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The impact of Foreign Direct Investment on Wage Inequality: Evidence from Chile

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Introduction

The objective of this paper is in the first place to analyze the relationship between FDI and wage inequality on a national level in Chile in the period 1980-2008. There is a large body of literature about the effects of globalization on income inequality, with ambiguous results. However, the general trend is that globalization increase income inequality in developing countries. This paper uses FDI inflows as measure of globalization and uses wage inequality as measure of income inequality. Also, this paper looks at a more detailed level to the relationship between FDI inflows and wage inequality. This paper analyzes the relationship between FDI inflows per sector and wages per sector. By looking at wage inequality within Chile this paper uses high quality data from one source (Laborsta), instead of incomplete cross country data from different sources. Together with Chile there are several developing countries that have an above average economic growth rate. However, Chile is one of the countries with the highest inequality out of these upcoming developing countries.

The period 1980-2008 is chosen, due the fact that globalization started to become a hot item in the eighties and things started to change quickly from 1980 onwards. 2008 is chosen as the last year, because of the limited availability of data and the fact that including the economic crisis could have skewed results as a consequence. The outcomes of this research can be very valuable for policymakers in developing countries and especially in Chile. Policies to attract FDI can be adapted in the future to makes sure that the FDI flows are divided more equally among the sectors to decrease wage inequality between those sectors.

The structure of this paper is as follows. The next chapter will focus on the economic development of Chile. Chapter three will focus on the existing literature about the relationship between FDI inflows and wage inequality. Chapter four will outline the effects of investments on wages and secondly this chapter will focus on the spillover effects of FDI. In addition chapter four will also discuss other factors of influence of wage inequality. In Chapter five the FDI inflows in Chile during the period 1980-2008 will be elaborated and changes in the regulations regarding FDI inflows will be discussed. Chapter six will first describe the data and methodology used in this paper. Secondly in chapter six the empirical results will be discussed. The last chapter will be a conclusion combined with some policy implications.

Economic Overview Chile

Since the early seventies the Chilean economy transformed from a closed economy towards an open economy. Nowadays Chile is one of the most globalized and open countries of Latin America, and with a GDP per capita of 9,728 US Dollars in 2013 Chile is also one of the wealthiest countries of the continent. The last decades of the Chilean economy are characterized by the transition from a closed economy towards an open economy combined with high economic growth. Chile's economic transition started in 1973, the year that neoliberalism was introduced. This new ideology of neoliberalism was strengthened by the influence of the 'Chicago boys'. They are named the Chicago boys because many of them were influenced by professors of the University of Chicago. The Chicago boys started a drastic change by introducing liberalization, privatization and several welfare projects during the late seventies, which triggered economic growth. Despite the economic growth and a more liberal policy, the economy of Chile was still very vulnerable.

In 1982 Chile was hit by a severe economic crisis lasting till the end of 1983. Consequences of this economic crisis were high unemployment and a collapse of the financial sector in Chile. From 1985 onwards the economy of Chile stabilized and economic growth rates became positive again. Underlying causes of this economic growth were found in a more pragmatic economic policy, focusing on a higher level of economic freedom and liberalism. During the period 1985-1995 GDP growth was on average 7.6%, and Chile was the booming economy in Latin America. This was the first period of economic growth combined with a lower level of inflation after General Augusto Pinochet Ugarte took over the government in 1973. In this period Chile experienced an increasing GDP per capita, a decreasing unemployment rate and a decreasing inflation rate. As a result of this period of prosperity, the Chilean economy is now considered as one of the richest and most globalized countries of Latin America. However, in 1998 a second downturn in the Chilean economy started. The outstanding performance of the 1990s reached a turning point when the Asian crisis hit the Chilean economy. The economic downturn was the result of a combination of the Asian crisis with additional factors. From 2002 onwards economic growth continued, and the Chilean economy prospered again.

Table 1 shows the most important economic indicators for Chile during the period 1980-2008. As mentioned earlier Chile experienced high growth rates the last decades. The GDP of Chile grew from US$ 27billion in 1980 till an amount of US$ 179billion in 2008, which means an average growth of 5.03%. Taking into account the population growth rate, the GDP per capita grew at a rate of 3,51% over the period 1980-2008. Other economic indicators such as health and schooling also improved. The life expectancy in Chile was only 69 years in 1980 and increased to almost 79 years in 2008. In 1980 the secondary school enrollment was only 62% and increased towards almost 90% in 2008. During the transition of Chile towards a more open and liberal economy, social indicators also improved. As can be seen, labor participation rates increased (percentage of population of 15 years of older) and the unemployment rate decreased. The unemployment rate decreased from almost 20% in the eighties to an average of 6% in the nineties.

Figure 1 shows the development of unemployment in Chile in the period 1980-2008 in more detail. It shows the number of unemployed people in Chile across nine sectors, the precise definitions of the nine sectors can be found in appendix A. After a peak in 1982, the year of the economic crisis in Chile, the number of unemployed people decreased in almost all sectors till the second economic crisis in 1998. Surprisingly the sectors categorized as blue collar sectors are not influenced by the fluctuations of the Chilean economy. Although these are absolute numbers it gives a representative view of the situation. The unemployment ratios are almost the same in all sectors. The only exception is the construction sector, where the unemployment ratio is far above average with a peak in the years around the economic crisis in 1982. A possible explanation of this is found by Albala-Bertrand (1999). The demand in the construction sector was remarkably high in the seventies. As a consequence many laborers got employed in the construction sector, which got all unemployed during the economic downturn in 1982.

Table 1. Macroeconomic indicators Chile (1980-2008)

	1980	1982	1984	1986	1988	1990	1992	1994	1996	1998	2000	2002	2004	2006	2008
Population (millions)	11.19	11.54	11.93	12.33	12.76	13.21	13.71	14.20	14.66	15.07	15.45	15.82	16.17	16.50	16.83
GDP (current US$ in millions)	27572	24339	19233	17723	24641	31559	44468	55154	75769	79374	79329	70985	100631	154671	179858
GDP growth (annual %)	8.15	-10.32	7.97	5.60	7.31	3.70	12.28	5.71	7.41	3.23	4.50	2.17	6.04	4.40	3.29
Life expectancy at birth, total (years)	69.06	70.34	71.39	72.20	72.89	73.55	74.16	74.71	75.29	75.98	76.76	77.46	77.96	78.29	78.62
GDP per capita (constant 2005 US$)	3362	3061	3078	3367	3723	4121	4817	5256	6051	6478	6552	6758	7289	7870	8382
School enrollment, secondary (% gross)	62.36	64.45	72.37	76.85	80.94	77.86	98.38			77.25	82.39	85.58	89.15	90.66	89.62
Real effective exchange rate index (2005 = 100)	155.46	165.18	134.49	96.02	82.59	80.95	87.68	92.58	100.52	105.88	100.00	87.42	86.25	96.88	96.53
Unemployment (% of total labor force)	10.40	19.60	13.90	8.70	6.30	5.70	4.40	5.90	6.30	6.30	9.20	8.90	8.80	7.70	7.80
Labor force participation rate	47.10	47.20	48.10	50.90	52.50	52.70	53.80	55.20	54.20	54.40	53.70	52.50	53.20	54.50	56.00
GINI index						55.25	54.77	55.05	54.88	55.54	55.26			51.84	
Inflation (annual %)	35.10	9.90	19.90	19.50	14.70	26.00	15.40	11.40	7.40	5.10	3.80	2.50	1.10	3.40	8.70

Source: Worldbank, World Development indicators

To give a better view of the socio-economic conditions of Chile, The development and division of the wages is going to be discussed in depth. In figure 2, the real wages in Chile in the period 1980-2008 are divided in 8 sectors. The ninth sector is agriculture, but since there is no data available on the wages of this sector it is excluded from the econometric analysis. As figure 2 shows, there is a positive trend of the wages in all sectors visible in the period 1980-2008. The average monthly wage increased from 31181 pesos in 1983 to 516813 pesos in 2008. An exception of this positive trend is the year 1992. In all sectors the wage decreased in 1992, but continued its upward trend in 1993 again. A possible part of the explanation can be found in the fact that 1992 was the year with the lowest unemployment rate in history. The unemployment rate had decreased till 4.4% in 1992 (Worldbank). This remarkably low unemployment rate can cause an excess supply of labor, with decreasing wages as a consequence. Another outliner in the development of the wages is the enormous increase in the upward trend in three sectors in 2005 and 2006. The mining sector (37.6%), the finance sector (59.6%), the construction sector (72.1%) and the wholesale sector (124%) had growth rates far above average in 2005. For the finance sector and the mining sector this increase could be the consequence of a combination of factors like; bargaining, investments and changing labor markets. However, the increase of the wage in the wholesale sector which more than doubled is highly remarkable. The wholesale sector also includes retail trade, hotels and restaurants. A boom in the tourist industry could be a cause for the sudden increase of the wage; however such a sudden increase is still highly remarkable. Determinants of this sudden increase have to be found in changes of the economic environment or in the data collection.

