firm and also the region. These studies, relate the community to multinational firms' presence, in terms of community response and the Corporate Social Responsibility (CSR) framework. For example Garvin *et. al.* (2009) researched the perceived impacts of FDI on gold mining companies of the community in Ghana. This research was made through interview data in the community under the CSR framework, finding that even though there is some recognition of benefit from the foreign companies, the community feels that the these companies are not "socially responsible" since they do not support local development. Much of the research done on CSR concentrates on the model design for this framework but empirical studies are scarce. There are several non-indexed articles that provide some results of surveys, firm's strategies and impacts related with the application of CSR policies inside the companies, either domestic or foreign, where the most common case of application of these policies has been made by multinational firms that might result in positive effects for the community and the firm, but also, some cases where the experience was less successful. Addressing this issue is not trivial, because the expansion of this framework indicates that the effects of the FDI and the community can yield compelling results for the literature and also for the regions that are studied. Until now,

the results suggested under this framework reveal that socially responsible companies will generate a more solid or stable grounds for growth, which requires a deeper analysis of these models that will be discussed in Chapter IV.

The purpose of this research is to determine the level of the relationship of FDI and GDP on the regions of Chile. In undertaking this challenge, three studies were completed. Chapter II examines the determination of the factors attracting FDI at a regional level, since there is a clear distinction in the composition of Regional FDI. The hypothesis points towards some macroeconomic factors and also some specific characteristics of the regions that go beyond the existence of large quantities of natural resources in the region or an appropriate market size. The third chapter analyzes the causality between GDP and FDI, since the findings in chapter II suggest that there might be a causal relationship from GDP to FDI, but the other way around is not clear by simply testing the regressions from the previous chapter. In chapter IV, for the specific case of the Second Region of Chile, (the Antofagasta Region), the impact on the community through CSR policies of foreign and the domestic investment is explored. Since the mining industry has inflows from both domestic[2] and foreign investments, and these firms compete each other in terms of productivity, profits, costs structure, the involvement and impact on the community might vary.

[2] More specifically, this domestic investment is made by the government.

Chapter II: The Determinants of the Regional Foreign Direct Investment in Chile

2.1. Introduction

Over the last 30 years, Foreign Direct Investment (FDI) has played an important role in the Chilean economy. In early 1970's there was a total control of capital movements, in addition with control of credit and the interest rate, capital inflows were close to zero and even negative, but in September of 1973, there was an attenuation of the restrictions affecting the amount of profits and dividends of external firms repatriated, in order to encourage and increase foreign investment. This was under a mechanism called Decree Law 600. In the late 1970s and early 1980's, Chile was facing a financial debt crisis, which was mostly solved through stabilization programs and the program of debt-equity swaps using foreign investors, although there were many privatizations, by 1990, these companies were not foreign-owned, during the first years of the 90's decade, FDI mostly concentrated in the mining sector, but it followed an evolutionary process towards investment in the services sector.

There have been many studies made concerning FDI in several ways, either as a determinant or as a dependant variable, but very few studies have considered the determinants of FDI at a regional level, then a question arises: Is it important to study the regional differences for attracting FDI?

The case of Chile is interesting, because, the patterns for FDI tend to be clearer as the years go by. One of these patterns can be seen on the distribution of FDI across regions, since Chile is considered a developing economy, the regions tend to specialize in their activities and in the ways in which they attract FDI. Then, it seems important to investigate what are the determinants for FDI across regions and if there are certain regions that attract more FDI than others.

This chapter is organized as follows, in the first section a theoretical framework is presented, followed by the introduction of the hypothesis regarding FDI and Chile; the third section presents the data and the methodology used specifically in this article, with the clear specification of the model used. Section five presents the main results, which are studied in section six. Finally section seven presents some concluding remarks regarding this study.

2.2. Theoretical Framework

There are many studies concerning the determinants of FDI, the traditional theory of FDI relates the profit maximization behavior of Multinational Enterprises, as indicated by Chen (2000) where the firm will decide whether it will enter the market of a host country or not, decision based on the profit maximization process. Smekal and Sausgruber (2000) and Kreinin (1995) on the other hand, explain FDI based on

International trade theory where capital is considered a factor with an influence in comparative costs, moreover, when firms asked about their motivation to invest abroad, may not even mention increased profits, but there are two categories that they consider: cost considerations and market considerations (the second in order to increase revenues). In term of cost considerations, one that might be relevant is the need to obtain raw materials from abroad, in fact "vast American investment in the extractive industries are motivated by the fact that the capital must follow the resources" (Kreinin, 1995), this is also influenced by transportation cost of the primary product, if it is very high, the first stage of processing may have to take place at or near the extraction site. Another type of cost reducing investment is related with labor, but in this case it is important to consider if the activity is labor or capital intensive in order to be cost-advantage. In the case of market considerations, international trade leads to firms to increase their foreign investment, in other words, the opportunities to market products abroad also encourages to invest abroad in order to reach more easily the markets.

In their book, Armstrong and Taylor (2000), the study for potential determinants in FDI follows an hierarchical process, from the decision to locate abroad, where the question of which region of the world could be determined by trade barriers, market size, market growth and potential for import penetration. Once this question is solved, comes the next question: which country? And once the country is decided, comes the final question of which location *within* the country? There are a large set of the determinants that the authors propose, but there are related mostly with the access to markets, labor-

market conditions, promotional activities of the state, state (or regional) taxes, access to land and the industrial structure at the new location.

Empirical studies usually link FDI with economic growth, either the GDP per capita or the growth of the GDP. For example Zhang, (2001) explores the link between FDI and economic growth. The main issue in his study is the bi-directional causality that could exist between these two variables, either FDI promotes growth or growth attracts FDI. His study considered 11 economies, in different parts of the world including East Asia and Latin America, although Chile was not considered in the group of Latin American countries. Other variable usually linked is the Exports level or international trade, as it was the case of Ruane and Görg (1996) and Lahiri and Ono (2003), in some cases because FDI is directly export oriented or because the international trade indicates the degree of openness of the country. FDI at the regional level became more appealing since the sole study of location factors showed that there are differences in the determinants, as is shown by Scott (1998) in his study of location factors of FDI in early 1930's.

One of the significant studies made was done by Wei *et al* (1999) where they study the determinants for pledged FDI and realized FDI for a panel data set of 27 provinces in China, the main variables include international trade, wage rates, growth of GDP, infrastructure and investment incentives, and agglomeration, among others. They used four specifications for each kind of FDI, with the result that the use of random effects models with autocorrelation being the most powerful explanatory models against

ordinary least squares. The use of fixed effects specification was not considered due the presence of perfect multicollinearity. Their results showed that here is a spatial distribution of FDI and some regional characteristics in China and these determinants differ if the dependant variable is pledged FDI instead of realized FDI. In fact, whereas all the variables considered were significant for pledged FDI, only few variables were significant for realized FDI, specifically from the main equation:

FDI = f (International trade, wage rates, R & D manpower, rate of GDP growth, infrastructure, agglomeration, a dummy for time (1 for 1992 onwards and 0 before 1992), and a cross-sectional dummy for low information costs and high investment incentives)

Only international trade, wage rates and R&D manpower were significant for the case of realized FDI, indicating that the openness, labor costs and human capital are significant determinants, although they considered wage rates as a proxy for productivity levels, the results revealed that wages are considered part of the cost function rather than productivity and hence they got the opposite sign expected. Both dummies were also significant, one of the possible explanations for the difference between pledged FDI and realized FDI is that the first one is strongly market oriented, whereas realized FDI is mainly influenced by comparative advantages of the regions in terms of human capital, trade and labor costs.

Another study considering the case of China, Q. Sun *et al* (2002), realized a panel data study of the determinants of FDI considering a sample of 30 provinces over 1987 to 1998 period and a large set of proxies for variables such as Market demand and market Size (using GDP), Infrastructure (Railway per Km^2), Degree of industrialization (domestic investment per worker), Level of Foreign Investment (ratio of Cumulative FDI over cumulative domestic investment), labor quality (ratio of number of engineers, scientist and technicians over total employees), Labor Cost (average wage) and country risk (risk ranking) Their regression considered a logarithm form estimating three models: Fixed effect model with a different intercept for each unit (province), a regression with common intercept and the third is first difference data (the latest considering the variables in term of growth), in all three cases Both OLS and GLS were estimated. Their results showed that "the importance of FDI determinants moves through time" (Q. Sun *et al*, 2002). The average wage was significant, although its sign changed from positive to negative, labor quality and infrastructure showed a positive relationship, meaning that they attract FDI, other variables that were significant were the political stability and degree of openness, the level of foreign investment has a negative impact on new FDI, this was explained in the sense that multinational corporations may want to consider investing in provinces that are not flooded with FDI competitors.

Kozlowski & Weekly (1990) were concerned in the uneven distribution of FDI among U.S. states. They pointed out that regional differences in FDI could be grouped into three categories, market-related conditions, cost-based factors and public sector

policies. In their research, they used a cross-section data analysis for the purpose of measuring the dependence of FDI and a set of variables, for example, population and the growth of domestic employment were used as market size and growth hypotheses, wage levels, union membership, tax burdens, right-to work laws and estimates of business climate were used as cost-related factors; and dollar allocation in the state budget was used as public sector policies. Using correlation between changes in affiliate shares and factor linked to FDI, their results revealed that aggregate economic growth could be considered as a proxy for higher profit potential, the size of the state (or the region) could reflect market-related factors, and a staff commitment appears to enhance FDI environment. Input costs seemed not to be related directly to change in the share of the affiliates, and most of the rank correlations are not significantly different from zero, it is also important to notice that previous findings about taxes do not influence location decisions was also confirmed in their study.

Few studies have considered the way in which developing countries attract FDI, Asiedu (2002), made a study taking into account the case of Africa, although in her study she considered variables such as the inverse of the real GDP per capita (as a proxy for return in investment), quality of infrastructure, openness of the host country (ratio of the trade to GDP), and political instability. She used a set of models such as ordinary least square model, cross-section regression and panel data for her estimation, the results that she obtained showed that a large share of the variation in FDI rate can be explained by openness to trade with a positive relationship, infrastructure and return on investment

(also positive), for all of the specifications, but other variables such as a dummy for those countries located in the sub-Saharan Africa was not significant in the case of the ordinary least squares, but in the case of the other models the effect was negative, since this region tend to be non-market oriented FDI, and there is an importance in the regional effect. Other variables considered, such as growth of GDP, government consumption rate of inflation, ratio of liquid liabilities to GDP, and political instability, were not significant. She also pointed out that there are two types of FDI that should be considered: the market-seeking FDI and non-market seeking FDI, the latter, more related natural resource based investments and other export-oriented investment (Asiedu, 2002). This remark was also made by Chen (2000), who pointed out that the reasons for multinational enterprises to invest abroad depend of necessities such as utilization of resources, attend to a foreign market, the internalization of intangible assets or the realization of locational advantages, each of them giving form a specific kind of FDI.

2.3. Proposition

In the specific case of Chile, we can notice that the regions have attracted different kinds of FDI, it seems that there is a relation between regional characteristics and certain types of FDI.

As can be seen on Table 1, the first sector mentioned corresponds to the targeted FDI made by the multinational enterprises; we can distinguish three different kinds of

FDI, based on the importance of the sector which received foreign investment in each region, having a share within the region of at least 25%. The first one is the investment made mainly in the mining sector and others such as fishing and forestry (primary sector), the second is the investment made in the industry sector and the third is the FDI on the services sector, along with electricity and transport. It is important to notice that the total population of Chile for the period of study is approximately 15 million people, and the metropolitan region concentrates approximately 30% of this population. Hence, the omission of the distinction for the FDI in services is not trivial.

Region	Sector
I	Mining
II	Mining, electricity and transport
III	Mining
IV	Mining, construction and services
V	Electricity and construction
VI	Industry, mining and agriculture
VII	Industry, construction and forestry
VIII	Industry, electricity and transport
IX	Industry and forestry
X	Industry, forestry and construction
XI	Mining, industry and fishing
XII	Industry
Metropolitan	Services, industry and electricity

Table 1. Main targeted sectors for FDI in Chile (1990 – 1999). Source: National Institute of Statistics, Chile and Vice-Presidency of Foreign Investments Committee.

Consider the following hypothesis:

1. The differences in regional economic structure play an important role in attracting FDI, i.e. the specific conditions of each region are a key to attracting a specific kind of FDI.
2. Considering previous studies, there are set of independent variables that act as a factors in attracting FDI at a regional level, such as:
    a. The level of growth of each region (+)
    b. The level of Exports in each region (+)
    c. The unemployment level, in other words, the rate of the unoccupied force in each region (-)
    d. The public incentives in each region (+)
    e. The average wage rates of the occupied labor force in each region (- +)[3]
    f. The size of the market (+).
    g. Education levels, i.e the percentage of people that have finished high school and college in each region each year (+)
    h. The infrastructure (+)

3. These main determinants act differently according to the targeted sector, i.e. these determinants differ if the FDI was oriented to the export sector, (non-market seeking FDI) which includes the primary sector, in this case, it is expected that macro-economic variables have more influence, such as growth, exports, public incentives and

[3] In the case of this variable the expected sign in not clear, according to Chen (2000), wages are part of the cost function of the firm that wants to invest, in this case, it is expected a negative effect of the wages on FDI, specially when the activities are labor-intensive. On the other hand, wages can also be viewed as a measure of productivity levels, as it was pointed out by Wei *et al* (2001) and Q. Sun *et al* (2002), under this point of view, it is expected a positive relationship.

the unemployment level; or if the FDI was made on the services sector (mainly electricity and telecommunications), for this case, the variables that are related to the market and regional conditions, such as infrastructure, the population, the level of education and the wage rates are expected to have a stronger influence in attracting FDI. Although the latter sector is related with market-seeking FDI, it is a little different from the traditional definition of market-seeking FDI, since the motives are more related with expansion with the rest of Latin America and lower costs for multinationals rather than the capturing large percentages of the Chilean market itself (ECLAC, 2000).

2.4. Data and Methodology

Taking into account previous research and the availability of the data, the methodology chosen considers a panel data set for the 13 regions in Chile over a 10-year period (between 1990 and 1999).

The data provided information about two cases of FDI, Authorized level of FDI and Realized FDI, and also a detail of FDI for nine sectors in each region per year. The dependant variable in each case is the FDI and the set of independent variables are:

- Growth of regional GDP (lagged 1 year) (LogGdp)
- Level of regional Exports (LogExp)

- Unemployment rate per region (LogUne)
- Public regional expenditure (LogPexp)
- Level of public investment in each region (LogPinv) – current year.
- Average monthly Income of the workers per region (LogIng)
- Population in each region per year (LogPop)
- Percentage of population that have at least finished High School in each region (LogEdu)
- Approved and initiated buildings in m^2 (LogInft)

The variables are in log form, and then the general equation is

$$LogFDI = f(LogGdp, LogExp, LogUne, LogPexp, LogPinv, LogIng, LogPop, LogEdu, LogInft)$$

There are many reasons for the use of the Log form in this equation, the period of time considered, (10 years), is very restrictive in using a linear form for this equation, with many variables, the panel data might yield non-significant results. Also, the magnitude of the different variables can result in diverse coefficients that might lead to some of them to be close to zero, other studies doing this relationship have proven that the R-squared is smaller that using a non-linear equation, a previous analysis on Pearson correlations for the variables told us that there are stronger correlations when these variables are in log form rather than direct form. Also, as it was pointed by Wei *et al* (1999), this is a way to obtain directly the elasticities of FDI with respect to several

explanatory variables in a non-linear relationship.

The set of variables used are explained as follow:

Rate of Growth (LogGdp) – lagged one year.

One of the key variables often used is the economic growth in the relationship with FDI, here it is considered as one of the determinants, and as noted earlier, it is expected to have a positive relationship with FDI, although it could be possible that it might not be significant for certain kinds of FDI, because since Chile is still a developing economy, the rate of growth of each region could not be powerful enough to act as an attractive factor opposing the overall rate of growth of the whole country. The data for GDP are lagged one year, because the possibility of a bi-directional causality is not discarded for the case of Chile.

Level of Exports (LogExp)

As it has seen in some studies, there could be a relationship between FDI and exports, although the causality is not clear. This variable acts also as a measure of openness to external trade and the "experience" of the region with exports, in the case of Chile, since there were periods of time where there was a closed economy and also the application of ISI policies in the past. Some descriptive studies have shown that FDI has been oriented directly to export activities, especially in the northern regions of the

country, and these exports are mostly aimed to developed countries such as Asia and the U.S., for these cases, the level of exports if it is large, might ease these transactions with foreign countries, or that the exports transactions are not a entrance barrier to the industry for foreign investors. Hence, it is expected a positive relationship because it might reflect also the accessibility to a needed resource in bigger markets.

Unemployment Rate (LogUne)

This is a variable considered in two ways, one as a measure of the availability of inputs, the other one as a part of the level of development in the region. According to Armstrong and Taylor (2000), the density of the manufacturing employment acts as a way to describe the industrial structure, and it has a positive relationship. Since in this case, we are using the unemployment rate, the expected result is the opposite; if this rate is high, it is expected that it deflects FDI to the regions rather than attracts it, due that in the export-oriented sector (mining) the labor force needs to be specialized to a certain level (like heavy machinery operators) and that labor force is scarce or more expensive. However, it is also expected that it does not have an influence on investments made in the services sector, for example, because this variable used as availability of inputs does not reflect completely the quality of the human capital and it could not have influence in FDI in contrast with the same variable used in the primary and manufacturing sectors.

Public Expenditure (LogPexp) and Public Investment (LogPinv)

Although these variables are not often seen in studies of FDI, either one of them or both variables are considered as a proxy for incentives made by the central government in order to attract FDI, it is not considered as public capital stock, but rather if the government moves along to attract FDI with public incentives. The variable often utilized is the expenditure for regional development alone, in Chile the public expenditure is referred to social programs, public education, health care systems and social protection; however, it seems reasonable to take a closer look at the public investment in order to narrow the scope of the government expenditures to something directly oriented to development. It is expected a positive relationship, although the opposite is also possible, for example, since the economic policy of Chile concerning FDI is the attraction of capital inflows towards development in general, when FDI concentrates in some of the regions, the central government tend to focus on those regions that do not receive these inflows in order to balance economic growth, under this point of view, it might be possible that FDI and public incentives compete each other.

Average Income of the workers per region (LogIng)

This variable is considered in two ways, the first one is for the case of market-seeking FDI, the total population of Chile is approximately 15 million, then the level of income could be a factor in the case of multinationals looking for profits in a small market. The second alternative, since it is specifically the income of the workers (on average) it could be used as a proxy for wages in the case of non-market (or export-oriented) FDI, either as a cost variable or a proxy for productivity levels, as it was indicated in Broad-

man and Sun (1997), Wei *et al* (1999), and Q. Sun *et al* (2002). Since there will be more that one model tested in this work, it is expected to identify these effects separately.

Population (LogPop)

This variable is the common proxy used for agglomeration, as it was used the same way in Wei *et al* (1998); however, it is expected that this variable might be only significant for the case of a specific kind of FDI, such as the authorized FDI or the FDI in the services sector (in a certain way, considered market-seeking FDI), and not for the export-oriented FDI, since agglomeration and vertical integration for the case of Mining or Fishing, is not necessarily related to a large population, since it seems that these activities when bring capital inflows, they also obtain technology transfer and the quality of human capital would be more important than the size of population.

Education (LogEdu)

A variable often linked to the attraction of FDI is the quality of "human capital". An important variable is the quality of education and training, as it was pointed out by Noorbakhsh *et al* (2001), because it often means lower costs, and better productivity. As an attractive factor for FDI, the use of educational levels provides an idea of the future quality of the workers and the ease with which employees could be trained.

Infrastructure (LogInft)

There are several studies that support the use of this variable on FDI, such as Broadman and Sun (1997), Wei *et al* (1999), Asiedu (2002) and Q. Sun *et al* (2002). Although the relationship with the theory itself it is not clear in the sense to provide better comparative advantage in terms of costs or market accessibility, and the proxies utilized in each case were completely different, in this particular case, the proxy utilized was the approved and initiated buildings in m^2, in terms of construction, in current terms rather that cumulative infrastructure, due to the short period of time considered for this work. Other variables, such as highways, railroads, or ports were not considered since they present less variation in the time frame considered (10 years).

2.5. Model

We can consider, for the specific case of Chile, two kinds of FDI:

a) Non-Market seeking FDI – Investments made primarily for Export activities, with special attention to availability of natural resources.
b) "Market Capture" FDI, This is slightly different from the definition of market-seeking FDI, since these investments are mainly targeted to a market whose demand tends to be inelastic, for example water and electricity, or were the market is not limited to the country itself, but aims to capture bigger market in neighboring countries.

There are 4 dependent variables for which we will estimate the parameters:

1. The authorized FDI
2. The realized FDI
3. The FDI in the export sector
4. The FDI in the services sector

Due the lack of previous studies made for the case of Chile, it was considered 4 econometric models to be compared:

a) Fixed Effects Model (One Way Fixed effects- Model 1)
b) Random effects model for the unobservable individual effect (One Way Random effects – Model 2)
c) Two way fixed effect model (group and time effect) (Two Way Fixed effects – Model 3)
d) Random effect model for both individual and time effect. (Two Way Random effects – Model 4)

Although all the regions of Chile are included in the model (13 regions), it is likely to find the random effect model more powerful than the fixed effects for some of the dependent variables, especially in the case when the FDI is divided in sectors such as exports and services, since the case of Chile presents a small degree of concentration of certain activities in specific regions, for example the mining sector is greatly concentrated on the northern regions of Chile, or the services sector is concentrated in the metropolitan

region. The random effects model might be better in explaining the influence of the regions themselves assuming these as an error component rather than a fixed effect, especially when this influence is uneven among all 13 regions, which is the opposite of the presumption of fixed effects specification. Random effects model takes into account that this influence is only due to selected regions of the total, which it is assumed random, and hence, part of the error term. The use of two-way fixed effect models was mainly in order to compare with the parsimonious one-way model and to obtain a more complete error-component model (random effect model for individual and period effect). The criteria for the decision of which model is more powerful to explain the dependant variable was based on the Likelihood ratio and F tests for the fixed effects and the Hausman Test in the case of random effects versus fixed effects, if the case was that the values were close to each other, the parsimonious principle was used to select the model.

