



JÖNKÖPING INTERNATIONAL BUSINESS SCHOOL
JÖNKÖPING UNIVERSITY

FDI Impact on Gross Profit, Wages and Labour Productivity

A Study of Swedish Firms in the Industrial Goods and Services Sector

Bachelor Thesis in Economics

Author: Andreas Blick

 David Mårtenson

Tutor: Börje Johansson

 Tobias Dahlström

Jönköping June 2007

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Author: Andreas Blick, David Mårtensson

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Date: June 2007

Abstract

This thesis analyses what effects foreign direct investments (FDI) has on a firm's gross profit, wages and labour productivity. Focus is on the Swedish industrial goods and service sector which has shown on a rapid growth of offshore production. We use a theoretical framework with FDI and productivity theories. As a result of cost efficient alternatives to domestic production, a firm's productivity should fall in the case of increased foreign production. Although, the increase in gross profit should rule out the negative affect that a decrease in productivity cause.

There is a positive relationship between offshore production and gross profits, and expanded foreign production leads to a decreased wage rate. However, increased foreign employment showed a boost the labour productivity, which is wrong from a theoretical point of view.

Kandidatuppsats inom Nationalekonomi

Titel: Utländska direktinvesteringars påverkan på vinst, löner och produktivitet

Författare: Andreas Blick, David Mårtenson

Handledare: Börje Johansson, Tobias Dahlström

Datum: Juni 2007

Sammanfattning

I den här uppsatsen analyseras hur utländska direktinvesteringar påverkar företags vinster, löner och arbetsproduktivitet. Fokus är ställt på svenska företag inom sektorn industriella varor och tjänster. Den teoretiska delen tar upp utländska direktinvesteringar och arbetsproduktivitet. Som ett resultat av kostnadseffektiva alternativ utomlands, borde arbetsproduktiviteten falla om den utländska produktionen ökar. Den väntade vinstökningen efter utlandslokalisering borde dock ge en generell positiv effekt.

Den empiriska delen visar ett positivt samband mellan utlandslokalisering och vinst. Bevis finnes också för att medellönen sjunker när utlandslokaliseringen ökar. Empiriska resultat visar också att ökad utlandslokalisering ökar arbetsproduktiviteten, vilket ur teoretisk ståndpunkt inte stämmer.

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1 Introduction

Maximizing profits is the most fundamental aim for every operational firm (Varian, 2006). How to reach the goal is moreover a much more complex task. During the last decades, FDI has become a revolutionary path to stimulate firm growth. The expression multinational enterprise has lately become a craze in economics literature. Due to stronger competition in western markets, corporations have been stimulated to find new ways to stay competitive and gain market shares. Offshore production has grown rapidly and the global sales of multinational firms ruled out the global exports in the beginning of the 90's (Dunning, 1998). This thesis focus on vertical integration as an attempt to minimize production costs. This type of off shoring has put more pressure on domestic producers, to increase their productivity. Furthermore focus will be on the labour side of vertical integration and how wages tend to affect the gross profits of firms with high rates of foreign employment and low rates respectively.

The large increase in FDI the last decades makes it a very hot topic in this era of internationalisation and globalisation. The Swedish approach is indeed interesting, especially due to high labour costs and taxes which firms in Sweden are faced with. The tax of labour is heavily debated in the Swedish and the conservatives want to decrease them to give incentives for firms to expand their businesses and to stay in Sweden (Brors, 2006, Isaksson 2007 & Erlandsson, 2006). On the other hand several firms in our data set still keep more than half of their employees in Sweden. In this sense we found the topic of offshore production among Swedish firms interesting; particularly what implications it has on productivity, wages and gross profits. If labour costs decrease and gross profits increase when the fraction of foreign employment increases, one can argue that production abroad is the best path to follow for Swedish firms.

1.1 Problem

FDI has increased for several decades and it has reduced the incentive of exporting and licensing different products (Dunning, 1998). Vertical integration or cost efficient foreign solutions are closely related to the standardization phase in the product lifecycle theory. When the product has gone through its innovative period and the demand has grown strong on the home market, more firms have adapted the new product and produced similar ones. Due to falling prices and decreasing market shares in the home market, firms need to locate new demanding markets (Vernon, 1966). Simultaneously as the price and quantity sold fall so does the profit. Therefore, one reason for why firms seek cost effective solutions in foreign countries is the ambition to generate higher profits during the whole product lifecycle. More multinational firms have R&D units and product development in many countries (Buckley 1998).

