



LUND UNIVERSITY  
School of Economics and Management

**Master in Economic Development and Growth**

**EFFECTS OF FOREIGN DIRECT INVESTMENT ON  
WAGES IN THE MANUFACTURING SECTOR, 2002-2008**

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*Abstract:* The purpose of the present thesis is to analyze the effects of FDI on wages in the manufacturing sector from 2002-2008 in 33 different countries. The introductory chapter will review existing literature, distinguishing between neoclassical, political economy and sociology approaches. A second part will estimate the effects of FDI on wages using the panel ordinary least squares (OLS) fixed effects method. Variables included to explain effects on wages, comprise: employment, inward FDI flows and stock, domestic capital, education and trade openness. Two sources are used to obtain international manufacturing wages' data: International Labour Organization (ILO, 2012) and the United Nations Industrial Development Organization (UNIDO, 2012). The main contribution of this master thesis is its estimation of the effects of FDI on wages in the manufacturing sector for both developing and developed countries, with the use of actual FDI data in the manufacturing sector. As a result, this master thesis will enable the reader to understand the effects of FDI on workers' wages in the manufacturing sector.

*Key words:* Wages, Foreign Direct Investment, Manufacturing, Political Economy, China

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## **LIST OF ABBREVIATIONS**

AW	Wages
CPI	Consumer Price Index
EX	Exports
FDI	Foreign Direct Investment
FE	Fixed Effects
GDP	Gross Domestic Product
GFCF	Gross Fixed Capital Formation
GMM	Generalized Method of Moments
ILO	International Labour Organization
ITC	International Trade Centre
IV	Instrumental Variables
IM	Imports
M&A	Mergers and Acquisitions
ODA	Official Development Assistance
OECD	Organization for Economic Co-Operation and Development
OLS	Ordinary Least Squares
RTB	Race to The Bottom hypothesis
UNCTAD	United Nations Conference on Trade and Development
UNIDO	United Nations Industrial Development Organization
WDI	World Development Indicators

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## **1 Introduction**

The present master thesis aims to answer the following research question: what is the impact of foreign direct investment (FDI) on wages? To this aim, we analyze the effects of FDI on average wages in the manufacturing sector in 33 different countries for the period between 2002 and 2008<sup>1</sup> and we conceptualize existing literature on the topic, distinguishing between neoclassical, political economy and sociology approaches.

Mainstream economic literature has argued openly in favour of FDI, underscoring that along to increased capital, FDI operates as a channel of technology diffusion that leads to permanent higher labour productivity and wages (Lipsey and Sjöholm, 2005). In contrast, a heterogeneous group of scholars, ranging from sociologists to political economists have stressed that foreign investment decreases bargaining power of labour causing a decline on wages (Seguino, 2007; Vijaya and Kaltani, 2007). The effects of FDI on wages are estimated using the panel ordinary least squares (OLS) fixed effects method. In order to explain effects on wages, we include data on employment, inward FDI flows and stock, domestic capital, education and trade openness.

The present study differs from existing literature in three aspects: First, the study examines the effect of manufacturing FDI on manufacturing wages, instead of using aggregate economy FDI figures which mismeasure the effect of FDI on wages. By making use of data from the International Trade Centre (ITC), we are able to provide more accurate estimates of FDI in the manufacturing sector. Secondly, this study examines the effect of FDI on wages considering both domestic and multinational firms, while most previous studies have focused on the effects of FDI on either domestic or multinational firms with firm-level data and for a single or few countries (e.g. Aitken et al., 1996). This way, past studies cannot draw economy-wide conclusions about the overall wage effects of FDI and firm-level datasets do not allow for cross-country comparisons. Thirdly, this study distinguishes developed and developing countries. Most previous studies concentrate their analysis either on a specific region or developed countries (e.g. Tintin, 2012; Teckan, 2010 and Mehmet and Tavakoli, 2003). The small number of studies that do include developing countries, fail nonetheless to consider the specifics of FDI effects in developing countries. Given China's importance in the global manufacturing sector, a specific analysis of this country will be made. However, data mismeasurements suggest that results should be taken with caution.

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<sup>1</sup> FDI can be defined as "an investment involving a long-term relationship and reflecting a lasting interest of a resident entity in one economy (direct investor) in an entity resident in an economy other than of the investor. The direct investor's purpose is to exert a significant degree of influence on the management of the enterprise resident in the other economy"(ITC, 2013).

The introductory section presents an in-depth analysis of globalisation trends in capital deregulation and investigates the past two decades of development of the manufacturing sector. Section 3 analyses the theoretical and empirical background of the relationship between FDI and wages. Section 4 presents data sources and definitions. Section 5 will study the model and the empirical analysis. In Section 6 methods will be discussed. Finally, section 7 concludes by presenting policy recommendations as well as discussing limitations of the current study and identifying areas for future research.

As a result, this master thesis will enable the reader to understand the effects of FDI on workers' wages in the manufacturing sector.

## 2 Globalisation trends

In this section we depict recent globalisation trends; capital flows, regulations and wages. We provide specific information of manufacturing sector wages and FDI in the data section.

### 2.1 Capital trends

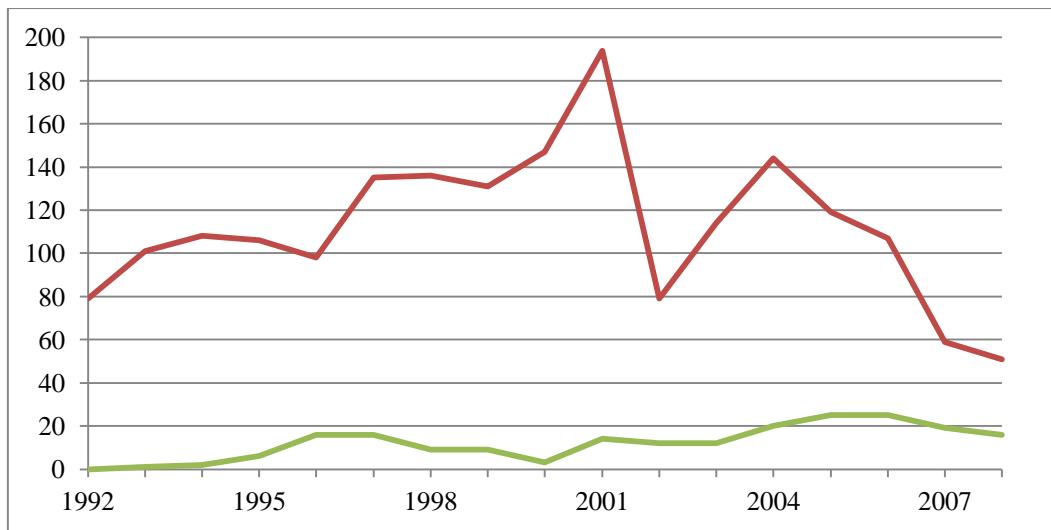
The deregulation of capital flows is probably the most important global change of the last 20 years. During this period, the US government and international financial institutions promoted neo-liberal policies and enshrined them in the Washington consensus. This particular view of globalisation deems necessary that governments "increase foreign direct investment by reducing barriers" and also "the abolition of regulations that impede the entry of new firms or restrict competition (except in the areas of safety, environment and finance)" (George, 2007). As these views were not shared by many governments, the International Monetary Fund (IMF) and other international financial institutions introduced conditionality of finance assistance to the completion of these policies (George, 2007). National policy changes that promote FDI include: easing foreign ownership of assets, reducing sector restrictions, the approval of procedures for foreign investment, easing operational conditions, stabilization of foreign exchange, promotion measures (including incentives), guarantees and favourable corporation regulations (Kobrin, 2005)<sup>2</sup>. Figure 1 shows the number of national policy changes from 1992 to 2008. National policy changes are representative of world policy making prevalent trends. During the past 20 years, national policy changes were directed at easing FDI. Deregulating policy changes prevailed during the whole period with the sole exception of the ITC crisis which saw a sharp

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<sup>2</sup> Corporation regulations refer to corporate governance, stock exchanges and financial market laws.

decrease in deregulations. Capital deregulation has paved the way for higher levels of FDI in the world.

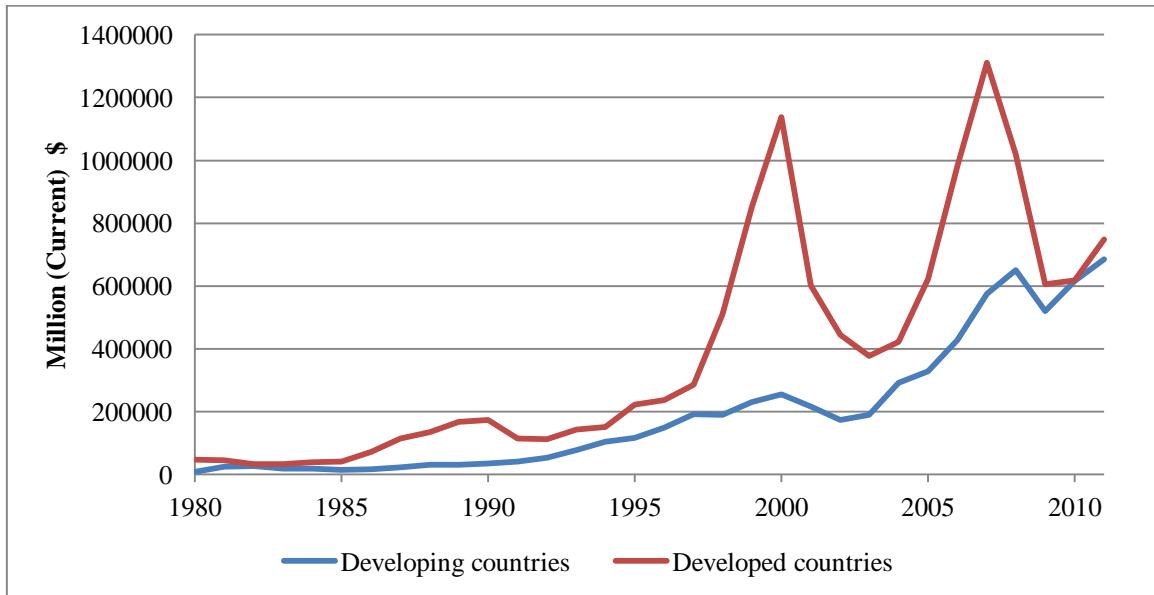
**Figure 1 National policy changes, 1992-2008 (Number).**



*Source:* UNCTAD (2011) *Note:* Red line denotes the number of national policy changes that promote or deregulate FDI. Green line denotes the number of national policy changes that restrict or regulate FDI.