Figure 1. Unemployment by economic activity in Chile 1980-2008 (people, thousands)

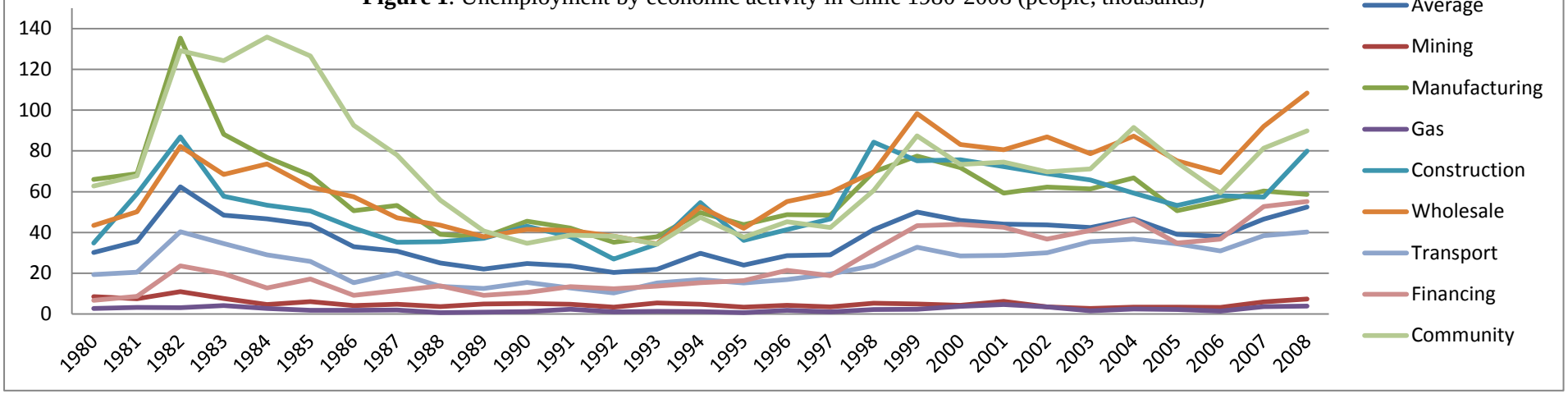
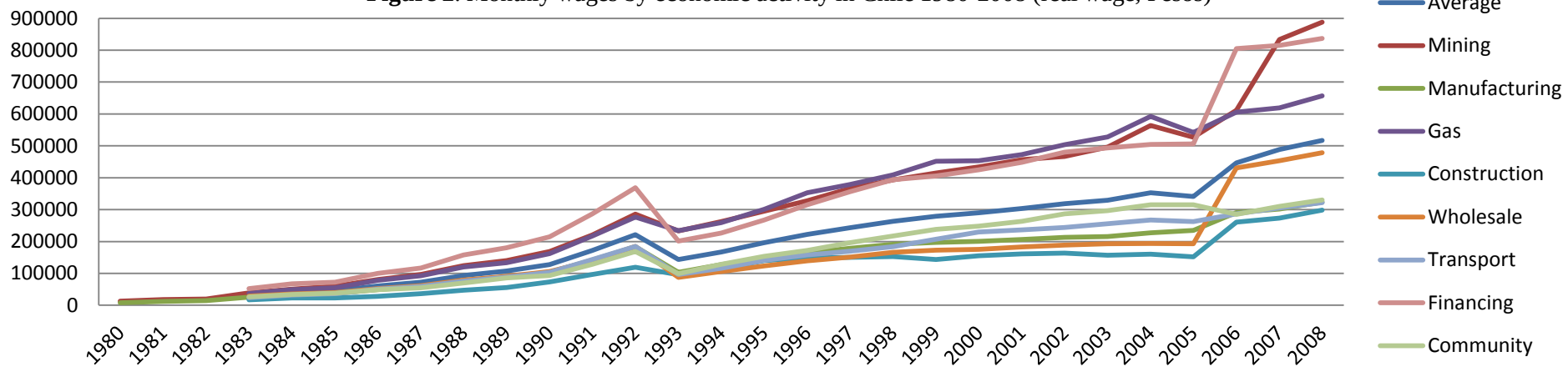


Figure 2. Monthly wages by economic activity in Chile 1980-2008 (real wage, Pesos)



As mentioned earlier Chile experienced a period of high economic growth and globalization during the years 1980-2008. Despite this, income inequality is still high in Chile. According to Contreras and Davis (2012) the level of income inequality in Chile has been very high since the 1970s and even worsened in the 1970s-80s. It took till the nineties till the first improvements were visible. However, table 1 clearly points out that the Gini coefficient is still high with a value of 51.28 in 2006; it has decreased with 5 percent points during the period 1990-2006. This small decrease of the income inequality is not visible in the development of the wages. The sectors financing, mining and gas, which are the sectors with the higher wages in the period 1980-1990, increased even more compared to the manufacturing, construction, wholesale, transport and community sector. Over the whole period 1980-2008 the average growth rate of the average wage is 14.5%. The mining sector (17.3%), the wholesale sector (23.1%) and the manufacturing sector (15.1%) are the sectors with the highest wages in the period 1980-1990 but also the highest growth rates of the wages during the period 1980-2008. Figure 2 suggests that wage inequality has increased over time.

According to (Agostini and Brown 2010) possible explanations for this prolonged inequality lie in the low level of migration, uneven returns to education, foreign competition in labor-intensive goods, an increase in labor-participation by women and increasing reliance on seasonal contract labor. Focusing on the wage inequality between sectors in Chile additional factors can be of influence. Examples of additional factors of influence are differences in labor supply, level of skilled work and the level of FDI inflows per sector.

Literature review

In the literature, an often heard criticism is that more FDI, which is seen as an indicator of globalization would benefit the rich more than the poor and so increases income inequality. Milanovic (2002) conducted research about the effects of globalization on the income distribution by using data from household budget surveys. He looks at the impact of openness and FDI on the relative income shares of the poorest and the richest. Milanovic finds that the effect of globalization on income distribution depends on the initial income level of a country. In developing countries income inequality increases, while in developed countries the income inequality decreases. Focusing on developed countries, Alderson and Nielsen (2002) try to explain the upswing in inequality in the OECD countries. They find empirical evidence that that FDI, immigration and North-South trade indeed have increased income inequality. Zhang and Zhang (2003) look at the effects of globalization on income inequality in developing countries, focusing on China. They find empirical evidence that even after controlling for several factors, globalization has a positive effect on income inequality. Bergh and Nilsson (2010) also investigated the relationship between globalization and income inequality. In contrast to the studies above, they use the KOF globalization index and not FDI or trade flows as indicator for globalization. Their study covers 80 countries across the time period 1970-2005. In their results they find that only parts of the KOF index, like social globalization have a positive effect on income inequality.