The discussion about FDI has lately become a discussion about different advantages instead. This theory is called the eclectic theory. In order to succeed with a foreign investment, a firm need an ownership, location or internationalisation advantage. The outsourcing of production has been an intentional breakthrough for the single firm, but the national governments have not been as positive. Governmental criticism of offshore production has been that jobs are becoming shipped out of the countries, leaving more people unemployed. Instead, there has been promotion for domestic production and spending resources on increasing productivity in the domestic markets.

Despite more resources spent on productivity development, smaller firms in particular have had problems to compete with the cost-efficient firms, partly located outside Sweden. There are however positive results for the industry. High competition forces firms to increase their own productivity (Baldwin 1992). Data from the annual reports of large Swedish firms shows an increasing level of foreign occupation. The nationality of ownership plays a much smaller role nowadays when the focus has been drawn more towards competence, attractive markets and competitive alternatives. The Swedish weakness during the growing outsourcing period has been the taxes and the labour market. The Swedish industrial goods and services sector is on of the sectors with the highest rates of outward FDI.

1.2 Limitations

This thesis does not try to explain why a firm undertakes FDI, (although empirical results can give a hint of that) neither does it try to explain where FDI is directed or the ownership nationality. Instead the focus is laid on how the fraction of offshore production affects gross profits, wages and labour productivity. Although interesting, a research of why FDI is made must be carried out with qualitative research as well and not purely quantitative as this study.

1.3 Purpose

The purpose of this thesis is to analyse if the fraction of firms' workforce employed outside the Swedish borders affects the gross profit, wages and the labour productivity.

1.4 Previous Studies

There have been extensive studies of FDI, especially since the foreign investments exploded during the last decade. One of the first known modern theorists on the subject was Raymond Vernon, who came up with the still used product life cycle theory of foreign investments. John Dunning is another known author in the field. He constructed the eclectic theory during the 1970s. These two theo-

ries of foreign investments are the once mostly used when explaining why companies are undertaking foreign investments. As for the previous studies of labour productivity, the studies on FDI mostly concern the in- and outward investments of countries. The firm-specific studies are very few.

1.5 Outline

This thesis continues with the theoretical framework, which is chapter two. The third chapter discusses the data and is labelled descriptive statistics. The empirical framework is chapter four and is followed by analysis in chapter five. Conclusions and further studies are given in chapter six.

2 Theoretical Framework

2.1 Foreign Direct Investment

Buckley (1998) defines FDI as “the acquisition abroad of physical assets, such as plant and equipment, with operational control ultimately residing with the parent company in the home country” (Buckley p. 110, 1998). Many authors believe FDI has a positive effect for the host country of the investment, see for example Bende-Nabende (2002), Seid (2002) and Kjeldsen-Kragh (2002). The positive effects of FDI are the important transfer of technology, the transfer of knowledge and the transfer of managerial skills from one country to another (Bende-Nabende, 2002). The inflow of capital to a developing country increases the total savings and the tax revenue in the country. Economic activity and overall social well-being increases as well with the inflow of FDI (Seid, 2002). During the last couple of decades FDI has increased a lot. In 1992 the global sales of multinational firms for the first time was larger than the world wide exports. FDI therefore plays a very important role in the international economy. Investments by multinational firms increase competition and productivity everywhere (Dunning, 1998).

2.1.1 Horizontal versus Vertical FDI

There are two main types of FDI activities by firms; horizontal integration and vertical integration. The differences between them are how and where a firm produce and their objective of expansion (Bora, 2002). Horizontal investments take place when a production facility is duplicated in the host country of the investment. The objective of this form of FDI is to get market access in another country. A reason for horizontal FDI can for example be an import barrier, which more or less rule out exports and FDI then is more efficient. Vertical FDI performed by a multinational firm is used for minimizing production costs and to produce more efficiently. Different stages in the production of a good are spread

over several countries and production facilities, and trade within the firm is necessary (Bora, 2002).

2.1.2 Theories of Foreign Direct Investments

In the literature about FDI there are especially two theories that explain why firms make investments abroad, instead of export and use licenses. The theories are the product life cycle of international investment and the eclectic theory (OLI paradigm). The product life cycle theory of international investment was first constructed by Vernon 1966, who aimed to explain why international production existed (Bende-Nabende, 2002). The theory is different from traditional trade theory due to four key assumptions:

- Taste is different in different countries
- Economies of scale in production
- Flows of information between countries are restricted
- Over time the production process changes (Buckley 1998)

The original product life cycle theory consists of three phases; the new product phase, the maturing or growth phase and the standardization phase. The stage in which the product is situated is crucially in explaining where the product will be produced and sold (Kjeldsen-Kragh, 2002). The theory is based on the fact that new products will be innovated in advanced countries where the consumers are rich and able to acquire new products. The demand is greater, the speed of knowledge is faster and the communication between producers and consumers is better in advanced countries (Vernon, 1966).