Figure 2 illustrates the evolution of FDI inflows since 1980 onwards for developing and developed countries. Three things stand out from the FDI inflow analysis: First, FDI inflows already took off in the 1990s. In 1990, total world FDI inflows amounted to around 176 billion dollars. Only twenty years later, this figure multiplied by eight, adding to a total of 1,433 trillion dollars (UNCTAD, 2011). Second, although most of the world FDI flows originate and are directed to developed countries, the proportion of FDI going to developing countries has been gradually increasing. Developing countries received about 20% of world FDI in 1980s. This number increased to 32% during 1992-1994 and reached 37% in 1997 (United Nations, 1999). FDI inflows in developing countries between 1986 and 1997 increased from \$10 billion to \$163 billion and they accounted for about 45% of "total net foreign resources flows" to developing countries in 1997 (Perkins et al., 2001). Third, FDI inflows in developed countries showed a steep increase before the ICT and current crises indicating the different nature of FDI inflows. FDI represent significant sums in developing countries and have surpassed ODA in importance as a source of financing.

**Figure 2 FDI inflows in current USD for developed and developing countries 1980 - 2011 (Million)**

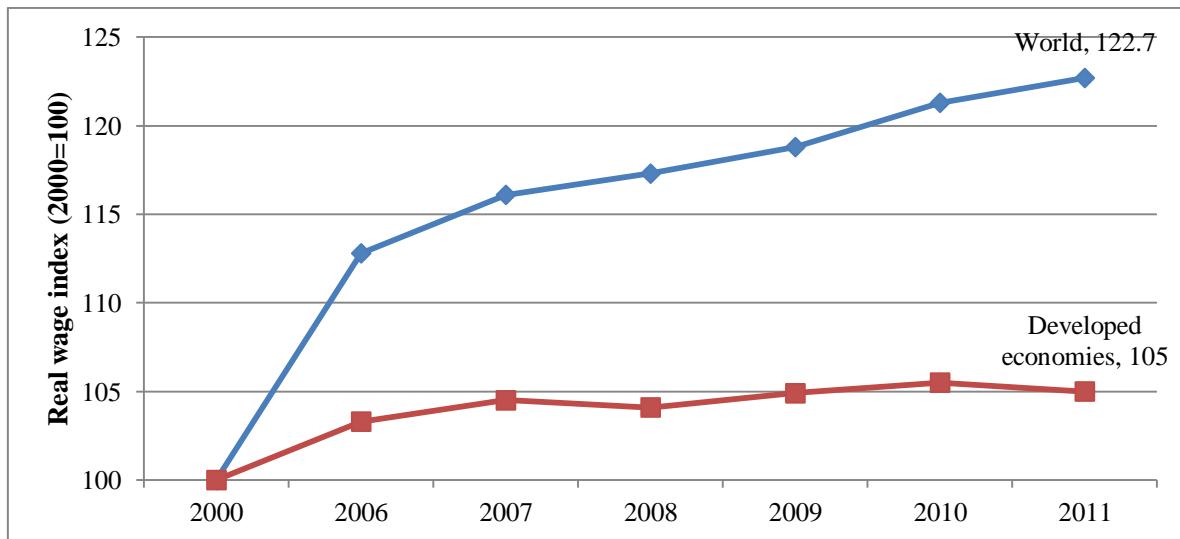


Source: UNCTAD (2011)

## 2.2 Labour workforce trends

Alongside the liberalisation of capital flows, the global workforce has doubled. This is due on one hand, to the world rapid population growth (especially in developing countries) and the fall of the "Iron Curtain". On the other hand, it is due to the incorporation of countries like Russia, China, India and other emerging country workers' to the global markets (Freeman, 2005 and Friedman, 2006). This additional 1.5 billion people plus the fact that supply of capital has virtually remained unchanged has contributed to the lowering of the share of wages in the aggregate product as a whole. From the US, to Japan and the EU countries, all developed countries suffer from declining labour incomes, while corporate profits are more robust (Freeman, 2005). In developed countries, labour shares declined from about 75% of national income in 1975 to about 65% prior to the current crisis. In developing countries the picture is the same. Average labour shares of developing countries declined from 62 per cent of GDP in the early 1990s to 58 per cent just before the crisis (ILO, 2013). However, even if there is a decrease in the labour share, there were increases in average wages. Figure 3 shows how real wages in the world increased 2.06 percent per year between the year 2000 and 2011. Real wage increases concentrated in developing countries and specially in two regions: Eastern Europe and Central Asia and Asia.

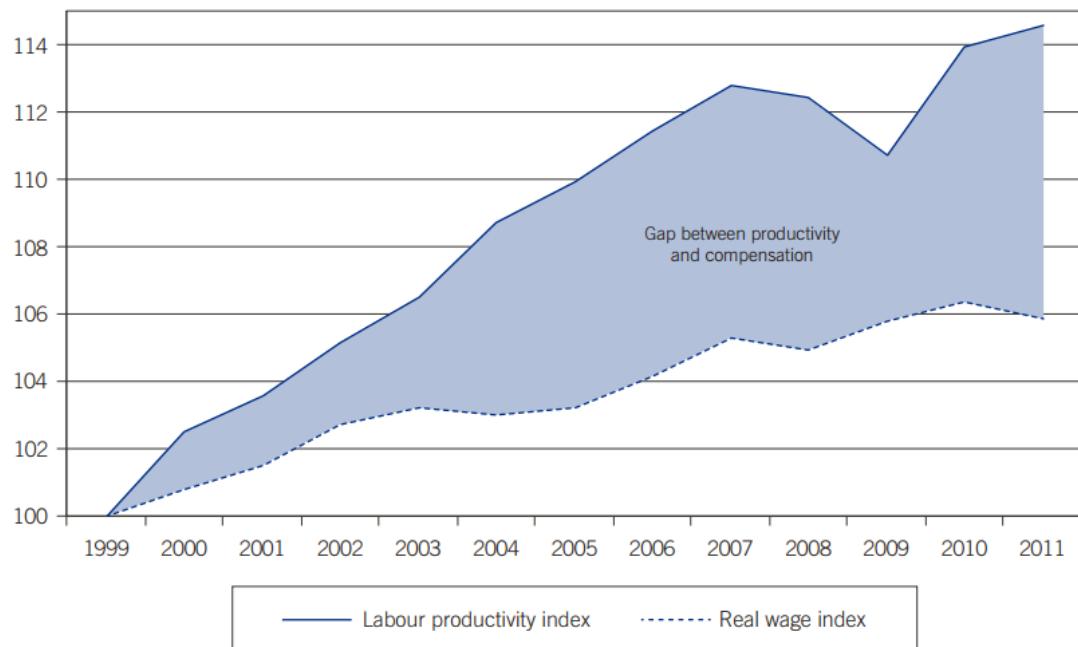
**Figure 3 Cumulative Real Wage Growth between 2000 and 2011: Average of the world and developed economies.**



Source: ILO (2013)

The puzzling fact is that labour shares are declining everywhere whilst wages are increasing. This is due to the broken link between wages and labour productivity. Increased productivity of labour is not transferred into a proportional increase in wages or in other words, workers and their families are not receiving their fair share of the wealth they create. Figure 4 shows the cumulative real wage and labour productivity growth in developed countries. The gap between productivity and compensation of workers is clearly increasing, probably indicating that gains from globalisation are not distributed evenly between capital and labour owners.

**Figure 4 Trends in growth in average wages and labour productivity in developed economies (index: 1999 = 100)**



*Source:* ILO (2013) *Note:* Since the indices refer to a weighted average, developments in the three largest developed economies (United States, Japan and Germany) have a particular impact on this outcome. Labour productivity is measured as output per worker.

### 3 Theory

This section will first analyse economic theories on the capital mobility effects on the labour market. Then, some of the most recent empirical studies are presented. The issue of globalization and wages has renewed importance. Forgotten in the last years, the recent economic crisis has brought fresh urgency to the debate about the effects of foreign capital flows and real wage movements.

#### 3.1 Theoretical approaches

The debate about the effects of capital mobility in the recipient economies started already in the 1960s. Originally, FDI was understood as the expression of monopolistic activities of multinational corporations. Since then, different fields of study have developed alternative theories to explain its effects on wages.

The following sections include a general review of literature on the effects of FDI on

wages according to three *ad hoc* approaches we distinguish in the social sciences literature; the neoclassical approach, the political economy approach and the sociological approach.

### 3.1.1 Neoclassical approach: technology spillovers

The neoclassical literature of the effect of FDI on wages can be divided into two: direct and indirect effects. If we consider standard neoclassical theories, wages are depicted in the following way:  $W=P^*MPL$ , where P represents the price of final goods and MPL is the marginal product of labour. From here, real wages are:  $W/P=MPL$ , which means that any increase in the marginal productivity of labour increases real wages (Tintin, 2012). The direct effects have to do with the accumulation of capital as well as faster restructuring of the economy (Vijaya and Kaltani, 2007)<sup>3</sup>.

However, FDI is considered to have indirect effects on wages through technological spillovers. This research field explains that along with foreign capital, multinationals bring many intangible assets i.e.-knowledge and organizational skills-. These in turn make local labour force permanently more productive (Aitken et al., 1996). When workers move from foreign to local firms they take this acquired technology to local companies (Liu, 2008). Thus, FDI will have an additional impact on wages through technological spillovers<sup>4</sup>.