All the above are just a few examples of studies about the effects of globalization on income inequality. The general trend in the existing literature is that globalization increases income inequality in developing countries, and decreases income inequality in developed countries. In line with this paper, Onaran and Stockhammer (2007) looked at the effects of FDI and foreign trade on the wages in different sectors in the Central and Eastern European countries. In their research they named 4 sectors, skilled versus unskilled and capital intensive versus labor intensive. They conclude that foreign trade has no significant effect on the wages and FDI has an positive effect on the wages in the skilled and capital intensive sectors, which increases wage inequality between skilled/capital versus unskilled/labor.

Lipsey and Sjoholm (2004) conducted empirical research about the effects of FDI on wages in the Indonesian manufacturing. They conclude that FDI has a positive effect on wages in foreign owned plants, with positive spillover effects to locally owned plants. Furthermore regions with more foreign FDI have higher wages, so FDI has a positive effect on wage inequality. Figini and Gorg (2006) did an empirical investigation about the effects of FDI on wage inequality. They choose for a cross country analyses with more than 100 countries, covering the years 1980-2002. They find mixed results, for developing countries FDI has a positive effect on wage inequality and for developed countries FDI has a negative effect on wage inequality. In line with Figini and Gorg (2006), Gopinath and Chen (2003) investigate empirically the effects of FDI on wages in a cross-country setting. In addition they investigate whether capital flows have different effects on skilled and unskilled wages. They conclude that wage inequality between countries decreases, however wage inequality increases between skilled and unskilled workers. Aitken et all. (1995) explored the relationship between FDI and wages in Mexico, Venezuela and the United states. In their paper they conclude that in all three countries higher levels of FDI are correlated with a higher wage rate. In the United States all sectors profit from the bigger FDI flows, in the other countries only the employees at the foreign-owned firms benefit.

Focusing on Chile there is only a small body of literature about the determinants of wage inequality in Chile and almost none which mention FDI inflows. Lopez and Miller (2008) state that while poverty in Chile has decreased, income inequality has not decreased. They find that key factors explaining this persistent inequality are the lack of public investment in education and knowledge diffusion, due the low tax revenues. Beyer et all (1999) study empirically the link between trade liberalization and wage inequality in Chile. They conclude that trade openness increases the wage gap between skilled and unskilled labor and so increases wage inequality.

Theoretical framework

Although the existing literature gives mixed results about the effect of FDI on wage inequality, classical economic theory assumes that more FDI will have a positive effect on the wage rate in the FDI receiving country. In classical economic theory an increase of investments is followed by an increase of income which is followed by an increase of the demand. More demand will lead to more production and therefore more demand for labor, which will lead to an increase of the wages. This only implies that the overall wage rate will increase, but the effects on wage inequality are unknown. However, the consensus is that foreign firms offer a better pay to workers than their domestic competitors and so FDI can be a source of wage inequality. If FDI is concentrated in a few sectors, this will mean that the wage rate in those sectors will increase more compared to the sectors without or with only a small amount of FDI inflows. This is in line with the empirical findings of Aitken et al. (1996). They conclude that the average wages of foreign owned plants are up to 30% higher than the wages in domestic owned plants. Still this does not directly imply that the wage inequality will increase. Foreign owned plants may be divided among several sectors and according to economic theory there are always spillover effects, which can smoothen out the differences between foreign owned plants and domestic owned plants.

There are two types of spillover effects, vertical spillover effects and horizontal spillover effects. Horizontal spillover effects are spillovers within the same sector, for example domestic firms active in the same sector will copy technology of the foreign owned firms. Vertical spillover effects are between firms from different sectors, but within the same production chain. Theory about vertical spillover effects assumes that if a downstream firm is foreign owned, other firms more upstream will also profit. These spillover effects can be the sharing of new technology which can raise productivity, or spillover effects in the form of more demand. Bitzer et all (2008) used industry-level data for OECD countries to investigate the importance of vertical and horizontal spillover effects. They conclude that vertical spillover effects between multinationals and domestic owned firms are strong for all countries. In line with the vertical spillover effects they also find positive horizontal spillover effects.

According to Du et all (2011) there are only positive vertical spillover effects. In their research they test for horizontal and vertical spillover effects from FDI in China. They find only weak horizontal spillover effects, while they find evidence for both backward and forward vertical spillover effects of FDI. In conclusion there can definitely be spillover effects of FDI; however the literature gives mixed results. In line with this view, Crespo and Fontoura (2006) conclude that the presence of FDI spillover effects depends on many factors. They survey the arguments that support the factors necessary for spillover effects and the empirical evidence. They conclude that the absorptive capacity of the domestic firms is a necessary precondition for FDI spillover effects. On the other determinants mentioned in the literature they cannot draw reliable conclusions. Therefore this paper assumes that there will definitely be FDI spillover effects in Chile, but not on the scale that they can undo the productivity, technology and wage gaps created by the initial FDI inflows.

Although this paper assumes that the positive spillover effects will not distribute evenly across sectors, this won't necessarily imply that all sectors can benefit from FDI inflows in one particular sector. One of the positive externalities of FDI is that employees at foreign owned firms receive a higher wage rate, and therefore the people employed in the sectors receiving most FDI will have on average a higher wage. As a consequence of these wage differentials, more people are willing to work in the sectors receiving the higher wages. People with the right qualifications will change jobs and try to get employed in the sectors with the higher wages. People who do not have the right qualifications can decide to follow additional training in order to get the right qualifications. The increase in the supply of labor in these sectors will put downwards pressure on the wages and will decrease the wage inequality between sectors again.

Although several factors like spillover effects and people changing jobs will decrease the possible wage inequality created by the FDI inflows, this paper shows that FDI will still create wage inequality. The literature acknowledges the existence of spillover effects, but the results of the effectiveness of spillover effects are mixed. As a consequence this paper shows that these spillover effects combined with other factors can't be influential enough to undo the created wage inequality by the FDI inflows.

According to the theoretical and empirical literature there are ambiguous results about the relationship between FDI inflows and wage inequality. However, most studies agree that FDI inflows will increase the wage rate at foreign owned firms which will create inequality between the foreign owned firms and the domestic owned firms. Furthermore the literature points out that spillover effects of FDI inflows exist and that they are very common significant, but the results about the real impact of these spillover effects are ambiguous. In formulation of the research hypothesis of this paper, previously theoretical and empirical literature about the magnitude of the effects of FDI inflows and their spillover effects on the wage rate are taken into consideration.

To test whether FDI inflows have effect on wage inequality between sectors, the hypothesis is:

H0: *FDI inflows in Chile have increased the wage inequality between sectors during the period 1980-2008.*