The products that Vernon used to construct his theory are R&D and skill intense products. Because of this, the production will first only take place in the domestic market of the innovator, about which the innovator is assumed to possess greatest knowledge of. Another reason for this is that the flexibility of inputs is small; all the possible inputs need to be close to the production facility in order to not interrupt the production process. Moreover, for those products the employees needs to be highly skilled, which also contributes to the theory of why production first will take place in an advanced country. Later in the product life cycle, when the product becomes more standardized, firms will choose to build production plants in low wage countries to keep their costs down (Vernon 1966).

The theory of the product life cycle in international investment is not fully accepted by economists, for example because it is not explaining why FDI is chosen instead of exporting or licensing and because of the theory cannot predict the trade of raw materials. The theory was more accurate a couple of decades

ago, and has less relevance today when multinational firms has R&D offices and new product development in many countries (Buckley 1998).

2.1.3 Eclectic Theory

The eclectic theory of FDI, developed by John Dunning, explains why FDI takes place at all. If a firm decides to perform FDI, there must be some advantage of this instead of exporting or licensing a product. Those advantages are what the eclectic theory explains. There are three advantages: ownership advantage, location advantage and internationalisation advantage (Bora, 2002 & Bende-Nabende, 2002).

- Ownership advantage: this advantage consists of advantages in production technology, managerial resources and marketing techniques. Those three assets give an advantage over national firms in the host country of the investment. More effective production, ownership skills and marketing are the core of ownership advantage.
- Location advantage: the host country of the investment has to be attractive in some way. Low labour costs, large domestic market and tax incentives are a few location advantages.
- Internationalisation advantage: the internationalisation advantage is the incentives that the firm may possess to perform FDI instead of licensing or exporting. Included here is for example the desire to erase the risk of losses due to fluctuations in exchange rates. (Bora, 2002 & Bende-Nabende 2002)

In summary, the theory explains that a firm start its production in the domestic country, when the demand for the product increases abroad exporting and maybe licensing will be the first international experience for the firm. When exports gets sufficiently large and production, managerial and marketing techniques are well developed, FDI are considered. If the firm, at the same time, possess the three advantages mentioned above, FDI is a better option than licensing and exporting (Bora, 2002 & Bende-Nabende, 2002).

2.2 Productivity Theory

The discussion about productivity has been more and more present during the last decades. Whether a study of the subject should focus on total factor productivity (TFP) or labour productivity differ in economic papers and literature.

The literature separates labour productivity from TFP. It is claimed that increasing TFP is a result of technological progress while labour productivity growth is a phenomena build on the connection between capital and labour inputs. The

most recent examined factors of productivity growth are assets such as managerial skills, technology, human capital and regulation. Hence, there is lacking knowledge of their relative importance and how they interact. One commonly used function of labour productivity is the Bartelsman and Dooms theory which is stated as follows:

Equation 1

$$LP_{it} = (Y_{it} / l_{it})$$

In the equation above Y denotes the output for firm i during period t . l is an expression of the amount labour input of firm i in period t . Moreover, labour productivity is usually expressed as the average output produced by each input of labour each working hour. Labour productivity can be calculated on a national level or within industries, but when it comes down to the firm level it becomes more complex. The lack of information of working hours on firm level makes this theory difficult to use when one analyses annual report data.

The other measurement of productivity, TFP, is expressed as follows: the extra output produced when one hold the input of labour and capital fixed. Instead it is technological progress that results in a growing rate of TFP. Adapting this on a firm level showed to be difficult as well because data on technological process are not to be found on firm level. One reason is that one cannot measure the skills of a firm's labour with a numerical angle of approach. We therefore suffer some setbacks when we try to use TFP as a measurement of the chosen firms. Since we do not have any data on working hours either we cannot use none of the Bartelsman and Domms theory or TFP in our analysis. Instead we have to narrow it down and focus on the wages.

2.2.1 Wages Effect on a Firms Productivity

A partly off shored firm with the aim to be cost-effective have two different wage levels. The foreign wages have to be lower than the domestic wages in order for a successful investment. W/L_1 is a firm's average wage rate in Sweden, while W/L_2 expresses the average wage rate in the foreign country:

Equation 2

$$W / L_1 > W / L_2$$

The total wage is the sum of W_1 and W_2 :

Equation 3

$$W_1 + W_2$$

When a firm chooses offshore production, it results in that foreign employment increases while the home employment has an opposite effect. Moreover it is a

relative decrease in the amount of home employment. As an effect of the offshored production the total wages paid will fall.