Increases of wages have been conferred additional positive attributes in the neoclassical literature. For example, foreign investors are esteemed to pay higher wages to local workers are to decrease labour turnovers and reduce labour market frictions; to attract the most productive workers that may have preferences to work with local companies because of cultural or language factors; and to have good public relations with society and local governments which constitute their potential local costumers (Decreuse and Maarek, 2008; Lipsey and Sjoholm, 2004 and Lipsey, 2004).

### 3.1.2 Political Economy approach: bargaining power theory

According to political economists, prevailing neoclassical theories omit social, cultural and institutional variables that are behind the actual process of capital movements. Thus, any technical analysis has to incorporate the social dimension of the process. This is, the relationship between social classes and groups between them and their institutions.

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<sup>3</sup> In traditional trade models countries gain from competing in the international markets through specialisation, economies of scale, comparative advantages and price reduction of commodities that are produced more efficiently abroad. If we consider the Stolper-Samuelson model, the relative factor rewards change with the movement from autarky to free trade benefiting factors in trade-oriented industries. In the Mundell model, factor movements have a similar effect on wages (Krugman and Obstfeld, 1994; Krueger, 1983).

<sup>4</sup> In models with differentiated labour input, the effects of FDI on wages may also depend on sector differences due to changes in the demand of skilled and unskilled labour (Feenstra and Hanson, 1997). However, this literature aims to explain wage inequalities more than absolute effects.

In relation to FDI, the political economy approach underscores the imbalance between capital's high mobility due to ongoing capital deregulation with respect to labour which suffers from natural (language and culture) as well as institutional (immigration laws) barriers to move. This approach argues that wages are the result of the bargaining process between employees and employers and the outcome is dependent on the power that these two actors have. Whilst working hours are specified in working contracts, these do not contain the actual level of work and effort that is put during these hours (Reich, 1981; Bowles and Gintis 1990)<sup>5</sup>. In this way, a labour contract is not directly enforceable and follows a "contested exchange". Employers and employees follow a bargaining process in which actual work, effort and wage are the outcomes. According to this approach, FDI would be a variable measuring bargaining power<sup>6</sup>.

There are three factors studied to pressure the bargaining power of labour down: the threat of capital to relocate or outsource, the increase in the mobility of capital and the consequent increase in the elasticity of labour demand. The political economy literature has long criticised that increase in productivity translates to wages (Reich, 1981; Bowles and Gintis, 1990). This literature argues that relative bargaining power of capital and labour is not accounted for.

Firstly, the threat of capital to relocate or outsource. Initially proposed by Blecker (1997). It considers that wages can be affected by firms threat to relocate production. The threat takes place even if the firm finally decides not to move. Seguino (2007) suggests that this mechanism is behind a low-wage-low productivity trap. The idea is that an increase in FDI leads to lower wages and thus productivity growth. Accordingly, the decline in productivity takes place for two reasons. In the first place because firms face less pressures to make investments that raise productivity. In the second place because deregulation of FDI permits companies to outsource their production.

Secondly, Vijaya and Kaltani (2007) argue that capital deregulation has made capital owners uphold increasing power when entering a market. With the shift in the relative importance of domestic to international markets, wages are no longer seen as a source of demand, but as a cost item and capital owners will move to markets with low wages. This way, FDI inflows have negative effects on wages in all countries.

Thirdly, Mehmet and Tavakoli (2003) argue that FDI deregulation has made labour demand more elastic. The fact that many countries have cut restrictions on foreign capital has

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<sup>5</sup> This political economy approach has been applied by Reich (1981) to find that divisions amongst workers have a negative impact on wages in the U.S. because these divisions lower the collective bargaining power of labour.

<sup>6</sup> This type of approach matches with Rodrik's (1999) finding that democracies pay higher wages because workers have in general stronger bargaining power in democracies.

allowed that MNC's can benefit from lower wages in labour abundant countries, leaving production in others. In this way, FDI net inflows would have no effects wages. Considering the unlimited labour supply of certain developing countries as opposed to industrialized economies, the increased elasticity demand of labour is bound to push wages down in developed countries but leaving wages in developing countries in subsistence levels.

### 3.1.3 Sociology approach: dependency theory

In the sociology field, FDI has been analyzed in the context of Neo-colonialism in which capital from developed countries is used to perpetuate control over developing countries. Known as the capital-dependency theory since the influential work of Bornschier and Chase-Dunn (1985), this approach considers that through the repatriation of profits and interests multinationals extract surpluses from developing economies. Moreover, foreign capital prevents the recipient country from developing a coherent internal economic structure and production process. Instead, it allocates resources according to the exporting interests of multinational companies. Consequently, opportunities to foster important industries and create comparative advantages are lost in the long run. Some sociologists have raised their concerns over the use of FDI inflows as a measure and consider that FDI stock reflects more the long-run negative effects of the dependency theory (Dixon and Boswell, 1996).

Table 1 summarizes the effects of FDI on wages following implications of the three approaches.

**Table 1. Effects of FDI on Wages**

	Neoclassical approach	Political Economy approach	Sociology approach
FDI Stock	+	-	-
FDI Inflows	+	-	+/-

Note: "+" stands for positive effect of FDI and "-" stands for negative effect of FDI.

## 3.2 Previous research

Having presented the theories involved, we discuss some of the recent studies about the FDI effect on the labour market.

- *Neoclassical approach*

Some empirical studies on FDI technological spillovers have found important spillover effects for skilled workers but there are mixed findings on the spillover effects for low-skilled workers (Hale and Long, 2008). Additionally, there are few studies in the neoclassical literature that research on developing countries. For example Aitken et al. (1996) find negative spillovers in Mexico and Venezuela for manufacturing industries whilst Lipsey and Sjöholm (2001) find positive effects in a firm-level cross-section of Indonesian firms<sup>7</sup>.

Tintin (2012) finds positive effects of FDI on average annual wages, minimum wages and labour income share for fourteen OECD countries between 1990 and 2010. However, he finds greater effects of FDI on average wages than on minimum wages suggesting that FDI might be behind wage inequalities.

- *Political Economy approach*

Vijaya and Kaltani (2007) make a panel-data analysis that studies the effects of capital movements in manufacturing wages finding a negative effect. The reasoning to focus on such a sector is because it is more likely to suffer from capital deregulation than non-tradable sectors or those that employ high-skilled workers. The analysis is from 1987 and 2000 and it covers mainly developed countries. They test the impacts of both the ratio of FDI to GDP, FDI inflows and stock on wages. There is an important issue in this paper. The specification analysis uses logarithms on all variables. The problem is the loss of observations as the logarithmic transformation of negative values generates missing values. This can potentially be a source of sample selection bias. Interestingly, only FDI inflows are found statistically significant whilst they do not find negative effects of FDI stock. In general terms, results are not conclusive on the negative effect of FDI.

Seguino (2007) also finds this relationship in a panel data fixed effects and GMM estimation for different manufacturing industries in 37 semi-industrialized economies. Additionally, she investigates the relationship between low productivity and low wages for different manufacturing industries. In order to obtain reliable estimates she conducts a robustness check taking out countries listed as tax haven's. She finds that bargaining power differs between industries. Such characteristics determine whether FDI will have a positive or negative effect on wages. Contrary to Vijaya and Kaltani (2007) she makes use of FDI stock variable instead of FDI inflows.

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<sup>7</sup> For a good review on spillover effects on wages read Lipsey and Sjöholm (2005).

Brofenbrenner (1997) provides empirical evidence of the threat theory for unionization in the US. The effect was higher in "mobile" industries such as communications and labor-intensive manufacturing industries with easy entry and exit. Interestingly enough, only 3% of the firms actually exited the US market after unionization which means that the sole threat was sufficient to keep wages down. Other empirical findings on the threat effect in developed economies are Choi (2001), Gopinath and Chen (2003) and Harrison and McMillan (2004).

Mehmet and Tavakoli (2003) provide a different empirical analysis using aggregate data to see the effect of FDI on wages for Asian countries to date. Instead of looking just at the effects of FDI on wages, these authors measure the elasticity demand for labour with and without FDI in China, the Philippines, Singapore and Thailand between 1970 and 1998. They find that with the inclusion of FDI labour demand becomes more elastic. As they have data for several years in each country, they perform their analysis with different pooled cross-sections.

- *Sociological approach*

The empirical evidence of the dependency theory has been mixed. Different conclusions have taken place depending on the use of FDI flows, stock or rate. The latter is the ratio of flows to the stocks. For example, Dixon and Boswell (1996) give evidence of the capital-dependency theory finding a positive impact of FDI flows on GDP growth but a negative impact of FDI stock.

Part of the previous literature considers the effect of FDI on wage inequality. We consider that measuring the effect on wages as opposed to economy-wide measures such as Gini coefficients allows for a more subtle understanding the mechanisms through which FDI causes inequalities and primarily because we want to consider the effects on the manufacturing sector which has been in the centre of the globalization debate all along.

This study concerns the effects of FDI on wages. However, it may also happen that changes in wages have an impact on FDI. Accordingly, this effect can be positive or negative. Negative effects can be identified with the Race to the Bottom Hypothesis (RTB). This is, the cost of labour is a major factor for attracting FDI. Thus, countries reduce labour regulations in order to attract FDI. Several authors find evidence of the RTB hypothesis.

To sum up, there are diverse opinions on the impact of FDI on wages. Results vary depending on choices of countries and variables. FDI stock is more likely to capture long-run effects of FDI on wages than FDI inflows. FDI inflows are potentially endogenous due to short run fluctuations. Although new research is increasingly aware of sector and industry differences, data for sector analysis of wages and for skilled and unskilled labour are in many cases

unavailable. Due to these limitations, we will use aggregate data to see the effects of FDI on manufacturing wages.