2.6. Results

We can see the main results in the following tables, the values in parenthesis associated with the parameters are standard deviations, whereas the percentages associated with the hypothesis tests indicate the probability to reject the correspondent model, the likelihood ratio and F test compares:

- Model 1 with a model without the effects, (a model considering the independent variables), and
- Model 3 with model 1

The Hausman Test compares the Random effect model with fixed effects i.e.:

- Model 1 vs. model 2

  Model 3 vs. model 4

Dependant Variable: Total Authorized FDI

	Model 1 One Way Fixed effects		Model 2 One Way Random effects		Model 3 Two Way Fixed effects		Model 4 Two Way Random effects	
LOGGDP	8.023		13.951	**	5.875		13.654	**
	(6.726)		(6.402)		(7.482)		(6.860)	
LOGEXP	-3.868	***	0.461		-4.646	***	0.328	
	(1.502)		(0.417)		(1.748)		(0.427)	
LOGUNE	-0.709		1.158		2.346		2.463	***
	(1.162)		(0.910)		(1.663)		(1.039)	
LOGPEXP	11.989	***	2.174		8.851		2.666	
	(4.881)		(2.859)		(7.737)		(3.458)	
LOGPINV	-1.153		-0.892		-2.353		-2.317	
	(2.157)		(1.909)		(2.268)		(2.024)	
LOGING	6.886	*	1.214		6.763		1.719	
	(3.880)		(2.106)		(5.037)		(2.258)	
LOGPOP	-45.271	*	0.609		11.316		2.518	
	(26.950)		(2.218)		(33.858)		(2.977)	
LOGEDU	4.953	*	5.777	**	6.581	**	6.419	***
	(3.015)		(2.726)		(3.074)		(2.709)	
LOGINFT	-3.386	**	-0.886		-4.152	**	-2.449	
	(1.777)		(1.457)		(1.934)		(1.566)	
Constant			-7.144		-166.105		-6.910	
			(29.494)		(443.490)		(30.950)	
R Squared	47.45%		30.75%		53.72%		25.64%	
Log - Likelihood	-314.325				-306.060			
Likelihood Ratio	31.639				16.530			
Test (χ^2)	(1.57%)				(5.66%)			
F Test	2.187				1.492			
	(1.70%)				(16.15%)			
Hausman (9)	20.02				18.71			
	(1.17%)				(2.77%)			

Table 2. Results for the first dependent variable, fixed and random effects model,

*: significant at 10%, **: significant at 5%, ***: significant at 1%

Dependant Variable: Total Realized FDI

	Model 1 One Way Fixed effects		Model 2 One Way Random effects		Model 3 Two Way Fixed effects		Model 4 Two Way Random effects	
LOGGDP	3.941		6.219	*	2.628		5.260	
	(3.891)		(3.812)		(4.150)		3.915	
LOGEXP	-0.932		0.521		-0.661		0.574	
	(0.869)		(0.413)		(0.969)		0.416	
LOGUNE	-1.705	***	-0.762		-3.151	***	-1.041	
	(0.672)		(0.593)		(0.923)		0.675	
LOGPEXP	9.396	***	5.072	***	22.894	***	6.498	***
	(2.824)		(1.840)		(4.291)		2.161	
LOGPINV	-1.466		-1.818		-1.309		-2.008	*
	(1.248)		(1.193)		(1.258)		1.188	
LOGING	-2.714		-0.846		-4.227		-0.851	
	(2.244)		(1.689)		(2.794)		1.828	
LOGPOP	-16.117		-2.472	**	-7.049		-3.080	*
	(15.590)		(1.486)		(18.780)		1.822	
LOGEDU	0.977		2.266		0.195		1.866	
	(1.744)		(1.637)		(1.705)		1.556	
LOGINFT	-1.360		-0.306		-1.022		-0.799	
	(1.028)		(0.916)		(1.073)		0.941	
Constant			18.205		-74.722		16.678	
			(21.628)		(245.988)		23.052	
R Squared	62.33%		24.04%		69.50%		16.28%	
Log - Likelihood	-243.166				-229.439			
Likelihood Ratio	59.572				27.452			
Test (χ^2)	(0.00%)				(0.02%)			
F Test	5.232				2.586			
	(0.00%)				(1.01%)			
Hausman (9)	14.85				29.65			
	(9.50%)				(0.50%)			

Table 3. Results for the Second dependent variable, fixed and random effects model,

*: significant at 10%, **: significant at 5%, ***: significant at 1%

Dependant Variable: FDI in the Primary Sector

	Model 1 One Way Fixed effects		Model 2 One Way Random effects		Model 3 Two Way Fixed effects		**Model 4 Two Way Random effects**	
LOGGDP	12.164	***	15.894	***	12.307	**	14.055	***
	(5.104)		(4.971)		(5.374)		(5.331)	
LOGEXP	-2.327	**	0.255		-2.507	**	-2.595	**
	(1.140)		(0.465)		(1.255)		(1.237)	
LOGUNE	-1.674	*	-0.891		-2.758	**	-3.390	***
	(0.882)		(0.757)		(1.195)		(1.129)	
LOGPEXP	3.099		1.952		23.005	***	17.906	***
	(3.704)		(2.354)		(5.556)		(4.989)	
LOGPINV	-3.533	**	-2.716	*	-3.028	*	-2.965	**
	(1.637)		(1.540)		(1.629)		(1.626)	
LOGING	7.310	***	4.174	**	3.227		3.489	
	(2.944)		(2.040)		(3.617)		(3.563)	
LOGPOP	10.651		0.224		50.192	**	7.351	
	(20.451)		(1.866)		(24.315)		(15.338)	
LOGEDU	2.016		1.265		1.937		0.935	
	(2.288)		(2.125)		(2.207)		(2.157)	
LOGINFT	-0.014		0.742		2.008		0.903	
	(1.349)		(1.181)		(1.389)		(1.323)	
Constant			-51.515	**	-926.483	***	-285.271	
			(26.513)		(318.492)		(193.275)	
R Squared	71.93%		18.04%		77.87%		29.79%	
Log - Likelihood	-278.451				-263.020			
Likelihood Ratio Test (χ^2)	111.577 (0.00%)				30.861 (0.03%)			
F Test	12.232 (0.00%)				2.947 (0.38%)			
Hausman (9)	29.36 (0.07%)				9.17 (42.18%)			

Table 4. Results for the Third dependent variable, fixed and random effects model,

*: significant at 10%, **: significant at 5%, ***: significant at 1%

Dependant Variable: FDI in the Services Sector

	Model 1 One Way Fixed effects		**Model 2 One Way Random effects**		Model 3 Two Way Fixed effects		Model 4 Two Way Random effects	
LOGGDP	-1.482		-2.229		0.639		0.217	
	(8.109)		(7.656)		(9.177)		(8.283)	
LOGEXP	-2.517		-0.043		-4.766	**	0.009	
	(1.810)		(0.458)		(2.144)		(0.468)	
LOGUNE	1.012		0.236		1.751		0.158	
	(1.401)		(1.065)		(2.040)		(1.210)	
LOGPEXP	9.701	*	6.482	**	4.599		8.443	**
	(5.884)		(3.359)		(9.490)		(3.943)	
LOGPINV	-3.613		-3.983	*	-3.303		-4.039	
	(2.600)		(2.255)		(2.782)		(2.419)	
LOGING	6.140		1.837		0.552		0.850	
	(4.677)		(2.382)		(6.178)		(2.543)	
LOGPOP	-26.322		-1.481		10.967		-3.091	
	(32.489)		(2.603)		(41.527)		(3.355)	
LOGEDU	-2.185		-1.159		-1.795		-1.096	
	(3.635)		(3.264)		(3.770)		(3.293)	
LOGINFT	1.382		1.638		1.485		1.535	
	(2.143)		(1.719)		(2.372)		(1.860)	
Constant			-62.627	*	-140.215		-51.483	
			(34.168)		(543.953)		(35.859)	
R Squared	62.02%		56.08%		65.38%		55.92%	
Log - Likelihood	-338.624				-332.604			
Likelihood Ratio Test (χ^2)	16.979 (15.04%)				12.039 (22.11%)			
F Test	1.256 (25.57%)				1.067 (39.36%)			
Hausman (9)	8.69 (46.62%)				10.01 (34.94%)			

Table 5. Results for the Fourth dependent variable, fixed and random effects model,

*: significant at 10%, **: significant at 5%, ***: significant at 1%

2.7. Analysis

Fixed Effects Versus Random Effects (One Way and Two Way)

As it was said before there are 4 models estimated for each dependent variable, model 1 estimates the parameters considering individual effects uncorrelated among each other and capture them as a fixed effect, whereas model 3 takes into account not only the individual effect but also the effect of each period inside the estimation, considering both of them as fixed effect, the comparison between these two models takes into account the values of the log-likelihood, the likelihood ratio and the F test, if the values are close to each other, the model selected is the one that uses less independent variables, due to the size of the sample (130 observations). For the case of the random effects, models 2 and 4 consider the individual[4] and period effects[5] correlated among each other and therefore the influence of these effects is random. This approach exploits the serial correlation in the composite error using a GLS framework, which was the estimation used here. The Hausman test compares its value with the critical χ^2 value, when this statistic exceeds the critical value it reveals that the fixed effects model is better than the random effects, for each case (one-way and two way respectively).

As we can see in the tables 2 and 3, the values for the Log-likelihood are close in the case of the one-way and two-way models, also, models 1 and 3 explain better the dependent variables, authorized FDI and realized FDI, that models 2 and 4 (random

[4] For the case of Model 2
[5] For the case of Model 4

effects), this suggests that the influence of the regions and the years themselves on FDI are uncorrelated and, therefore, can be captured as a fixed effect of the region and the year, although the values of R-squared and log-likelihood are smaller in the case of one-way fixed effects versus two-way, we applied the parsimonious principle and chose model 1 for the case of authorized FDI and realized FDI.

Table 4 indicates a different situation, in this case Model 3 is more powerful to explain the dependent variable, FDI in the export sector, when it is compared with one-way fixed effects, however, when the comparison is made with the random effects model (model 4) the Hausman value indicates that the latter is a better model, in other words, the influence of the regions and the years is random and cannot be captured as individual effect, hence it is considered in the error term. This result is not completely surprising, since the largest amount of FDI in the export sector is concentrated in few regions of the country, particularly those regions that have a large amount of natural resources such as mining and forestry, since the random effects model considers a large number of random draws from the cross-section, the treatment of these effects is as they were random draws of the population, which is appropriate when there is neglected heterogeneity in the regions concerning this sector, this heterogeneity of the FDI cannot be captured with fixed coefficients. A similar case happened for the fourth dependent variable, FDI in the services sector, table 5 shows in this case that both one-way and two-way random effects explain better the variable than models 1 and 3, but the R-squared value shows that model 2 explains better the variable than model 4, and that means that the individual effects are

correlated among each other but not the period effects, and that the effects of the regions are orthogonal with the rest of the explanatory variables, making necessary to treat them in the error term, which is correlated serially with the "natural" error term. The fact that the services sector is more concentrated in the regions with larger population (about one third of the total population in Chile), supports the idea of random effects, in the sense that the effect of the regions is not fixed for all regions, but rather concentrated in few regions of the population of study. The selected models for each variable are shown in Table 6, as a summary:

Dependent Variable	Model Chosen	Name of the Model
Authorized FDI	1	One-way Fixed Effects
Realized FDI	1	One-Way Fixed Effects
FDI in the Export Sector	4	Two-Way Random Effects
FDI in the Services Sector	2	One-Way Random Effects

Table 6: Summary of the models Chosen for each dependent variable

Authorized FDI

From the results shown in Table 2, we can see that the level of exports, the public expenditure, the average income, the population, the education and the infrastructure are significant variables, this means that the "traditional" variables play a role in the decision of how much foreign investment is permitted in each region, the fixed effect of each region is also significant although only at a 10% level. The public expenditure, the income and the education have the sign expected, meaning that they are considered as

attractive factors of FDI, and the magnitude of these parameters indicate that there is high sensitivity of the authorized FDI to these variables, since the results show directly the elasticities of the dependent variable to the explanatory variables; however, the exports, the population and the infrastructure present an opposite sign expected, they appear to deflect this kind of FDI rather than considered attractive, since this variable is more concerned with decision making rather than actual capital inflow, it is reasonable to think that variables such as population and infrastructure, when they are larger, they could be considered as a measure of agglomeration, which in the case of Chile, being a small country in terms of space might be considered a disadvantage, at least for the decision-makers, in terms that little agglomeration is not attractive in considering to put investment on the country, but rather other determinants are considered. The exports level also shows a negative sign, which is a little surprising, since it was expected that openness to trade would be attractive to FDI. In this case, it seems that as exports increase, authorized FDI would decline, but this also could mean that exports and FDI are correlated each other rather than one explain the other, since this variable was not used in lagged form, there is possibility that the causality of these variables is the other way around, i.e. that the authorized FDI causes the export level to fall.

Realized FDI

When we look at the results for the realized FDI on table 3, these differ completely form the previous case, the realized FDI estimation indicates that only the

unemployment and the public expenditure are significant variables, with 99% of confidence, both variables have the sign expected, i.e. the public expenditure shows a positive sign, indicating that it is considered an attractive factor of FDI, since this variable is a proxy for public incentives, it shows that they are correlated, the other proxy used, public investment was not significant, although it was thought a better proxy, the unemployment rate shows a negative sign, which indicates that it deflects the actual FDI, since it may indicate instability of the country, the magnitude of them, measured as elasticities, indicate also a large sensitivity of the dependent variable, specially in the case of the public expenditure. Since it is also a fixed effects model, a closer look to these effects reveals that they are not significantly different from zero, indicating that the differences of the regions themselves do no play a role in the attraction of FDI. An interesting result is that the variables often linked with FDI, such as growth, income and infrastructure, do not play an important role in the attraction of FDI, at least not at regional level.

FDI in the Primary Sector

Looking the results on Table 4, we can see that the significant variables are the growth of GDP, the exports level, the unemployment rate, the public expenditure and the public investment. The values for the growth of GDP and public expenditure present the sign expected, with a large sensitivity of this kind of FDI to these variables. FDI on the primary sector is characterized mainly by investments on natural resources such as

mining and fishing; in some cases they form a great part of regional GDP. The positive relationship of GDP with FDI indicates that the return of these investments are important for the multinationals and, in the case of public expenditure this variable acts as a measure of efforts for development and of the regions. The level of unemployment has a negative sign which it is expected if this variable is considered as an indicator of the quality of the labor force and development, considering that investment on natural resources may be a large source of profits for multinationals, every variable that indicates growth and development of the region acts as an attractive factor for investment. An interesting result is the role the level of exports, even though it is significant, it has a negative sign, which means that the elasticity of FDI is negatively related with the level of exports. Again, this could be explained in the sense that since this sector (primary), is mostly export-oriented, the country in general puts greater efforts in promoting exports in sectors. In this case, the level of exports acts as "competition" for the export-oriented FDI maybe because it leads to increase the foreign currency, making the exchange rate unfavorable to the export sector. For the case of public investment, is it reasonable to think that the FDI in the primary sector and this kind of investment might act as substitutes, i.e. the negative correlation between these two variables indicates that if there is public investment in one region then there will be foreign investment in the others, as a way to balance the capital in the regions. However, the causality in each case is not clear, specially for GDP, exports and public investment, these results only indicate that the FDI in the primary sector and the independent variables are correlated in a non-linear relationship.

FDI in the services sector

In the case of the FDI in the services sector, we can see from Table 5, that the public investment, the public expenditure and the constant significant variables, indicating that the proxies used for public incentives are correlated with the dependent variable, but the signs are different, in the case of public expenditure the sign is positive indicating that the larger the expenditure, the more the FDI will be attracted, with a high level of sensitivity, as it shows its magnitude of the coefficient, but for the public investment, the relationship is negative which could be explained in the same sense that these types of investments compete each other, the result of the influence of these variables is interesting, since there might be a positive linear correlation between each other, but the fact that they act in opposite ways in this non-linear model indicates that the variables have independent influence on the FDI in the services sector. The constant itself, although significant, shows that if has very little influence, since its magnitude is negative and only significant at 10% level. It is probably also that this FDI had flourished mainly through acquisitions and privatizations, the idea of market capturing can still be differentiated from pure market-seeking, since the gross of these investments are in activities related with almost inelastic demand and the attainment of a "secure" market. Market-seeking FDI is the searching for a large size market with downward slope demand. These mergers and acquisitions took place in sectors such as electricity and water (sanitation is also included in this category) as well as services such

telecommunications and finances. Since very few variables explain the dependant variable, it should be considered the search for more specific determinants, such as costs, and demand-related variables, like consumption and prices, or time-related variables, the increase of these investments took place in the latter years of the period of study. The study of investment in sectors such as water and electricity also need the inclusion of "non-traditional" variables, since, for the specific case of Chile, many of these firms were government-owned, and these investments took place in a specific period of time of Chile, when the government authorized the privatization of such services.

2.8. Concluding Remarks

The story of FDI in Chile had tell us that direct policies made by Chile in order to attract FDI were slightly different from others applied in countries such as Argentina and Brazil, this difference is visible when comparing the authorized and realized FDI, the traditional variables were significant for the authorized FDI, indicating that the model of FDI that relates comparative advantages for multinationals is put into practice, although in Chile the objective for attracting FDI was not development *per se*, but the control of the debt crisis and inflation and to expand the export sector, this explains in part the reason why during the early 1990's most of the FDI were concentrated on the mining sector, a sector highly profitable for foreign companies, and appropriate as a tool for the export sector. However, when considering the realized FDI, the variables were not significant, with exception of two of them, indicating that the regional macroeconomic variables do

not play an important role in FDI, but that there are other factors that do not imply regional location when attracting the total FDI.

The analysis of the determinants at a sector level tends to confirm that even though the usual variables used for explaining FDI might be significant in explaining the FDI, the causal relationships could explain the other way around and that there is only correlation or even a bi-directional causality. In fact, for the case of the Mining sector, which was the leader in FDI until mid 1990's, some the typical determinants were significant, whereas for the services sector, most of the determinants were shown to be not significant. Hence, as FDI was evolved from the primary to the tertiary sector, the determinants also evolved, making necessary the search for other factors that could explain the attraction of FDI, examples could be the consideration of spatial effects or more specific factors such as trade arrangements, or the inclusion into to bigger markets, which still have not been tested in other studies.

The use of panel data specifications showed an appealing performance, since for the main dependent variables (authorized and realized FDI) the fixed effects specification were significant, a most exhaustive analysis could be performed, it could be considered that an individual analysis of FDI en each region could provide more insight about the special characteristics that attract FDI that do not change in a short period of time or vice versa, characteristics that change over the time but are the same for all regions such as prices or taxes. It was specifically avoided the use of variables that did not vary either

across regions or years, in order to avoid using dummies or combined dummies in this panel, which was almost a balanced-type panel (the number of individuals were 13 compared with a 10-year period). The fact that the random effects model were significant for the secondary dependent variables (FDI in the primary and services sector), indicate that there is some kind of concentration of the sector in few regions, i.e. the regions are heterogeneous in terms of FDI in certain sectors and that the fixed effects specification is not able to explain.

From the point of view of the policy making, it seems that the relevant variable in attracting FDI is the public expenditure and those policies related with unemployment and income, which are oriented to developing a region. The more ignored is the region in its development, the less attractive is to FDI, even though there could be sources of natural resources available, if the region does not show signs of development, it will not be necessarily attractive to FDI.

The role of the mechanism for FDI (D.L. 600 and Chapters XIX) is very important at national level, but it needs to be accompanied with other factors purely regional for materializing the FDI.

For the case of the services sector, we cannot assume that it was market-seeking FDI, since the typical factors considered for this kind of FDI were not significant, hence the denomination of market-capture FDI. So far, this concept has not been explored

extensively, and the results presented here suggest that there are still some factors that need to be considered, from the quality of the data, the specification of the model and the use of other explanatory variables.

Lastly, for the specific case of Chile we need to consider other aspects, for example the presence of double causality between FDI and some of its explanatory variables, particularly, the GDP, since it is a significant variable for attracting FDI in those regions where there was a steady flow of investment, it is not discarded the idea that also could exist the presence of an unit root for FDI itself. Either way, the study of FDI presents wide range of alternatives that are waiting to be explored, in the next chapter, it will be studied one particular causality relationship: FDI and GDP, the results here tell the reader that in order to attract FDI, it is necessary the growth of GDP, but since it is also the question that past FDI might act as an attractor for FDI itself, there may exist a link between FDI to GDP, although there is no evidence of spillover effects from FDI on the region, there might be a double causality, this hypothesis will be explored in the next chapter.

Chapter III: A Granger Test for Regional FDI & Growth in Chile

3.1. Introduction

Whereas there are studies about the relationship between Foreign Direct Investment (FDI) and Gross Domestic Product (GDP) that look for an uni-directional or bi-directional causality of the FDI and GDP, the study of the regional link in developing countries concerning these two variables are not widely explored, due mainly to the lack of an adequate amount of data for all the regions in a period of time for the country of interest, and also because the policies for attracting FDI are used at a country level rather than a regional level in these countries. At a country level, there are several studies that research uni-directional or bi-directional causality in many countries, even applied to countries like Chile and other from Latin America, still with no consensus that there is bi-directional causality between GDP and FDI.

Previous studies relate FDI to GDP in the sense that FDI might cause the growth of GDP due to spillover effects from this form investment, in Chile, the studies about this particular spillover effect are not widely explored, hence it cannot be said in a formal way that FDI causes the GDP, because the exploratory findings say that the effect of FDI might take more than one or two periods of lag in order to capture the effect. But also, the FDI that takes place in Chile is very specific in its character, for the FDI in the primary sector, it is export oriented investment with little transfer of technology, and larger investment in capital goods, whereas the FDI in the services sector (oriented to the

market) might have a little more technology transfer, but since it has a captive market the remittances of these investments leave quickly the country and the spillover effect is smaller. Mechanisms such as D.L. 600 and Chapter XIX in order to attract FDI were developed by policy makers in the early 80s in order to impulse the economy, which was under crisis, so in a sense, it was expected that FDI would contribute to the Growth of GDP.

In the previous chapter, the findings of the exercise indicate that the variable GDP is a significant factor in attracting FDI, which might lead to think that GDP causes FDI and, since there the spillover effects of FDI are not easily recognizable, the notion of FDI to cause GDP takes a longer period of time or there is not causality the other way around.

It is the purpose of this chapter is to research this causality by using one of the many proposed tests available which can pinpoint the reader towards which direction these variables are related. Using the regional component, the results may vary due to the type of FDI which is different depending on which region it is referred to. Since there are two types of FDI identified for the regions in Chile (export-oriented FDI and Market-oriented FDI - or “market captured” FDI as referred in Robles and Hewings (2004)), it may not be trivial to obtain the causality for each region.

This chapter is organized as follows, the first segment shows an exploratory evolution of FDI and GDP across regions in Chile for a period of time from 1990 to

2003, to see if it possible to establish the hypothesis of the relationship between the variables, the second section explores the Granger Causality test, the Toda-Yamamoto test and Granger tests for causality in panel data models. In section three, the data and the model used are described for this study. Section four presents and studies the results of the tests that will lead to some final considerations in the last segment.

3.2. The Regional Behavior of GDP and FDI

In Chile, FDI is mainly attracted by three mechanisms that are clearly identified when reviewing the evolution of FDI in Chile. In the mid-1970s, there was decrease of the restrictions that affect the repatriation of profits of foreign companies, later, the Decree-law 600 formalizes this mechanism, under which foreign companies pay a fixed tax rate for profits, the other mechanism was the debt-equity swaps used during the financial crisis in Chile in the late 1970s and early 1980s. (Agosin, 1997).

At a regional level, FDI behaves differently across regions and time, we can see on figure 1 that there are three regions that have presented high amounts of FDI during the period 1990 thru 2003, two of them showed higher investment in the Mining sector, located in the northern part of Chile (regions I and II). On the other hand, there is a region with the highest amount of FDI throughout the time, called the Metropolitan Region, which concentrates about 30% of the total population and where, Santiago, the capital of the country is located.

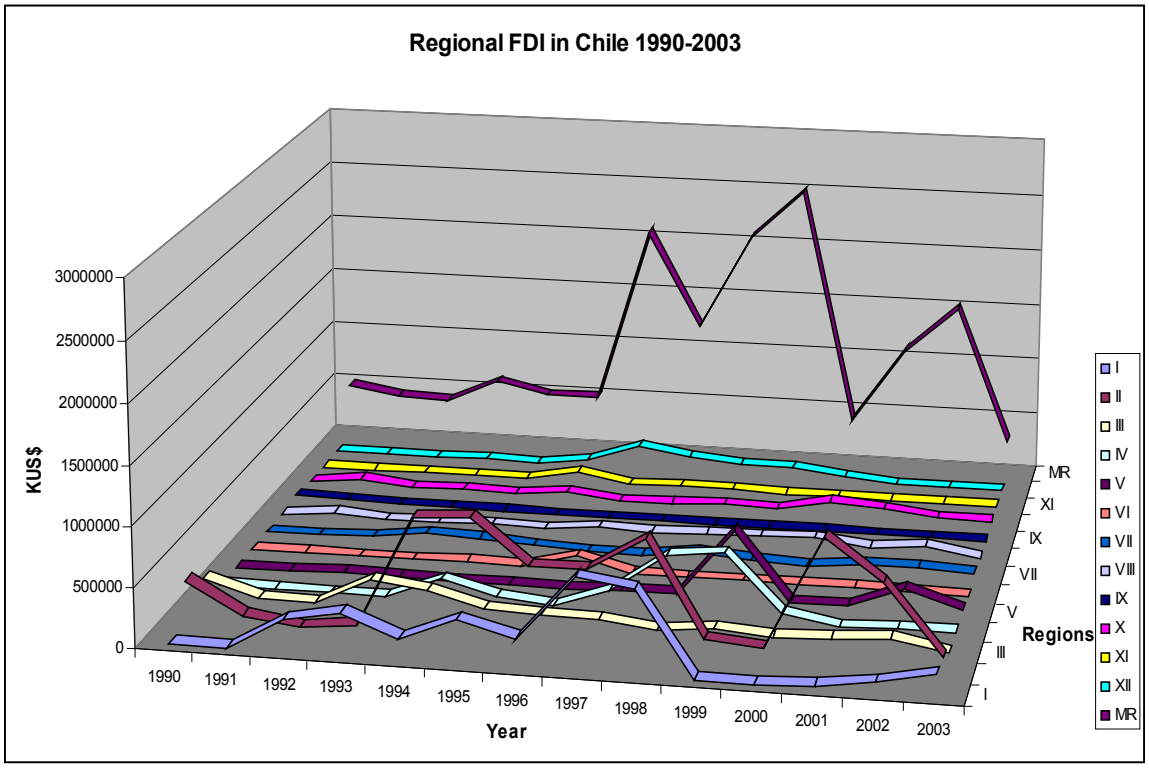


Figure 8: FDI Across Regions - Source: Foreign Investment Committee.

On the other hand, the Regional GDP in Chile behaves differently from FDI, since the population factor makes a difference for some regions, it is better to look at GDP per capita rather than just real GDP across regions, we can see on figure 2 that the regions with the highest GDP per capita is not the Metropolitan region, but rather the second region of Chile, Antofagasta, which in terms of levels of FDI is ranked 2nd after the metropolitan region.