Equation 4

$$U1/U2 \downarrow \Rightarrow \text{Total wages} \downarrow$$

According to microeconomic theory, labour productivity increases with the wages. Higher wages has a positive effect on labour productivity (Neil & Sollow, 2001). The other factor that can boost productivity is technological progress. Although in this thesis we focus on labour and the price of labour as the only shifting factor. Therefore we consider the rate of technology to be equal among the firms. Moreover, when we look at wage as a factor of productivity we reach the following labour productivity formula based on gross profits and wages.

Equation 5

$$F = W + B$$

In this equation F denotes labour productivity as a function of the total wage and the gross profit. There are several reasons why corporations move parts of their production abroad. Thus, since we believe that the Swedish industrial goods and service sector is relatively labour intensive, the probable reason of the offshoring is to minimize cost.

From this model we assume that a higher rate of foreign production will lead to lower total wages (W). Furthermore, the gross profit (B) will boost because of a declining production costs. The wages will decrease faster than the boost of the gross profits which will cause the labour productivity (F) to fall. Therefore, companies with higher rates of foreign employment gain higher gross profits despite a lacking annual labour productivity. Thus, it might be lags in the statistical results from the observations. An increase in foreign employment may not show an immediate increase in the gross profit. We therefore use a lag of two and three years respectively for the gross profits, to analyze if we can find evidence of an increasing effect. We also test if there are evidence of a positive correlation between gross profit (B) and wage per employee. A high rate of foreign employment will most likely generate a high gross profit per employee despite the negative effect on labour productivity. Thus, F will drop slower than B/W will increase.

2.2.2 Productivity and Cost Minimization

Stefan Tangen (2003) discusses different endogenous and exogenous factors which influence productivity. In order to compete with firms with high rates of FDI, the firms with low rate need to improve factors such as speed, reliance, flexibility, and quality. The fifth factor which is cost may be difficult to adjust in

shorter perspectives when keeping the amount of capital and labour constant. In order to increase productivity this put pressure on technological progress.

It is the cost advantage which many outsourced firms possess that is the greatest treat to domestic production. Furthermore, when discussing costs, Tangen (2003) means that a firm can keep their prices low or have a high value added. The other path is cost efficient operations which is one reason to invest in foreign countries. An effective cost efficient operation such as FDI, put pressure on the domestic firms the increase their other factors. Although, there is a start-up process of a new factory or entering a new market abroad and it will most likely result in a competitive advantage for the investing firm. Moving production to a low cost country is one way to minimize the firm's costs and thereby be able to keep a high profit margin. Moreover, since we believe that the industrial goods and service sector is a relatively labour intensive sector, cost minimization is the probable reason of the outsourcing in the first place.

3 Descriptive Statistics

3.1 Data

Data for the empirical analysis has been collected for the years 2001 to 2005 for Swedish companies within the sector industrial goods and services. The main sources are Largest Companies database and the Osiris database. Annual reports from the companies have also been used in the search for the data. The data include: number of employees, fraction of employees working abroad, total wages and gross profit. In the Osiris database we searched for Swedish, publicly quoted companies in the industrial goods and services sector. 77 companies were listed, and a "single out" process started. Companies younger than five years and companies that lacked data were, for obvious reasons, taken away. After this process, 46 random sized companies were left. One advantage with using companies from only one sector is that the market trend is the same for all companies, which is why no market trend deflator is used in our models. Another advantage is that the firms have similar production and costs so that they can be compared in the first place.

3.2 Offshore Production

Between 2001 and 2005 the foreign employment among the companies in our data set increased by 12 percent. The mean for the years can be seen in figure 1.

Figure 1 Foreign Employment 2001-2005



Source: Constructed by authors with data from Largest Companies and Annual Reports from 2002-2006

There is a downturn in 2002, but from 2003 and forward the fraction of the workforce employed abroad has increased on a yearly basis. The companies in the industrial goods and services sector raise their fractions of the workforce employed abroad, which is an evidence of more offshore production. The data also shows that the more employees in a company, the larger is the fraction of foreign employment. A large company tends to have more foreign production than a smaller one, which is showed in table one.