## 4 Data

Data was collected from different sources<sup>8</sup>. We use average monthly wage data from the UNIDO Industrial Statistics Database (2013) and average monthly earnings data from the ILO LABORSTA Database (2013) to construct two distinct variables<sup>9</sup>. In order to make them comparable we follow the procedures of Yang, et al. (2010). Ideally, we would use wages per hour but this data is not available by UNIDO (2013) and is scarce in ILO (2013). Thus, we resume to use average manufacturing wages per month as our unit of comparison. This represents a defect in the data as we are not taking into account the hours worked in each country and consequently, wages per hour are likely to differ from monthly wages.

UNIDO (2013) reports total annual wage bills in the manufacturing sector of each country. We obtain annual individual manufacturing earnings by dividing total annual earnings by the total number of employees in the manufacturing sector and then we obtain monthly earnings by dividing this number into 12:

$$\text{Monthly wages} = \frac{\text{Total manufacturing wages}}{\text{Total number of employees} * 12}$$

UNIDO's (2013) definition of wages include all payments in cash made to employees during a year in relation to work done for the firm. The payments include direct wages and salaries, remuneration for time not worked, in kind payments, bonuses and donations, housing allowances and family allowances and in kind transfers paid directly by the employer.

For ILO (2013) data there are different definitions of earnings and wages but we take the former for our analysis. The difference between both is that overtime payments are not included in the wage rate. Consequently, in order to obtain earnings per month from wage rates per month and daily wage rates we need to account for overtime payments. We proceed in the following way:

- For wage rates per day:

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<sup>8</sup> For a concise description of variables used and the sources please refer to the data annex.

<sup>9</sup> Information of UNIDO (2012) is found at [/http://www.unido.org/statistics.html/](http://www.unido.org/statistics.html). ILO (2012) data is found in <http://laborsta.ilo.org/>. For word saving purposes and in order to avoid using excessively both terms, in other sections we refer to both terms as wages.

$$Earnings \text{ per month} = \left( \frac{wage \text{ rates per day}}{8} \right) * working \text{ hours per week} * 4,3$$

We assume that the daily working hours is 8. Further, 4.3 weeks per month is calculated by dividing 52 weeks a year by 12 months.

- For wage rates per month:

$$Earnings \text{ per month} = \left( \frac{wage \text{ per month}}{40 * 4.3} \right) * working \text{ hours per week} * 4,3$$

We assume that the weekly working hours are 40 (8 hours per day and five days per week). The underlying assumption is that overtime hours are paid at the same rate as regular ones.

- For Earnings per hour:

$$Earnings \text{ per month} = earnings \text{ per hour} * working \text{ hours per week} * 4,3$$

Data on working hours are not complete for some countries. For example, Thailand hours of work are only reported for the years 2002 and 2003. We take the hours worked in the last of the year's available. A weakness of our definition of both earnings and wages is that it excludes the employers contributions paid to social security, insurance and pension schemes. UNIDO (2013) reports data on compensation of employees which includes these aspects. However, information is only available for a small group of countries (Yang et al. 2010).

A greater concern are the "composition effects" (ILO, 2013). The problem with calculating national average earnings is that it may reflect changing in the wage-earning segment instead of recording changes in wages. The result is that national estimations underestimate wage losses.

Despite its growing importance, FDI data is scarce and when existent, it is not publicly available. FDI inflows and stock data are taken from the International Trade Centre database (2013). ITC's Trade Map is often used by policy-makers in conducting research. However, less known is the Investment Map (2013). ITC's (2013) database reports information on

manufacturing FDI since 2002. Most assessments on FDI and the manufacturing sector use aggregate FDI values provided by UNCTAD. These estimates add FDI in a country without disaggregating by sectors. As FDI in the manufacturing sector has lost weight in favour of FDI in the tertiary sector, in principle it is preferable to use ITC (2013) data. However, we need to make sure that this data is consistent.

ITC (2013) defines FDI in the same way as UNCTAD. FDI is the increase in the equity position of a foreign firm that holds more than 10 percent of the shares of a host country firm. FDI includes three elements: equity capital, intra-company loans and reinvested earnings (UNCTAD, 2005).

This definition has some problems (UNCTAD, 2005)<sup>10</sup>. Firstly, statistics fail to record small FDI flows. Due to the intangibility of FDI, statistics are more likely to capture large transactions. Consequently with aggregate data we do not take into account the effects of small scale investments<sup>11</sup>. Secondly, the 10 percent rule isn't consistently followed by all countries. Third, reporting of the three components of FDI flows isn't consistent between all countries. Some countries do not report intra-company loans, others do not report re-invested earnings and a minority report investments of foreign affiliates in the country of the parent firm. Forth and most important, FDI data is systematically overestimated due to round-tripping and transshipping of FDI in tax havens (UNCTAD, 2005)<sup>12</sup>. Round-tripping is when FDI is channelled to specific purpose entities abroad and later returned back to the original economy in the form of FDI. An example is the case of China and Hong Kong. Chinese investors take advantage of the beneficial taxation conditions that FDI has in China to invest from firms created under Hong Kong's laws (Seguino, 2007). We account for China's differenced effect of FDI on wages due to its importance but such inferences should be taken with caution. Transshipping is when FDI is channelled to specific purpose entities abroad that serve as an intermediary for FDI to other countries. For example, 95% of Luxembourg's FDI inflows are estimated to be in transit (ITC, 2013). Consequently, the inclusion of these countries is likely to bias our results. We make a robustness check by tacking out countries that have been identified as tax havens by the IMF (2000) : Cyprus, Ireland and Malta.

A specific concern over ITC (2013) data has to do with classification problems. In the

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<sup>10</sup> We record the main issues that affect our estimates. Data compilation of FDI data has many other issues concerning different methodological methods of data collection, time periods for recording FDI transactions and valuation. These are discussed in more detail in UNCTAD (2005).

<sup>11</sup> This is a potential source for bias shared by all national level FDI estimators.

<sup>12</sup> Tax havens can be defined as countries that "offer an environment conducive to individuals and corporations seeking to hide their assets and business activities from government authorities of their home countries" (Seguino, 2007).

case were FDI cannot be classified in a specific sector, it is not counted. Although unclassified FDI represents small sums, this varies through countries. We avoid this problem partially by making use of sector-level instead of industry-level data.

Manufacturing employment and domestic manufacturing capital data comes from UNIDO. However, as data availability for domestic manufacturing capital was scarce we construct a proxy using total gross fixed capital formation (GFCF) data from the World Bank's World Development Indicators (WDI). We did so by converting GFCF into a stock variable using the perpetual inventory method and then multiplying the total domestic capital stock with the share of manufacturing value added provided by WDI. The perpetual inventory formula is<sup>13</sup>:

$$K_t = (1 - \sigma) K_{t-1} + I_t \text{ where } K_0 = \frac{I_{2002}}{\sigma + g_I}$$

Overall, correlation between manufacturing capital from UNIDO and our proxy variable for countries that have both variables is very high (98 percent). Further, we found that our capital proxy variable has slightly higher mean and standard deviation.

Nominal wages and domestic capital stock are transformed into fixed 2005US\$ the same way whilst FDI inflows and FDI stock are divided into domestic manufacturing capital stock. Firstly, we convert into local currency if not already converted using year average exchange rates. Secondly, we deflate the variables using national CPI data indexed for 2005 in order to arrive to real terms. Finally, we apply exchange rates from the year 2005 to obtain real wages in fixed 2005 US dollars. Data on CPI and exchange rates is contained in the WDI of the World Bank.

Additionally we used two variables for educational levels and trade openness. For our educational variable, we would ideally include secondary school attainment as our educational variable. However, school attainment is not available for the selected sample. We result in using gross school enrollment which is a proxy of school attainment. Gross secondary school enrolment is the total enrolment in secondary education regardless of age<sup>14</sup>. An important concern of using school enrollment is that we are not accounting for educational levels in the manufacturing sector and most importantly, we do not differ between actual levels of attainment nor for education quality.

Trade openness measures to what extend a country is integrated in the global economy,

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<sup>13</sup> Formula for proxy initial capital stock is found in Hall and Jones (1999).

<sup>14</sup> Consequently, this percentage can exceed 100% due to the inclusion of people over-aged or under aged people in education.

and thus exposed to its effects. It is calculated as the sum of total exports and imports divided into total GDP.

Finally, we compiled a panel composed of 33 countries with data from 2002 to 2008. Unfortunately data is not available for all countries and years. In order to make a sound analysis we resulted to drop countries with insufficient number of observations<sup>15</sup>. Countries are divided into 4 different groups. First we reduce our sample to control for possible distortions produced by tax havens. We include two additional samples to investigate the effects of FDI in OECD countries and developing countries. Sample groups are presented in Table 2.

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<sup>15</sup> In order to avoid losing too many observations, we conducted selected interpolation for FDI STOCK, EDUC, EMP and OPEN variables. The rule was to do linear interpolation in the case where one or two values are missing. In the case of employment, we additionally imputed nearest preceding and following values for missing observations because this variable has no clear trend.

**Table 2. Sample Groups and Observation Period**

Sample Groups	Countries Included (Number of countries)	Countries
ALL	(32)	Armenia, Austria, Bulgaria, Canada, China <sup>16</sup> , Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Hungary, Ireland, Italy, Kazakhstan, Latvia, Lithuania, Macao, F.Y.R. of Macedonia, Malta, Netherlands, Norway, Peru, Poland, Portugal, Republic of Korea, Russian Federation, Sweden, Thailand and United States of America.
ALL EXCEPT TAX HAVENS	(29)	All except Cyprus, Ireland and Malta.
OECD	(17)	Austria, Canada, Czech Republic, Denmark, Estonia, Finland, France, Germany, Ireland, Italy, Netherlands, Norway, Poland, Portugal, Republic of Korea, Sweden and United States of America.
DEVELOPING COUNTRIES <sup>17</sup>	(9)	Armenia, Bulgaria, China, Kazakhstan, Lithuania, F.Y.R. of Macedonia, Peru, Russian Federation and Thailand.