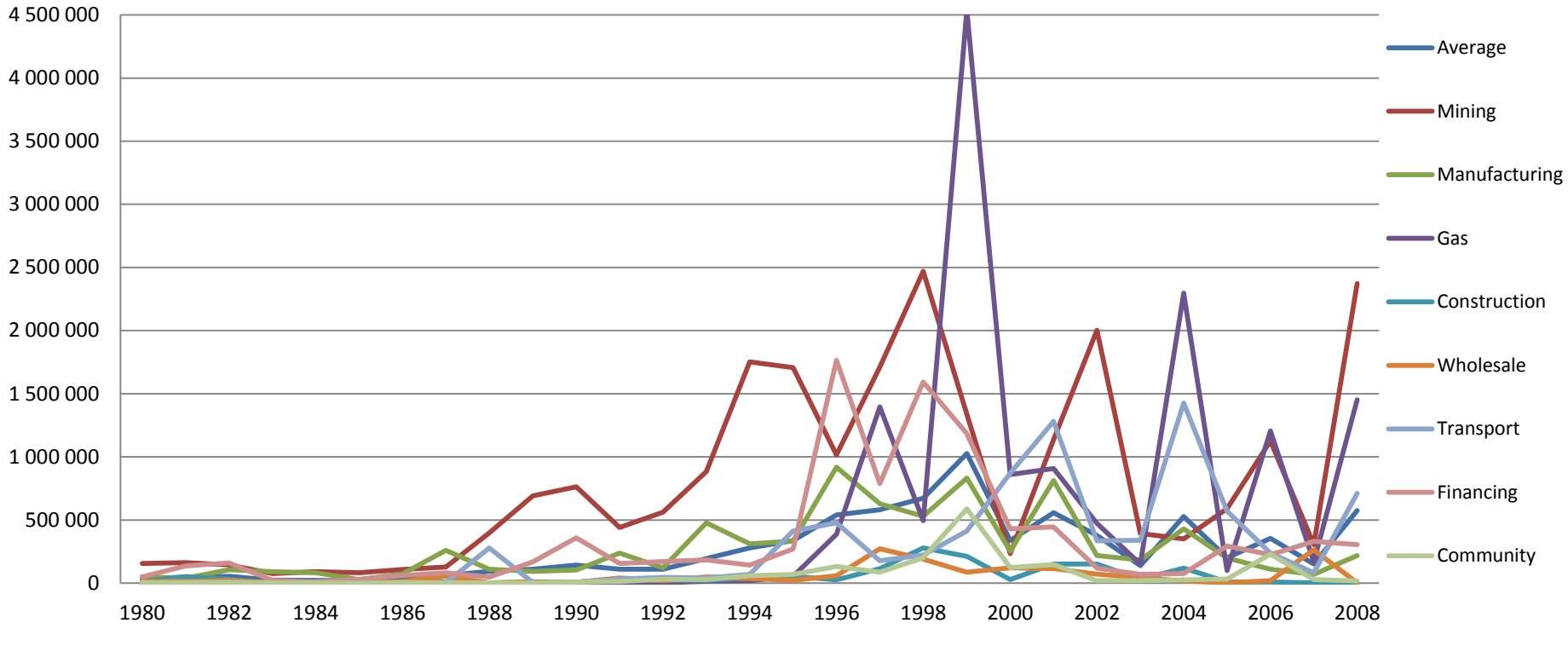
Ha: *FDI inflows in Chile have not increased the wage inequality between sectors during the period 1980-2008.*

Foreign direct investment in Chile

In the period 1980-2008 Chile has gained popularity as a destination for FDI. In 1980, Chile received a relative small amount of US$ 304 million FDI inflows. However, in 2008 Chile received FDI inflows worth US$ 5.2 billion, which is almost 17 times the amount of FDI inflows in 1980. During the 80's, the growth of FDI inflows was negligible and the potential of Chile as a destination of FDI was not recognized yet. From 1987 onwards Chile managed to attract larger amounts of FDI inflows each year, with its peak during the 90's. From 1987 onwards the FDI/GDP ratio didn't get lower than 2% and during the nineties the average FDI/GDP ratio was around 6%, with a positive outlier of 12.6% in 1999 (Worldbank). As mentioned before, the nineties were a period characterized by policy changes towards more openness and economic freedom in Chile. As a consequence Chile gained popularity as a destination for FDI, which expressed itself in a tremendous growth of the amount of FDI inflows during the nineties. After 1999 the amount of FDI inflows decreased again as a result of the U.S. recession (ECLAC 2002). In the period 2000-2008 FDI inflows in Chile were very unstable and they have never reached the historically amount of US$ 9.2 billion from 1999 again.

To give a better view of FDI inflows in Chile, figure 3 shows the development of FDI inflows by economic activity. As mentioned FDI inflows started to increase in the late 80's and reached its peak during the late 90's. Despite the fact that the total amount of FDI inflows shows an increasing trend, the distribution among sectors is very unequal without a real trend. The largest part of the investments is divided among five sectors. The sector that received the most FDI inflows is the mining sector. This is surprising while in the period 1980-2008 only 1.6% of the working population was employed in the mining industry, despite the fact that the mining industry is one of the leading industries of Chile. Chile is a very mineral rich country and is even called the copper capital of the world. The enormous size of the copper industry in combination with the investor friendly environment created by the Chilean government makes the mining sector the biggest receiver of FDI inflows. During the period 1980-1998 the mining sector was by far the largest receiver of FDI, in the period 1998-2008 most of the FDI was invested in the Gas, electricity and water industry.

Figure 3. FDI inflows by economic activity in Chile 1980-2008 (thousands US$)



As you can see in appendix B, which shows the distribution of FDI inflows in Chile, there were no FDI inflows in the gas, electricity and water industry in the period 1980-1989. During the nineties the gas industry started to develop, and as a result it became the biggest receiver of FDI inflows in the period 1998-2008. A positive outliner is the huge amount of FDI which was invested in the gas, electricity and water industry in 1999. This was the year that three new cycle generators were planned to build and a huge pipeline project between Argentina and Chile, named Gasoducto del Pacífico was finished. (Jadresic 2000).

Next to the mining industry and the gas, electricity and water industry there are three sectors which receive an equal amount of FDI. During the period 1980-1989 the manufacturing industry received 21.1% of all FDI inflows (appendix B). During the period 1990-1999 the absolute amount of FDI inflows in the manufacturing sector increased, however the relative amount of FDI inflows in the manufacturing sector decreased to 12.5%. Another sector flourished in the period 1990-1999, namely the finance sector. During the period 1990-1999 the finance sector received 18.4% of all FDI inflows. However, as figure 3 and appendix B point out, the amount of FDI in the finance sector decreased again during the period 2000-2008. The fifth sector with a worth noticing amount of FDI inflows is the transport sector. Where the amount of FDI inflows of both the finance sector and the manufacturing sector decreased, the amount of FDI inflows of the transport sector increased. 20.2% of the FDI inflows received by Chile were invested in the transport sector. The remaining sectors are construction, agriculture, wholesale and other services that account for 8.5% of the FDI inflows in the period 1980-2008. Overall the mining sector and the gas, electricity and water sector are the sectors with the highest FDI inflows, followed by the transport sector, finance sector and manufacturing sector which received all an equal amount of FDI inflows.

Regulatory framework for FDI

Foreign direct investment in Chile is regulated by two laws. The Foreign Investment Statute (Decree Law N° 600) and Chapter XIV of the Foreign Exchange Regulations of the Chilean Central Bank. The mostly used law is the Decree Law N° 600 which was introduced in August 1974 and later in march 1993 little modifications were added by the Congress. The Decree Law N° 600 demonstrates the stable foreign investment policy of Chile and is mostly used as channel to invest in Chile. Under the Decree Law N° 600 an investor signs a legally binding contract with the Chilean government with certain rights and advantages. Article 1° defines the situation were and investor can sign a contract with the Chilean government under the Decree Law N° 600.

Art. 1°, DL.600 states that *"Foreign individuals and legal entities and Chileans resident or domiciled abroad who transfer foreign capital to Chile and enter into a foreign investment contract".*

Where legal entities are defined as foreign states, foreign companies, international organizations or corporations and foundations. The minimal investment necessary for getting approved under the Decree Law N° 600 is US$5 million, with exception of investment in physical assets and technology. For these two sectors an investment of only US$2.5 million is necessary. Six forms or investment are entitled to fall under the Law Decree N° 600, these are: Tangible assets, Technology, Freely-convertible foreign currency, loans related to the foreign investment, capitalization of loans, foreign debt and profits. Under the contract several rights and obligations are set. Besides the defined time of the capital inflow and the country of origin, the Law Decree N° 600 has several main characteristics.

The first and one of the most important characteristics of the Law Decree N° 600 is non-discrimination. This implies that the Law Decree N° 600 guarantees non-discriminatory treatment of foreign investors. Foreign investors have the guarantee of getting the same treatment for the law as domestic investors. Examples of discrimination are, refused access to a free trade zone or if a foreign company gets excluded of a specific activity.

A second characteristic are the special tax treatments of foreign investors under the Law Decree N° 600. The standard tax rate in Chile is 35%, however foreign investors can choose for a fixed tax rate of 42% for ten years. This way the investor is immune for changes in the tax rate. Furthermore foreign investors can also choose to freeze their VAT as well as import tariffs. If investments in the industrial sector or mining sector have a value higher than US$ 50 million, additional tax benefits are available. Another highly valued characteristic is free access to all economic sectors; the only reasons for limitations can be morality, public order or national security. Other characteristics are the use of an investment contract, access to the formal exchange market and favorable rules on capital and profit remittances.