Table 1 Companies divided by size and fraction of foreign employment

Table 1. Companies divided by size and fraction of foreign employment.	
<i>Number of employees</i>	<i>Average percentage of workforce employed abroad</i>
0-700 (15 firms)	25,7 %
701-3000 (16 firms)	37,2 %
3001-220000 (15 firms)	70,2 %

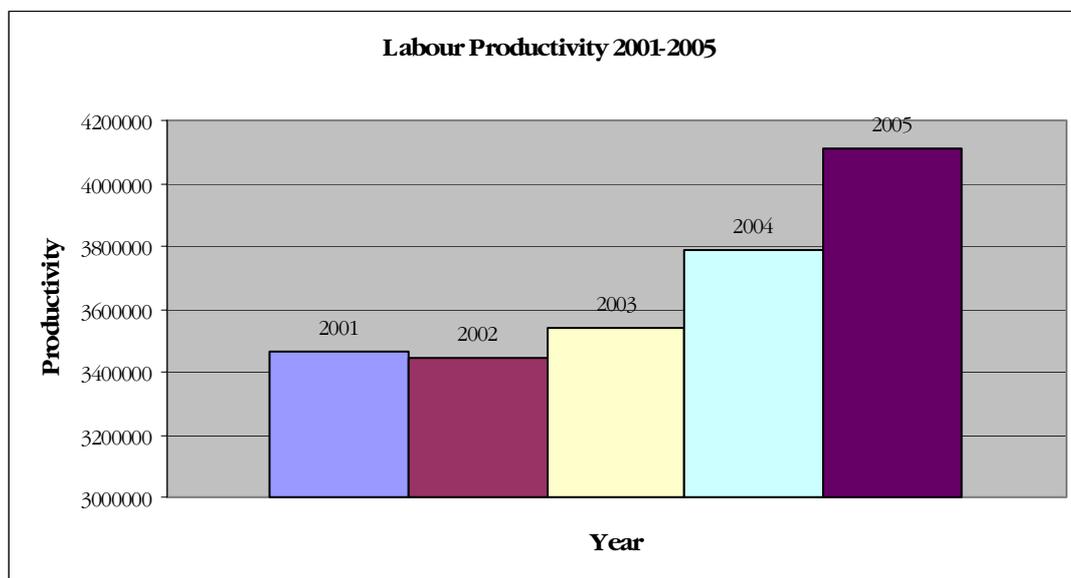
Source: Constructed by authors with data from Largest Companies and Annual Reports from 2002-2006

3.3 Growth in Productivity, Wages and Gross Profits

The labour productivity has increased with almost 16 percent over the time span. The average productivity level among the companies can be seen in figure two.

There is a small downturn from 2001 to 2002, but since 2002 the productivity level has increased every year. Both 2000 and 2001 were relatively bad years on the stock market and for the overall economy activity (see for example the Annual Report from Second Swedish National Pension Fund 2001) which is one reason for the decrease in 2002.

Figure 2 Labour productivity 2001-2005



Source: Constructed by authors with data from Largest Companies and Osiris Database

Below, in table two, descriptive statistics for the labour productivity show that there is a great difference between the maximum and the minimum productivity level among the companies. One interesting point is that the minimum productivity level has more than doubled between 2001 and 2005, whereas the maximum decreased between 2001 and 2004 before returning in 2005 to a slightly higher level than 2001.

Table 2 Labour productivity 2001-2005, descriptive statistics

Table 2. Labour productivity 2001-2005, descriptive statistics.					
<i>Year</i>	<i>Mean</i>	<i>Median</i>	<i>Maximum</i>	<i>Minimum</i>	<i>Std. Dev.</i>
2001	3465654	401600	46131387	23772	8489441
2002	3444905	391134	44863660	24548	8302041
2003	3538571	394309	40086969	32253	8472144
2004	3785989	414950	40405999	35925	8810690
2005	4110629	402659	47737156	48740	9910940

Source: Constructed by authors with data from Osiris database

The wage level has encountered a moderate increase of seven percent within the group of companies from 2001 to 2005. The cost of employees in the total manufacturing sector in Sweden grew with 5,2 percent yearly between 2001 and 2003, and is expected to grow with 4,0 percent between 2004 and 2006 (Facken inom industrin, 2006). The lower increase among the companies in our investigation can be explained by the increase in foreign employment. As the labour productivity and the foreign employment, the average gross profit also faced a downturn in 2002. Since 2002, however, the average gross profit for the companies has quadrupled. The development of the average gross profit and wage level can be seen in figure three.