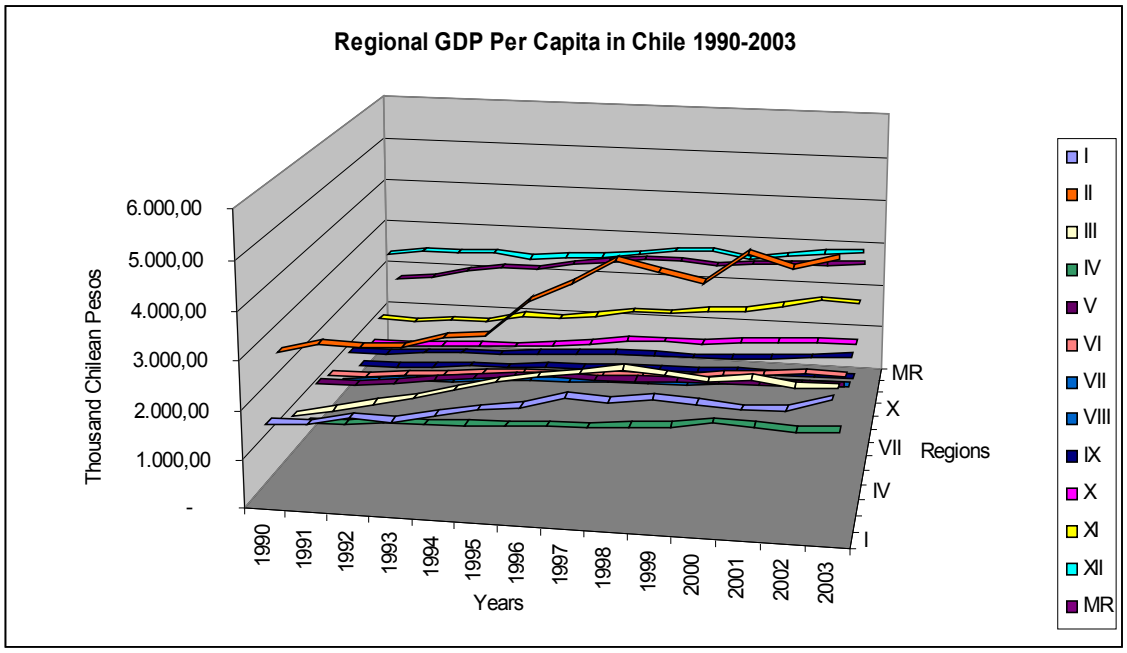


Figure 9: GDP Per Capita in Chile. Source: Central bank of Chile and National Statistics Institute of Chile

We may be able to find a hypothesis for a possible causality between FDI and GDP. In a previous study, Robles and Hewings (2004), discovered that the regional GDP was a significant variable in attracting FDI for the period 1990 to 1999. Also, the behavior of FDI was different according to the type of investment. If the type of investment was export-oriented FDI, there was a relationship between GDP and FDI but for the case of market-oriented FDI no relationship could be established. In this paper, we will test further this relationship.

3.3. Theoretical Framework

The use of Granger causality tests to trace the direction of causality between two economic variables is used frequently in empirical work. For that, the tests need time

series, but they can be misleading when they focus on time rather than causality itself because the test has not strength in establishing the relationship between "forward-looking variables" (Chowdury and Mavrotas, 2003).

Considering that the standard Granger causality definition is that a variable x causes y if the other information available from x is no better able to predict y. If x and y are observed on N individuals, the issue consists in determining the optimal information set used to forecast y. The most general solution is to test the causality from the variable x observed on the ith individual to the variable y observed for the jth individual, with $j = i$ or $j \neq i$. The second solution is more restrictive and is directly derived from the time series analysis. However, one of the main specific stakes of panel data models is to modelize the heterogeneity between individuals. In a p order linear vectorial autoregressive model, we distinguish four kinds of causality relations given the heterogeneity of the data generating process.

A study made by Chowdury and Mavrotas (2003) on FDI and GDP concluded that for the specific case of Chile there is a strong uni-directional causality at country level, meaning that GDP causes FDI and not vice versa, supporting a study made by Hewings and Robles (2004) stating that, at regional level, the growth of regional GDP is a determinant for FDI, in the cases when the FDI is not market-oriented, whereas for the market-seeking FDI, the growth of GDP was not a significant variable in attracting FDI. Also, Sjöholm (2000) indicates that in the case of recovery from a crisis in Indonesia, the

factors that are significant are the ability to attract FDI and to attain uniform regional development, the development has to be even, so as the country feel the recovery as a whole and avoid regional and social tensions. But on the other way around, FDI tends to locate in clusters, which might mean that there will be spatial inequalities.

FDI in Chile is mainly structured through the mechanism of the Decree Law 600, which is mostly FDI in the primary sector (mining, fishing and forestry), the other mechanism was a program of debt-equity swaps (in order to solve a debt crisis in the early 1980´s), this mechanism is changed in the 90´s to associated credits of foreign investors, which is somewhat similar to say Market-Seeking FDI, although the population in Chile is about 15 million people, which is not a large market, the same study made by Hewings and Robles (2004), mentioned this phenomenon as a "market capture FDI", meaning that a stable economy may attract FDI in order to use this economy as a platform to seek larger markets in South America, this notion, although not formally researched, also suggests that GDP or the Growth of GDP causes FDI.

The inverse, i.e., the thesis that FDI causes Growth of the GDP is not supported by enough studies, since the FDI as a variable for Growth of GDP has not been significant in the study of Chowdury and Mavrotas (2003), in the study for another developing country, Sri Lanka, Balamurali and Bogahawatte (2004) found that there is a bi-directional causality between GDP and FDI, but suggesting that for FDI causing growth it has to be accompanied by trade policy reforms, the expansion and

diversification of the country's exports, and the promotion of FDI and domestic Investment. These policies where applied in Chile at different time on the regions, for example, the trade policies for exporting natural resources where made at the early stages of FDI policies, whereas the diversification of exports were made later. The study made by Kumar and Pradhan (2002) for 98 developing countries also suggests that it is not clear that FDI causes growth but it becomes clear that "the direction of causation actually runs from growth to FDI". Why is that the previous research only points to uni-directional causality, meaning that growth causes FDI and not viceversa in developing countries? Looking in an exploratory way, we can see that the capital remittances and repayments of the investments made by the multinational enterprises are quite large for the primary sector and some firms from the services sectors (such as banking), with almost minimum lag between the investment and the capital remittances, as shown on figure 3:

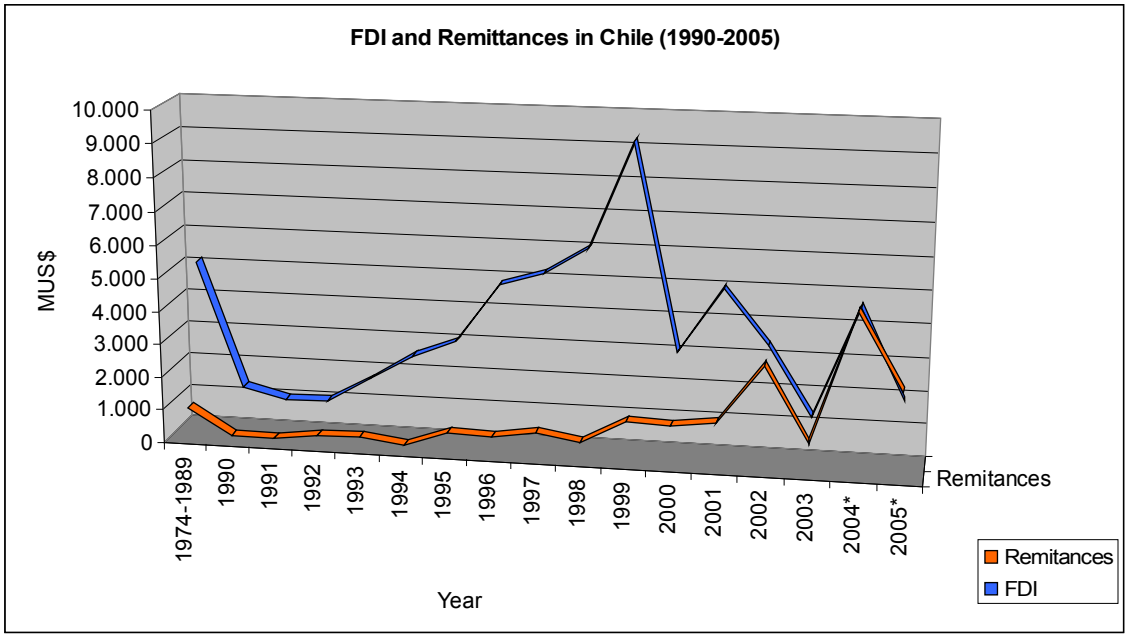


Figure 10: Total FDI and Capital remittances - Source: Foreign Investment Committee.

We could say that the capital gains from FDI do not stay within the country or the region where the investment took place. Also, the political division of Chile is structured in such a way that the investment is centralized in the Metropolitan Region, meaning that the companies that want to invest in Chile have their main branch in the capital (Santiago), which acts as a canal for the foreign inflows. In the case of larger investments, such as the ones made in the mining sector, the companies that might cause growth in the regions where the activity takes place, and are oriented to provide services to the Multinational Enterprises are also Foreign or have their main branch in the Metropolitan Region, in addition to that, the human labor involved in these extensive projects belong to other regions due to an artificial migratory effect that can be observed in these regions where people from other regions come to work for the companies and

spend their incomes in their region of origin, suggesting that FDI, neither directly nor indirectly causes growth of the regional GDP, although there is a slight possibility that there is a more induced impact of FDI on GDP through the continuity of their projects (inviting to human labor to migrate to the region) or the other measures that Multinational Enterprises have to take in order to access the region for investment in the primary sector (such as Environmental Impact studies, mitigation measures, Corporate Social Responsibility and some policies related to being a "Good Neighbor" with the local community).

3.4. Hypothesis and Model

At a regional level in Chile, this possibility of uni-directional causality between Growth of GDP and FDI will be explored through a Granger Test using panel data model with fixed coefficients for a period from 1990 to 2003, where the Total FDI for the regions and the Regionalized GDP for each year is used. The use of a Granger Test with panel data models was done previously by Wen (2005) for the case of FDI, regional geographical conditions and regional development in China, where he concluded that FDI inflow affects industrial location in identifying market conditions for investment. But the distribution of these effects vary among the spatial distribution. In some regions FDI promotes exports, but weakens the contribution to regional growth; whereas in others the ratio of FDI-GDP has a direct relationship with the increase of the percentage of regional value added in the total industry, thus contributing positively to regional income growth. Also, Hurlin and Venet (2001) developed four Granger tests for panel data application the

case of financial deepening and economic growth, a very close topic to FDI and Growth, concluding mainly that the testing for homogeneous and heterogeneous causality and non-causality might not result conclusive due to differences in the F-tests applying to data sets with short periods of time, in this particular case it seems that the F-test for Granger hypothesis would be inconclusive due to the limitation of data for period of time over than 14 years.

Frimpong Oteng-Abayie (2006) studied the causal link between FDI and GDP growth for the pre- and post Structural Adjustment Programme (SAP) implemented in 1983 in Ghana, for the period 1970 to 2002, finding that there is no causality between growth and FDI for the total sample period and the pre structural adjustment program period, but for the post structural adjustment period FDI did caused GDP growth. On the other hand, Seabra & Flach, (2005) found that "FDI causes profit remittance and emphasize significant adverse long−run effects of FDI attraction policies for the Brazilian economy".

Despite the observations given by Hurlin and Venet (2001), and based on the exploratory analysis and supported by previous empirical evidence for Chile as a whole country, a hypothesis may be presented as follows:

1. There is causality from GDP or growth of GDP to FDI across regions with at least 1-year lag of GDP as independent variable.

2. There is causality from FDI to GDP across regions but it is only noticeable after a 2-year lag of FDI in the region.

The data available for this test consist on total realized FDI for all 13 regions of Chile, expressed in nominal thousand U.S. Dollars over a period from 1990 to 2003 (the availability of the data provided some provisory figures for years 2004 and 2005). On the side of GDP, there is real GDP expressed in Millions of Chilean Pesos (base year 1996) for all regions over the period of time 1990-2003[6], the total population for the regions, in order to obtain *per cápita* GDP over the time period, also, as a way to explore another test, the growth of GDP was also calculated for these periods of time, but since the model to be used is including up to 2-year lag on the variables, the use of Growth of GDP was only for complementary purposes of the results.

The model to be used over a panel data of 13 regions and 14 years is expressed as follows (Hurlin and Venet, 2001):

1. $$FDI_{i,t} = \sum_{K=1}^{2} \gamma^{(k)} FDI_{i,t-k} + \sum_{K=0}^{2} \beta^{(k)} GDP_{i,t-k} + v_{i,t}$$

2. $$LnFDI_{i,t} = \sum_{K=1}^{2} \gamma^{(k)} LnFDI_{i,t-k} + \sum_{K=0}^{2} \beta^{(k)} LnGDP_{i,t-k} + v_{i,t}$$

3. $$GDP_{i,t} = \sum_{K=1}^{2} \gamma^{(k)} GDP_{i,t-k} + \sum_{K=0}^{2} \beta^{(k)} FDI_{i,t-k} + v_{i,t}$$

[6] In the year 2003, there was a change in the base year for National statistics, and the figures of Regional GDP for the years 2004 and 2005 were not available at the time of this testing.

4. $$LnGDP_{i,t} = \sum_{K=1}^{2} \gamma^{(k)} LnGDP_{i,t-k} + \sum_{K=0}^{2} \beta^{(k)} LnFDI_{i,t-k} + v_{i,t}$$

In both cases, $v_{it} = \alpha_{I+} \varepsilon_{I,t.}$ where i = region i, and t is the year. The Model tested assumes that there are fixed coefficients in the panel data set, according to Robles and Hewings (2004), the regression made with a panel data set for the 13 regions of Chile with FDI as the dependent variable and Growth of GDP in the vector of exogenous variables (among other variables tested) showed that for total realized FDI in Chile the best explanatory model according to the Hausman test is One-way fixed effects (where the regions are the fixed effect).

The data are presented as follows:

FDI_T = Foreign Direct Investment in time t expressed in thousand US dollars (nominal)

FDI_{T1} = FDI with one year lag

FDI_{T2} = FDI with two years of lag

$GDPPC_T$ = Gross Domestic Product Per Capita in time t expressed as a ratio between GDP and population.

$GDPPC_{T1}$ = GDP with one year lag

$GDPPC_{T2}$ = GDP with two year lag

In the case of the variables that were used as natural logarithm (LN) for all the variables presented above, the variable in Natural Logarithm has the prefix “LOG” in the

case of FDI as follows:

$LOGFDI_T$

$LOGFDI_{T1}$

$LOGFDI_{T2}$

And for the GDP is presented as:

$LOGGDP_T$ = in time t

$LOGGDP_{T1}$ = with one-year lag

$LOGGDP_{T2}$ = with two-year lag

3.5. Granger Test for FDI and GDP in Chile at Regional Level.

Having performed the regressions using Limdep for a panel data of 13 regions over a period of 14 years for FDI and GDP the results are (see appendix A for the tables) as follows:

1. $FDI_T = FDI_{T-1}, FDI_{T-2}, GDPPC_T, GDPPC_{T-1}, GDPPC_{T-2}$

The only significant variable in this Model is FDI_{T-1}, which indicates the existence of autocorrelation with one lag variable. Whereas GDP *per cápita* in time t and time t-1 are only significant with 87% of confidence, indicating that GDP alone is not a factor of causality for FDI. This is expected, given the behavior of these variables at regional level, centralization and regional policy, GDP is not enough to determine FDI, but rather is a complementary variable for others that might cause FDI, such as regional factors (exist-

ence of large quantities of natural resources, diversification of exports, population, and others).

2. $LOGFDI_T = LOGFDI_{T-1}, LOGFDI_{T-2}, LOGGDPPC_T, LOGGDPPC_{T-1}, LOGGDPPC_{T-2}$

Since a linear model such as the former might not be effective enough to test the causality from GDP to FDI, this model is non-linear, but the result is similar to model 1, the only significant variable is FDI in time t-1, which indicates autocorrelation, or rather, a behavior of Regional FDI that it is delayed in various periods of time. This is not unusual for those export-oriented FDI where the investment is made in the primary sector on copper mining. Such investments, that are large in amount, are also long-term projects, usually over a period of 10 years where the amount of investment is similar for all years, in the model, it is very possible that the model may have a result similar to autocorrelation.

3. $GDPPC_T = FDI_T, FDI_{T-1}, FDI_{T-2}, GDPPC_{T-1}, GDPPC_{T-2}$

The results of this model indicate that the only significant variable is GDP *per capita* in time t-1, also, the coefficient associated is 0,88; indicating that the variable might have a unit root. Since this variable is the regional Gross Domestic Product *per capita*, and an analysis of the population indicates that the growth of the population is slower than the GDP, it may suggest that the behavior of GDP at a regional level might not be connected with any exogenous variables but rather an effect of the growth of the

population and the growth of the GDP, thus suggesting this autocorrelation. Certainly, there might be an effect from FDI but for those regions which the large amounts of investment are over large periods of time in this model, given that there is little timeframe of study, it might not be a support for any conclusive results.

3. $LOGGDPPC_T = LOGFDI_T, LOGFDI_{T-1}, LOGFDI_{T-2}, LOGGDPPC_{T-1}, LOGGDPPC_{T-2}$

Again, in order to test the causality with a non-linear model, Model 4 shows that the significant variables are: The FDI in time T-2, the GDP *per capita* in times T-1 and T-2. Although the level of significance for the variables that present a two-year lag is only a 90%. But the values for these coefficients are reserved, indicating that there is a slight elasticity between these variables when the model is not linear. Since the timeframe and the number of regions of the panel are reduced, testing for more lagged variables makes the model more inconclusive than with just these results. Nevertheless, the significance of GDP *per capita* in times t-1 and t-2 are more than 90% indicates that the same variable itself is correlating, again this could be explained as before, that is to say, there is a combined effect of the growths of GDP and the population. This can also be explained in the sense that there is an effort of each region when it is growing, that the outcome stay on the region, developing more businesses inside the region itself. But, what does this small significance of FDI lagged in two years mean? Having seen the evolution of FDI and the growth this might suggest that FDI may act as a starting motor for growth. Unfortunately, without more years for study, we cannot verify this hypothesis with more

accuracy, but it hints that they are not completely unrelated.

There is also the possibility that the presence of the same variable with lag in the equation (the coefficients γ in the equations 1, 2, 3 and 4 of section 3.4 of this chapter) might cause some misleading results towards the hypothesis to test, the following subsection shows the results for the models without including in the equation the dependent variable in lag 1 or 2 as part of the vector of exogenous variables (see appendix B for the results):

Model 1a:

$$\mathbf{FDI_T = GDPPCT_T + GDPPCT_{T-1} + GDPPCT_{T-2}}$$

Taking the simple model as linear with GDP *per capita* in three periods of lag, the results show that there is no causality of FDI with GDP *per capita*, which means that given that the model has only an adjusted R-squared of 53%, the relationship between the variables is more complex than a direct causality relationship.

Model 2a:

$$\mathbf{LOGFDI_T = LOGGDPPCT_T + LOGGDPPCT_{T-1} + LOGGDPPCT_{T-2}}$$

In this non-linear model, the R-squared is around 99%, but, leaving the effect of the fixed coefficients aside, the only significant variable is the GDP *per capita* with a two-year lag. This result is consistent with the model tested by Hewings and Robles (2004), but with less power to explain the significant variable since the value of the coefficient is very small, this could be explained in the sense that there is little causality

of GDP to FDI since the effect is taken away by the fixed coefficients and the growth of the region is better explained in terms of growth of GDP *per capita* rather than the variable itself.

Model 3a.

$$\mathbf{GDP_T = FDI_T + FDI_{T-1} + FDI_{T-2}}$$

In testing the direct causality from FDI to GDP, the results show that the only significant variable is FDI with a two-year lag, but the value of the coefficient is very small, which could mean that the FDI is a factor of causality but not strong enough to be the only factor to explain the GDP, this result implies that since the FDI is also a factor in the equation of GDP, it has to be combined with other variables in order to generate a change in the GDP, or maybe that the effect of FDI on GDP is longer than two years.

Model 4a:

$$\mathbf{LOGGDP_T = LOGFDI_T + LOGFDI_{T-1} + LOGFDI_{T-2}}$$

To test further if the relationship from FDI to GDP is nonlinear, the model 4a shows that there is also one significant variable different from the fixed coefficients, that is, the log of FDI in time T-2, same as model 3a, with the difference that the coefficient has a smaller value than the value in model 3a. In this model, since it is measured as an elasticity, its magnitude is bigger, this shows that FDI causes growth, but this causality happens only with two years of lag or more, indicating that the mechanism of FDI in order to produce growth is slow, but if it can be combined with other variables, the effect

might be significant.

Illustrative model (appendix C):

The previous models related only GDP *per cápita* with FDI, the restrictions in the number of variables (only thirteen regions and 14 years) proved the causality for the FDI to GDP with a two year lag, but it did not strengthen the idea presented on the hypothesis 1. In order to attempt to prove that at least there is connection between a developing region and the FDI, The illustrative model takes as a dependant variable the Level of FDI in time t (FDI_T), whereas the independent variables are growth rate of GDP in times t, t-1, and t-2 ($GrGDP_{T-i}$)

The regression had the following results:

Illustrative model:

$$\mathbf{FDI_T = GrGDPPC_T + GrGDPPC_{T-1} + GrGDPPC_{T-2}}$$

As it can be seen on the total results from appendix 3, the only significant variable is the rate of growth of GDP with a two-year lag, but only with a 95% of confidence, this coincides with the results on the previous regression, but it contradicts the hypothesis 1 of this paper, since the lag is 2 years rather than 1. But still, it could mean that if there is a recursive effect from FDI to GDP, in terms that FDI is placed on the region for exploiting a business profitable for the multinational enterprise, but also expecting that there would be some development of the economic sector or the region in order to continue investing upon the region.

3.6. Concluding Remarks

It is clear that in the case of Chile, the regional factor makes a strong influence in the panel data for testing the causality between two variables. In this case, the fixed effects take away the possible causality between GDP and FDI, and there are also some points in time that might have produced distortion into the equation: the fluctuating signal of GDP that appeared in late 1990s. The previous study made by this author only considered the sample up to year 1999, after this timeframe, GDP at regional level becomes unstable, whereas the behavior of FDI in these late years are more stable than GDP.

Another explanation for no obtaining conclusive results is the econometric test that can show more confidence levels, since the warning given by Hurlin and Venet (2001) tells to the reader that with a timeframe smaller than 30 years, the use of standard F-test are misleading towards rejecting the null hypothesis that there is homogeneous causality, for example. Another factor is the orientation of FDI, apart from the regional factor, there is correlation from type of FDI (Export-oriented or Market-oriented FDI) and the regional location of the FDI, which may lead to different indicators of Growth of GDP in each region or, opposite results for some regions.[7]

[7] For example, in those cases where there is Export-oriented FDI, or FDI in the primary sector, GDP may cause FDI with one or two years of lag, whereas FDI will not cause GDP Growth due to migratory process that usually follow these kind of investments. On the other hand, in those regions where FDI is “market oriented” or “Marked captured”, FDI might cause Growth, due to investments in the services sectors, rise in consumption and transfer technology (in the case of Investment in telecommunications) and GDP may or may not make in influence on FDI.

Nevertheless, with the information obtained by this exercise, it can be said that the variables are not completely unrelated, but, in order to study thoroughly the impact of FDI on GDP or vice versa, there are signs on the regions that point towards this relationship and can be studied in a case-by-case approach, especially in those regions where FDI is export-oriented (FDI in the primary sector). In those cases, there seems that there is double causality but the timing is different, for example, two, three or more years of lag from FDI to growth, whereas there is a two-year lag from GDP to FDI. Why this difference? The difference comes from the type of investment, the investment in the export-oriented FDI is that in Chile most of these projects are long-term investment but with rapid capital remittances, so the effect from FDI to GDP will take longer to notice, but at the same time, these long-term investments in natural resources may need an structured economy which will develop creating clusters and stability on the region in time to supply the larger investment. The creation of a cluster is not something that generates in one or two years, it takes the transference of knowledge, the developing of education and the infrastructure in a developing region to attract more FDI, which implies more re-investments on the region[8].

In the case of the Market-oriented FDI, it could be said that there will not be any causality, the size of the Chilean market is not large enough to attract FDI *per se*, but it has a growing services sector which is sometimes unrelated to the technology and know-

[8] This could be another explanation for the "auto correlative" investment shown in the first 4 models explored in this paper.

how that FDI might transfer, in this sense it would be the level of regional income rather than GDP the factor for FDI which is consistent with the growth of the GDP being a causality factor with more than 1 year of lag, that is, it would be *one* of many factors that attract FDI to these regions. Analyzing the other way around, the impact of the FDI over the GDP is very little or unnoticeable, given that the region may grow (although it would be less) without this investment, this is clear since the investment on services sectors is smaller than the investment in the copper mining sector for example, the infrastructure needed is less, so the impact would be oriented to the transfer of know-how, and the effect of the initial investment, since once this transfer is made there is no need to continue research and development in the region, all that is made in the parent branch of the multinational firm.

The next chapter will explore the notion of the impact of FDI in a region, although there are other econometric tests that can be performed, the approach taken in the next chapter is different from this present chapter, due to the restrictions in modeling with short periods of time in a panel data regression, the approach on the next chapter will analyze a specific case of FDI compared with domestic investment and the impact that have these investments in the community where they take place.