The second law for foreign investments is the Chapter XIV of the Foreign Exchange Regulations of the Chilean Central Bank. The Chapter XIV law applies to foreign loans, deposits, investments and capital contributions. In order to register under the Chapter XIV 2 requirements have to be met. Foreign loans, deposits, investments and capital contributions must have been made through the formal exchange market. Secondly the Central bank of Chile has to be informed using the right forms.
However contradicting to the Law Decree N° 600, the Chapter XIV law doesn't require entering into a contract with the State of Chile. Furthermore only an investment of only US$ 10.000 is necessary in order to fall under the Chapter XIV law. The Chapter XIV law has fewer advantages for the foreign investor than the Law Decree N° 600. There is no guarantee of non-discrimination, one of the main characteristics of the Law Decree N° 600. Also access to the formal exchange market is dependent on the regulations at the time of the investment. Another guarantee under the Law Decree N° 600 is the special tax treatment; again this treatment is not available under the Chapter XIV law.

The Decree Law N° 600 and Chapter XIV law are examples of policies of the Chilean government to attract FDI. In the first place FDI should be attracted by the economic situation and economic potential of a country, however some policies can help. The above laws introduced by the Chilean government create some investors stability, special tax treatments and a guarantee of non-discrimination. The Chilean government has created a few free trade zones. In 1975 the first free trade zone in Chile is in the north in place called Iquique.

There are two other big free trade zones, one in the south and a mining free trade zone. On top of these three zones, there are a few zones with special tax treatments. Furthermore the Chilean government has introduced some special regulations in selected sectors. The forestry, petroleum, mining and transport sector are examples of sectors with special policies to attract more FDI.

Data

This section will elaborate on the empirical data. The data set is panel data and consists of annual data of Chile for the period 1980-2008 for eight economic sectors. Several data sources are used, but the dependent and the main independent variables are both from Laborsta, a database on international labor statistics. The dependent variable is *Wagedispersion*, which is the difference between the wage in a sector and the average wage of Chile. The main independent variable is *FDI*, which is the total amount of FDI inflows in a sector in Chile. Furthermore five control variables are added to the regression equation, which can be found in Appendix C.

Dependent variable

The dependent variable is *Wagedispersion,* which is constructed out of data available on the wages by economic activity. The data contains information on the wages of eight different sectors in Chile over the period 1983-2008. Figure 4 displays the deviation of the sector wages from the average wage. In figure 4 the zero line is the average wage in Chile, the sectors above this wage receive a higher wage than the average wage and the sectors below the zero line receive a lower wage than the average wage. Especially the deviation from the average wage of the mining, gas and finance sector has an upward trend, which implies that the wage gap between those sectors and the average wage in Chile increased. Figure 5 displays the sum of the dispersion of all sectors over time. There is a positive trend visible, which implies that the total deviation of the wage in Chile increased over the time period 1983-2008.

Figure 4. Deviation from the average yearly wage by economic activity

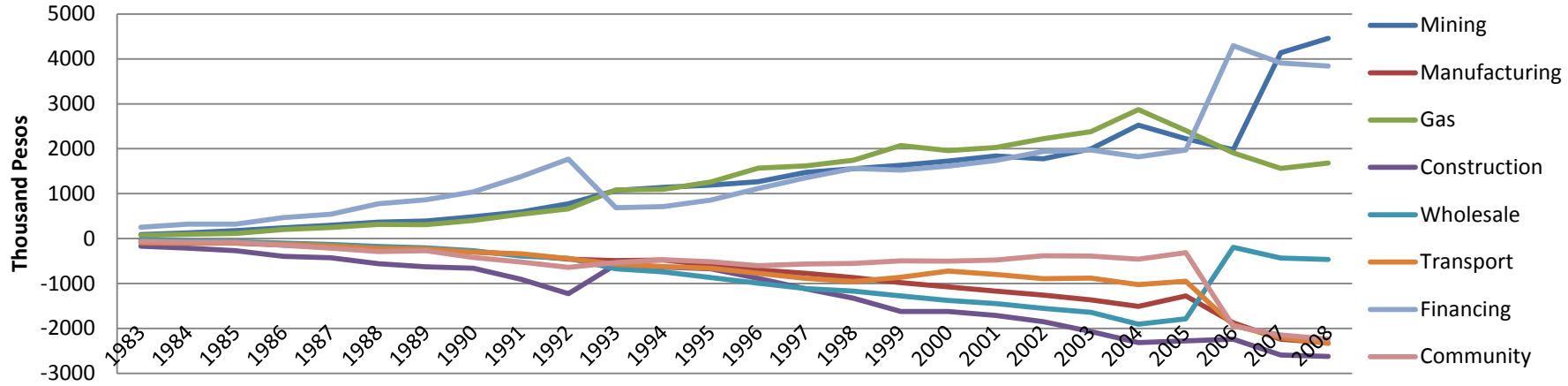
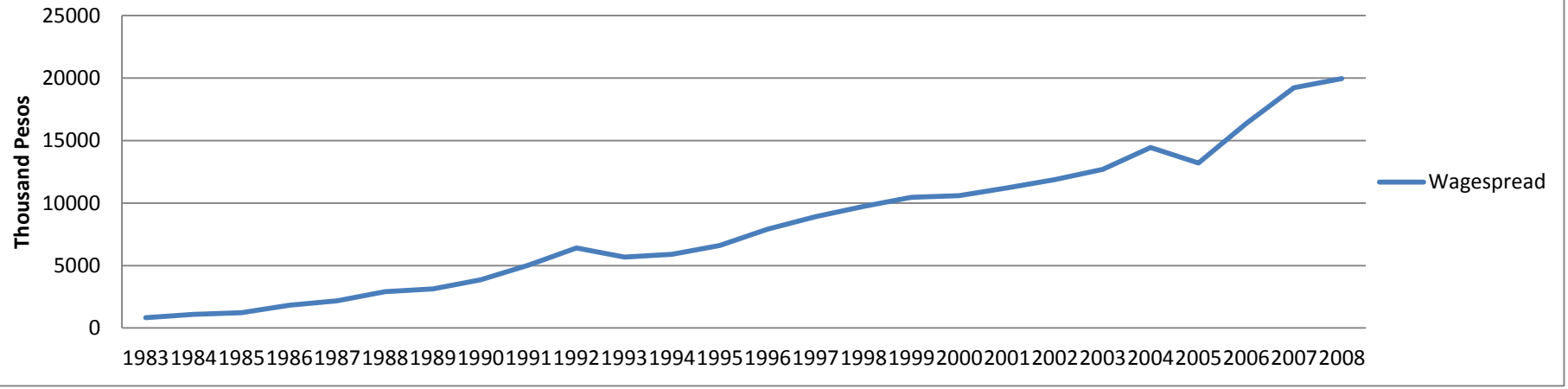


Figure 5. Deviation from the average yearly wage, total sum of all sectors

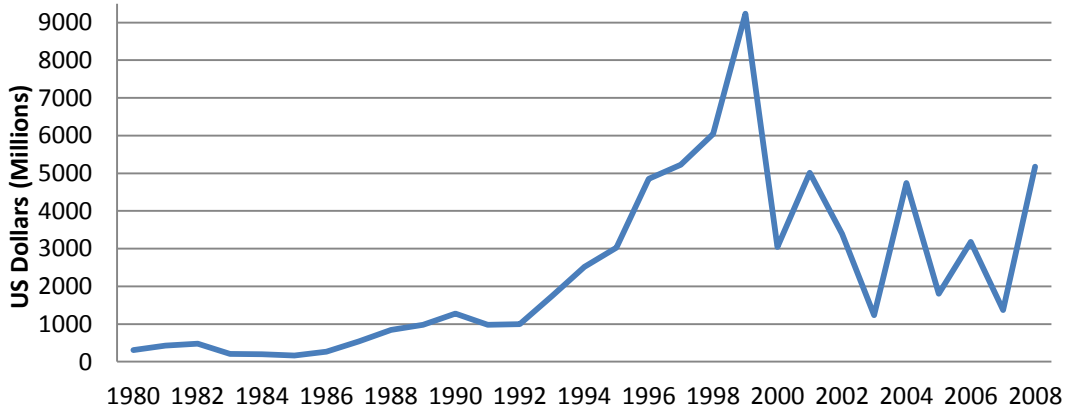


In 1992 this upward trend is interrupted by a decrease of the total deviation from the average wage. This can be explained by a change of the methodology of the data. The data on the wages by economic sector is received from Laborsta. The data from Laborsta is collected by several surveys. However, in the month April of 1993 there was a new sample design and the methodology was revised. There is no additional information available of the consequences of this revision; however this paper assumes that this revision (partly) explains the sudden decrease. In 2006 there is an upward trend which is caused by a data which is collected from a new survey. However, the definitions and data collection methods are in both the surveys the same, so the specific cause of this upward trend cannot be explained with the information available