Figure 3 Gross profit & Wage 2001-2005



Source: Constructed by authors with data from Largest Companies and Osiris Database

4 Empirical Framework

The aim in this thesis is to see if the labour productivity, wages and the gross profit are related to the fraction of the workforce employed outside Sweden. Since there must be underlying reasons for foreign investments, this empirical chapter will see if the labour productivity, wages and the gross profit in some way are affected by the fraction of the workforce employed abroad. There are of course many other variables affecting FDI than labour productivity, wages and gross profit. However, they are not taken into account in this thesis.

4.1 Empirical Models

Three main regressions will be tested and analyzed. Cross tabulation is also used to explain the findings in the research. Below the three main regressions are stated and explained in detail.

Equation 6

$$1.A F_t = c + \beta_1 * U_t + \beta_2 * W_t + \mu$$

$$1.B \Delta_{(2001-2005)} F_t = c + \beta_1 * avgU + \beta_2 * avgW + \mu$$

Where the variables are the following:

F_t = labour productivity

U_t = the percentage of the workforce employed abroad

W_t = wage per employee

$avgU$ = average percentage (2001-2005) of the workforce employed abroad

$avgW$ = average (2001-2005) wage per employee

μ_t = error term

t = 2001, 2002, 2003, 2004, 2005

Besides the nominal labour productivity, the change in the variable will also be tested against foreign employment and wages. The expectation, as explained in the theoretical framework, is that the labour productivity, F , will decrease when U increases, and increase when W increases.

Equation 7

$$2.A U_t = c + \beta_1 * B_{t+2} + \mu$$

$$2.B U_t = c + \beta_1 * B_{t+3} + \mu$$

Where:

U_t = the percentage of the workforce employed abroad

B_t = gross profit

μ_t = error term

t = 2001

In regression number two we believe that the fraction of foreign employment can have a lagged effect towards the gross profits. If a firm increases their fraction of workforce employed abroad in year t , the result of this may not be observed di-

rectly. Start up and training costs abroad will probably be high, which lower the profit margin in the beginning. After year t , however, those costs disappear or fall. This may imply that the profit margin increase again. We will test if the percentage of the workforce employed abroad in 2001 has a positive relationship with the gross profit a couple of years later, which also is our prediction. The regressions include lead terms, B_{t+2} and B_{t+3} , which are used as indicators of future expectations of the gross profit (Gujarati, 2003).

Equation 8

$$3. W_t = c + \beta_1 * U_t + \mu_t$$

Where:

W_t = wage per employee

U_t = the percentage of the workforce employed abroad

μ_t = error term

t = 2001, 2002, 2003, 2004, 2005

Firms may invest in foreign countries due to the possibility to decrease costs. In this regression we test if the wages decrease when foreign employment increases, and the five years are tested separately. We expect the relation between wage per employee and foreign employment to be negative. If this relation holds, we can draw the conclusion that the companies try to decrease costs when they decide to undertake foreign investments.

According to our expectations, the gross profit will increase and wages decrease when foreign employment increases. The result from this test is showed in a cross tabulation model (table six). We choose a cross tabulation here to stress the relationship between the two variables. On the left hand side the ratio gross profits divided by wage per employee is used, and on the right hand side the fraction of the workforce employed abroad. Since the ratio gross profits divided by the wages increases if either W decreases or B increases, the expectations of the results is that a high fraction of the workforce employed abroad is correlated with a high B/W ratio.

4.2 Regression Results

Complete results of all tests performed are found in appendix I.

The first regression states that the percentage of the workforce employed abroad and the wage level will affect the labour productivity. For the change in the labour productivity over our time period following model is estimated: $\Delta_{(2001-2005)}F_t = c + \beta_1 * avgU + \beta_2 * avgW + \mu$. An average of the fraction of

the workforce employed abroad is calculated and then tested against the change in labour productivity. The results can be seen below:

Table 3 Econometric test results data. Regression 1.A and 1.B

Table 3. Econometric test results data. Regression 1.A and 1.B		
	Regression 1.A	Regression 1.B
<i>Constant</i>	944900.2	-0.142
U_t	118293.2**	
W_t	-5889.5*	
<i>avgU</i>		0.0003
<i>avgW</i>		0.0007
<i>Nr. of Obs.</i>	219	46
R^2	0.20	0.06

Note: ** Significant at 1 % level, * Significant at 5 % level

Table number four presents the regressions with the fraction of foreign workforce for the year 2001 as the dependent variable with gross profit in 2003 and 2004 as independent variables. The results are as follows:

Table 4 Econometric test results data. Regression 2.A and 2.B

Table 4. Econometric test results data. Regression 2.A and 2.B		
	Regression 2.A	Regression 2.B
<i>Constant</i>	34.97**	36.55**
B_{t+2}	0.011**	
B_{t+3}		0.005**
<i>Nr. of Obs.</i>	45	45
R^2	0.23	0.15

Note: ** Significant at 1 % level

As stated above, regression three is tested for the five years separately. The results are presented in the table below:

Table 5 Econometric test results data. Regression 3.