Chapter IV: The Impact of FDI & Domestic Investment on Local Community Development of 2nd Region of Chile[9]

4.1. Introduction

Do foreign investments really make a difference in those regions where they take place? Traditional econometric analysis cannot provide reliable results in measuring this impact; this is not because econometric techniques are at fault, but because the data needed in order to obtain good results from the tests are often not available for the regions of interest, in this case, the thirteen regions of Chile. The Second Region of Chile, Antofagasta, is the focus of attention because it is a region which has attracted large amounts of FDI in addition to significant domestic investment due the existence of large quantities of natural resource, copper.

The purpose of this paper is to explore how these investments affect the economy of the region in which they are made. An analysis of the investments made by a multinational enterprise such as Bhp Billiton[10] and a state-owned company, such as Codelco Chile on the Antofagasta Region of Chile, will provide the focus of attention, providing assessments of their impacts on the regional community. Secondary data are

[9] The author wishes to acknowledge the support of Mr. Dennis Palacios, Psychologist of the Universidad Católica del Norte, Calama, Chile.

[10] Bhp Billiton is a foreign company that focuses on the industry of resources, in Chile, they have operations in Chile owning 57,5% of Minera Escondida, producing copper concentrate and cathodes, and 100% of Minera Spence, which produces copper cathodes, both of them located on the Antofagasta Region, and also owns 100% of Cerro Colorado, a copper producing company located in the Tarapacá Region of Chile.

used to measure the contributions of projects initiated by these companies for development of the region, using indicators such as employment, quality of life, environmental aspects, and education. Companies in Chile are required, under the provisions of the Corporate Social Responsibility framework, to estimate their impacts on the region in which they are located.

It is relevant to point that the analysis will take into account 2 companies from BHP Billiton: Minera Escondida and Minera Spence as representatives of foreign cooper mining investment and Codelco Chile División Codelco Norte as a representative of domestic copper mining investment since Codelco is a state-owned company. Also, the contributions are considered to be **direct** contributions from the firm to the community, in order to assess the growing tendency to be "a good neighbor" or socially responsible.

4.2. Theoretical Framework

The reason that foreign and domestic companies make contributions to the community is directly linked to the concept of Corporate Social Responsibility, CSR is an enterprise management model, and it integrates economic development with respect for ethical values, community and the environment. Also, it implies a strategic attitude of the firm in listening, understanding and satisfying the interests and expectations of its stakeholders. (Acción RSE, 2006). In the last few years, many companies have detected the benefits of incorporating socially responsible policies and practices. CSR has positive impacts on corporate values. However CSR was instituted in response to

pressure from customers, providers, the community, investors, non-profit organizations and other stakeholders. In taking active actions towards CSR, firms also have benefits in the form of improving financial performance, decreasing operations' costs and developing brand image and reputation.

The CSR initiative is divided in several aspects, such as: Ethics, Labor quality of life, Environment, Marketing Responsibility, and Community Commitment. Why firms are concerned with this issue? The reason is related with a new concept of making value for the firm. The universe of stakeholders for any firm is not limited to their owners or shareholders anymore; it also involves the community, the government, clients, providers and general public. Though these groups made pressure from the beginning, now, with the discovery of the benefits for the firm it is an issue that becomes more and more relevant in each company, to the point that they create a division within the company dedicated exclusively to these topics. Also, institutions have become more interested in providing information, making conferences and seminars about CSR and also promoting the "Principles for Responsible Investment", (PRI, 2005).

The community

The interaction with the community implies a wide spectrum of actions and initiatives oriented to improve the quality of life of the community where the firm is inserted. Through these actions, the firm expects to maximize the impact of its

contributions made in skills, resources, products, services, and knowledge management made available to the community. (Acción RSE, 2006).

Regional Development

Academic researchers study the effect on Regional development through different mechanisms, as it is stated in Rodríguez.-Pose and Crescenzi (2008), first there is the analysis between the investment in R&D, patents and economic growth, second, the existence of regional innovations systems and third, the examination of the geographical diffusion of regional knowledge spillovers, In their study, Rodríguez-Pose and Crescenzi, illustrated that the interaction between research (local and external) and local and external socio-economic and institutional conditions shapes the innovation capacity of every region using a principal component analysis and a model based on the GDP *per cápita* and variables such as the R&D, a Social Filter[11], Spillovers (contributions to the creations of new local knowledge), a Extraregional Social Filter (the same composite index applied to each region different from the region of study) and the GDP of the neighbouring regions.

Another study, made by Jensen (2004), approach the issue of localized spillovers and the role of FDI in the development process using regression analysis, estimating of the firm's production function and supply curve, finding that there are spillovers among

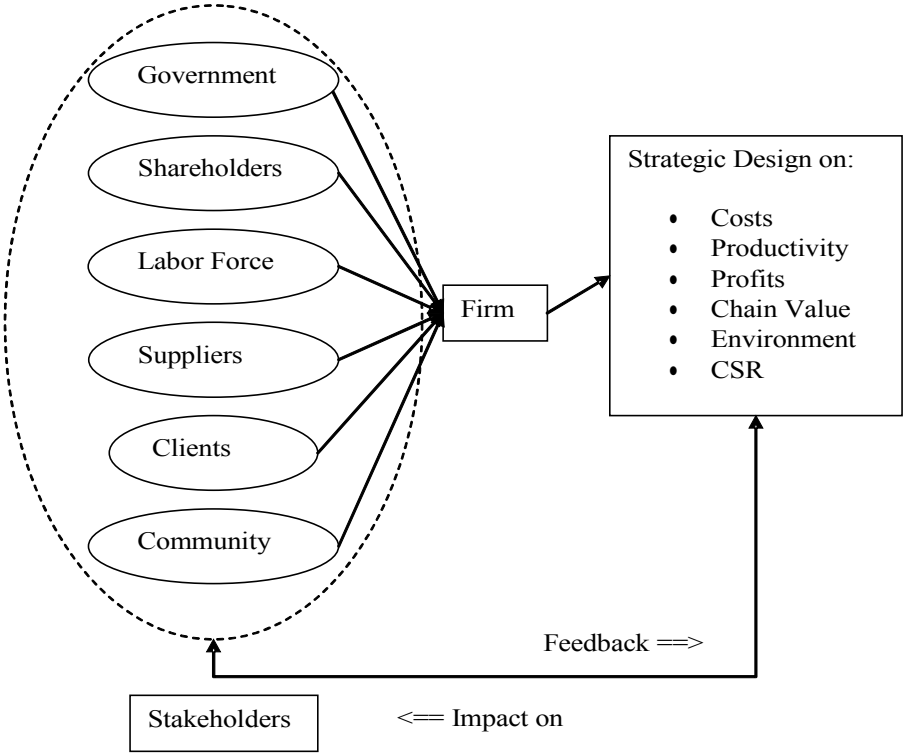
[11] Social Filter is a composite index that combines a set of variables describing teh socio-economic sphere of the region, such as educational achievements, productive employment of human resources and demographic structure.

communities of producers in the industry of study, but that these spillovers may not be catalyzed as traditionally assumed on spillovers in developing and transition countries.

In Chile, researchers approach the issue of Regional Development and spillovers through the cluster phenomena and the relation between buyers and suppliers in the Antofagasta region (Culverwell, 2002). In the study made by Culverwell, the results show that long-term relationships between large and specialized suppliers with the mining companies has the potential of increasing the value of mining companies. Small and Medium suppliers tend to show opportunities for the mining companies in obtaining lower costs and flexibility. Culverwell also concluded that income and employment generated by small and medium firms are essential for regional development.

Another approach used in researching the impact of the main industry of the Antofagasta Region (which is the main industry where FDI is placed in this region) is the use of Regional Input-Output matrix , as it was described by Aroca (2002), where the results indicate that the type I product multiplier is 1,28 for the mining industry. However, due the lack of available data it cannot be measured if the real multiplier is the indicated above, but exploratory analysis point towards this value.

The conceptual model for RSE can be summarized as follows:



The different stakeholders take part as an input on the strategic design of the firm. These strategies have an impact on the stakeholders, resulting in a feedback on the re-design of the strategy. For example, the cost strategy will have an impact on the labor force, the suppliers and the shareholders, resulting on actions from these stakeholders towards these policies, if there are policies oriented to reducing costs through reducing the labor force, there will be a reaction from the unions formed at the firm, likewise, if these policies are oriented towards reducing the number of contracts with suppliers, or increasing the number of after-sale negotiations, the suppliers may act differently.

Another example comes from environmental policies taken by the firm. If there is

not enough interest on taking care of the environmental issues, there will be a reaction from the community and the government, the community may react unfavorably towards the firm and create conflict on new projects that the firm might want to develop, also, the government may react issuing new restrictive laws or increasing taxes, thus hurting profits for the firm.

On the other way around, Corporate Social Responsibility policies have an impact on the community directly and also the other stakeholders, these policies are expected to have a positive impact resulting in actions that are favorable for the firm, for instance, supporting educational programs, might lead on increasing the cultural level of families and also the own workers of the firm, thus, leading to increasing productivity in the long term. Eco-friendly policies might lead to getting smoother processes of approval in new projects, some taxes reductions and a supporting community. Good relationships with suppliers and outsourcing companies might lead to cheaper contracts in the future or the development of clusters with the main firm.

4.3. Hypothesis

The studies about Regional Development and Spillover effects cannot capture the direct effect of direct contributions made under the CSR framework. Mainly, because the community only see that the development is at a regional level, the investments, policies applied over the region are seen as development for the **region**, not for the community, or smaller groups, the CSR framework allows researchers to study how the community see

their development, and it answer questions such as: Do I have more employment opportunities?, Is the education level of my community improving?, Are the companies located here worried for the environmental conditions of my children?.

The hypothesis is that the community will respond to social stimuli towards these companies coming from direct contributions rather than reading the reports from the local or national government in terms of statistics, also, these responses are reflected in a sense of "pride" for the community and thus, contributing to efficiency or better results for the contributing companies, for example, reducing the number of conflicts between unions and the company, smoothing contracts negotiation processes (with workers, suppliers and contractor companies), reducing conflictivity (number of manifestations, strikes, etc.) in the application of environmental laws and labor laws.[12]

4.4. An Overview of the Mechanisms for Making Contributions.

Donation is not a simple issue in copper firms. It is either the policy of the company or country regulations that prevent direct donation from the copper firm to the community, but there are other mechanisms that allow firms to make contributions to a city, an institution or a social group, or make commitments with different entities. To see a profile and location of the firms studied here, please go to appendix D and E.

[12] Although it is not the case, other impacts can be seen in the number of claims made by the clients. The clients in the case of mining in Chile are international markets, since copper is a commodity traded in LME. It is supposed that a company that have a defined CSR strategy also have an impact on the competitiveness of the firm, but for the companies studied here it is very difficult to obtain reliable information.

Minera Escondida

The Escondida mine is located in the Atacama Desert in the second region of Chile about 170 km southeast of Antofagasta and has an investment projected of US$1,254 Million. However, Minera Escondida does not make the contributions directly. It does them through a holding company called Fundación Minera Escondida (Minera Escondida Foundation). The mechanism is based on a 5-year funding agreement between Minera Escondida and Minera Escondida Foundation. The funding is approximately $15 million dollar for the period. With this funding, Minera Escondida Foundation elaborates a 5-year strategic plan with basis on the Master Plan of Social Operations and Investment, made annually. The 5-year strategic plan is evaluated each year, whereas the Master Plan is evaluated each 3 months. The key in making contributions is based on the organization for the implementation of projects as well as funding projects; it takes an active role in assembling multitask workgroups and coordinating different initiatives. Also, it maintains a policy of co-funding projects rather than funding them completely.

Minera Spence

Minera Spence, located on the Atacama Desert close to the Community of Sierra Gorda, started on 2006 with its copper production. The Capital Investment is US$ 1.000 Million. At Spence, inside its Sustainable Development policy, there is a system based

on a Health, Hygiene, Safety, Environment and Community (HSEC). This system is fully integrated, where the main issues on CSR are related to the Environment and the Community. Under this System is that the company makes a Plan of Relations with the Community. The Plan of Relations with the Community is a set of planned activities and then executed inside the frame of CSR of Minera Spence. It has a very specific number of social components. To date, its contributions cannot be measured exactly in monetary transfers to the community, since it has only been two years since Spence started its operations.

Codelco Chile - División Codelco Norte

Codelco Norte, the biggest branch (or division) of Codelco Chile is located in the Atacama Desert 20 kilometers north of Calama. It is State-owned and its level of investment is around US$ 1,230 Million per year. This company, being state-owned, cannot make donations, because all of its earnings go straight to the Government, becoming part of the Government expenditure. Also, in order to make donations it has to ask to Chilean people. However, given those restrictions, Codelco also has a Corporate Policy for Sustainable development and Relations with the community.

In Codelco Norte, the contributions are made through agreements with several institutions and local communities; in this way it maintains involvement with the community and develops a clear procedure for making the contribution. Inside Codelco Norte, there is a department of Community Relations (formerly, Direction of Community

Relations), which is the operator for planning the agreements with the institutions and makes the contributions. The planning follows a corporate manual for community relations, which was elaborated in 2004 (Codelco Sustainability Report, 2005), and it has 6 strategic goals focused on Employment, Indigenous Communities, Citizen Safety, Health, Culture and Education and Sustainability.

4.5. Regional Development

With the arrival of significant investment projects, the Antofagasta Region has experienced a change through the years. The settlement of Escondida in 1990 when it started its operations not only made an impact as an investment but it also made an impact on employment, income and the development of a mining cluster that over the years has been growing. This impact can be associated with the direct Investment made by BHP Billiton and its partner companies. More than the economic impact, there is the change that it made to the local economy and its competitor. Codelco, which, by the time this investment took place has been operating for 75 years; with the arrival of BHP Billiton, Codelco almost immediately adapted to more competitive practices and also changed internally in order to integrate itself with the community, placing more attention to its stakeholders and participating in the development of the region.

As a whole, the rate of growth of the Antofagasta Region has been the highest among the other regions, in the period 1960 to 2001. Over a period of 40 years, the growth of the Antofagasta GDP has been the highest in Chile, with more pronounced

growth is in the last two decades of the 20th century. This is even more striking when one examines the Growth of the GDP *per cápita*.

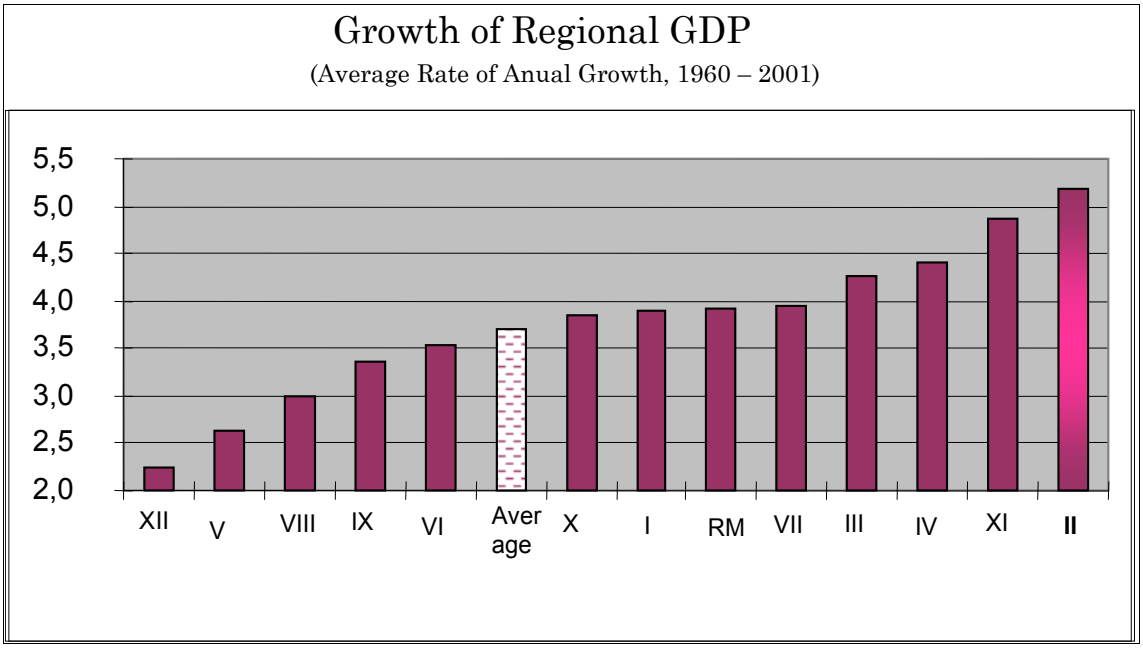


Figure 11: Regional Growth, Mideplan, 2004

Also, the Integrated System of Territorial Information shows that for the Antofagasta Region during the period from 1990 to 1998, the regional GDP *per cápita* almost doubled increasing by 89,45% (Congress library, 2004). This is partially explained by the steadily flow of Foreign Domestic Investment into the region and also by public investment which increased by 218% (Congress library, 2004). The increase in public investment was a feature in most regions, whereas the FDI is more focused in certain regions. Hence, we can propose that the larger increase of regional GDP *per cápita* is partly due to the growth of FDI in the region.

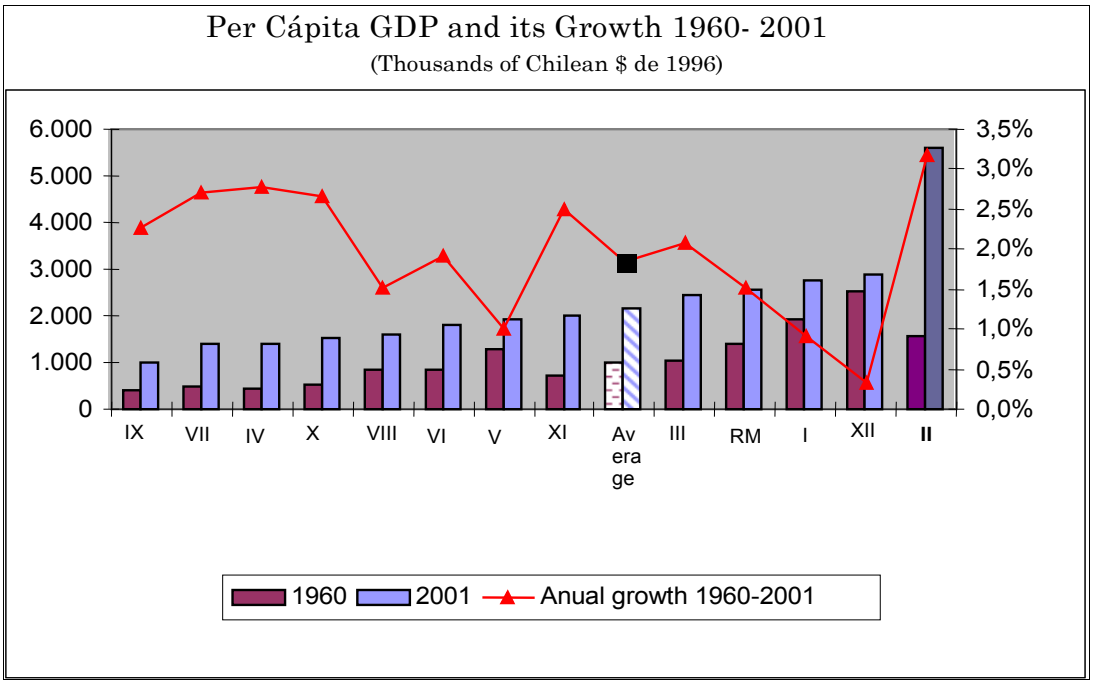


Figure 12: Growth of the GDP per capita, Mideplan, 2004.

4.6. Community Contributions

The rationale for making a community contribution by these companies may be attributed to two different reasons. On one hand, Codelco has an "historical debt" with the community of Calama given that it is an old company and it had a settlement for its workers that weren't integrated with Calama; Chuquicamata grew from a small encampment, to a "city"[13] separated from Calama. Now, at the beginning of the last decade of the 20th century, environmental issues and economic reasons forced Codelco to move Chuquicamata, leading to the development of policies and plans for integrating

[13] Chuquicamata was never a city under the political division of the region, since was a camp, the utilities were administrated and paid by Codelco, it also had the facilities of a mini-city: stores, plazas, hospital, sports clubs, etc. Even a social register existed and the person who was born in the Hospital was registered as a "chuquicamatino" or "chuquicamatina", but it never had a mayor or its residents paid taxes.

Chuquicamata with Calama and a growing interest in Corporate Social Responsibility and contributions to the development of neighbor communities.

On the other hand, Escondida and Spence are both relatively new (Escondida started to operate in 1990 and Spence in 2006) with corporative policies that were implemented almost at the time in which the investment took place. In the next section, the programs and contributions that these companies have made and the impact on the community for each area are reviewed.

1. Economy

The contributions directed to improve the local economy are related mostly with development of Small and Medium Companies. For example, Escondida has as a strategic goal of contributing to the social development and the creation of opportunities in the community. The development of programs such as assistance to head of households (Usually single-parent families), developing projects of personal development, integration to labor force, entrepreneur training and increasing educational levels. Among these programs, for the year 2005 the following were in place:

- "Emprendedores Escondida 2005" (Entrepreneurs Escondida 2005): A program executed by "Fundación Juventud Emprendedora", with 365 participating high school students from Antofagasta, Tocopilla, Mejillones, Tal Tal and San Pedro de Atacama. This program was oriented to three initiatives, Busi-

ness game, the Company and GLOBE, with external commerce as a principal point; in the latter whose objective was to train and prepare young women and men to develop entrepreneurship talents.

- Entrepreneur Training; in this program people, and especially young men and women, were trained as young micro entrepreneurs, using a methodology called "MIEMPREX- Aprender haciendo" (MIEMPREX- learning through making).
- Tax exemptions and partnership workshop and Cultural Donations law, 19.247 ("ley Valdés" seminar: These workshops and seminars presented these topics to a group of 372 people from nine cities in the Antofagasta Region, coupled with partnership workshops using the methodology of Outcome Mapping[14], which was the starting point for the change of institutional methodology that Fundación Minera Escondida will implement on 2006.

Minera Spence, has developed a program for support of local development, (PADL in Spanish), focusing on the Sierra Gorda Community. This program's main objective is the empowerment of actual local organizations and those that are able to develop with the support of the program; for that, Spence funds projects presented in a contest by organized groups, which are evaluated by a working group composed of

[14] Outcome Mapping is a methodology that focuses on outcomes as behavioral change. These outcomes are defined as changes in the behavior, relationships, activities, or actions of the people, groups, and organizations with whom a program works directly. These changes are aimed at contributing to specific aspects of human and ecological well-being by providing partners with new tools, techniques, and resources to contribute to the development process. (Earl, Carden, and Smutylo, 2001).

representatives of the community and the company. Additionally, it is developing a program for entrepreneurs and micro firms, oriented specifically to people or micro firms that are able to increase the value added of Sierra Gorda. This program funds part or the whole equity needed for the creation of sustainable businesses, it is planned that it will involve public entities that are interested in supporting these projects, such as CORFO, SERCOTEC, FOSIS and others[15]. In that sense, seminars and workshops will be given to interested parties:

- Training for developing entrepreneurship skills
- Funding Entrepreneurship
- Government alliances to support entrepreneurs
- developing database of entrepreneurs
- entrepreneurship in youth.

On the other hand, Codelco Chile and Codelco Norte, give all their earnings to the state, along with the taxes that, as with any other company, have to pay for its income utility. This amount was approximately US $4,901m in 2005 and US $9,215m, in 2006; however, the distribution of these earnings is not directly translated into income for the region. Aside from these fund transfers, the programs oriented for the local community development are focused on:

[15] CORFO: Corporation for the promotion of the production, SERCOTEC: Technical Cooperative Service, FOSIS: Solidary Social Investment Fund. These are government entities that work towards the support of entrepreneurs in aid to development.

- Agricultural program: This program is oriented to support the development of agricultural communities located on the Andean border in the Antofagasta Region and also funds social development initiatives, which later will be complemented with the Social Investment Fund;[16] organizations have to apply for these funds in competition with other projects. These initiatives have the objective of assisting the development of rural communities through the industrialization of agricultural products.

2. Employment

The issue of employment is a very important subject for the companies; it is relevant in the sense of contributing to increasing the level of employment in the region beyond the direct workforce that these companies hire. The main interest is to create clusters and contribute to the development of employment through diversification of the employment The arrival of Spence meant the generation of approximately 2,000 jobs for the construction phase, whereas in entering the operations' phase it has 656 direct (own) employees and about 500 through outsorcing. However, it is expected that at its peak, Minera Spence will employ between 7000 and 8000 workers (directly and through outsourcing). Minera Escondida, in 2005 had 2,850 direct employees and 6,000 workers through outsourcing, and it is expected that it will reach a peak of 11,000 employees

[16] Social Investment Funds are an initiative from the head office of Codelco Chile, created in 2004 where projects selected by each division of Codelco compete between each other. In 2005, this fund has developed 26 projects, having a financial commitment for a minimum of 20% of the total. (Codelco Sustainability Report 2006)

between both direct and outsourcing. Codelco Norte for the year 2005 had 8,168 direct workers, and 13,485 workers through outsourcing. Since it is a mature company, but still has development projects, it is expected that the workforce will continue at the same level in the foreseeable future. The employment created by outsourcing is a matter of controversy for the region and the country, since it can be seen as a multiplier effect from an outsider's point of view, in Chile the outsourcing is not "pure", because it was detected that the same activities made in the mining industry are made in the same exact way by an employee from an outsourcing company and an employee from the mining company, thus, even though there are some outsourcing activities that count for a multiplier effect, there are also some activities that represent an increase in employment, but a significant difference on income levels of same qualified workers, hence, the CSR policies oriented to diversification of employment.