<sup>16</sup> Data on China should be taken with caution due to miss-measurements as well as missing observations. We retrieved additional information from China's MOFCOM (2013) in order to provide better estimates of FDI inflows and stock. However, we finally decided to leave these estimations out due to lack of comparability with ITC (2013) data. We proceeded with the same imputation methodology as with the other variables.

<sup>17</sup> World Bank defines as developing countries those with GNI per capita of US\$11,905 or less in 2010. Accordingly we use this classification.

## 4.1 Descriptive statistics

In this section we provide an overview of the variables used in our panel. We additionally describe the trends in wages and FDI for our selected group samples.

Table 3 provides a summary statistics of key variables. Statistics presented describe our sample and in any case they should be understood as representative of the whole world. We present our variables in levels for a more comprehensive understanding of variable magnitudes. The first two variables are the Average Monthly Wages in real terms of 2005 US dollars. Average wage earnings per month between 2002 and 2008 added 1756.64 US dollars for UNIDO data. However, according to ILO data, the same concept is estimated to be of 1589.60 US dollars. These estimations are rather high which indicate the unequal presence between developed and developing countries. However, we should take into account that standard deviations are lower for ILO data meaning possible less within-country variation of such indicator over time. Mean FDI inflows and FDI stock variables are remarkably high. There are two reasons for this. First, FDI inflows and domestic capital come from different sources. Second, as previously noted ITC data is systematically overestimated<sup>18</sup>. The correlations among the wage, FDI and control variables are presented in table 4.

**Table 3. Summary statistics for all variables**

FDI								
	Average Earnings UNIDO	Average Wage ILO	Inflows (share of domestic capital)	FDI Stock (share of domestic capital)	Employment (Thousands of Employees)	Domestic capital (Million 2005US\$)	Secondary School Open	Enrollment (Gross, %)
All years	(2005US\$)	(2005US\$)						
mean	1756.64	1589.60	4.773058	59.62137	3434.59	222000	60.47	98.38
stnd. Dev	1523.01	1427.26	6.655104	49.67062	10700.00	590000	67.43	12.50
min.	53.84	74.04	-8.336095	6.380566	20.32	97.9	0.05	63.92
max.	5284.18	5522.11	32.62157	385.4481	81500.00	3410000	259.36	143.89

*Note:* Variables are in levels. *Source:* Author's calculations.

<sup>18</sup> Problems are described in more detail in the precedent section.

**Table 4. Correlogram for key variables**

	Average Earnings (UNIDO)	Average Wages (ILO)	FDI Inflows	FDI Stock	Domestic capital	Employment	Education	Open
Average Wage (UNIDO)		1						
Average Wages (ILO)	0.963		1					
FDI Inflows	-0.319	-0.298		1				
FDI Stock	0.026	0.020	0.447		1			
Domestic capital	-0.103	-0.115	-0.093	-0.160		1		
Employment	0.246	0.177	-0.165	-0.234	0.532		1	
Education	0.235	0.170	-0.019	0.077	-0.168	-0.111		1
Open	0.723	0.751	-0.176	0.187	-0.337	-0.105	0.291	1

Source: Author's calculations.

We now analyze the changes in FDI and real wages for our different samples.

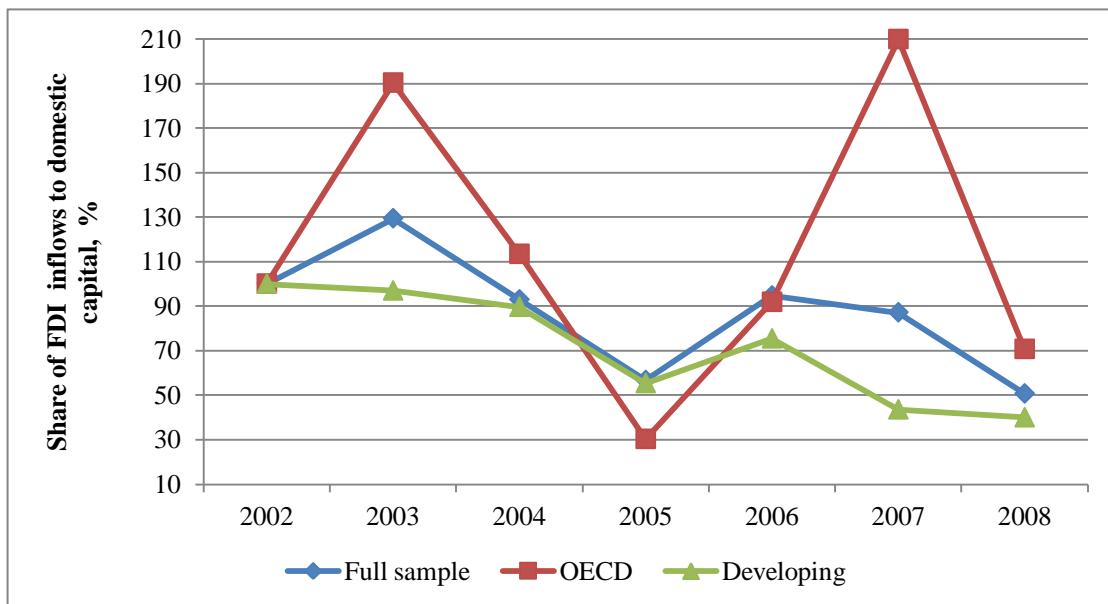
#### 4.1.1 Capital trends in the manufacturing sector

In this section we depict the specific trends of FDI in the manufacturing sector. This analysis is done in relation to our sample and in no way should be understood as world representative.

In general terms, manufacturing FDI follows the same patterns as overall FDI. FDI stock is concentrated in developed countries but increases have concentrated in developing countries. Most of it was absorbed by China. However, this is only part of the story. In figure 5 we see the evolution of the share of FDI of manufacturing *inflows* in relationship to domestic capital in the manufacturing sector indexed for the year 2002 whilst figure 6 shows the evolution of the share of FDI of manufacturing *stock* in relationship to domestic capital in the manufacturing sector indexed for the year 2002. Conclusions are twofold. Firstly, although FDI in the manufacturing sector of developing economies increased, there was a decline in its relative importance due to the even greater increase in domestic capital. Secondly, domestic capital growth in OECD countries was milder and consequently FDI's share as a percentage of domestic capital increased

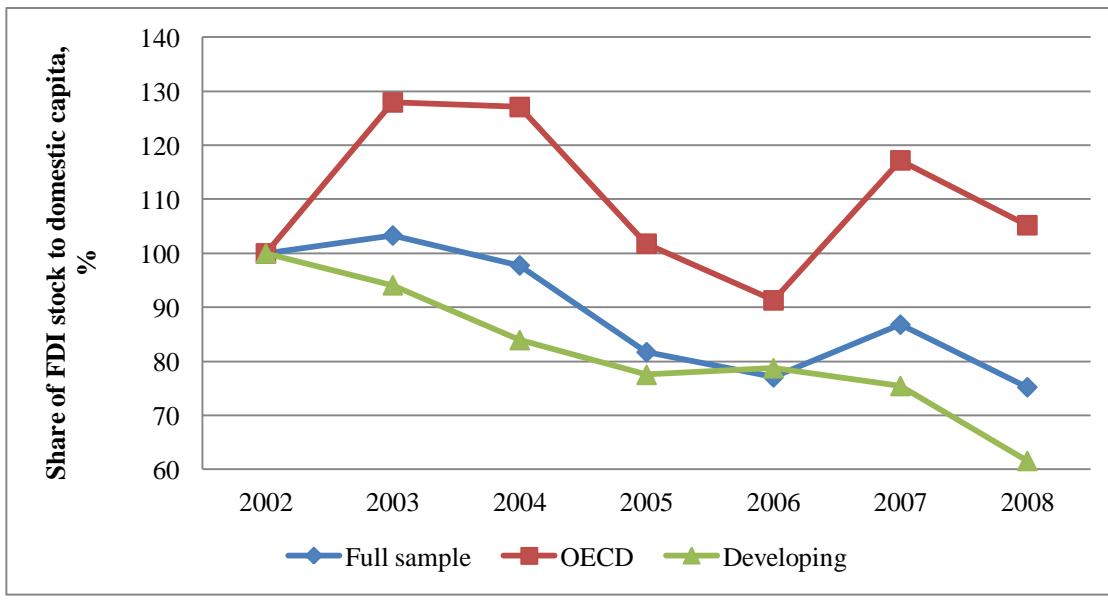
as a result of greater investments.

Figure 5. Average FDI inflows in Million USD for all our sample, OECD and developing countries 2002 - 2008



Source: Author's calculations with ITC (2013) Note: Indices are unweighted averages.

Figure 6. FDI inflows in Million USD for all our sample, OECD and developing countries 2002 - 2008

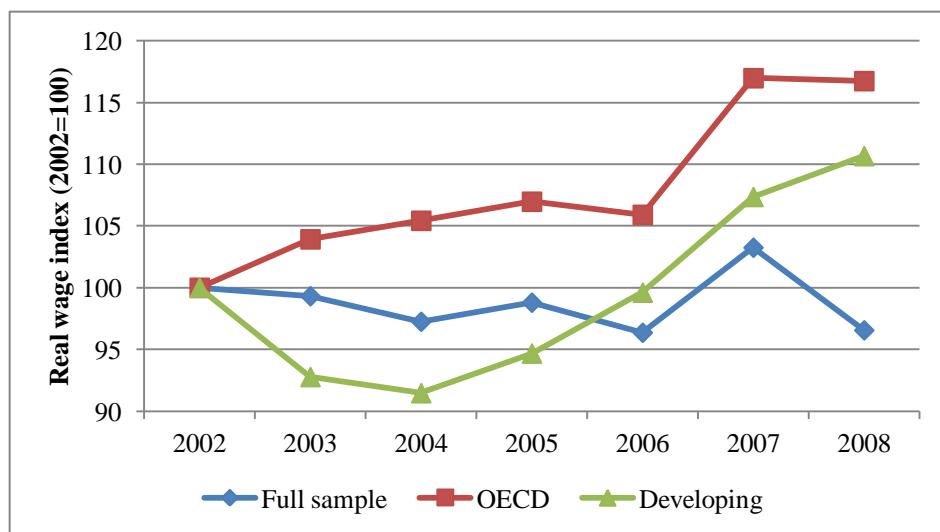


Source: Author's calculations with ITC (2013) Note: Indices are unweighted averages.