Table 5. Econometric test results data. Regression 3.					
	2001	2002	2003	2004	2005
<i>Constant</i>	518.59**	513.12**	516.13**	518.28**	511.74**
U_i	-2.25**	-1.89*	-1.78**	-1.63**	-1.11
<i>Nr. of Obs.</i>	45	45	40	46	46
R^2	0.14	0.10	0.12	0.15	0.05

Note: ** Significant at 1 % level, * Significant at 5 % level

The result of the cross tabulation is presented below. The reasoning is that a high percentage of the workforce employed gives a higher gross profit per wages paid out. The cross tabulation are for the years 2001, 2002, 2004 and 2005.

Table 6 Cross tabulation model

Table 6. Cross tabulation model.				
		<i>U</i>		<i>Total</i>
		High	Low	
<i>B/W</i>	High	65	26	91
	Low	26	65	91
<i>Total</i>		91	91	182
<i>Chi-square</i>				33.42**

Note: ** High significance U = percentage of the workforce employed abroad, B/W = gross profit divided by wage per employee.

5 Analysis

The labour productivity, F , is positively correlated with the fraction of the workforce employed abroad (denoted U). The variable U is significant at the one percent level; the relationship cannot be rejected. The wage per employee is negatively related with labour productivity. The R^2 -squared is not very high in the first regression and the constant is insignificant. The opposite relationship was expected; that F would be negatively related to foreign employment and positively related to wages. But in our set of data the labour productivity increases when the fraction of the workforce employed abroad increases, keeping everything else

constant. An explanation might be the fact that there are different wage levels in different countries. If we assume that a company pays the sector average wage to its employees in Sweden, those employees can find another job in the same sector with the same wage. Further, suppose that this Swedish company pays a wage higher than the sector average wage in a low income country. In India, for example, it is usual that foreign companies pay a higher wage than the average. The employees in the foreign country also know that it is difficult to find a work with a higher wage than the average wage. This makes the employees to work harder, which increase the labour productivity.

The regression result also shows a negative relation between the wage per employee and the labour productivity. This result makes no sense according to economic theory. The productivity of a worker is not likely to decrease if the worker receives a higher wage. One explanation for this can be omitted variables. From the change in productivity over the chosen years the conclusion is that the change in F is not correlated with the average foreign employment level. Neither is F correlated with the average wage per employee over the selected years. Regressions on particular years give similar results as the one presented in table two. A change-on-change regression with the two variables also gave insignificant results.

As discussed in the theory part, time lags are used to see how the gross profits are related to foreign employment. The percentage of workforce employed abroad in the year 2001 is positively related to gross profits in 2003 and 2004 for our group of companies. The results are significant at the one percent level. The relation can't be rejected; cost minimization can therefore be a reason for foreign investments. It is interesting no significant relationship between the percentage of workforce employed abroad in the year 2001 and the gross profit in 2002 is found. This is clearly an evidence of the high start up costs related to FDI. The gross profits probably increase due to lower costs, the result in regression one shows however that labour costs is not one of them. Similar regressions for the years 2002, 2003 and 2004 also are significant.

The result from regression number three, that wage per employee and foreign employment are negatively correlated, is in line with the expectations. For all the years the coefficient for the fraction of the workforce employed abroad is negatively correlated with the wage per employee. All the results, except for the year 2005, are significant at the one or the five percent level. When the fraction of the workforce employed abroad increases the wage per employee decreases. Sweden is a country with relatively high costs of labour, so when firms place more production abroad, those costs can be expected to decrease. This is especially true if FDI is preformed in low wage countries, such as India or Mexico. The industrial goods and services sector is a labour intensive sector, which give further evidence for the cost minimization reason for foreign investments.

The B/W ratio, the gross profit divided by wage per employee is tested against foreign employment in a cross tabulation table. The relation that this ratio hold is interesting because, as results shows, a high percentage of the workforce employed abroad gives a higher gross profit per wages paid out. The chi-square value of 33.42 is significant, so we cannot reject the relationship. All the regressions presented have relatively low R^2 . As stated in the first paragraph of this chapter, there are many variables that affect productivity, wages and gross profit. Exact figures to calculate the total factor productivity for a single firm are hard to find, and at the firm level the exact output produced per hour of labour is also hard to calculate. Even though the R^2 are low in the regressions, almost all of them show significant relationships.