Independent variable

The main independent variable is *FDI*, which is the total sum of FDI inflows in Chile in US dollars. The data is received from the Foreign Investment Statute D.L. 600 (Laborsta). Figure 6 shows the development of the total FDI inflows in Chile, there is positive trend visible in the period 1980-1999. However, after 1999 the economy got very unstable and the amount of FDI inflows fluctuated a lot. In figure 3 in the section about foreign direct investments in Chile the FDI inflows per sector are pictured and elaborated.

Figure 6. Total amount of FDI inflows in Chile (1980-2008)



Control variables

In order to control for different factors of influence on the deviation of the wage several other variables are added to the regression equation. *Unemp* is added as indicator for the situation of the labour market. According to economic theory, a high unemployment rate indicates that there is far more labour supply than labour demand. This can have a negative effect on the wages and therefore can also create a wedge between wages in different sectors. Secondly *prod* is added to the regression equation to control for differences in productivity between sectors. Higher values for *prod* have a positive effect on the wage rate and therefore can affect wage inequality. Some sectors have a higher productivity than others in Chile and therefore can create a difference between the wages.

Growth is added to control for the economic situation of a sector. A high value for *growth* means that there was a period of growth and the output in that sector increased remarkably compared to the previous year. If sectors are booming and output is growing, wages can rise more than wages in other sectors. The variable *men* is an indicator for the percentage men working in a sector. A higher value for *men* indicates that large parts of the labour force are men. Men are expected to receive higher wages than woman; therefore wages between sectors can differ as a consequence of different values for *men*.

At last, the dummy variable *FDIL* is added to the regression equation. The variable *FDIL* controls for the effect that some sectors receive by far the largest part of the FDI inflows. In appendix B the distribution of FDI inflows is pictured. The figures show that there are two sectors that receive the largest amounts of FDI over time, which are the gas and the mining sector. Over the time period 1980-2008 only 2.3% of the working population is employed in the gas or mining sector, while the gas and mining sector receive together about fifty percent of the FDI inflows. This indicates that both sectors are highly capital intensive and the dummy *FDIL* controls for this. If a sector receives more than 22% of all the FDI inflows in a given year, it gets a value of 1, otherwise 0. With nine sectors, a ratio of 11% of all FDI inflows would be a nominal value for a sector, a value of 22% indicates that a sector receives 200% the nominal value of FDI inflows.

The value of 22% is chosen because only the gas and mining industry have values higher than 22% and its 200% the nominal value what a sector should receive. This research also wants to make a distinction between high skilled and low skilled sectors, to control for the wage differences between high skilled labour and low skilled labour. Unfortunately there is no clear distinction between high skilled and low skilled sectors in Chile. As a consequence this cannot be taken into account.

Apart from the above five control variables there are more factors of influence. In the literature, openness of an economy is often a factor of influence on wage inequality. According to the Heckscher-Ohlin model used by Stolper and Samuelson (1941) openness can affect wage inequality due specialization. Unfortunately there is no data available on sectorial level for trade openness. Another important factor of influence is education. People with a higher educational degree are expected to get high skilled jobs which have on average a higher wage then low skilled jobs. In most literature the effects of education on wages are positive, but the literature about the effects on wage inequality is more differentiated. According to Martins and Pereira (2004) and Reis and Barros (1991) education will increase wage inequality, due the fact that wages increase more when people have a higher educational degree. Again, data as a measure for the level of education is only available on national level. The results are thus based on the assumption that each sector is affected by openness and education to the same extent.

Methodology

This section will elaborate on the methodological approach used to find support for the research hypothesis by using panel data regression. To see the effect of FDI inflows on the wage inequality between sectors, the following regression equation is estimated:

$$log\Delta W_{it} = \alpha + \beta_1 logFDI_{it-1} + \beta_2 unemp_{it-1} + \beta_3 men_{it} + \beta_4 growth_{it} + \beta_5 prod_{it} + \beta_6 FDIL_{it} + \varepsilon_{it}$$

Where the subscript *i* stands for the sector and the subscript *t* for the time period. α is the constant in the regression, $log\Delta W_{it}$ stands for *logwagedispersion*, which is the log of wagedispersion. Taking the log of wagedispersion has two main reasons. First of all the variable wagedispersion is positively skewed at the end and taking the log can reduce, or even eliminate this skew. Furthermore the outcomes are easier to interpret in ratios than in differences. The main independent variable is the first lag of *logFDI*, which is the log of FDI. By using the log of FDI we can interpret the results as a ratio increase of FDI, which has certain ratio change in wagedispersion as a consequence. The first lag of FDI is taken to take into account the delayed effect of investments on wages. The first control variable is *unemp* which is the first lag of unemployment. The first lag of unemployment is taken because it takes time for wages to adjust to changing labour market conditions.

As mentioned before, the dataset used in this paper is panel data, which refers to multi-dimensional data. Because there are no missing data points, the data used is a balanced panel. Using panel data there are two options, using fixed effects or random effects. In order to decide a Hausman specification test is done. Under the null hypothesis (H0) both fixed effects and random effects are consistent, but random effects is more efficient. Under the alternative hypothesis (H1) a fixed effects model is consistent, while the random effects model is not. Our test statistic is 18.20 with a p-value of 0.0027, which means we reject H0 at a 5% significance level. A fixed effects model has to be used according to the Hausman test.

Using a fixed effects model the model analyses the impact of variables within a sector over time. So a fixed effects model zooms in on the outcomes of variables within a sector. With a fixed effect model the development of the deviation of the wage of one sector compared to the average wage can be viewed over time. An assumption of the fixed effects model is that each entity is different and as a consequence of this, the error term and the constant of a coefficient cannot be correlated with others.

After the Hausman test, the variables are tested for unit root. The Levin-Lin-Chu (2002) test is used to test for unit root. The null hypothesis (H0) is that all the panels contain unit root and the alternative hypothesis (H1) is that the panels are stationary. The variables *men* and *prod* have p-values of 0.35 and 0.90 and therefore we cannot reject the null hypothesis at a significance level of 5%. To correct for unit root, first differences are taken of *men* and *prod*. This leads to the following regression equation, with first differences for *men* and *prod*.

$$log\Delta W_{it} = \alpha + \beta_1 logFDI_{it-1} + \beta_2 unemp_{it-1} + \beta_3 dmen_{it} + \beta_4 growth_{it} + \beta_5 dprod_{it} + \beta_6 FDIL_{it} + \varepsilon_{it}$$

To test for hetroskedasticity this paper uses the xttest3 in Stata, which calculates a modified Wald statistic for group wise hetroskedasticity in the residuals. The null hypothesis (H0) specifies that $\sigma_i^2 = \sigma^2$ for $i = 1, \dots, N$. The outcome of the Wald statistic is 18.52 with a p-value of 0.0177 which means we can reject the null hypothesis at a 5% significance level. This indicates that we have hetroskedasticiy and have to use robust standard errors to correct for this.

Results

Table 2 summarizes the results of four regressions. The first and the third regression are using normal standard errors and the second and fourth regressions are using robust standard errors to correct for hetroskedasiticy. Furthermore the third and fourth regressions include the dummy variable FDIL to control for the fact that some sectors are very important to the Chilean economy and receive by far the largest part of FDI inflows.