#### 4.1.2 Labour workforce trends in the manufacturing sector

Average real wages have had an unequal evolution between 2002 and 2008 (figure 7). In our sample, we observe that real wages in the manufacturing sector have stayed the same. However, this is only because of lowering wages in middle income countries. In our distinct samples we observe a different pattern. In spite of declining wages from 2002 to 2004, wages in developing countries overall increased between 2002 and 2008. OECD countries experienced highest wage increases. In average, real wages in OECD countries increased a 2.79% per year. As noted above, average monthly wages do not account for the hours worked. Thus, changes in hours worked may be behind the evolution of wage patterns.

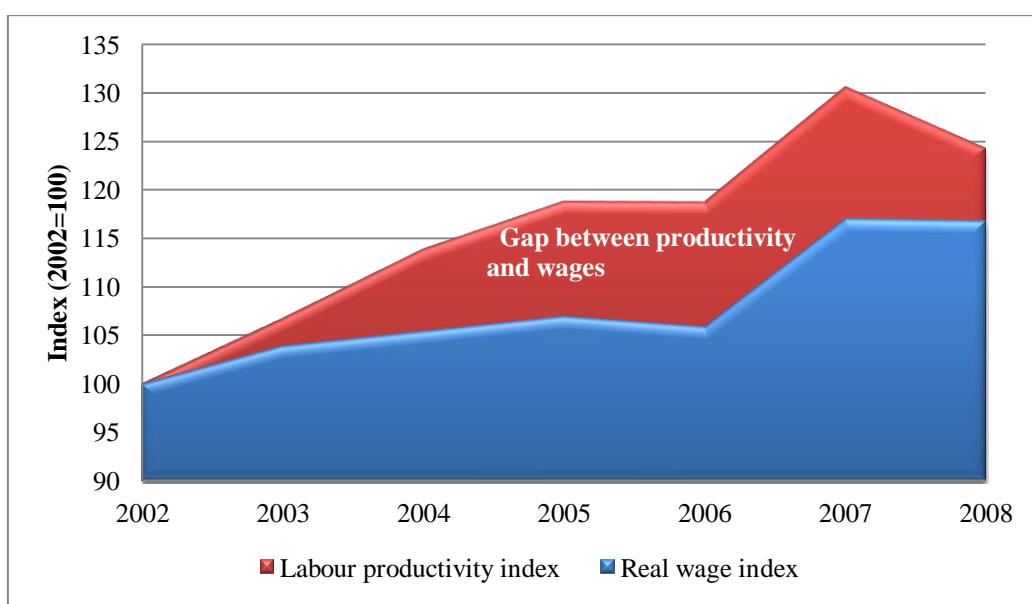
**Figure 7. Average Real Wage Growth for Selected Groups, 2002-2008 (index: 2002=100)**



Source: Author's calculations with UNIDO (2013) Note: Indices are unweighted averages.

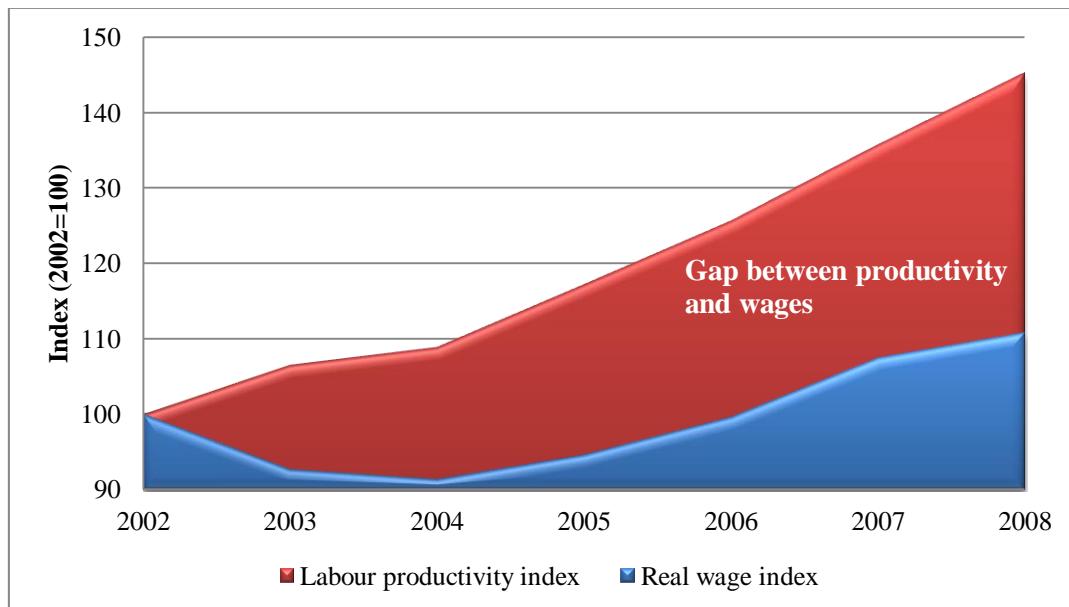
We now consider the evolution of average wages with respect to labour productivity. As previously shown for all sectors, increased productivity of labour is not transferred into a proportional increase in wages. In figure 8 and 9 we can see the cumulative real wage and labour productivity growth in developed as well as in OECD countries. Clearly, the gap between productivity and compensation of workers is increasing showing probably that gains from globalisation are not distributed evenly between capital and labour owners. However, the gap is greater in developing than in developed countries. This might be because the link between labour productivity and workers wages in developed countries is stronger than in developing countries, because of differences industry composition and structural change.

**Figure 8. Trends in growth in average wages and labour productivity in OECD economies, 2002-2008 (index: 2002= 100)**



Source: Author's calculations with ILO (2013) Note: Indices are unweighted averages.

**Figure 9. Trends in growth in average wages and labour productivity in developing economies, 2002-2008 (index: 2002= 100)**



Source: Author's calculations with ILO (2013) Note: Indices are unweighted averages.

## 5 Methods

### 5.1 The model

The impact of FDI on the labour market can be studied in the standard labour framework. Here we benefit from developments made by Aitken et al. (1996), Mehmet and Tavakoli (2003). The neoclassical economic specification developed by Aitken et al. (1996) derives from the standard production function<sup>19</sup>:

$$Y = A \cdot F(L, K) \quad (1)$$

where Y, L and K are total output, labour and capital stock respectively. We derive equation (1) and assume that the initial technological parameter ( $A_0$ ) equals one:

$$y = dA + \beta_1 l + \beta_2 k \quad (2)$$

where lowercase letters indicate rates of variable change. Thus,  $\beta_1$  and  $\beta_2$  represent the elasticity of labour and capital respectively.  $dA$  represents the endogenous change of technology which is dependent on FDI share ( $fdis$ ) which is FDI divided by total Output. The resulting equation after substituting both terms is as follows:

$$y = \alpha_0 + \alpha_1 fdis + \beta_1 l + \beta_2 k \quad (3)$$

Where the effect of  $\beta_2$  is expected to be positive and  $\beta_1$  is expected to be negative. The equilibrium in the labour market corresponds to the following equation:

$$NW = P * MP_L = Price * (A(FDI) f(L, K)) \quad (4)$$

Where W represents wages, P is prices, K is capital and L is Labour. If we divide prices in both sides we get real wages where higher amounts of capital increase labour productivity and thus wages:

$$W/P = \alpha_0 + \alpha_1 K + \alpha_2 L + \alpha_3 FDI \quad (5)$$

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<sup>19</sup> Neoclassical wage equations typically include factors that affect productivity i.e. the labour force and the capital available to work with a general price level for the economy (e.g. Teckan, 2010; Onaran and Stockhammer, 2006; Tintin, 2012).

Where the effect of  $\alpha_1$  is expected to be positive and  $\alpha_2$  is expected to be negative. The issue relies on the sign of  $\alpha_3$ . However, alternative specifications from the economic growth literature suggest that the model specification provided in equation (5) lacks two important variables: education and trade openness.

Education is potentially an important factor affecting labour productivity. From the political economy perspective, the more educated workers are, the greater bargaining power they will have (Seguino, 2007). From the neoclassic point of view, education also has a positive effect on wages as higher education leads to greater productivity of labour.