In Escondida, for the year 2005, there were no programs oriented to increasing employment or strengthening the labor force on the region. On the other hand, Spence devised the Program of Assistance of Employment Opportunities (PFOE in Spanish). This program creates mechanisms and openings that make it easier for the people of Sierra Gorda to find employment opportunities, either directly (in Minera Spence) or indirectly (Outsourcing). With the support of the Municipality of Sierra Gorda, a database with the name of the people and the selection process is updated annually. The management areas of Spence will familiarize service provider companies with the process of employment of local workforce, (where "local" includes people from the cities

of Baquedano and Sierra Gorda). In addition, Minera Spence will ease the process of training for students from technical high schools, institutes and universities, allowing them to do the training in Spence. For 2007, there was a commitment of 6 trainee students in the community.

Codelco, over the last years had made a pledge with the local government to create the Labor Intermediation Program, this program consist of a contribution for generating spaces and opportunities for employment with local companies. This program is monitored by Codelco Norte and executed by the local government, conducting follow ups of the people who have been allocated jobs. In addition, it also has an instruction program for those people that want to earn skills in order to get a job.

3. Education

The contribution to educational programs is mainly focused on generating high skilled workers for the future or people able to gain expertise to work in areas related to mining or services to this industry. In general, support to education was always considered as an investment rather than simple contribution.

In 2005, Minera Escondida created the Minera Escondida School Network (REME in Spanish) and one of the most important programs of Fundación Minera Escondida to the community. The main goal of this program is to construct a series of

educational programs as a contribution to the educational process. These programs are applied in a group of schools with special features such as dynamic and proactive Principals of schools and school teams and also to be located in socially vulnerable sectors of Antofagasta, Mejillones and San Pedro de Atacama cities, meaning a total of 12 schools and 4 programs which will be applied gradually in these schools. The programs are:

- Active Mind Program
- Reader and method “Matte” Project
- English Discoveries Software
- Applied teaching of Mathematics, Language and Science through Pocket PC.

These programs, are oriented at elementary school level, due to the necessity of improving the basis in Mathematics, Language and Sciences, using innovative technologies. Minera Escondida Foundation has stated that the improvement of quality of education is only reachable by building cooperative learning processes between teachers and students. The Escondida Pedagogic Interchange System (SIPE in Spanish) was created with this objective, uniting 300 teachers, in order to exchange experiences and learning new approaches in education. Following the same guidelines, support for 17 schools in joining the I-Net (International Networking for Educational Transformation) was provided, which allows to build a collaboration network with English schools. Also, Escondida has made efforts to expand the quality of English language teaching,

developing 2 programs:

- FME Scholarship for 10 Students of English Teaching program at the Universidad Católica del Norte in Antofagasta. This scholarship supports the student economically for all the terms of study. In return, the students should teach in one of the 10 schools of REME.
- Support for 20 English Teachers in order to visit Queensland University in Australia, and learning new methodologies for teaching and increasing language skills.

Minera Spence, on the other hand, to this date has not formulated a specific program in order to support employment, however, it has a monitoring program that maybe in the future will lead to employment-related assistance on the lines of education.

Codelco Norte, following the guidelines of Education and Culture, has made contributions through training programs and assistance in building schools, also, as a way to preserve the original language of indigenous communities, it released the first ever Dictionary Kunza-Spanish-Kunza[17], which it is available for any person through its official webpage, www.codelco.com.

Nonetheless, the efforts of Codelco Norte related to education are more focused to its own workers, meaning that it formulated a plan for the training of its workers, in order

[17] Kunza is the original language of the indigenous communities of the Atacama Desert, especially Lican-Antai community.

to close gaps in skills needed for their jobs but also to make career inside the company, these plans were called Individual Development Plan (PDI in Spanish) and all the workers had access to it.

From these three, it can be seen that only Escondida had planned the contributions to the community in Education thinking in the future, The other two are more oriented to close gaps and improving in a small part the education, whereas MInera Escondida Foundation, aside to aim its efforts on the long term, its programs and contributions will develop the skills that in the future might be needed by the same firm. This is clearly seen by its major focus on English teaches or English courses, seminars and workshops.

4. Quality of life

The term "quality of life" could mean different things when it is related to communities or a region. Nonetheless, the contributions analyzed here will refer to quality of life of the surrounding areas, public places, culture and entertainment.

Escondida, for example, it is more oriented to culture and sports, it specially sponsors the main local soccer club "Club de Deportes Antofagasta", although it is not a steadily support, there are also commitment through contestable funds to sporting clubs, such as soccer, baseball, fishing, and others. These funds go to projects for the development of teams, rebuilding sports spaces, (e.g. baseball diamond), teaching in

competitive sports, etc.

Looking at the cultural contributions, these are focused on educational centers for culture and radio communications, reinforcement of regional identity and cultural patrimony, high school orchestras, and promoting the development of artistic capacities in young men and women.

In an effort to show its attempts to get close to the community, Spence even before entering in operations and in the middle of its construction phase, sponsored cultural activities, starting in 2005 with the “Desert Festival”, which it is free to the community and it summons people from cities such as Calama, Antofagasta, Sierra Gorda, Tocopilla, Taltal to the small town called Baquedano. The main purpose is to make these events as part of habitual activities of Sierra Gorda.

Codelco Norte has contributed to the project of moving the Chuquicamata camp to the city of Calama. This was a project of 6-7 years approximately (between its beggining until it moved the last worker living in the camp to the city of Calama). The scope of this project involved the construction of houses, squares, contributions to city enhancement, events for community integration and promotion of cultural spaces (Theatrical shows, Anniversary of the city events, Film Festival in Antofagasta and Calama, etc.). Even though by 2007 there is no one worker living in Chuquicamata, Codelco still will make contributions to the community in terms of supporting cultural

activities, also, Codelco Norte will preserve which is called a "historic envelope" of Chuquicamata, the downtown of the camp, which once had stores, banks, plazas and social clubs, in order to expand the cultural assets of the Second Region of Chile.

Through the social investment fund competition, the project "Puesta en valor del Patrimonio Arqueológico de Calama" (Adding Value to the Archaeological Patrimony of Calama) was funded to generate the space for recording, preservation and filing the archaeological remains found on Chorrillos, Calama.

There is still no pattern on the improvement of quality of life that can be attributed to the contributions in culture and city landscapes, but since the all three companies in study made a fair effort in this field, it could be said that the results will be see in the long term of the region.

5. *Social pathology (domestic violence, citizen safety, integration with indigenous communities)*

Psychologists in the Antofagasta Region call Social Pathology all those problems that affect society, that includes: illegal substance abuse, violence, women and children abuse, crime, terrorism, corruption, criminality, discrimination, isolation, stigmatization and human rights violations. Chile is not immune to these problems, especially those related with crime, women and children abuse and discrimination.

Perhaps the most evident form of contribution for the companies is the one related with discrimination. Integrating the indigenous communities and disabled people has always been part of the CSR programs of these big companies. Only one of these three had made contributions following other guidelines in addition to discrimination.

For example, Escondida supports a labor intervention office (OIL in Spanish) which is sponsored by the National Incapacity Fund in Antofagasta to help the inclusion of 35 people with incapacities. Another part of managing the discrimination issue is the encouragement of the development of human and productive skills with identity of the local indigenous communities, as a part of one of its strategic goals, with special attention to the town of San Pedro de Atacama. The indigenous development is the central point of working with the ethnic communities, but for Escondida, the educational theme is the main target of its work. Escondida believes that quality in education will allow these communities access to new methodologies and techniques, without losing their identity. Some of these projects are:

- English: San Pedro de Atacama has a beautiful landscape that every year attracts hundreds of tourists from anywhere in the world. However, these tourists usually need bilingual guides, which at the moment are supplied with people often outside the town and the region. In coordination with the municipality of san Pedro, the aid comes in the form of a outlined agreement for town educational system advisor, which allowed English teachers training, preparing them to teach in early

years of their elementary students, basic notions of the language as means to give their students tools for obtaining better jobs or working in tourism. This idea is complemented with the construction of a language laboratory in a rural high school.

- Education, "Reader and method Matte Project": with special emphasis on the indigenous communities, because at national level, rural schools or Atacamenian schools are qualified below average. Under the outlined agreement, there is a 3-year program to develop an improvement of the educational level.
- Scholarship programs: There is a special scholarship program oriented to Atacamenian and Quechua undergraduate students, which was cultivated conjoined with the CONADI[18]. To this date, there are two university professionals graduated under this program.

Minera Spence, since it is a very new project, only has develop the Social Monitoring Program, which goal is to control and follow up of all the parameters identified in the baseline and required for the environmental evaluation. Its objective is to evaluate and inform to local authorities the behavior of the local population of the cities of Baquedano and Sierra Gorda, measuring economic, cultural and social elements.

On the other hand, Codelco Norte had considered the social problems of the

[18] CONADI = "Corporación Nacional de Desarrollo Indígena" (National Development Indigenous Corporation), an entity oriented to promote and help the development of the indigenous communities of all the regions in Chile.

Calama community and has taken into action programs designed specifically to address these issues, through an agreement with the local government to reduce the perception of unsafe conditions of the citizens. Thus, sporting, cultural and entertainment activities were made with the community and the local government targeted specifically the most vulnerable groups, among other programs such as:

- Support to local police ("carabineros"): The program of citizen safety helps supporting the local authorities and the police in the implementation of the "Plan Cuadrante" ("District Plan") with the objective to reduce criminality, understanding criminality as robberies, assaults, drug trafficking, piracy, street fights and murders. In this sense, Codelco through the agreement made with the local government, contributed with concession of land and giving infrastructure and vehicles to the local police.
- Support to local firemen: Also under the citizen safety program, Codelco Norte supports the fire stations and firemen of Calama through the concession of land for future infrastructure.
- "Centro de Prevención de la Violencia Intrafamiliar (CIVIF)": (Domestic Violence Prevention Center) The issue of violence inside families and especially towards women in Chile and in particular in the Antofagasta Region is something that Codelco takes very seriously, in this center, psychological help is provided for battered women and also helping them denouncing the abuse them or their kids.

In addition to the Citizen Safety program, the other emphasis that Codelco puts

into action is the commitment with the indigenous communities. For that, inside the Manual of Community Relations there are specific points related to this issue, in order to analyze the situations where possible development projects may affect the indigenous community, following the law and with respect for the ethnic population, among the projects developed in 2005 it can be mentioned:

- Agricultural program: As it was mentioned in the section for the development of local economy.
- Indigenous communities program: support through the entity "CONADI" to the development of the community.
- Origins Program: Derived from the agricultural program, this support the empowerment of the indigenous communities of the Antofagasta region in terms of politics, economics, identity and labor.
- Indigenous Communities: The support to the communities is also through helping to develop the social problems that might exist, for example, the communications (contribution to radio communications), workshops on civil rights, and improvement of health and sanitary conditions of small indigenous villages and towns.

The three of them had focused on different strategic approaches to social problems. One re-directs the effort in one scope (discrimination) through education (Escondida), the other is a greenfield project in a very small town (Spence) and the other

it just starting to develop a strategic planning to face Social Pathologies that go beyond discrimination (Codelco).

6. Health

The mining industry where these companies place their investments, is a hazardous activity for the health of their own workers and the community (due to pollution).Therefore , health is another issue where these companies take as part of their CSR.

In addition to design strict policies for the health of its workers, Escondida has promoted initiatives for improvement of quality and access to public health care in the Second Region of Chile, in this order, the social investment is on:

- Strengthening primary health care: This is made through an agreement with the municipality of Calama, the implementation of a model for dental care and primary urgency dental care service, made before in Antofagasta and replicated in other regions, expecting 32000 people to benefit from this program. Regarding primary health care, In Antofagasta, the contribution was made in infrastructure for two local health care centers in vulnerable sectors of the city, oriented to the progress of preventive actions with citizen participation, aiming to minimize illnesses and increase self-care of the community.

- Increasing the quality and health care access in suburban communities: Support was provided to approximately a hundred medical doctors and volunteer interns for the development of Medical Operatives[19] in Taltal, Mejillones, Tocopilla, and San Pedro de Atacama cities. Additionally, for a immediate treatment of injured patients from accidents and avoid delays in moving them to the Antofagasta Hospital[20], a room for trauma patients attention has been implemented in Taltal's hospital,

For Codelco, the first issue in health is the health care for its workers. The hospital administrated by Codelco Norte existed before in Chuquicamata, and after the moving to Calama the "Hospital del Cobre" was built. This hospital is for all Codelco workers and their families. The company maintains inside a strict policy of self care, being also certified in OHSAS 18001 and constantly promoting at the interior the care for avoiding accidents inside and outside the workplace. But over the years, Codelco has been concerned with attracting more health care (inviting more doctors to the city) to the community, and also dealing with issues of mental health care in small projects in coordination with Social Pathologies, such as the women and children abuse and suicide[21]. Additionally, the hospital dictate seminars in health care and prevention.

[19] These operatives meant specialized health care, surgeries, and seminars of prevention for people of limited income.
[20] Over the last years, the number of driving accidents that are accompanied by serious trauma occur at the road from Santiago to Antofagasta, close to the city of Taltal.
[21] Suicide was, during 2005, a critical issue due to the high number of suicides in one year, doubling the percentage rate of suicides in 2005.

7. Environment (Regulatory laws)

The issues related to the environmental corporate social responsibility concerns mostly in the application of measures for acting in accordance with the regulatory laws of envorinmental emissions and the proper utilization of natural resources.

For example, Escondida formulated a program for the proper utilization of water (in terms of levels and quality), control of dust emissions, noise and respect for archeological sites. Additionally, it elaborated a plan for the control of emissions of MP-10 and hazardous waste, being first from a list of other environment plans management.

Spence created the Good Neighbor team as a strategy to join neighboring copper companies (Minera el Tesoro and Compañía Minera Cerro Dominador) in an effort to commit these companies to the community for the search of solutions and implementation of measures oriented to manage and control dust emissions.

In Codelco Norte, the main Project related with the environment in 2005 was an agreement subscribed between Conaf[22] and Codelco, for the development of environmental programs, sustainability of the Oasis (Calama), extend forestry and support agricultural activities. Also, regarding the utilization of resources, water is the main objective: in 2005, Codelco Norte initiated the implementation of a program for

[22] Conaf = "Coporación Nacional Forestal", National Forestry Corporation, an entity oriented to the preservation of the environment in Chile.

efficient consumption of water resources, which main goal is water management optimization[23]. In terms of regulated emissions, the company keeps tabs regularly on the legislation and developed a program for the control and management of both dangerous and non-dangerous waste.

4.7. Good Neighbor

What means to be a "good neighbor"? In Chile, this issue means integration of a company with the community where it is inserted. In fact, the good neighbor policy that Codelco Chile and Codelco Norte have implemented considers all the environmental, landscape architecture, cultural development, and insertion of its workers into the community of Calama[24].

But why they have to be a "Good Neighbor"? It is clear that corporate image is part of what every firm is keen to increase. The perception of the community towards the great investor companies, especially toward foreign investors, plays a critical role in the Name and company image.

In the case of Escondida, the focus of CSR was created in order to promote the involvement of own and outsourcing workers with the community. Through a contestable

[23] Another characteristic of the location of these mining companies is that the Antofagasta Region has the most arid desert of the world, thus, water is very scarce.
[24] This movement from Chuquicamata to Calama has not been exempt of problems; the coordination of 3300 families implied the construction of houses, church, schools, commercial establishments and other things. This process took nearly 8 years.

fund, it was possible to program activities with groups from Escondida and Social Organizations that were able to ease the process of generating trust between the company and the community.

Spence, being a Greenfield project, put special emphasis for gaining closeness to the community, searching for spaces of encounter between the company and the community,. Bi-mensual meetings in Sierra Gorda and Baquedano are held with the purpose of letting know to the community of the activities and contributions from Spence and its outsourcing companies. and also to listen to opinions, questions and suggestions from the community.

For Codelco, “good neighbor” is a corporate policy. It is more relevant in Codelco Norte since the moving of Chuquicamata to Calama. However, the perception at the beginning was that “they” (meaning the Codelco workers and their families) came to Calama to overpopulate the city and that the infrastructure to receive 3500 families was not enough. Additionally, the locations of the new houses were apart from the city itself, which was not taken sympathetically by the population of Calama. The first point of mitigate the displease of this change was the support for the construction of a Commercial Center (Mall) in Calama, which made businesses flourish and attracted all the population in one gathering point, since then, Codelco has to continue its efforts to convince the community of Calama that, as a company, and its workers, are “good neighbors”.

4.8. Analysis and Conclusions

Regional development may act as a key factor for attracting FDI, but it will only be a factor if the region or the city is able to respond to social stimulus that may lead to growth or development of the region. The Investors look for statistics when deciding to place an investment in a particular region, such as Regional growth, population, average income, number of firms related to the industry and other factors. However, when a company starts its production on the chosen region it becomes clearer that the community has a greater effect on the success of the company, in terms of efficiency, costs and revenues if the community does have a perception that the company is Socially Responsible.

Even though it was the pressure from different stakeholders that drove firms into support and make contributions to the community where it is inserted, the community response to social stimuli is reflected on the results to the multinational companies, which will continue to invest and apply CSR, if the region is more developed, it leads towards an increase in efficiency, reduction of costs, and future benefits for the company.

It is clear that even though Escondida has 6 strategic goals towards the community, Education is the central axis, in other words, education is the key strategy, they will support development, through teaching micro entrepreneurs, promoting seminars and workshops, supporting the training of workers, teaching the indigenous

communities. In education itself, the radical change is intervening the educational system, thinking of future generations. This does not mean that it was only for one year it is a methodology that will continue to be applied in the following years.

Minera Spence, even though has the same owner as Escondida, has a different approach, since it is a Greenfield project, its maximum efforts are oriented to the integration of the company with the communities of Sierra Gorda and Baquedano, as a way to improve the local development and the study for prevention of future social pathologies. When an investment takes place, it attracts people from anywhere in the country, with high expectations of income, benefits and quality of life, unfortunately, this is also accompanied with problems such as increasing delinquency and crime. To prevent that, Spence looks at the community to expand its social development and especially, culture.

Codelco Norte, on the other hand, is ‘catching up’ with its historical debt, the window opened by the movement of families from Chuquicamata to Calama, drove Codelco to take more action within this community, consequently, its efforts are concentrated in two main objectives, community development of Calama and its rural indigenous towns and the issue of Social Pathology, such as Safety and domestic violence. Although they do not have yet a strategic plan for the application of programs and contributions, it is clear for Codelco Norte that the issue of this company belonging to all Chileans, does not mean that it is exempt of being Socially Responsible and not

integrating with Calama city. Watching the efforts of its peer companies in the same region[25], in the near future, CSR becomes a strategic issue of competitiveness for both types of companies, foreign and domestic invested.

There are many contributions, some of them are made for the long term, for example the case of Escondida for the case of education, whereas the other contributions of this company are more oriented to the media and thus for increasing its corporate image. For the case of Spence, since it is a starting company, it has made good use of the media to get the attention of the community, but it cannot be seen if its projects oriented to the community are long term. Codelco, on the other hand, has concentrated in the long term on the indigenous communities but it has not made good use of the media, it has to divert to more short-term projects (or contingent) to improve its image. Besides, its other projects are not made regarding the long term, due to its lack of strategic planning in this issue.

How do the communities of Sierra Gorda, Antofagasta and Calama have reacted to the efforts of these companies?. Although the data cannot be related directly to these contributions, there have been responses from the communities toward these firms, for example:

In 2006, Codelco Norte reported a reduction of its level of conflictive issues with

[25] In addition of Escondida and Spence, there are many other mining companies in the region of Antofagasta that are operated with either Chilean or Foreign Investment.

the workers through the increase of the number of dialogs established between the workers (unions) and the management, in this way, this reduction was a contributor in reducing the risk levels of the firm, thus increasing the value of the firm.

Escondida has increased its corporate image through its policies of involvement with the community and has helped in the development of a mining cluster in Antofagasta, also, the number of applications for jobs has increased due to this sense of "pride" in working in a prestigious firm.

The level of applicants for the three companies have increased in quality, in terms that a larger number of professional labor force apply to these firms, by professional, it is meant to say just graduate students from disciplines such as Mining Engineering, Industrial Engineering, Electronic and Electric Engineering, and some of them with MBA degrees, this is a positive effect on the firm.

In 2006 Fundación Prohumana, an entity concerning in researching CSR, made a survey asking the public if from a pool of firms which were considered Socially Responsible, for the case of Antofagasta Region, Escondida ranked first with 46,7% of number of times mentioned, followed by Codelco in second place with 14,1%, meaning that the perception of the public is also related not only with the contributions to the community, but also with the level of publicity of these contributions. According to internal analysis in Codelco Norte, the GESTRA survey about sustainability and CSR

said that the contributions made by Codelco were appreciated by the community, but not enough known to them.

Perhaps the most clear example of the pay-off from contributing to the community are the incidents occurred in the years 2006 and 2007 with the proclamation of the Subcontractor laws for main companies, this law consisted mainly in regularizing the contracts with outsourcing companies where the workers were "masked" as third-party workers while in reality they were working for the main firm directly (but they didn't have the same benefits as the direct employees of the main firm.) In the Antofagasta region there were some manifestations, strikes from some outsourcing companies, affecting Codelco, Escondida and very subtly, Spence, but these manifestations were small in proportion to those occurred in other mining regions (like Fifth and Sixth Regions) where other divisions of Codelco were located (Andina and Teniente divisions), these manifestations resulted in injured workers, serious damaged properties and loss of production due to strikes and the fact that the people took by force the entrances to the workplaces, preventing the other workers to enter.

Nevertheless, even though there are few projects oriented to having a long-lasting impact on the region, the existence of at least three major projects of investment and the issue of a CSR with more importance in modern companies creates a sort of "competition" between these companies to demonstrate its social responsibility, which, with good planning, understanding the dynamic of the region and evaluating the benefits

of the programs to implement, it will lead to more elaborated and strategic projects that will contribute significantly to the growth and development of the region as a whole.

In comparison, the Foreign Investment and the Domestic Investment, even though have different focus in the Antofagasta region, but they are both concerned with making contributions to the city, even under the precepts of Corporate Social Responsibility, it is expected that either foreign and domestic companies continue to compete in this issue that although does not make a great impact in the region it does make a difference in the communities where they are inserted.

Chapter V: Conclusions

It was the objective of this work to study and analyze the relationship between Foreign Direct Investment and Regional Development in the regions of Chile. This decision was made taking into account that, even though there are numerous and diverse studies about FDI and the GDP, Growth of GDP, and another other macro-economic variables related with development, very few of them had taken into consideration the regional characteristics of Chile.

In the case of the search of the determinants of FDI at regional level in Chile, there were found some very significant results that concerns the authorities and policy-makers, first, the differences between the attracting factors for FDI if the FDI is Authorized (meaning the intention of invest), or Realized FDI (the actual investment), Export-oriented FDI and Market-Seeking FDI. Also, the role of regional characteristics that act as determinants in the case of authorized FDI and Realized FDI, which means that the process of multinational firms in deciding to invest and realizing the investment the region *per se* is an attractor (this is a strong factor since the presence of natural resources in some regions and the size of the markets are very distinctive between the regions, but also, in the case of Realized FDI, not only the region is determinant, but also is the time since the effect of the year in attracting FDI does not behave randomly when the FDI is completed within the region. Once the process of deciding to make the investment, the analysis of FDI for the cases of Export-Oriented FDI and Market-Seeking FDI the factors that are relevant in the case of Export-oriented FDI are related to

macroeconomic variables such as the GDP, the unemployment level, and public expenditure (results not completely surprising) but in the case of Market-Seeking FDI only variables such as public incentives are relevant, implying that the variables expected to be relevant (such as population, income, education and infrastructure) were not powerful enough to be significant.

What do these results imply? First, that the mechanisms that were designed to promote and attracting FDI at national level were successful in increasing significantly the attraction of foreign inflows to Chile even though the period of time where these instruments were implemented was characterized by crisis in Chile (early 1980s – where there was a financial crisis and Chile was still under a military government). Nowadays, although there is a democratic regime in Chile with a leftist orientation, these mechanisms were not eliminated but, on the contrary, are still promoted, it is the work of policy makers to continue with these policies, but also evolve towards the development of clusters, which are favorable to growth and also increase FDI.

The methodology used in this study of determinants also needs to be validated by further studies and adding more periods of time, it was a strong restriction to have data for only 10 years, but as the information systems and the databases become more sophisticated and reliable it allows for future researchers to have more robust results and also the application of other methodologies.