In the first regression the main variable, which is the first lag of logFDI has a value of 0.283 and is significant on a 1% significance interval. The value of 0.283 indicates that if FDI inflows in the previous year went up with 1% then wagedispersion in the current year will increase with 0.283%. So wage inequality between the real wages of sectors will increase with 0.283%. The first lag of unemp is also significant on a 1% significance interval with a value of -0.0355. This indicates that when unemp in the previous year increases with 1%, the wagedispersion this year will decrease with 0.0355%, so wage inequality between the real wages of sectors will decrease with 0.0355%. The first difference of men has a value of -0.0348, but is not significant at a 10% significance interval. The value of -0.0348 indicates that a one percent point increase of men will lead to a decrease of wagedispersion with 0.0348%. Growth has a value of -0.00138 which is not significant at a 10% significance interval. The value of -0.00138 indicates that if growth increases with 1%, wagedispersion will decrease with 0.138%. This can be interpreted as a decrease of the wage inequality between sectors; however the value is so small that it has no significant effect. The first difference of prod has a value of -4.60e-07, which indicates that if prod rises with 1%, wagedispersion will decrease with 4.60e-07%. When prod increases with 1% the wage inequality between the yearly wages of sectors will decrease with 4.60e-07%, which is again no significant change. Also the first difference of prod is not significant at a 10% significance interval. Furthermore the constant has a value of 12.56 and is significant at the 1% significance interval, the R-squared has a value of 0.432 and 8 sectors are used in the regression. A R-squared of 0.432 means that 43.2% of the variation in the wage dispersion is explained by the indicators included in the regression model.

Table 2 VARIABLES	(1) logWagedispersion	(2) logWagedispersion	(3) logWagedispersion	(4) logWagedispersion
L.logFDI	0.283***	0.283***	0.288***	0.288***
	(0.0320)	(0.0416)	(0.0318)	(0.0404)
L.Unemp	-0.0355***	-0.0355**	-0.0344***	-0.0344**
	(0.00679)	(0.0147)	(0.00674)	(0.0134)
dMen	-0.0348	-0.0348	-0.0475	-0.0475
	(0.0314)	(0.0204)	(0.0317)	(0.0259)
Growth	-0.00138	-0.00138	-0.000984	-0.000984
	(0.0123)	(0.0214)	(0.0122)	(0.0209)
dProd	-4.60e-07	-4.60e-07*	-2.04e-07	-2.04e-07
	(1.02e-06)	(2.41e-07)	(1.01e-06)	(2.11e-07)
FDIL			-0.351**	-0.351
			(0.166)	(0.195)
Constant	12.56***	12.56***	12.60***	12.60***
	(0.203)	(0.269)	(0.202)	(0.264)
Observations	198	198	198	198
R-squared	0.432	0.432	0.445	0.445
Number of Sector	8	8	8	8
Robust SE	No	Yes	No	Yes

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

In the second regression all the variables have the same coefficients as in the first regression; although robust standard errors are used. Compared to the first regression the first difference of prod is significant at a 10% significance interval. However, the first lag of unemp is not significant anymore on a 1% significance interval but still at a 5% significance interval. In this case the second regression is the better one, because robust standard errors are used and the first difference of prod is significant as well.

In the third and fourth regression the variable FDIL is added. Compared to the first two regressions the coefficients are quite similar and contain only small differences. However, the signs are for all the variables the same as in the first two regressions. If we compare both regressions using robust standard errors, which are regression number two and four, we can conclude that the only difference in significance is the variable prod. In the second regression the first difference of productivity is significant at a 10% significance level, while it is not significant at a 10% level in the fourth regression. The variable FDIL has a value of -0.351 in both regression three and four, and is in the third regression significant at a 5% significance interval and not significant at all in the fourth regression. A value of -0.351 indicates that if the value for FDIL goes from 0 to 1, wagedispersion will decrease with 0.351%, so wage inequality between sectors will decrease. Furthermore the constant has a value of 12.60 and the R-squared has a value of 0.445 in the third and fourth regression. In comparing the third and the fourth regression, this paper concludes that despite the lesser significance, using robust standard errors gives here as well the best results.

In the regressions without the variable FDIL as well as the regressions with the variable FDIL, we chose to focus in the regressions using robust standard errors, while these correct for hetroskedasticity. Comparing the second and the fourth regressions there are no huge differences. All the coefficients are quite similar and only the first differences of productivity becomes significant at a 10% significance interval when FDIL is dropped. Furthermore the variable FDIL itself is not significant at all, therefore this paper concludes that we don't have to control for the effect of some really important sectors. The second regressions equation, without the variable FDIL, but with robust standard errors is chosen as the best regression equation for this research.

In this section this paper zooms in on the coefficients and their signs. In figure 5 the development of the wage dispersion is visible, which will be used for explaining the signs of the coefficients. Focusing on the main independent variable, a positive sign for the effect of the first lag of logFDI on wagedispersion is visible. Looking at the data we can explain this positive effect. The gas, mining and finance sector are over the whole period 1980-2008 the sectors with the highest wages. Furthermore, the difference between the wages of those three sectors and the wages of the other sectors increases over time. Over the whole time period 1980-2008 the gas, mining and finance sector receive combined 65.78% of all the FDI inflows. Additionally, an upward trend of the percentage of FDI inflows received by the gas, mining and finance sector is visible. Especially the growth of the gas industry is worth noticing, which goes from 0.00% in the period 1980-1989 towards 26.30% in the period 2000-2008. Apart from the first lag of FDI, all the other variables have a negative sign. The negative sign for unemp can be explained by zooming in on the data on the unemployment rates. The unemployment rate for the construction and manufacturing sector had a peak in the period 1980-1988 compared to the other sectors. In the period 1988-2008 the construction sector and the wholesale sector are the sectors with the sharp decrease of the unemployment rate. The construction sector and the manufacturing sector are two of the sectors with the lowest wages, and as mentioned before, the difference between the gas, mining and finance sector compared to the other sectors increases over time. The growing difference between wages, combined with the decreasing unemployment ratios of the construction and manufacturing sectors can explain the negative relationship between unemp and wagedispersion.

The variable men has also a negative sign which indicates that when the value for men increases, wagedispersion decreases. Focusing on the data on the percentage men working in a sector, there are four sectors with values above 80%, which are the gas, mining, transport and construction sectors. The community, wholesale, manufacturing and finance sectors have values far below the 80%. Almost for all sectors the percentage men does not change over time, except for the gas industry, which is one of the industries receiving the highest wage. The percentage men working in the gas industry decreased from 93.47% in 1980 to 79.58% in 2008. This downward trend can explain the negative relationship between men and wagedispersion.

In addition to men, growth has also a negative sign which implies a negative relationship between growth and wagedispersion. The average outputgrowth of all sectors over the period 1980-2008 is 5.04%. There are three sectors that have a higher value for output growth than the average value of 5.04%, namely the transport, wholesale and construction sector. These are also three of the sectors with the relative lower wages, which can explain the negative relationship between growth and wagedispersion. The last variable, the first difference of prod has also a negative sign; however prod has a small coefficient. For all the sectors the productivity increases over the period 1980-2008. In all the sectors an upward trend is visible without real peaks. As an exception, the development of the productivity in the mining sector is very spiky and unstable. The productivity of the mining sector has not the same upward trend as the other sectors. Because the mining sector is one of the sectors with the higher wage, this can explain the small negative relationship between prod and wagedispersion.

In conclusion this paper states that FDI inflows have had a small effect on the wage inequality in Chile during the period 1980-2008. Despite the small size of the effect of FDI inflows on wage inequality, FDI inflows increased the wage inequality in Chile during the period 1980-2008. Therefor this research cannot reject the null hypothesis.