## 6 Empirical analysis

Taking into account the three approaches listed in the previous sections, we can estimate the effect of FDI on manufacturing wages in the following way:

$$\ln W_{it} = \beta_0 + \beta_1 FDI\_INFLows_{it} + \beta_2 FDI\_STOCK_{it} + \beta_3 \ln CAPITAL_{it} + \beta_4 \ln EMP_{it} + \beta_5 \ln EDUC_{it} + \beta_6 OPEN_{it} + \beta_7 CHINA INF_t + \beta_8 CHINA STK_t + \beta_9 T_t + \varepsilon_{it} \quad (6)$$

where  $W_{it}$  is the Average Monthly Wage in the Manufacturing Sector of country  $i$  at time  $t$  and  $FDI\_INFLows_{it}$  and  $FDI\_STOCK_{it}$  are FDI inflows and stock as a share of domestic capital in the manufacturing sector.  $CAPITAL_{it}$  and  $EMP_{it}$  are respectively domestic capital and employment in the manufacturing sector.  $EDUC_{it}$  and  $OPEN_{it}$  measure educational levels and international trade openness. Additionally, we include two dummy variables that take into account the specific effects of FDI inflows and FDI stock on wages for the case of China. This is:

$$CHINA INF_t = \ln FDI\_INFLows_{jt} \quad \text{where } j=\text{China} \quad (7)$$

$$CHINA STK_t = \ln FDI\_STOCK_{jt} \quad \text{where } j=\text{China} \quad (8)$$

Interpretations of  $\beta_1$  and  $\beta_2$  coefficients are straightforward. A positive (negative) sign means respectively that FDI inflows and FDI stock have positive (negative) effects on wages. Specifically a positive sign of  $\beta_1$  means that keeping other factors constant (manufacturing capital included), an increase in 1 percent in the share of FDI inflows to domestic capital

increases wages in a  $(\beta_1 * 100)$  percent. Alternatively a positive sign of  $\beta_2$  means that keeping other factors constant, an increase in 1 percent in the share of FDI inflows to domestic capital increases wages in a  $(\beta_1 * 100)$  percent. The effect of FDI inflows on wages in China is the sum of  $\beta_1$  and  $\beta_7$ . The effect of FDI stock on wages in China is the sum of  $\beta_2$  and  $\beta_8$ .

We gathered data of the variables for a total of 33 countries over the period 2002-2008<sup>20</sup>. Data limitations have forced us to work with such small number of countries. With such a limited number of countries we can estimate our model with pool OLS or with the panel OLS method. For all of our specified models, we test that our variables are highly correlated to individual specific unobserved effects and decide to use panel OLS procedures with fixed effects (FE).

The advantage of panel data is that it allows conducting analysis for a heterogeneous number of countries (Baltagi, 2001). Additionally it allows for more observations, better precision and higher power than in standard OLS estimation<sup>21</sup>.

## 6.1 Results

In this section, we present the results from the estimation of the effects of FDI in average manufacturing. First, we present estimation results for UNIDO Earnings data. Second, we conduct alternative estimations with ILO wage data.

### 6.1.1 Results for UNIDO Earnings data

According to the results reported in table 5, we find mixed evidence on the effect of FDI on earnings. Estimators for FDI stock are statistically significant at a 1 percent significance level. This result is found to be consistent for the different specifications of the full sample and when we rule out tax havens. For example, in the first specification of the full sample we see that *ceteris paribus*, a 1 percentage point increase in the share of FDI stock to domestic capital leads to a 0.17 percentage point growth in average manufacturing wages.

FDI inflows however show opposite results. We find that a 1 percentage increase in the FDI inflows to domestic capital share decreases manufacturing wages by 0.3 percent. However, we find FDI inflows is statistically significant at a 10 percent level when FDI stock is included.

Then again, we do not find any significant effects for OECD nor for developing countries. Both FDI have a significant and negative effect in China. An increase in 1 percentage point in the share of FDI stock to domestic capital stock leads to a 3.8 percentage decline in

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<sup>20</sup> For a detailed explanation on data construction please refer to the data section

<sup>21</sup> To account for country and time fixed effects in the error term, equation 6 is estimated using country and time effects in the error term. We additionally conducted a Haussmann test to see whether Random Effects perform better but this wasn't the case.

Chinese manufacturing wages.

Our control variables were found to have different levels of significance. Employment and Domestic capital have the predicted effects found in literature. An increase in the labour force has a negative effect on wages, indicating that the expansion of employment holds down wages. The coefficient is significantly negative in the case of developing countries, indicating greater elasticity demand for labour for countries in that sample.

An increase in the percentage of population in secondary education does not have a significant effect on wages. However, labour literature in the past has had problems in finding this relationship significant (Seguino, 2007). Similarly, openness has not been found to have an effect on wages<sup>22</sup>.

### 6.1.1 Results for ILO Wage data

Estimations of the effects of FDI on manufacturing wages from ILO are reported in table 6. These confirm the mixed findings we found in table 5.

The obtained estimators for FDI stock show a positive relationship between this variable and wages as well as a negative relationship between FDI inflows and wages. However, estimations for ILO wage data show smaller size of the estimates. This may be due to lower within country variation of ILO wage data. This is due to lower within-country variation of wages.

A 1 percentage point increase in the share of FDI stock to domestic capital leads to a 0.14 percentage increase in manufacturing wages. Estimations confirm that neither FDI stock nor FDI inflows have an effect on developing countries. Additionally, we see the significance of labour elasticity in developing countries.

In contrast with table 5, here we find that FDI inflows have a negative impact on wages in the OECD sample. Alternatively, we find a smaller but positive impact of FDI stock.

Estimations also show a negative relationship between FDI and wages in China. As before, estimates of the effect of FDI inflows are less big but still considerable. However, it appears that FDI does not have positive effects on Chinese workers' wages.

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<sup>22</sup> Estimations were conducted without these factors but results estimators do not change much.

**Table 5. Fixed effects estimation with UNIDO Earnings Data**

Dependent variable: Average Monthly Real Earnings in logged form.

	ALL			ALL EXCEPT TAX HAVENS			OECD			DEVELOPING		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
Ln Employment	-0.4161 (0.2632)	-0.4331 (0.2726)	-0.1504 (0.3236)	-0.6082** (0.2779)	-0.5678* (0.2870)	-0.2567 (0.3545)	-0.1915 (0.1730)	-0.1967 (0.1753)	-0.1840 (0.1659)	-1.4738** (0.5011)	-1.3701* (0.6070)	-1.4439** (0.5206)
Ln Capital	0.3910*** (0.0801)	0.3897*** (0.0833)	0.2723** (0.1125)	0.4299*** (0.0919)	0.4233*** (0.0954)	0.2591** (0.1210)	0.3484** (0.1428)	0.3409** (0.1425)	0.3440** (0.1382)	0.4604* (0.2072)	0.4353* (0.2104)	0.4361** (0.1532)
Openness	0.0002 (0.0008)	0.0002 (0.0009)	-0.0001 (0.0009)	0.0002 (0.0009)	0.0001 (0.0009)	0.0002 (0.0010)	-0.0005 (0.0006)	-0.0005 (0.0006)	-0.0005 (0.0006)	-0.0017 (0.0036)	-0.0013 (0.0034)	-0.0005 (0.0041)
Secondary Education	0.0515 (0.1965)	0.0898 (0.2082)	0.0076 (0.2091)	-0.0711 (0.1518)	-0.0209 (0.1718)	-0.0503 (0.1854)	0.0643 (0.1001)	0.0681 (0.1035)	0.0643 (0.0986)	-0.2109 (0.9301)	0.0186 (0.9767)	-0.0281 (0.9870)
FDI Inflows	-0.0030* (0.0015)		-0.0014 (0.0017)	-0.0031* (0.0018)		-0.0014 (0.0022)	-0.0016 (0.0009)	-0.0014* (0.0007)		-0.0028 (0.0016)	-0.0012 (0.0014)	
FDI Stock	0.0017*** (0.0005)	0.0015*** (0.0005)	0.0021*** (0.0005)		0.0019*** (0.0004)	0.0001 (0.0002)		-0.0000 (0.0002)	0.0026 (0.0022)		0.0016 (0.0017)	
FDI Inflows*China				-0.6188*** (0.1050)				-0.5124*** (0.1296)				-0.9084*** (0.1463)
FDI Stock*China				-0.0403*** (0.0064)	0.0119*** (0.0030)	-0.0305*** (0.0080)				-0.0580*** (0.0089)	0.0185** (0.0058)	-0.0555*** (0.0092)
Observations	208	208	208	189	189	189	110	110	110	57	57	57
R-squared	0.6476	0.6329	0.5724	0.6811	0.6558	0.5913	0.7089	0.7012	0.7080	0.7596	0.7156	0.7460
Number of country	32	32	32	29	29	29	17	17	17	9	9	9

Source: Author's calculations with UNIDO (2012) data.

Note: Model (1): FDI inflows and FDI stock included. Model (2): FDI stock included. Model (3): FDI inflows included.

Robust standard errors in parentheses. Linear time trend not reported. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1



**Table 6. Fixed effects estimation with ILO Wage Data**

Dependent variable: Average Monthly Real Wage in logged form.

	ALL			ALL EXCEPT TAX HAVENS			OECD			DEVELOPING		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
Ln Employment	-0.3151 (0.2059)	-0.3292 (0.2103)	-0.1062 (0.2495)	-0.4082* (0.2015)	-0.3823* (0.2078)	-0.1586 (0.2505)	0.0820 (0.2096)	0.0747 (0.2135)	0.1179 (0.2003)	-0.9071* (0.4064)	-0.8504 (0.4601)	-0.8974* (0.4110)
Ln Capital	0.3770*** (0.0791)	0.3759*** (0.0807)	0.2837*** (0.0990)	0.3633*** (0.0881)	0.3589*** (0.0897)	0.2420** (0.0975)	0.2930 (0.1719)	0.2825 (0.1705)	0.2719 (0.1712)	0.4583 (0.2668)	0.4384 (0.2546)	0.4505 (0.2579)
Openness	0.0000 (0.0008)	-0.0000 (0.0008)	-0.0002 (0.0009)	0.0006 (0.0009)	0.0005 (0.0009)	0.0006 (0.0010)	0.0000 (0.0008)	-0.0000 (0.0008)	-0.0002 (0.0007)	-0.0015 (0.0031)	-0.0011 (0.0028)	-0.0011 (0.0029)
Secondary Education	-0.1351 (0.1708)	-0.1033 (0.1790)	-0.1696 (0.2052)	-0.1431 (0.1488)	-0.1013 (0.1613)	-0.1283 (0.1787)	0.0202 (0.1186)	0.0254 (0.1246)	0.0200 (0.1230)	-0.5656 (0.7528)	-0.3640 (0.7370)	-0.5069 (0.6915)
FDI Inflows	-0.0025* (0.0013)		-0.0012 (0.0014)	-0.0029* (0.0016)		-0.0017 (0.0018)	-0.0022** (0.0009)		-0.0012 (0.0008)	-0.0026 (0.0015)		-0.0021 (0.0016)
FDI Stock	0.0014*** (0.0004)	0.0012*** (0.0004)		0.0015*** (0.0004)	0.0013*** (0.0004)		0.0007** (0.0003)	0.0004* (0.0002)		0.0008 (0.0018)	-0.0001 (0.0016)	
FDI Inflows*China				-0.4183*** (0.0860)		-0.3427*** (0.1019)				-0.6526*** (0.1507)		-0.6556*** (0.1462)
FDI Stock*China				-0.0259*** (0.0050)	0.0094*** (0.0028)	-0.0189*** (0.0060)				-0.0390*** (0.0083)	0.0164** (0.0049)	-0.0381*** (0.0090)
Observations	208	208	208	189	189	189	110	110	110	57	57	57
R-squared	0.5402	0.5285	0.4868	0.5985	0.5770	0.5428	0.5671	0.5518	0.5467	0.6702	0.6358	0.6684
Number of country	32	32	32	29	29	29	17	17	17	9	9	9

Source: Author's calculations with ILO (2012) data.