In studying the double causality between GDP and FDI, it was not good enough to have feeble results, it seems that there is a causal link from GDP to FDI, due to prior evidence, and also from FDI to GDP, but the econometric instrument used might not be adequate to test these hypotheses. It was the interest of the author that since the previous findings that tell that the GDP or the growth of GDP is a significant factor in attracting FDI, FDI itself might be a relevant factor on the GDP, either in its direct form or through spillover effects, but when tested on the GDP alone it could also mean that it is a factor, but not the *only* one, i.e. that it needs to be coupled with other factors to be a robust determinant for FDI. On the other way around, where it was not proved that FDI is a causality factor for GDP, there could be diverse explanations, from the model used, which might not be adequate to use a panel data in non-linear equations, the data, meaning that the assumptions of the distribution of the data is not a normal distribution, its measurement unit needs some adjustments or the data need to be subject to indexation, (since the values of CPI - both foreign and domestic – and also the exchange rate varied significantly in the timeframe considered), or simply, there was not enough data for this kind of model.

From the results of this study, it can be inferred for the policy makers that (1) the causal link from regional GDP to FDI is weak if the GDP is not accompanied by other factors, besides the regional factor *per se* (for example the presence of large quantities of natural resources or and adequate market size). Also, (2) Since there might be a causal link from FDI to GDP, the possible spillover effects that affect GDP or the growth of

GDP take more than two years to be noticed, in this period of time, the policies that are oriented to promote the growth of the regions need to be reinforced and not be left aside, because there might be the risk of stagnation, since there will be an effect from FDI, but slower that expected initially.

For future research, as in the case of the study of the regional determinants for FDI in Chile, it will be available more reliable and sophisticated sets of data to test this model or designing a more specific model, the findings of the study of bi-directional causality leaves an open door to research these causalities with more specific framework, i.e., it can be done for some specific regions or by activity sectors, which might lead to have more conclusive results.

When studying the direct effect of the multinational and domestic firms on the community, made through direct contributions, it can be seen that the CSR framework is useful to explain these contributions, also, that it is a relatively new theoretical framework to work with. There are many results that lead to diverse conclusions for the policy-makers, where the different focus of the companies studied may be very significant, for example, the fact that Escondida mine is converging all the contributions into one main strategy such as education, tells the community and its stakeholders that these contributions are seen as profitable in the long-term, in the case of Spence, a greenfield project is concentrating in developing ties with its community through culture, which can also be seen as a long term “investment” (for a period of time larger than the

case of Escondida). Codelco, being state-owned was not concerned at the beginning and thus, its contributions seem to be one step behind to those of the foreign invested companies, however, its process of developing a strategy for the community development is rapidly reaching its competitors, being the oldest mine, it still can absorb new strategies, and although it might be struggling to be competitive in front to these "new" companies, it will not ignore its community any longer, due that CSR can prove to be profitable.

Even though it is very difficult to measure formally the positive impacts of these contributions, there are more entities (not only regional, but also national), that survey the community and diverse stakeholders about the perception of firms socially responsible. To be socially responsible not only means increase in value of corporate image, for those companies that have international trade, there is less risk to be held from dumping, it also can help to develop clusters within regions, vertical integration, reducing the risk of conflicts with own workers and the community, increasing productivity in the long term, reducing costs and other benefits. In this study, although it was only considered one year of contributions, there are some responses from the community that can be related to these actions, so far, the community reacts favorably towards these three firms, but to measure it in the long term it needs a longer period of time.

For the planners and policy-makers the results, can lead to develop closer relationships with the firms that are seriously engaged into being socially responsible,

they can create strategies for community development with strong support of the firm, the alliances might be very powerful toward these goals, but also, careless planning and weaker alliances with these firms (either domestic or foreign invested) might result in negative responses and effects, such as delinquency, unemployment, daily strikes or manifestations and corruption for both the government institutions and inside the company.

Although the methodology used was weak-supported by previous research, there is a strong potential for future studies, the framework can be evolved with more analysis that go beyond exploratory and descriptive studies, since CSR has to be a strategy that needs to be known for the community, the collection of data for larger periods of time is possible and with the use of information technologies, social networks and digital back-up of events, and productivity indicators, it is possible to systematize the information and develop new techniques for the study of this issue.

The existence of many papers, books and articles about FDI and FDI at regional level, implies that this subject is still a relevant variable for the researchers and policy-makers, it also can be seen that the study of FDI is evolving because it is a dynamic process due to its strong presence in developing (and transition) economies, there are also many studies on FDI in more developed countries but they are seen not as receptors of this kind of investment but as countries that have investments abroad, the policy-makers and relevant stakeholders of multinational firms are also concerned with this issue, but

still the stronger focus is on those findings for the policy-makers located in the economies where FDI is a significant macro-economic variable.

Appendix A

1st Regression:

```
--> REGRESS;Lhs=FDIT;Rhs=FDIT1,FDIT2,GDPPCT,GDPPCT1,GDPPCT2;Panel;Str=REGION
    ;Fixed;AR1$
```

```
+------------------------------------------------------------------------+
| OLS Without Group Dummy Variables                                      |
| Ordinary    least squares regression    Weighting variable = none      |
| Dep. var. = FDIT     Mean=   179104.5353    , S.D.=   381227.2357      |
| Model size: Observations =     170, Parameters =   6, Deg.Fr.=    164  |
| Residuals:  Sum of squares= .1241879620E+14, Std.Dev.=   275180.60813  |
| Fit:        R-squared=  .494379, Adjusted R-squared =          .47896  |
| Model test: F[  5,    164] =   32.07,    Prob value =          .00000  |
| Diagnostic: Log-L =  -2367.4464, Restricted(b=0) Log-L =   -2425.4137  |
|             LogAmemiyaPrCrt.=   25.085, Akaike Info. Crt.=     27.923  |
| Panel Data Analysis of FDIT       [ONE way]                            |
| Autocorrelation model, RHO=     .000000                                |
|           Unconditional ANOVA (No regressors)                          |
| Source      Variation        Deg. Free.     Mean Square                |
| Between       .137763E+14           13.         .105971E+13           |
| Residual      .107852E+14          156.         .691358E+11           |
| Total         .245615E+14          169.         .145334E+12           |
+------------------------------------------------------------------------+
```

```
+---------+-------------+----------------+--------+---------+----------+
|Variable | Coefficient  | Standard Error |t-ratio |P[|T|>t] | Mean of X|
+---------+-------------+----------------+--------+---------+----------+
 FDIT1     .5208631668      .78892898E-01    6.602   .0000  181402.75
 FDIT2     .1700317448      .82695014E-01    2.056   .0412  164825.76
 GDPPCT    329.9480109      193.14824        1.708   .0893  1905.4364
 GDPPCT1  -309.4267121      202.28173       -1.530   .1279  1841.7281
 GDPPCT2   9.539439986      32.308131         .295   .7681  1597.3672
 Constant -17460.17932      49417.003        -.353   .7243
```

```
+----------------------------------------------------------------------+
| Least Squares with Group Dummy Variables                             |
| Ordinary    least squares regression    Weighting variable = none    |
| Dep. var. = FDIT     Mean=   179104.5353    , S.D.=   381227.2357     |
| Model size: Observations =     170, Parameters =  19, Deg.Fr.=    151 |
| Residuals:  Sum of squares= .9806093866E+13, Std.Dev.=   254835.27813 |
| Fit:        R-squared=  .600753, Adjusted R-squared =          .55316 |
| Model test: F[ 18,    151] =   12.62,    Prob value =          .00000 |
| Diagnostic: Log-L =  -2347.3688, Restricted(b=0) Log-L =   -2425.4137 |
|             LogAmemiyaPrCrt.=   25.003, Akaike Info. Crt.=     27.840 |
| Estd. Autocorrelation of e(i,t)     .000000                          |
+----------------------------------------------------------------------+

+---------+-------------+----------------+--------+---------+----------+
|Variable | Coefficient  | Standard Error |t-ratio |P[|T|>t] | Mean of X|
+---------+-------------+----------------+--------+---------+----------+
 FDIT1     .2493633571      .85025240E-01    2.933   .0038  181402.75
 FDIT2    -.2692834240E-01  .83798469E-01    -.321   .7483  164825.76
 GDPPCT    304.4755690      199.18131        1.529   .1281  1905.4364
 GDPPCT1  -300.1577819      191.00979       -1.571   .1178  1841.7281
 GDPPCT2   35.76233600      32.846716        1.089   .2777  1597.3672


+----------------------------------------------------------------------+

|                Test Statistics for the Classical Model               |
|                                                                      |
|        Model            Log-Likelihood    Sum of Squares    R-squared  |
| (1)  Constant term only    -2425.41373   .2456148068D+14     .0000000  |
| (2)  Group effects only    -2355.45825   .1078518922D+14     .5608901  |
| (3)  X - variables only    -2367.44643   .1241879620D+14     .4943792  |
| (4)  X and group effects   -2347.36882   .9806093866D+13     .6007531  |
|                                                                      |
|                              Hypothesis Tests                        |
|              Likelihood Ratio Test                F Tests            |
|          Chi-squared   d.f.  Prob.          F    num. denom. Prob value |
| (2) vs (1)   139.911     13     .00000    15.328   13   156     .00000 |
| (3) vs (1)   115.935      5     .00000    32.071    5   164     .00000 |
| (4) vs (1)   156.090     18     .00000    12.623   18   151     .00000 |
| (4) vs (2)    16.179      5     .00635     3.015    5   151     .01267 |
| (4) vs (3)    40.155     13     .00013     3.095   13   151     .00042 |
+----------------------------------------------------------------------+
```

2nd Regression:

```
--> REGRESS;Lhs=LOGFDIT;Rhs=LOGFDIT1,LOGFDIT2,LOGGDPT,LOGGDPT1,LOGGDPT2;Panel
    ;Str=REGION;Fixed;AR1$
```

```
+-------------------------------------------------------------------------+
| OLS Without Group Dummy Variables                                       |
| Ordinary    least squares regression    Weighting variable = none       |
| Dep. var. = LOGFDIT  Mean=   4.195209643    , S.D.=   77.44965354       |
| Model size: Observations =     170, Parameters =   6, Deg.Fr.=    164   |
| Residuals:  Sum of squares= 894.0522735    , Std.Dev.=        2.33485   |
| Fit:        R-squared=  .999118, Adjusted R-squared =          .99909   |
| Model test: F[  5,    164] =37158.09,    Prob value =          .00000   |
| Diagnostic: Log-L =   -382.3166, Restricted(b=0) Log-L =    -980.1549   |
|             LogAmemiyaPrCrt.=    1.731, Akaike Info. Crt.=      4.568   |
| Panel Data Analysis of LOGFDIT    [ONE way]                             |
| Autocorrelation model, RHO=     .000000                                 |
|           Unconditional ANOVA (No regressors)                           |
| Source      Variation        Deg. Free.     Mean Square                 |
| Between       .101294E+07           13.         77918.5                 |
| Residual      797.685              156.         5.11337                 |
| Total         .101374E+07          169.         5998.45                 |
+-------------------------------------------------------------------------+
```

```
+---------+--------------+----------------+--------+---------+----------+
|Variable | Coefficient  | Standard Error |t-ratio |P[|T|>t] | Mean of X|
+---------+--------------+----------------+--------+---------+----------+
 LOGFDIT1   .4438564505      .74827502E-01    5.932   .0000  4.1991109
 LOGFDIT2   .1352496979      .78408313E-01    1.725   .0863 -72.952002
 LOGGDPT   5.970117120      4.2955286        1.390   .1663  1.5440813
 LOGGDPT1 -5.413771370      4.2910816       -1.262   .2087  1.5090931
 LOGGDPT2 -.1344362538      .78605668E-01   -1.710   .0890 -75.466806
 Constant  1.004207730      .30791453        3.261   .0013
```

```
+----------------------------------------------------------------------+
| Least Squares with Group Dummy Variables                             |
| Ordinary    least squares regression    Weighting variable = none    |
| Dep. var. = LOGFDIT  Mean=   4.195209643    , S.D.=   77.44965354    |
| Model size: Observations =     170, Parameters =  19, Deg.Fr.=    151 |
| Residuals:  Sum of squares= 714.7794243    , Std.Dev.=        2.17569 |
| Fit:        R-squared=  .999295, Adjusted R-squared =          .99921 |
| Model test: F[ 18,    151] =11889.18,    Prob value =          .00000 |
| Diagnostic: Log-L =   -363.2945, Restricted(b=0) Log-L =    -980.1549 |
|             LogAmemiyaPrCrt.=    1.661, Akaike Info. Crt.=      4.498 |
| Estd. Autocorrelation of e(i,t)     .000000                          |
+----------------------------------------------------------------------+

+---------+-------------+----------------+--------+---------+----------+
|Variable | Coefficient  | Standard Error |t-ratio |P[|T|>t] | Mean of X|
+---------+-------------+----------------+--------+---------+----------+
 LOGFDIT1  .2270195527      .79044729E-01    2.872   .0046  4.1991109
 LOGFDIT2 -.3018007742E-01  .80926813E-01    -.373   .7096 -72.952002
 LOGGDPT   3.172013196      4.7338142         .670   .5037  1.5440813
 LOGGDPT1 -4.183122388      4.1978465        -.996   .3204  1.5090931
 LOGGDPT2  .3205524364E-01  .81077053E-01     .395   .6930 -75.466806


+----------------------------------------------------------------------+
|                Test Statistics for the Classical Model               |
| t\logtotal.wk1                                                       |
|        Model            Log-Likelihood    Sum of Squares    R-squared  |
| (1)  Constant term only     -980.15485   .1013737853D+07     .0000000  |
| (2)  Group effects only     -372.62239   .7976853066D+03     .9992131  |
| (3)  X - variables only     -382.31664   .8940522735D+03     .9991181  |
| (4)  X and group effects    -363.29447   .7147794243D+03     .9992949  |
|                                                                      |
|                              Hypothesis Tests                        |
|              Likelihood Ratio Test               F Tests             |
|          Chi-squared   d.f.  Prob.         F    num. denom. Prob value |
| (2) vs (1)  1215.065     13     .00000 15238.192   13   156     .00000 |
| (3) vs (1)  1195.676      5     .00000 37158.092    5   164     .00000 |
| (4) vs (1)  1233.721     18     .00000 11889.175   18   151     .00000 |
| (4) vs (2)    18.656      5     .00223     3.503    5   151     .00503 |
| (4) vs (3)    38.044     13     .00028     2.913   13   151     .00085 |
+----------------------------------------------------------------------+
```

3rd Regression:

```
--> REGRESS;Lhs=GDPPCT;Rhs=FDIT,FDIT1,FDIT2,GDPPCT1,GDPPCT2;Panel;Str=REGION
    ;Fixed;AR1$


+------------------------------------------------------------------------+
| OLS Without Group Dummy Variables                                      |
| Ordinary    least squares regression    Weighting variable = none      |
| Dep. var. = GDPPCT   Mean=   1905.436448    , S.D.=   944.5543853      |
| Model size: Observations =     170, Parameters =   6, Deg.Fr.=    164  |
| Residuals:  Sum of squares= 1994317.842    , Std.Dev.=      110.27454  |
| Fit:        R-squared=  .986773, Adjusted R-squared =          .98637  |
| Model test: F[  5,    164] = 2447.02,    Prob value =          .00000  |
| Diagnostic: Log-L =  -1037.6708, Restricted(b=0) Log-L =   -1405.3393  |
|             LogAmemiyaPrCrt.=    9.441, Akaike Info. Crt.=     12.278  |
| Panel Data Analysis of GDPPCT     [ONE way]                            |
| Autocorrelation model, RHO=     .000000                                |
|           Unconditional ANOVA (No regressors)                          |
| Source      Variation        Deg. Free.     Mean Square                |
| Between       .133091E+09          13.         .102378E+08            |
| Residual      .176880E+08         156.         113385.                |
| Total         .150779E+09         169.         892183.                |
+------------------------------------------------------------------------+


+---------+-------------+----------------+--------+---------+----------+
|Variable | Coefficient  | Standard Error |t-ratio |P[|T|>t] | Mean of X|
+---------+-------------+----------------+--------+---------+----------+
 FDIT      .5298590895E-04  .31017418E-04    1.708   .0893  179104.54
 FDIT1    -.3658132182E-04  .35454388E-04   -1.032   .3036  181402.75
 FDIT2     .2213750723E-04  .33518669E-04     .660   .5098  164825.76
 GDPPCT1   1.023607873      .16608545E-01   61.631   .0000  1841.7281
 GDPPCT2  -.5988811979E-02  .12941998E-01    -.463   .6441  1597.3672
 Constant  23.29252522      19.726994        1.181   .2393
```

```
+----------------------------------------------------------------------+
| Least Squares with Group Dummy Variables                             |
| Ordinary    least squares regression    Weighting variable = none    |
| Dep. var. = GDPPCT   Mean=   1905.436448    , S.D.=   944.5543853     |
| Model size: Observations =     170, Parameters =  19, Deg.Fr.=    151 |
| Residuals:  Sum of squares= 1611954.158    , Std.Dev.=      103.32083 |
| Fit:        R-squared=  .989309, Adjusted R-squared =          .98803 |
| Model test: F[ 18,    151] =  776.29,    Prob value =          .00000 |
| Diagnostic: Log-L =  -1019.5781, Restricted(b=0) Log-L =   -1405.3393 |
|             LogAmemiyaPrCrt.=    9.382, Akaike Info. Crt.=     12.219 |
| Estd. Autocorrelation of e(i,t)     .000000                          |
+----------------------------------------------------------------------+


+---------+-------------+----------------+--------+---------+----------+
|Variable | Coefficient  | Standard Error |t-ratio |P[|T|>t] | Mean of X|
+---------+-------------+----------------+--------+---------+----------+
 FDIT      .5005057734E-04  .32742002E-04    1.529   .1281  179104.54
 FDIT1    -.1444260637E-04  .35421515E-04    -.408   .6840  181402.75
 FDIT2     .4894530034E-04  .33752794E-04    1.450   .1488  164825.76
 GDPPCT1   .8655342785      .33679246E-01   25.699   .0000  1841.7281
 GDPPCT2   .2006866393E-01  .13269472E-01    1.512   .1322  1597.3672


+------------------------------------------------------------------------+

|                Test Statistics for the Classical Model                 |
|                                                                        |
|        Model            Log-Likelihood    Sum of Squares    R-squared  |
| (1)  Constant term only    -1405.33933   .1507789248D+09     .0000000  |
| (2)  Group effects only    -1223.19042   .1768799776D+08     .8826892  |
| (3)  X - variables only    -1037.67076   .1994317842D+07     .9867732  |
| (4)  X and group effects   -1019.57809   .1611954158D+07     .9893092  |
|                                                                        |
|                                Hypothesis Tests                        |
|              Likelihood Ratio Test                F Tests              |
|          Chi-squared   d.f.  Prob.          F    num. denom. Prob value |
| (2) vs (1)   364.298     13     .00000    90.292   13   156     .00000 |
| (3) vs (1)   735.337      5     .00000  2447.020    5   164     .00000 |
| (4) vs (1)   771.522     18     .00000   776.291   18   151     .00000 |
| (4) vs (2)   407.225      5     .00000   301.185    5   151     .00000 |
| (4) vs (3)    36.185     13     .00056     2.755   13   151     .00155 |
+------------------------------------------------------------------------+
```

4th Regression:

```
--> REGRESS;Lhs=LOGGDPT;Rhs=LOGFDIT,LOGFDIT1,LOGFDIT2,LOGGDPT1,LOGGDPT2;Panel
    ;Str=REGION;Fixed;AR1$

+------------------------------------------------------------------------+
| OLS Without Group Dummy Variables                                      |
| Ordinary    least squares regression    Weighting variable = none      |
| Dep. var. = LOGGDPT  Mean=   1.544081327    , S.D.=   77.19350445      |
| Model size: Observations =     170, Parameters =   6, Deg.Fr.=    164 |
| Residuals:  Sum of squares= .2920116883    , Std.Dev.=         .04220 |
| Fit:        R-squared= 1.000000, Adjusted R-squared =         1.00000 |
| Model test: F[  5,    164] =********,    Prob value =          .00000 |
| Diagnostic: Log-L =    299.9550, Restricted(b=0) Log-L =    -979.5917 |
|             LogAmemiyaPrCrt.=   -6.296, Akaike Info. Crt.=     -3.458 |
| Panel Data Analysis of LOGGDPT    [ONE way]                            |
| Autocorrelation model, RHO=     .000000                                |
|           Unconditional ANOVA (No regressors)                          |
| Source      Variation        Deg. Free.     Mean Square                |
| Between       .100704E+07           13.         77464.6               |
| Residual      3.43132              156.         .219956E-01           |
| Total         .100704E+07          169.         5958.84               |
+------------------------------------------------------------------------+

+---------+-------------+----------------+--------+---------+----------+
|Variable | Coefficient  | Standard Error |t-ratio |P[|T|>t] | Mean of X|
+---------+-------------+----------------+--------+---------+----------+
 LOGFDIT   .1949933846E-02  .14029875E-02    1.390   .1663  4.1952096
 LOGFDIT1  .3397076487E-03  .14901085E-02     .228   .8199  4.1991109
 LOGFDIT2  .1018420606E-02  .14276191E-02     .713   .4766 -72.952002
 LOGGDPT1  .9977417313      .15567777E-02  640.902   .0000  1.5090931
 LOGGDPT2 -.1024503623E-02  .14309803E-02    -.716   .4750 -75.466806
 Constant  .2576907019E-01  .53783081E-02    4.791   .0000
```

```
+----------------------------------------------------------------------+
| Least Squares with Group Dummy Variables                             |
| Ordinary    least squares regression    Weighting variable = none    |
| Dep. var. = LOGGDPT  Mean=   1.544081327    , S.D.=   77.19350445    |
| Model size: Observations =     170, Parameters =  19, Deg.Fr.=    151 |
| Residuals:  Sum of squares= .2106120502    , Std.Dev.=         .03735 |
| Fit:        R-squared= 1.000000, Adjusted R-squared =         1.00000 |
| Model test: F[ 18,    151] =********,    Prob value =          .00000 |
| Diagnostic: Log-L =    327.7310, Restricted(b=0) Log-L =    -979.5917 |
|             LogAmemiyaPrCrt.=   -6.469, Akaike Info. Crt.=     -3.632 |
| Estd. Autocorrelation of e(i,t)     .000000                          |
+----------------------------------------------------------------------+

+---------+-------------+----------------+--------+---------+----------+
|Variable | Coefficient  | Standard Error |t-ratio |P[|T|>t] | Mean of X|
+---------+-------------+----------------+--------+---------+----------+
 LOGFDIT   .9346438631E-03  .13948335E-02     .670   .5037  4.1952096
 LOGFDIT1  .9634337446E-03  .13911990E-02     .693   .4895  4.1991109
 LOGFDIT2  .2440899815E-02  .13755174E-02    1.775   .0777 -72.952002
 LOGGDPT1  .8487034480      .21361578E-01   39.730   .0000  1.5090931
 LOGGDPT2 -.2408415910E-02  .13785829E-02   -1.747   .0823 -75.466806

+----------------------------------------------------------------------+

|                Test Statistics for the Classical Model               |
|                                                                      |
|        Model            Log-Likelihood    Sum of Squares    R-squared  |
| (1)  Constant term only     -979.59168   .1007043475D+07     .0000000  |
| (2)  Group effects only       90.52304   .3431317807D+01     .9999966  |
| (3)  X - variables only      299.95504   .2920116883D+00     .9999997  |
| (4)  X and group effects     327.73100   .2106120502D+00     .9999998  |
|                                                                      |
|                              Hypothesis Tests                        |
|              Likelihood Ratio Test               F Tests             |
|          Chi-squared   d.f.  Prob.         F    num. denom. Prob value |
| (2) vs (1)  2140.229     13     .00000**********   13   156     .00000 |
| (3) vs (1)  2559.093      5     .00000**********    5   164     .00000 |
| (4) vs (1)  2614.645     18     .00000**********   18   151     .00000 |
| (4) vs (2)   474.416      5     .00000   461.822    5   151     .00000 |
| (4) vs (3)    55.552     13     .00000     4.489   13   151     .00000 |
+----------------------------------------------------------------------+
```