Conclusion

This thesis examined the relationship between FDI inflows and wage inequality by focussing on 8 different sectors in Chile. There is a large body of literature and empirical research about the relationship between FDI and inequality. Most studies focus on the inequality between high skilled and low skilled labour or on inequality between different regions. However, this study focusses on the wage inequality between sectors. This thesis uses the time period 1980-2008 as research period for examining the relationship between FDI inflows and wage inequality. In this period FDI inflows in Chile increased remarkably and wage inequality is still at a high level.

The results imply that there is a relationship between FDI inflows and wage inequality between sectors. More FDI inflows will increase the level of wage inequality between sectors in Chile. However, the relationship between FDI inflows and wage inequality in Chile is not as significant as expected. There is only a small effect of growing FDI Inflows on wage inequality. Furthermore only the control variable unemployment has a significant effect on wage inequality in this research. In order to draw conclusions from these results, the fact of missing data has to be taken into account. Factors of influence like education, local investments and trade are not taken into account; therefore the results have to be interpreted with some caution.

In summarizing the results we can conclude that the results in this research are not sufficient enough to state that FDI inflows have a significant effect on the wage inequality between sectors in Chile. Reasons for the small relationship between FDI inflows and wage inequality can be found in spill over effects of FDI inflows between sectors and the limited availability of data. Although the division of FDI inflows between sectors is highly unequal, it does not have high wage inequality as a consequence. Due to the limitations of this research and the small effect of FDI inflows on wage inequality it is hard to target policy implications in Chile. Therefore it is hard to give an advice to policy makers in Chile. Further research will be needed to give a better view on the distribution of FDI inflows and determinants of the wage inequality in Chile. However, more data on sectorial level must be available in order to conduct further research.

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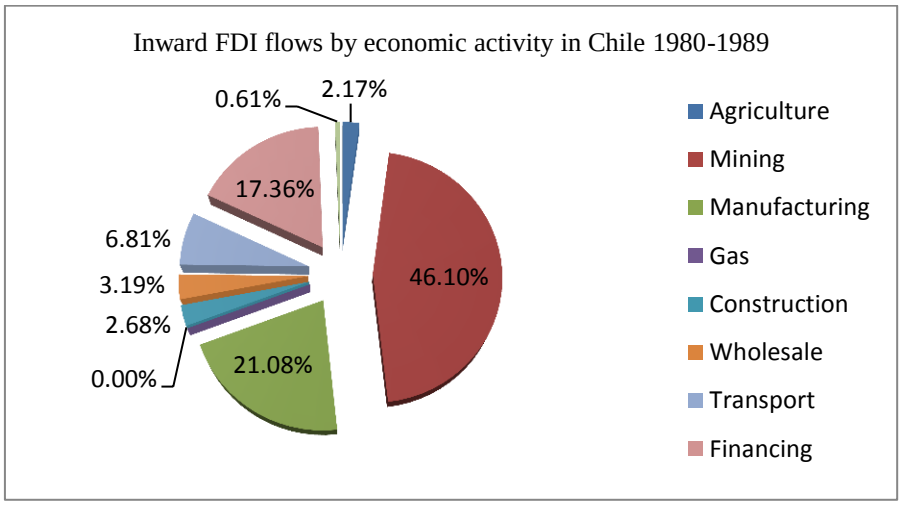
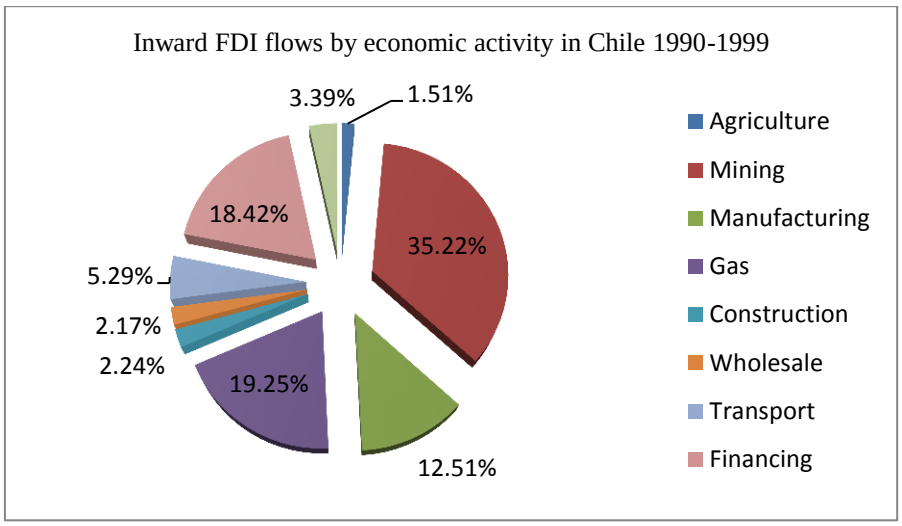
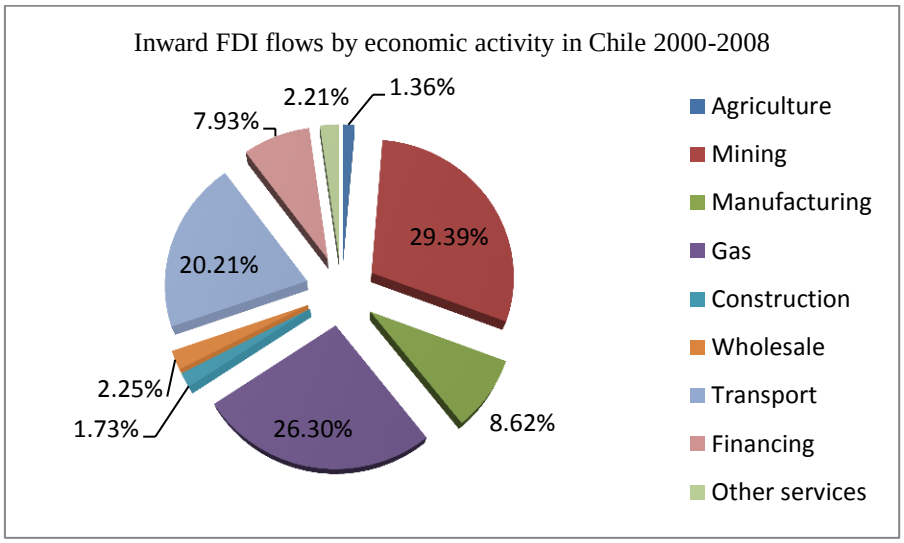
Appendix A

Sectors	**Full Description**
Agriculture	Agriculture, Hunting, Forestry and Fishing
Mining	Mining and Quarrying
Manufacturing	Manufacturing
Gas	Electricity, Gas and Water
Construction	Construction
Wholesale	Wholesale and Retail Trade and Restaurants and Hotels
Transport	Transport, Storage and Communication
Financing	Financing, Insurance, Real Estate and Business Services
Community	Community, Social and Personal Services

Appendix B


Inward FDI flows by economic activity in Chile 1980-1989
0.61%
2.17%
17.36%
6.81%
3.19%
2.68%
0.00%
46.10%
21.08%
Agriculture
Mining
Manufacturing
Gas
Construction
Wholesale
Transport
Financing


Inward FDI flows by economic activity in Chile 1990-1999
3.39%
1.51%
18.42%
35.22%
5.29%
2.17%
2.24%
19.25%
12.51%
Agriculture
Mining
Manufacturing
Gas
Construction
Wholesale
Transport
Financing


Inward FDI flows by economic activity in Chile 2000-2008
2.21%
1.36%
7.93%
29.39%
20.21%
2.25%
1.73%
26.30%
8.62%
Agriculture
Mining
Manufacturing
Gas
Construction
Wholesale
Transport
Financing
Other services

Appendix C

Table 3. Data Description

Growth	Difference between output of a sector in current year and previous year in %.	Authors contribution
Prod	Output of a sector divided by the people employed in that sector in US$	Authors contribution
Unemp	% of people (aged 15+) of the total workforce in a sector who are unemployed	Laborsta
Men	Percentage men of the total people employed in a sector in Chile	Laborsta
FDIL	Dummy variable with value 1 if sector receives more than 22% of all FDI inflows, otherwise value 0	Authors contribution