Note: Model (1): FDI inflows and FDI stock included. Model (2): FDI stock included. Model (3): FDI inflows included.

Robust standard errors in parentheses. Linear time trend not reported. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1



Taking into account results from estimations on earnings and wages, none of the approaches analyzed give a good explanation on the effects of FDI in the totality of our sample. Whilst there is preliminary evidence in favour of the neoclassical approach in the effect of FDI stock on manufacturing wages, there is no such evidence of positive effects of FDI inflows on wages. How can we reconcile both facts? Both in the political economy and in the neoclassical approach FDI stock measures the genuine effect of FDI existent in an economy. It can be understood as confronting more rigid structures as it suffers transaction costs. Consequently we could understand this as FDI of better quality. On the other hand, FDI inflows can be particularly indicative of the unstable nature of global capital movements. Consequently, results should be taken with caution. Additionally, FDI inflows could respond to short term features of capital deregulation. Alternatively, it may be showing the negative effects of capital dependency or the bargaining power approach as in Vijaya and Kaltani, (2007). Thus, a relative variation in FDI inflows could be causing downward pressures on wages.

Interestingly enough, for developing countries we do not find any statistically significant effects of FDI on wages. For China however, we find that FDI has a negative effect, providing evidence supporting the political economy and sociology approaches.

## 6.2 Discussion

Results in the previous section provide with mixed evidence on the effects of FDI on manufacturing wages. Whilst we see positive effects of FDI stock on wages and negative effects of FDI inflows on wages we should be cautious of what this entails. Alternatively, the negative correlation between FDI and wages in China is of great interest. In order to assess the validity of our findings we should put in place certain limitations that potentially may affect our results.

### Limitation 1: mismeasurements

International wage data suffers from multiple definitions susceptible to individual country standards which might lead to mismeasurements. Additionally, wage variables suffer from underestimation of wage decreases due to composition effects (ILO, 2013). However, a bigger concern relates to the mismeasurement FDI data due to round-tripping and transhipping (Seguino, 2007). Such problems if systematic could cause bias our estimations. We attempt to control for this problem by excluding tax havens from our sample. However, these problems

may persist. Another problem of mismeasurement consists in estimating the effect of FDI on manufacturing wages with aggregate estimations of FDI instead of using FDI in the manufacturing sector (for ex. Vijaya and Kaltani, 2007). This study makes use of data of FDI in the manufacturing sector. However, the drawback of such variable measure is when manufacturing wages are being affected by changes in FDI composition of other sectors.

### **Limitation 2: omitted variable bias.**

In our estimations, we included secondary school enrolment. An argument for the inclusion of this variable is that higher education incorporates greater labour productivity as well as higher bargaining power of workers (Seguino, 2007). However, in most cases we haven't found significance of education. Further research should take into account additional fields. For example, this study does not control for industry-specific variations. FDI is likely to affect labour-intensive industries in a different way than capital-intensive industries (Onaran and Stockhammer, 2008). It would have been useful to conduct assessments with this data since it is likely that the effect of FDI on wages is more obvious in countries with more FDI in the manufacturing sector. Increased upgrading of tasks in manufacture requires higher skills for workers. Comparing manufacturing wages has become increasingly difficult as there is a wide diversity in the tasks carried out by workers in the manufacturing sector, depending on the sophistication of their products and tasks.

### **Limitation 3: reverse causality.**

The RTB hypothesis predicts that the lowering of wages in a country will lead to higher FDI inflows. Thus, capital deregulation may generate greater competition for attracting capital (Drezner, 2006). In order to solve part of endogeneity problems, we make use of a panel (OLS) with FE and control for additional variables which might bias our results. However, we might want to be cautious as estimators need to be strictly exogenous. This way, future research should consider to explore IV and GMM techniques.

### **Limitation 4: different samples.**

Finally, the last concern deals with the utilization of different samples to conduct inferences. Results could respond to systematic differences in our samples. This way, results concerning the OECD economies and developing countries should be taken as purely indicative.

To sum up, we have found mixed findings on the effect of FDI on wages in the

manufacturing sector. However, we do not find evidence that FDI has neither a positive or negative causal effect on wages. In this sense we should speak in terms of correlations.

The picture that emerges is that of a globalizing world in which FDI has unequal effects on wages between different samples of countries. Whilst there is mixed evidence on the effect of FDI in our sample, if we consider only developing countries we did not find significant effects of FDI on wages. Even more striking, we find that FDI does not have positive effects in China. In the sample including all countries as well as that without tax haven's there appears to be some positive correlation. However, the question is what characteristics a country has to have in order to perceive such technology spillovers. In this sense, further research is needed.

## 7 Concluding remarks

The present master thesis aims to answer the following research question: what is the impact of foreign direct investment (FDI) on average wages? To this aim, we analyze the effects of FDI inflows and FDI stock on wages in the manufacturing sector and conceptualize existing literature on the topic. Mainstream economic literature has openly argued in favour of FDI, underscoring that additionally to increased capital, foreign investment operates as a channel of technology diffusion that leads to permanent higher labour productivity and wages (Lipsey and Sjöholm, 2005). In contrast, a heterogeneous group of scholars, ranging from sociologists to political economists have stressed that foreign investment decreases bargaining power of labour causing a decline on wages (Seguino, 2007; Vijaya and Kaltani, 2007).

To test the validity of these approaches, we constructed a panel of 33 countries further disaggregating samples into OECD economies and developing countries. We find mixed evidence on the effect of FDI on wages in the manufacturing sector. FDI stock has positive effects on manufacturing wages, when found statistically significant. This provides preliminary evidence to support the neoclassical approach.

On the other hand, when significant, FDI inflows are found to have negative effects on manufacturing wages. We do not find evidence that FDI has any effect on manufacturing wages in developing countries. Consequently, economists and policy-makers should be more cautious when making assumptions on the positive effects of FDI.

This study has three major limitations. Firstly, FDI is likely to suffer from systematic mismeasurements. To control this, we decided to exclude tax havens in one of our

specifications. Secondly, there might be omitted variable bias. We included additional variables to account for this problem. Thirdly, our variables of interest might suffer from reverse causality. This is, the reduction of wages might attract further FDI. Results should be therefore taken with caution.

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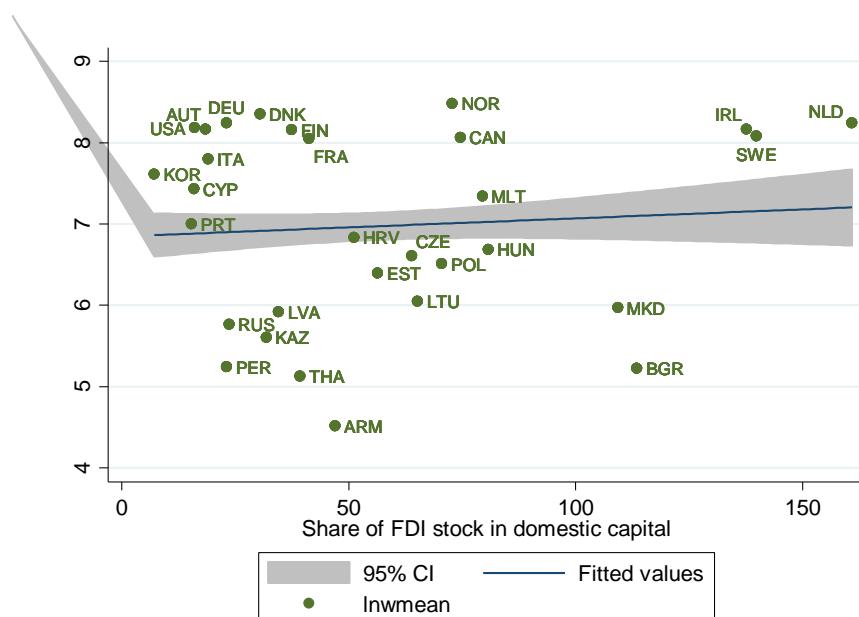
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## Annexes

### Data annex description

Symbol	Variable	Data Source	Unit of Scale
UNIDO and			
AW	Real Monthly Average Wage	ILO	2005US\$
EMP	Employment	UNIDO	Number of employees (in thousands)
FDI-FLOW	FDI inward flows as a share of domestic capital stock	ITC and WDI	%
FDI-STOCK	FDI inward stock as a share of domestic capital stock	ITC and WDI	%
UNIDO			
K	Domestic capital stock	WDI	2005US\$
EDUC	School enrollment, secondary (gross)	WDI	%
OPEN	Openness [(Exports +Imports)/GDP]	WDI	%

Annex 1. Scatter plot of wages in logged form against FDI stock variable, mean values, 2002-2008



Annex 2. Scatter plot of wages in logged form against FDI inflows variable mean, 2002-2008