Appendix B

Regression 1:

```
--> REGRESS;Lhs=FDIT;Rhs=GDPPCT,GDPPCT1,GDPPCT2;Panel;Str=REGION;Fixed;AR1$
+----------------------------------------------------------------------+
| OLS Without Group Dummy Variables                                    |
| Ordinary    least squares regression    Weighting variable = none    |
| Dep. var. = FDIT     Mean=   179104.5353    , S.D.=   381227.2357    |
| Model size: Observations =     170, Parameters =   4, Deg.Fr.=    166 |
| Residuals:  Sum of squares= .2063533085E+14, Std.Dev.=   352575.12959 |
| Fit:        R-squared=  .159850, Adjusted R-squared =          .14467 |
| Model test: F[  3,    166] =   10.53,    Prob value =          .00000 |
| Diagnostic: Log-L =  -2410.6089, Restricted(b=0) Log-L =   -2425.4137 |
|             LogAmemiyaPrCrt.=   25.569, Akaike Info. Crt.=     28.407 |
| Panel Data Analysis of FDIT       [ONE way]                          |
| Autocorrelation model, RHO=     .000000                              |
|           Unconditional ANOVA (No regressors)                        |
| Source      Variation        Deg. Free.     Mean Square              |
| Between       .137763E+14           13.         .105971E+13          |
| Residual      .107852E+14          156.         .691358E+11          |
| Total         .245615E+14          169.         .145334E+12          |
+----------------------------------------------------------------------+
+---------+-------------+----------------+--------+---------+----------+
|Variable | Coefficient  | Standard Error |t-ratio |P[|T|>t] | Mean of X|
+---------+-------------+----------------+--------+---------+----------+
 GDPPCT    421.7788293      246.66755        1.710   .0890  1905.4364
 GDPPCT1  -295.5713144      258.51287       -1.143   .2544  1841.7281
 GDPPCT2   21.28183956      41.037396         .519   .6047  1597.3672
 Constant -114201.1429      62124.786       -1.838   .0677
```

```
+----------------------------------------------------------------------+
| Least Squares with Group Dummy Variables                             |
| Ordinary    least squares regression    Weighting variable = none    |
| Dep. var. = FDIT     Mean=   179104.5353    , S.D.=   381227.2357    |
| Model size: Observations =     170, Parameters =  17, Deg.Fr.=    153 |
| Residuals:  Sum of squares= .1038632190E+14, Std.Dev.=   260546.45821 |
| Fit:        R-squared=  .577130, Adjusted R-squared =          .53291 |
| Model test: F[ 16,    153] =   13.05,    Prob value =          .00000 |
| Diagnostic: Log-L =  -2352.2551, Restricted(b=0) Log-L =   -2425.4137 |
|             LogAmemiyaPrCrt.=   25.036, Akaike Info. Crt.=     27.874 |
| Estd. Autocorrelation of e(i,t)     .000000                          |
+----------------------------------------------------------------------+
+---------+--------------+----------------+--------+---------+----------+
|Variable | Coefficient  | Standard Error |t-ratio |P[|T|>t] | Mean of X|
+---------+--------------+----------------+--------+---------+----------+
 GDPPCT    315.4192223      202.19886        1.560   .1205  1905.4364
 GDPPCT1  -270.3123627      194.77596       -1.388   .1669  1841.7281
 GDPPCT2   35.05017828      33.441227        1.048   .2960  1597.3672

+----------------------------------------------------------------------+
|                Test Statistics for the Classical Model               |
|                                                                      |
|        Model            Log-Likelihood    Sum of Squares    R-squared  |
| (1)  Constant term only    -2425.41373   .2456148068D+14     .0000000  |
| (2)  Group effects only    -2355.45825   .1078518922D+14     .5608901  |
| (3)  X - variables only    -2410.60888   .2063533085D+14     .1598499  |
| (4)  X and group effects   -2352.25511   .1038632190D+14     .5771297  |
|                                                                      |
|                              Hypothesis Tests                        |
|              Likelihood Ratio Test               F Tests             |
|          Chi-squared   d.f.  Prob.         F    num. denom. Prob value |
| (2) vs (1)   139.911     13     .00000    15.328   13   156     .00000 |
| (3) vs (1)    29.610      3     .00000    10.528    3   166     .00000 |
| (4) vs (1)   146.317     16     .00000    13.051   16   153     .00000 |
| (4) vs (2)     6.406      3     .09343     1.959    3   153     .12258 |
| (4) vs (3)   116.708     13     .00000    11.614   13   153     .00000 |
+----------------------------------------------------------------------+
```

Regression 2:

```
--> REGRESS;Lhs=LOGFDIT;Rhs=LOGGDPT,LOGGDPT1,LOGGDPT2;Panel;Str=REGION;Fixed
    ;AR1$
+------------------------------------------------------------------------+
| OLS Without Group Dummy Variables                                      |
| Ordinary    least squares regression    Weighting variable = none      |
| Dep. var. = LOGFDIT  Mean=   4.195209643    , S.D.=   77.44965354      |
| Model size: Observations =     170, Parameters =   4, Deg.Fr.=    166 |
| Residuals:  Sum of squares= 1227.174877    , Std.Dev.=        2.71894 |
| Fit:        R-squared=  .998789, Adjusted R-squared =          .99877 |
| Model test: F[  3,    166] =45654.12,    Prob value =          .00000 |
| Diagnostic: Log-L =   -409.2366, Restricted(b=0) Log-L =    -980.1549 |
|             LogAmemiyaPrCrt.=    2.024, Akaike Info. Crt.=      4.862 |
| Panel Data Analysis of LOGFDIT    [ONE way]                            |
| Autocorrelation model, RHO=     .000000                                |
|           Unconditional ANOVA (No regressors)                          |
| Source      Variation        Deg. Free.     Mean Square                |
| Between       .101294E+07           13.         77918.5                |
| Residual      797.685              156.         5.11337                |
| Total         .101374E+07          169.         5998.45                |
+------------------------------------------------------------------------+
+---------+--------------+----------------+--------+---------+----------+
|Variable | Coefficient  | Standard Error |t-ratio |P[|T|>t] | Mean of X|
+---------+--------------+----------------+--------+---------+----------+
 LOGGDPT   10.32249695      4.9551623        2.083   .0386  1.5440813
 LOGGDPT1 -9.321457066      4.9553360       -1.881   .0616  1.5090931
 LOGGDPT2  .1425806238E-02  .78008848E-03    1.828   .0692 -75.466806
 Constant  2.430982896      .27752500        8.760   .0000
```

```
+------------------------------------------------------------------------+
| Least Squares with Group Dummy Variables                               |
| Ordinary    least squares regression    Weighting variable = none      |
| Dep. var. = LOGFDIT  Mean=   4.195209643    , S.D.=   77.44965354      |
| Model size: Observations =     170, Parameters =  17, Deg.Fr.=    153  |
| Residuals:  Sum of squares= 753.9419676    , Std.Dev.=        2.21985  |
| Fit:        R-squared=  .999256, Adjusted R-squared =          .99918  |
| Model test: F[ 16,    153] =12848.02,    Prob value =          .00000  |
| Diagnostic: Log-L =   -367.8285, Restricted(b=0) Log-L =    -980.1549  |
|             LogAmemiyaPrCrt.=    1.690, Akaike Info. Crt.=      4.527  |
| Estd. Autocorrelation of e(i,t)     .000000                            |
+------------------------------------------------------------------------+
+---------+--------------+----------------+--------+---------+----------+
|Variable | Coefficient  | Standard Error |t-ratio |P[|T|>t] | Mean of X|
+---------+--------------+----------------+--------+---------+----------+
 LOGGDPT   4.248851545      4.7576387         .893   .3730  1.5440813
 LOGGDPT1 -4.853094428      4.2481724       -1.142   .2548  1.5090931
 LOGGDPT2  .1867785379E-02  .75000216E-03    2.490   .0137 -75.466806

+------------------------------------------------------------------------+

|                Test Statistics for the Classical Model                 |
|                                                                        |
|        Model            Log-Likelihood    Sum of Squares    R-squared  |
| (1)  Constant term only     -980.15485   .1013737853D+07     .0000000  |
| (2)  Group effects only     -372.62239   .7976853066D+03     .9992131  |
| (3)  X - variables only     -409.23663   .1227174877D+04     .9987895  |
| (4)  X and group effects    -367.82849   .7539419676D+03     .9992563  |
|                                                                        |
|                              Hypothesis Tests                          |
|              Likelihood Ratio Test               F Tests               |
|          Chi-squared   d.f.  Prob.         F    num. denom. Prob value |
| (2) vs (1)  1215.065     13     .00000 15238.192   13   156     .00000 |
| (3) vs (1)  1141.836      3     .00000 45654.121    3   166     .00000 |
| (4) vs (1)  1224.653     16     .00000 12848.016   16   153     .00000 |
| (4) vs (2)     9.588      3     .02242     2.959    3   153     .03422 |
| (4) vs (3)    82.816     13     .00000     7.387   13   153     .00000 |
+------------------------------------------------------------------------+
```

Regression 3:

```
--> REGRESS;Lhs=GDPPCT;Rhs=FDIT,FDIT1,FDIT2;Panel;Str=REGION;Fixed;AR1$
+----------------------------------------------------------------------+
| OLS Without Group Dummy Variables                                    |
| Ordinary    least squares regression    Weighting variable = none    |
| Dep. var. = GDPPCT   Mean=   1905.436448    , S.D.=   944.5543853     |
| Model size: Observations =     170, Parameters =   4, Deg.Fr.=    166 |
| Residuals:  Sum of squares= 117209680.7    , Std.Dev.=      840.28710 |
| Fit:        R-squared=  .222639, Adjusted R-squared =          .20859 |
| Model test: F[  3,    166] =   15.85,    Prob value =          .00000 |
| Diagnostic: Log-L =  -1383.9321, Restricted(b=0) Log-L =   -1405.3393 |
|             LogAmemiyaPrCrt.=   13.491, Akaike Info. Crt.=     16.329 |
| Panel Data Analysis of GDPPCT     [ONE way]                          |
| Autocorrelation model, RHO=     .000000                              |
|           Unconditional ANOVA (No regressors)                        |
| Source      Variation        Deg. Free.     Mean Square              |
| Between       .133091E+09           13.         .102378E+08          |
| Residual      .176880E+08          156.         113385.              |
| Total         .150779E+09          169.         892183.              |
+----------------------------------------------------------------------+
+---------+-------------+----------------+--------+---------+----------+
|Variable | Coefficient  | Standard Error |t-ratio |P[|T|>t] | Mean of X|
+---------+-------------+----------------+--------+---------+----------+
 FDIT      .3795708509E-03  .23492175E-03    1.616   .1079  179104.54
 FDIT1     .3986499592E-03  .26724534E-03    1.492   .1375  181402.75
 FDIT2     .5755023428E-03  .24968891E-03    2.305   .0223  164825.76
 Constant  1670.279777      73.028784       22.872   .0000
```

```
+----------------------------------------------------------------------+
| Least Squares with Group Dummy Variables                             |
| Ordinary    least squares regression    Weighting variable = none    |
| Dep. var. = GDPPCT   Mean=   1905.436448    , S.D.=   944.5543853     |
| Model size: Observations =     170, Parameters =  17, Deg.Fr.=    153 |
| Residuals:  Sum of squares= 15287451.16    , Std.Dev.=      316.09806 |
| Fit:        R-squared=  .898610, Adjusted R-squared =          .88801 |
| Model test: F[ 16,    153] =   84.75,    Prob value =          .00000 |
| Diagnostic: Log-L =  -1210.7928, Restricted(b=0) Log-L =   -1405.3393 |
|             LogAmemiyaPrCrt.=   11.607, Akaike Info. Crt.=     14.445 |
| Estd. Autocorrelation of e(i,t)     .000000                          |
+----------------------------------------------------------------------+
+---------+--------------+----------------+--------+---------+----------+
|Variable | Coefficient  | Standard Error |t-ratio |P[|T|>t] | Mean of X|
+---------+--------------+----------------+--------+---------+----------+
 FDIT      .1079588657E-03  .99515357E-04    1.085   .2794  179104.54
 FDIT1     .1574328379E-03  .10720365E-03    1.469   .1437  181402.75
 FDIT2     .3505001498E-03  .99469477E-04    3.524   .0005  164825.76

+----------------------------------------------------------------------+

|                Test Statistics for the Classical Model               |
|                                                                      |
|        Model            Log-Likelihood    Sum of Squares    R-squared  |
| (1)  Constant term only    -1405.33933   .1507789248D+09     .0000000  |
| (2)  Group effects only    -1223.19042   .1768799776D+08     .8826892  |
| (3)  X - variables only    -1383.93206   .1172096807D+09     .2226388  |
| (4)  X and group effects   -1210.79283   .1528745116D+08     .8986102  |
|                                                                      |
|                              Hypothesis Tests                        |
|              Likelihood Ratio Test               F Tests             |
|          Chi-squared   d.f.  Prob.         F    num. denom. Prob value |
| (2) vs (1)   364.298     13     .00000    90.292   13   156     .00000 |
| (3) vs (1)    42.815      3     .00000    15.848    3   166     .00000 |
| (4) vs (1)   389.093     16     .00000    84.752   16   153     .00000 |
| (4) vs (2)    24.795      3     .00002     8.008    3   153     .00005 |
| (4) vs (3)   346.278     13     .00000    78.466   13   153     .00000 |
+----------------------------------------------------------------------+
```

Regression 4:

```
--> REGRESS;Lhs=LOGGDPT;Rhs=LOGFDIT,LOGFDIT1,LOGFDIT2;Panel;Str=REGION;Fixed
    ;AR1$
+------------------------------------------------------------------------+
| OLS Without Group Dummy Variables                                      |
| Ordinary    least squares regression    Weighting variable = none      |
| Dep. var. = LOGGDPT  Mean=   1.544081327    , S.D.=   77.19350445      |
| Model size: Observations =     170, Parameters =   4, Deg.Fr.=    166 |
| Residuals:  Sum of squares= 946.4233585    , Std.Dev.=        2.38775 |
| Fit:        R-squared=  .999060, Adjusted R-squared =          .99904 |
| Model test: F[  3,    166] =58822.20,    Prob value =          .00000 |
| Diagnostic: Log-L =   -387.1553, Restricted(b=0) Log-L =    -979.5917 |
|             LogAmemiyaPrCrt.=    1.764, Akaike Info. Crt.=      4.602 |
| Panel Data Analysis of LOGGDPT    [ONE way]                            |
| Autocorrelation model, RHO=     .000000                                |
|           Unconditional ANOVA (No regressors)                          |
| Source      Variation        Deg. Free.     Mean Square                |
| Between       .100704E+07           13.         77464.6               |
| Residual      3.43132              156.         .219956E-01           |
| Total         .100704E+07          169.         5958.84               |
+------------------------------------------------------------------------+
+---------+--------------+----------------+--------+---------+----------+
|Variable | Coefficient  | Standard Error |t-ratio |P[|T|>t] | Mean of X|
+---------+--------------+----------------+--------+---------+----------+
 LOGFDIT   .5007326501      .68424284E-01    7.318   .0000  4.1952096
 LOGFDIT1  .4965276571      .68369038E-01    7.262   .0000  4.1991109
 LOGFDIT2 -.9493466800E-03  .68633757E-03   -1.383   .1683 -72.952002
 Constant -2.710828533      .19083738      -14.205   .0000
```

```
+----------------------------------------------------------------------+
| Least Squares with Group Dummy Variables                             |
| Ordinary    least squares regression    Weighting variable = none    |
| Dep. var. = LOGGDPT  Mean=   1.544081327    , S.D.=   77.19350445    |
| Model size: Observations =     170, Parameters =  17, Deg.Fr.=    153 |
| Residuals:  Sum of squares= 2.453038349    , Std.Dev.=         .12662 |
| Fit:        R-squared=  .999998, Adjusted R-squared =         1.00000 |
| Model test: F[ 16,    153] =********,    Prob value =          .00000 |
| Diagnostic: Log-L =    119.0505, Restricted(b=0) Log-L =    -979.5917 |
|             LogAmemiyaPrCrt.=   -4.038, Akaike Info. Crt.=     -1.201 |
| Estd. Autocorrelation of e(i,t)     .000000                          |
+----------------------------------------------------------------------+
+---------+--------------+----------------+--------+---------+----------+
|Variable | Coefficient  | Standard Error |t-ratio |P[|T|>t] | Mean of X|
+---------+--------------+----------------+--------+---------+----------+
 LOGFDIT  -.4732018120E-02  .47037453E-02   -1.006   .3158  4.1952096
 LOGFDIT1  .7080916024E-02  .46005961E-02    1.539   .1255  4.1991109
 LOGFDIT2  .2783916924E-03  .37101555E-04    7.504   .0000 -72.952002

 +---------------------------------------------------------------------+
|                Test Statistics for the Classical Model              |
|                                                                     |
|        Model            Log-Likelihood    Sum of Squares    R-squared |
| (1)  Constant term only     -979.59168   .1007043475D+07     .0000000 |
| (2)  Group effects only       90.52304   .3431317807D+01     .9999966 |
| (3)  X - variables only     -387.15533   .9464233585D+03     .9990602 |
| (4)  X and group effects     119.05049   .2453038349D+01     .9999976 |
|                                                                     |
|                              Hypothesis Tests                       |
|              Likelihood Ratio Test               F Tests            |
|          Chi-squared   d.f.  Prob.         F    num. denom. Prob value |
| (2) vs (1)  2140.229     13     .00000**********   13   156     .00000 |
| (3) vs (1)  1184.873      3     .00000 58822.199    3   166     .00000 |
| (4) vs (1)  2197.284     16     .00000**********   16   153     .00000 |
| (4) vs (2)    57.055      3     .00000    20.339    3   153     .00000 |
| (4) vs (3)  1012.412     13     .00000  4528.997   13   153     .00000 |
+---------------------------------------------------------------------+
```

Appendix C

Illustrative Model

```
--> REGRESS;Lhs=FDIKUST;Rhs=GRGDPT,GRGDPT1,GRGDPT2;Panel;Str=REGION;Fixed;AR1$

+----------------------------------------------------------------------+
| OLS Without Group Dummy Variables                                    |
| Ordinary    least squares regression    Weighting variable = none    |
| Dep. var. = FDIKUST  Mean=   179104.5353    , S.D.=   381227.2357     |
| Model size: Observations =     170, Parameters =   4, Deg.Fr.=    166 |
| Residuals:  Sum of squares= .2411650642E+14, Std.Dev.=   381156.34475 |
| Fit:        R-squared=  .018117, Adjusted R-squared =          .00037 |
| Model test: F[  3,    166] =    1.02,    Prob value =          .38488 |
| Diagnostic: Log-L =  -2423.8597, Restricted(b=0) Log-L =   -2425.4137 |
|             LogAmemiyaPrCrt.=   25.725, Akaike Info. Crt.=     28.563 |
| Panel Data Analysis of FDIKUST    [ONE way]                          |
| Autocorrelation model, RHO=     .000000                              |
|           Unconditional ANOVA (No regressors)                        |
| Source      Variation        Deg. Free.     Mean Square              |
| Between       .137763E+14           13.         .105971E+13          |
| Residual      .107852E+14          156.         .691358E+11          |
| Total         .245615E+14          169.         .145334E+12          |
+----------------------------------------------------------------------+
+---------+--------------+----------------+--------+---------+----------+
|Variable | Coefficient  | Standard Error |t-ratio |P[|T|>t] | Mean of X|
+---------+--------------+----------------+--------+---------+----------+
 GRGDPT    61.36075990      395.91825         .155   .8770 -5.8247951
 GRGDPT1   8.757958822      149.64609         .059   .9534 -82.221478
 GRGDPT2   132.5582187      110.51844        1.199   .2319 -158.61755
 Constant  201208.1015      31872.111        6.313   .0000
```

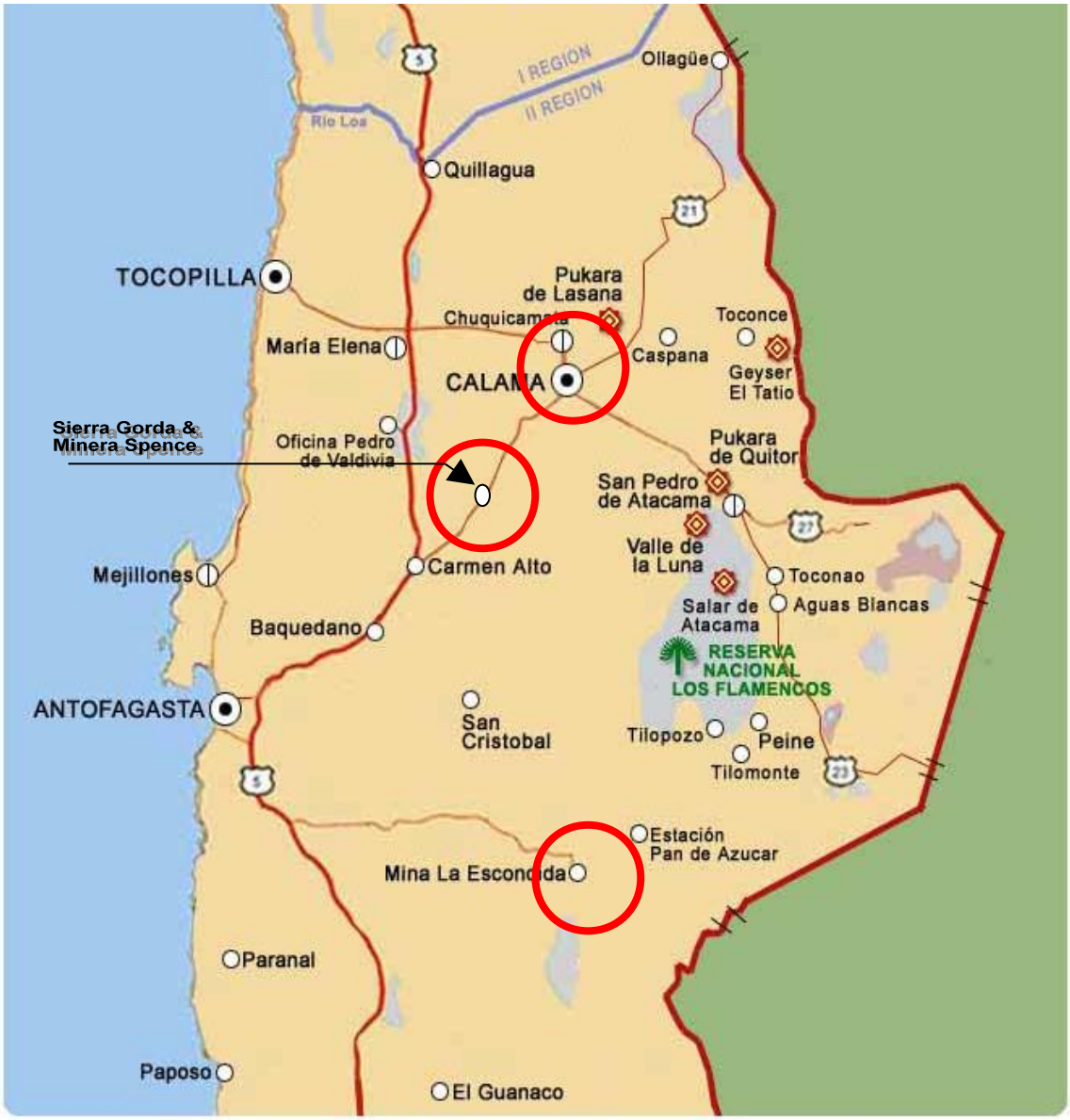
```
+----------------------------------------------------------------------+
| Least Squares with Group Dummy Variables                             |
| Ordinary    least squares regression    Weighting variable = none    |
| Dep. var. = FDIKUST  Mean=   179104.5353    , S.D.=   381227.2357     |
| Model size: Observations =     170, Parameters =  17, Deg.Fr.=    153 |
| Residuals:  Sum of squares= .1033318692E+14, Std.Dev.=   259879.14387 |
| Fit:        R-squared=  .579293, Adjusted R-squared =          .53530 |
| Model test: F[ 16,    153] =   13.17,    Prob value =          .00000 |
| Diagnostic: Log-L =  -2351.8191, Restricted(b=0) Log-L =   -2425.4137 |
|             LogAmemiyaPrCrt.=   25.031, Akaike Info. Crt.=     27.868 |
| Estd. Autocorrelation of e(i,t)     .000000                          |
+----------------------------------------------------------------------+
+---------+--------------+----------------+--------+---------+----------+
|Variable | Coefficient  | Standard Error |t-ratio |P[|T|>t] | Mean of X|
+---------+--------------+----------------+--------+---------+----------+
 GRGDPT    360157.0602      469542.70         .767   .4441 -5.8247951
 GRGDPT1  -5.814833137      103.78723        -.056   .9554 -82.221478
 GRGDPT2   150.2371704      78.802424        1.907   .0582 -158.61755

+----------------------------------------------------------------------+

|                Test Statistics for the Classical Model               |
|                                                                      |
|        Model            Log-Likelihood    Sum of Squares    R-squared  |
| (1)  Constant term only    -2425.41373   .2456148068D+14     .0000000  |
| (2)  Group effects only    -2355.45825   .1078518922D+14     .5608901  |
| (3)  X - variables only    -2423.85968   .2411650642D+14     .0181168  |
| (4)  X and group effects   -2351.81914   .1033318692D+14     .5792930  |
|                                                                      |
|                              Hypothesis Tests                        |
|              Likelihood Ratio Test                F Tests            |
|          Chi-squared   d.f.  Prob.         F    num. denom. Prob value |
| (2) vs (1)   139.911     13     .00000    15.328   13   156     .00000 |
| (3) vs (1)     3.108      3     .37526     1.021    3   166     .38488 |
| (4) vs (1)   147.189     16     .00000    13.167   16   153     .00000 |
| (4) vs (2)     7.278      3     .06354     2.231    3   153     .08688 |
| (4) vs (3)   144.081     13     .00000    15.699   13   153     .00000 |
+----------------------------------------------------------------------+
```

Appendix D

Location of the Mining Companies and their neighboring communities in the Second Region of Chile, Antofagasta.



Source: Mining Ministry of Chile and Own Complements, 2004

Appendix E

Profile of the Mining Companies of this study:

Minera Escondida

Creation: Entered in operations in 1990.

Location: Second Region of Chile, Antofagasta, 160 kilometers southeast of Antofagasta.

Height: 3100 meters above the level of the sea.

Production of copper: 1.272.472 ton in 2005

Own Labor force: 2850

Mines: Escondida (open pit), Escondida Norte (Open pit – entered in October 2005)

Owners: BHP Escondida Inc. 57,5%, Río Tinto Escondida Limitada 30%, JECO Corporation 10%, International Finance Corporation 2,5%.

Investment: USD $ 1254 Million.

Minera Spence

Creation: Entered in operations November 2006. "Green-field" Project,

Location: Second Region of Chile, Antofagasta, 8 kilometers northeast of Sierra Gorda.

Height: 1700 meters above the level of the sea.

Production of copper: 150.000 ton. In 2005

Own labor force: 640

Mines: Open pit

Owner: 100% BHP Billiton – Basic Metals

Investment: USD $1000 Million

Codelco Norte

Creation: Created in 2002 by integrating the Chuquicamata (started on 1915) and Radomiro Tomic (started on 1997) Divisions.

Location: Second Region of Chile, Antofagasta, approximately 20Km North of Calama.

Height: 2800 meters above level of the sea.

Production of copper: 964.930 ton.

Own labor force: 8168

Mines: Chuquicamata (open pit), Sur (open pit) and Radomiro Tomic (open pit)

Owner: State

Investment: USD $1230 Million

References

Chapter I

Barbosa, N. and Eiriz, V. *"Linking Corporate productivity to Foreign Direct Investment: An Empirical Assessment"* International Business Review, N. 18 (2009).

Basu, P. and Guariglia, A. *"Foreign Direct Investment, Inequality and Growth"*, Journal of Macroeconomics, N. 29 (2007).

Bengoa, M. and Sánchez-Robles, B. *"Foreign Direct Investment, Economic Freedom and Growth: New Evidence from Latin America"*, European Journal of Political Economy, Vol. 19 (2003).

Bengoa, M. and Sánchez-Robles, B. *"Policy Shocks as a Source for Endogenous Growth"*, Journal of Policy Modeling, N. 27 (2005).

Borensztein, E., De Gregorio, J., and Lee, J-W. *"How Does Foreign Direct Investment Affect Economic Growth?"* Journal of International Economics, N. 45 (1998).

Chen, M. *"Regional Economic Integration and Geographic Concentration of Multinational Firms"* Economic Review, N. 53 (2009).

Damijan, J., Knell, M., Majcen, B. and Rojec, M. *"The role of FDI, R&D Accumulation and Trade in Transferring Technology to Transition Countries: Evidence from Firm Panel Data for Eight Transition Countries"* Economic Systems, N. 27 (2003).

Del Sol, P. and Kogan, J. *"Regional Competitive Advantage Based on Pioneering Economic Reforms: The Case of Chilean FDI"* Journal of International Business Studies, N. 38 (2007).

Escribá. F., and Murgui, M. *"Factores de Localización Regional en las Inversiones Industriales"* (Regional Location Factors in Industrial Investments), Revista de Economía Aplicada, N. 47, Vol XVI (2008).

Garvin, T., McGee, T., Smoyer-Tomic, K. and Aubynn, E. *"Community-Company Relations in Gold Mining in Ghana"* Journal of Environmental Management, N. 90 (2009).

Jordaan, J. *"Intra- and Inter-Industry Externalities From Foreign Direct Investment in the Mexican Manufacturing Sector: New Evidence from Mexican Regions"* World Development, Vol. 36, N. 12 (2008).

Kim, Y. *"Cross-Border M&A vs. Greenfield FDI: Economic Integration and its Welfare Impact"* Journal of Policy Modeling, N. 31 (2009).

King, L. and Váradi, B. *"Beyond Manichean Economics: Foreign Direct Investment and Growth in the Transition from Socialism"* Communist and Post-Communist Studies, N. 35 (2002).

Kuo, C. and Yang, C. *"Knowledge Capital and Spillover on Regional Economic Growth: Evidence from China"* China Economic Review N. 19 (2008).

Lin, F. *"The Determinants of Foreign Direct Investment in China: The Case of Taiwanese Firms in the IT Industry"* Journal of Business Research - article in press (2009).

Liu, X., Wang, C. and Wei, Y. "*Causal Links between Foreign Direct Investment and Trade in China"* China Economic Review, n. 12 (2001).

Liu, X. and Wang, C. *"Does Foreign Direct Investment Facilitate Technological Progress? Evidence from Chinese Industries"* Research policy, N. 32 (2005).

Lu, C. *"Moving Up or Moving Out? A Unified Theory of R&D, FDI, and Trade*" Journal of International Economics, N. 71 (2007).

Montiel, P. and Reinhart, C. *"Do Capital Controls and Macroeconomic Policies Influence the Volume and Composition of Capital flows? Evidence from the 1990s"* Journal of International Money and Finance, N. 18, (1999).

Noorkbakhsh, F., Paloni, A. and Youssef, A. *"Human Capital and FDI Inflows to developing Countries: New Empirical Evidence"* World Development, Vol 29, N. 9 (2001).

Sembenelli, A. and Siotis, G. *"Foreign Direct Investment and Mark-up Dynamics: Evidence from Spanish Firms"* Journal of International Economics. N. 76 (2008).

Tuan, C., Ng, L. and Zhao, B. *"China Post-Economic Reform Growth: The Role of FDI and Productivity Progress"* Journal of Asian Economics – article in press (2009).

Ugarte, M. *"Conflictos Sociales y Responsabilidad Social de las Empresas Mineras"* (Social Conflicts and Social Responsibility of Mining Firms) Suplemento de Análisis legal jurídica (2009).

Vergara, A. *"Conflicto y Modernización en la Gran Minería del Cobre (1950-1970)"* (Conflicts and Modernization in Copper Mining Industry) Historia, Vol. II. Instituto de

Historia Pontificia Universidad Católica de Chile (2004).

Vu, T. and Noy, I. *"Sectoral Analysis of Foreign Direct Investment and Growth in the Developed Countries"* Journal of International Financial Markets, Institutions & Money, N. 19 (2009).

Yamin, M. and Sinkovics, R. *"Infrastructure or Foreign Direct Investment? An Examination of the Implications of MNE Strategy for Economic Development*" Journal of World Business, N. 44 (2009).

Chapter II

Agosin, M., Fuentes, J. and Letelier, L. "*Chile: The Origins and Consequences of External Capital*" in Foreign Capital in Latin America, edited by Jose Antonio Ocampo and Roberto Steiner. Inter-American Development Bank. (1994)

Armstrong, H. and Taylor, J. *Regional Economics And Policy*, third edition, Blackwell Publishers (2000)

Asiedu, E. *On the Determinants of Foreign Direct Investment to Developing Countries: Is Africa Different?*, World Development, Vol 30 N.1 (2002).

Broadman H. And sun X., *Distribution of Foreign Direct Investment in China*, World Economy, (1997).

Chen, J-r. FDI, *International Financial Flows & Geography*, in Foreign Direct Investment, Edited By John-ren Chen, New York St. Martin's Press (2000)

Chen, K., Chou, J., Wang, S. and Kuo, N. *Economic Impact of Export processing zones in Taiwan: A CGE analysis*, in Foreign Direct Investment, Edited By John-ren Chen, New York St. Martin's Press (2000)

De Ferranti, D., Perry, G., Lederman, D. and Maloney, W. *From Natural Resources to the Knowledge Economy, Trade and Job Quality*, World Bank Latin American and Caribbean studies (2002).

Economic Comission for Latin American And The Caribbean (ECLAC-CEPAL). *La Inversion Extranjera en America Latina y el Caribe* (Foreign Direct Investment in Latin America and the Caribbean) CEPAL - Unidad de Inversiones y Estrategias Empresariales de la División de Desarrollo Productivo y Empresarial, Report 2000.

Kozlowski P. and Weekly, J. *Explaining Interstate Variations in Foreign Direct Investment in The United States*, Regional Science Perspectives Vol 20 N.2 (1990).

Kreinin, M. *Chapter 9: International Mobility of Productive Factors*, in Internationsl Economics, a Policy Approach, Seventh Edition, The Dryden Press, 1995

Lahiri S. and Ono Y., *Export-Oriented Foreign Direct Investment and Local Content Requirement*, Pacific Economic Review Vol 8 N.1 (2003)

O'Huallacháin, B. *The Relationship Between Foreign Direct Investment and a Regional Industry System: An Analysis of Interregional and Intra-Corporation Linkages of Foreign-Owned Manufacturing Establishments*, Ph.D. in Geography Thesis, University of Illinois at Urbana-Champaign (1982)

Noobakhsh, F., Paloni, A. and Youseff, A. *Human Capital and FDI Inflows to Developing Countries: New Empirical Evidence*, World Development, Vol 29 N.9 (2001)

Ruane F. and Gőrg H. *Aspect of Foreign Direct Investment in Irish Manufacturing since 1973: Policy and Performance*. Journal of the Statistical and Social Inquiry Society of Ireland Vol 27 Part IV (1996)

Scott, P. *The Location of Early Overseas Multinationals in Britain, 1900-1939: Patterns and Determinants,* Regional Studies, Vol 32 N.6 (1998)

Smekal C. and Sausgruber R. *Determinants of Foreign Direct Investment in Europe*, in Foreign Direct Investment, Edited By John-ren Chen, New York St. Martin's Press (2000)
Sun, H. and Parikh, A. *Exports, Inward Foreign Direct Investment (FDI) and Regional Economic Growth in China*, Regional Studies, Vol 35 N.3. (2001)

Sun, Q., Tong W. and Yu Q. *Determinants of Foreign Direct Investment Across China,* Journal of International Money and Finance, Vol 21 N.1 (2002)

Wei, Y., Liu, X., Parker, D., and Vaidya, K. *The Regional Distribution of Foreign Direct Investment in China*, Regional Studies, Vol. 33 N.9 (1999)

World Investment Report, *Foreign Direct Investment and the Challenge of Development,* United Nations, (1999)

Zhang, K. *Does Foreign Direct Investment Promote Economic Growth? Evidence from East Asia and Latin America*, Contemporary Economy Policy, Vol 19 N.2 (2001)

Chapter III

Agosin Trumper, M., *Capital inflows and investment performance: Chile in the 1990s*, Series Documentos de Trabajo, N° 148 Universidad de Chile, Marzo, 1997.

Balamurali, N. & Bogahawatte, C. *Foreign Direct Investment and Economic Growth in Sri Lanka,* Sri Lankan Journal of Agricultural Economics. Vol. 6, No. 1, 2004

Chowdhury, A. & Mavrotas, G. *FDI & Growth: What Causes What?,* Paper presented at the WIDER Conference on "Sharing Global Prosperity", WIDER, Helsinki, 2003.

Frimpong, J. M. & Oteng-Abayie E. F. *Bivariate Causality Analysis Between FDI Inflows And Economic Growth In Ghana* Munich Personal RePEc Archive paper Nº 351, 2006.

Hurlin, C. & Venet, B. *Granger Causality Tests in Panel Data Models with Fixed Coefficients,* Paper developed at the Department of Economics of the University Paris Dauphine, EURIsCO and in CEPREMAP., 2003.

Hurlin, Christophe *Testing Granger Causality in Heterogeneous Panel Data Models with Fixed Coefficients*, Paper developed at the Department of Economics of the University Paris IX Dauphine, EURIsCO and in CEPREMAP, 2004.

Jaumotte, Florence *Foreign Direct Investment and Regional Trade Agreements: The Market Size Effect Revisited*, IMF Working paper, 2004.

Kumar, N. & Pradhan, J.P. *Foreign Direct Investment, Externalities and Economic Growth in Developing Countries: Some Empirical Explorations and Implications for WTO Negotiations on Investment*, Research and Information System discussion papers, RIS-DP #27/2002.

Robles, J. & Hewings, G. *The Determinants of the Regional Foreign Direct Investment in Chile*, Regional Economics Applications Laboratory Working Paper, REAL 04-T-2, 2004.

Seabra, F. & Flach, L. *Foreign direct investment and profit outflows: a causality analysis for the Brazilian economy*, Economics Bulletin, Vol. 6, No. 1 pp. 1−15, 2005.

Shan, J., Gang Tian, G. & Sun, F. The *FDI-led growth hypothesis: further econometric evidence from China*, Working Paper of Economic Division, Research School of Pacific & Asian Studies. The Australian National University, 1997.

Wen, Mei *Foreign Direct Investment, Regional Geographical and Market Conditions, and Regional Development: A Panel Study on China*, Division of Economics Research School of Pacific and Asian Studies Australian National University And Department of

Economics University of Sydney, 2000.

Chapter IV

Barria, D. *Los desafíos de Codelco* (The Challenges of Codelco). 4º Encuentro Codelco y Proveedores TICA, Santiago, Chile, 2007.

Chile, Biblioteca del Congreso Nacional, *Reporte Regional Sistema Integrado de Información Territorial* (Regional Report of the Integrated Territorial Information System). Antofagasta Section, Valparaíso, Chile, 2002.

Chile, Ministerio de Planificación y Cooperación, Departamento de Planificación y Gestión del Territorio. *Desarrollo Regional: Balance de una Década de Gobiernos Regionales* (Regional Development: Status of a decade of regional governments), 2004.

Chilean Copper Comission, COCHILCO. *Inversión en la Minería Chilena del Cobre y del Oro, Proyección del periodo 2007-2011* (Investment in the Chilean Copper and Gold Mining, Forecast for 2007-2011 period). Updated December 2007.

Chilean Copper Comission, COCHILCO. Unidad de Asuntos Internacionales y Medioambiente, Documento Interno, "*Desarrollo del cluster minero en Chile: Estado actual*" (Actual status of the development of Chilean mining cluster), 2003.

Corporación Nacional del Cobre, CODELCO, *Anual Report*. Santiago, Chile, 2005.

Corporación Nacional del Cobre, CODELCO, *Sustainability Report*. Santiago, Chile, 2005.

Corporación Nacional del Cobre, CODELCO, *Sustainability Report*. Santiago, Chile, 2004.

Costabal, F., *Spence: Una operación de BHP Billiton destacada y simple, Liderazgo Gerencial en la Gestión de Seguridad* (Spence: a Bhp Billiton operation featured and simple, Management Leadership in Safety management), BHP Billiton, Antofagasta, Chile, 2007.

Culverwell, M., *Desarrollo de proveedores en la región de Antofagasta* (Supplier development in the Antofagasta Region), Chapter IV of the Book : Aglomeraciones Mineras y Desarrollo Local en América Latina, Rodolfo M. Buitelaar (Editor), Alfaomega/CEPAL/IDRC, 2002.

Fundación Minera Escondida, *Anual Report*, Antofagasta, Chile, 2005.

Fundación Prohumana, *Encuesta Prohumana- Adimark Responsabilidad Social Chile Opina: ¿Somos Socialmente Responsables?(Prohumana-Adimark Survey Social Responsibility, Chilean Opinion: Are we Socially Responsible?)*, 2006.

Gobierno de Chile, *Estrategia Regional de Desarrollo, Región de Antofagasta, 2000-2006*. (Strategy of Regional Development of Antofagasta, 2000-2006), 2001.

Jensen, C., *Localized Spillovers in the Polish Food Industry: The Role of FDI in the Development Process?* Regional Studies, 38:5, 533-548, 2004.

Minera Escondida, *Anual Report*, Antofagasta, Chile, 2005

Minera Spence, *Sustainability Report*, Santiago, Chile, 2006.

Monge, R., *Foreign Direct Investment and MSME Linkages in Costa Rica*, Costa Rican High Technology Advisory Committee Foundation (CAATEC), IDRC Private Sector Development Task Force Conference. Ottawa, Canada, 2005.

Ojeda, J.M., *Essay: Towards a Sustainable Mining, Building Up Human and Social Capacities*, Minera Escondida Foundation, Antofagasta, Chile, 2002.

Rodríguez-Pose, A. and Crescenzi, R., *Research and Development, Spillovers, innovation Systems and the Genesis of Regional Growth in Europe*, Regional Studies, 42:1, 51-57, 2008.

Turner, B., *Sustentabilidad en la Gestión de la Empresa Minera: el Caso de Minera Escondida* (Sustainability of the Management of Mining Firm: the case of Minera Escondida). Revista ambiente y desarrollo, Vol. XVIII, Nº 2-3-4, pag.79-82, 2002.

Magazine Articles and Internet Information.

- "*Matriz Insumo Producto y Encadenamientos Productivos: Impacto de la Minería en la Segunda Región*" (Input-Output and Clusters: The impact of Mining on the Second Region) Article from magazines Minería Chilena, October 2002. Web Page: http://www.editec.cl/mchilena/Oct2002/Articulo/impacto.htm

- "*Spence: Nuevo Hito para BHP Billiton en Chile*" (Spence: A new frontier for BHP Billiton in Chile) obtained from online magazine: Minería Chilena, March 2007. Web Page: http://www.mch.cl/revistas/index.php?id=366.

- "*Esperamos producir 180.000 ton en 2007 - Francisco Costabal, VP y Gerente*

General De Minera Spence" (Waiting to produce 180000 ton in 2007 – Francisco Costabal, Vice-president and C.E.O of Minera Spence) obtained from online magazine: Minería Chilena on March 2007. Web Page: http://www.mch.cl/revistas/index.php?id=365

- *"¿Qué es la RSE?"* (What is CSR?) Definition obtained from page "Acción RSE" November 2006, Chile. Webpage: http://www.accionrse.cl/app01/home/queEs.html

- "*Banco de Casos, Fundación Minera Escondida, Comprometida con la superación de la pobreza*" (Database, Minera Escondida Foundation, Committed to get beyond of poverty) obtained from page "Acción RSE" , June 2007. Webpage: http://www.accionrse.cl/app01/home/DesCaso.asp?id=127#arriba

- "*Information and Analysis on Emerging CSR Trends and Solutions*". Article obtained from Business for Social Responsibility – Insight on January 2008. Webpage: http://www.bsr.org/insight/index.cfm

- "*Desarrollo Sustainable – Codelco Buen Vecino*" (Sustainable Development – Codelco Good Neighbor) Definition obtained from official Webpage of Codelco Chile, February 2007. Webpage: http://www.codelco.com/desarrollo/comunidad.asp#

- "*Pauta General para Materializar la Inversión Extranjera*" (General guidelines for bringing forth Foreign Investment). Obtained from page of Chilean Copper Commission, Investment, Guidelines for the Investor, Chile, December 2006. Webpage: http://www.cochilco.cl/inversion/guia/pauta.asp#

- "*Proyectos Mineros Principales*" (Principal mining projects). Obtained from page of Chilean Copper Commission, Investment, Principal mining Projects, Chile, December 2007. Webpage: http://www.cochilco.cl/inversion/proyectos/2.asp

- "*Plan de Relaciones con la Comunidad*" (Community Relations Program). Obtained from official page of Minera Spence, Community portal, Chile, December 2007.
Webpage:http://www.spence.cl/spence/web/NV_Portal_Comunidades/Programa_Acercamiento/#top

- "*Otros Programas*" (Other Programs). Obtained from official page of Minera Spence, Community portal, Chile, December 2007. Webpage: http://www.spence.cl/spence/web/NV_Portal_Comunidades/Otros_Programas/#top

- "*Equipo de Buenos Vecinos*" (Good Neighbors Team). Obtained from official page of Minera Spence, Community portal, Chile, December 2007. Webpage:

http://www.spence.cl/spence/web/NV_Portal_Comunidades/Equipo_Bueno_Vecinos/

- "*Codelco Norte Define Su Plan De Acción En Relaciones Comunitarias Para 2007*" (Codelco Norte defines its plan for Community Relations for 2007). Obtained from Digital newspaper "El América", December 2007. webpage: http://www.elamerica.cl/index.php?Itemid=9&id=59&option=com_content&task=view#Top

- "*La gran minería no avizora cataclismos políticos*" - Francisco Costabal, presidente del Consejo Minero ("The Mining Sector does not perceive political crisis" – Francisco Costabal, president of Mining Board) Obtained from online magazine "El periodista", March 2007. Webpage: http://www.elperiodista.cl/newtenberg/1849/article-73598.html

- "*Discurso de la Ministra de Minería y Energía, Karen Poniachik, en la Inauguración de la Mina Spence en Santiago*" (Speech from Energy and Mining Minister, Karen Poniachik at the inaugural ceremony of Mina Spence in Santiago) Obtained from official page of Chilean Government, Energy and Mining Ministry, Speech section, December 2007. Webpage:http://www.minmineria.cl/pagina.php?seccion_id=190&sub_id=194&cont_id=3530

- "*OUTCOME MAPPING - Building Learning and Reflection into Development Programs*", Online Book from International Development Research Centre, Canada, authors Earl, S., Carden F. & Smutylo, T. Obtained on November 2007, Webpage: http://www.idrc.ca/en/ev-9330-201-1-DO_TOPIC.html

- "*Tenemos éxito cuando las comunidades en las que operamos valoran nuestra calidad de miembros de ellas*" (We are successful when the communities where we operate values us as a member). Obtained from official page of Minera Escondida Limitada on December 2007. Webpage: http://www.escondida.cl/mel/acerca_escondida/impacto_socioeconomico.asp

- "*Uno de nuestros objetivos estratégicos es ser un ciudadano responsable y ser reconocido como tal*" (The goal of minera escondida is to become the world's leading copper mine by means of a superior performance in safety, production and unit costs). Obtained from official page of Minera Escondida Limitada on December 2007. Webpage: http://www.escondida.cl/mel/desarrollo_sustentable/comunidad.asp

- "*Empresa del Grupo Luksic: Adasa suministrará agua para proyecto Spence*" (Firm form Luksic Group: Adasa will provide water for Spence Project) Article from online magazine Minería Chilena on June 2007. Webpage:

http://www.editec.cl/mchilena/jun2004/Articulo/luksic.htm

- "*Spence ya es una realidad para las comunidades de Sierra Gorda y Baquedano*" (Spence is already a relity for the communities of Sierra Gorda and Baquedano) Article from online magazine Area Minera on June 2007. Webpage: http://www.areaminera.com/CONTENIDOS/NOTICIAS/2004/4089.act

- "*The Principles for Responsible Investment*" Obtained from official page of Principles for responsible Investment – An investor initiative in partnership with UNEP Finance Initiative and the UN Global Compact, on November 2007. Webpage: http://www.unpri.org/principles/

- "*Proyecto Spence generará dos mil 500 empleos en su fase de construcción*" (Spence Projects will create 2500 jobs in its construction phase) Article obtained from online newspaper La estrella del Loa on June 2007. Webpage:http://www.estrellaloa.cl/site/edic/20030702000143/pags/20030702003139.html

- "*Codelco invirtió cifra récord de US$ 1.690 millones en 2007*" (Codelco Invested record number of US$ 1.690 Million in 2007) Article obtained from online magazine Area Minera on February 2008. Webpage: http://www.aminera.cl/index.php?option=com_content&task=view&id=8176&Itemid=2

- "*FME: Innovadores proyectos para mejorar la educación en sectores vulnerables*" (Minera Escondida Foundation: innovative projects to improve the education in vulnerable sectors) Article obtained from online magazine Area Minera on December 2007. Webpage: http://www.aminera.cl/index.php?option=com_content&task=view&id=7056&Itemid=2

- "*Inversiones en minería y energía representan el 65% del total de proyectos para 2007-2011*" (Investments in Energy and mining are the 65% of total investment projects of 2007-2011) Article obtained from online magazine Area Minera on February 2008. Webpage:http://www.aminera.cl/index.php?option=com_content&task=view&id=8252&Itemid=2#top

- "*Spence en la línea de partida*" (Spence at the starting line) Article obtained from online magazine Area Minera on April 2007. Webpage: http://www.aminera.cl/index.php?option=com_content&task=view&id=3230&Itemid=2#top

- "*BHP BILLITON DA EL VAMOS AL PROYECTO SPENCE*" (Bhp Billiton gives the OK to Spence Project) Article in online magazine Boletín Minero, author Torres,

D. Obtained on April 2007. Webpage: http://www.sonami.cl/cgi-bin/procesa.pl?plantilla=/boletinmensual_detalle.html&id_art=866

- *Social Pathology*. Definition obtained online from International Consortium For Mental Health Policy And Services Mental Health Policy Template. Obtained on June 2007. Webpage: http://www.qcmhr.uq.edu.au/template/Context/Societal%20Organisation/Social%20Pathology_Intro.htm

Author's Biography

Johanna d. Robles was born in Calama, Chile, on December 3, 1974. She graduated from Universidad Católica del Norte in 1996 with a bachelor's degree in business management and a professional title of Commercial Engineer. For several years Robles worked as an Economics teacher at the same university from which she graduated before pursuing graduate study in regional science and urban planning. Following the completion of her Ph.D., Robles will work for a major state-owned company producer of Copper in Chile, which represents the 5% of national PIB, as an engineer for operational excellence and the development of business plans for the company.