6 Conclusion

The purpose of this thesis was to analyse if gross profit, wage and the labour productivity are related to the fraction of firms workforce employed outside Swedish borders. Both the productivity and the labour employed abroad have increased the last couple of years in the industrial goods and service sector. The cost efficient choice of investments can be a form of location advantage over firms in the target countries. Risk averse behaviour of investments in production plants abroad, instead of exports or licenses, can be a further reason of growing FDI.

The results show that there is a positive relationship between offshore production and gross profits, and that expanded foreign production leads to a decreased wage rate. In the case of labour productivity we found that it was positively correlated with the fraction of the workforce employed abroad, and negatively correlated with the wage rate. Opposite results were expected in this regression and the negative correlation between productivity and the wage rate might be a result of either omitted variables or a possible misspecification of the labour productivity formula. Theoretically higher wages stimulate productivity. Therefore the labour productivity should decrease with foreign direct investments in low wage countries.

We found evidence of a time lag of two years and forward in the boost of gross profits when the FDI rate is increased. The time lag can be connected to factors such as high start up costs, delays and other problems in the start of the process. The escalated levels of gross profits after a couple of years can be evidence of an efficient cost investment. If the increased profit level of one company is visible to others in the sector they might choose to increase their foreign investments as well. Market leaders are in general better scouts of new target markets, than the market followers. As a result, the followers will most likely face higher start up costs due to market failures. The avoidance of those market failures can explain

the short time lag of our results. A sample of smaller and younger firms will probably show a more delayed effect.

There was a negative connection between the wage rate and the share of foreign employment as we expected. When the foreign workforce increases, it results in a lower average wage. Furthermore, Sweden's powerful labour unions, high taxes and relatively high minimum wages drive up the price of labour. This is one motive to why low wage countries are targeted.

6.1 Future Studies

Since the focus in this thesis has been on how offshore labour affects the gross profits, wage and labour productivity, the aim has been kept quite narrow. It would be interesting to try other industries and compare if one can find similar or completely opposite effects of FDI flows.

In addition, one can look at the exact geographical direction of the investments. Are there for example differences in regions where there are more MNE's gathered, which can benefit from spill over effects and thereby result in a higher total growth for the region. Furthermore, an interesting study would be to analyze how Swedish firm with a home concentrated production approach the tough competition from foreign direct investors, and what strategies they choose and what they need to improve to increase their own productivity and competitiveness even more. To compare foreign regional growth rates where there is high rates of Swedish investments, can thereby be a way to estimate the productivity and efficiency of Swedish industries. Another approach could be to research about if companies move production abroad, to avoid bankruptcy for example, or if they open up a plant abroad and keep the same number of employees in Sweden.

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Appendix I

Model 1.1

$$F_t = c + \beta_1 * U_t + \beta_2 * W_t + \mu$$

Table 7 Econometric test results data, model 1.1

White Heteroskedasticity-Consistent Standard Errors & Covariance				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	944900.2	1163205.	0.812325	0.4175
U	118293.2	21248.70	5.567079	0.0000
WL	-5889.452	2985.215	-1.972874	0.0498
R-squared	0.203338	Mean dependent var		3593998.
Adjusted R-squared	0.195961	S.D. dependent var		8416057.
S.E. of regression	7546528.	Akaike info criterion		34.52468
Sum squared resid	1.23E+16	Schwarz criterion		34.57110
Log likelihood	-3777.452	F-statistic		27.56558
Durbin-Watson stat	2.056471	Prob(F-statistic)		0.000000

Model 1.2

$$\Delta_{(2001-2005)} F_t = c + \beta_1 * avgU + \beta_2 * avgW + \mu$$

Table 8 Econometric test results data, model 1.2.

White Heteroskedasticity-Consistent Standard Errors & Covariance				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.141744	0.169699	-0.835263	0.4082
AVGU	0.000327	0.002235	0.146121	0.8845
AVGW	0.000746	0.000423	1.764452	0.0848
R-squared	0.061533	Mean dependent var		0.201120
Adjusted R-squared	0.017884	S.D. dependent var		0.409719
S.E. of regression	0.406039	Akaike info criterion		1.098258
Sum squared resid	7.089308	Schwarz criterion		1.217517
Log likelihood	-22.25994	F-statistic		1.409712
Durbin-Watson stat	2.375150	Prob(F-statistic)		0.255273

Model 2.1

$$U_t = c + \beta_1 * B_{t+2} + \mu$$

Table 9 Econometric test results data, model 2.1.

White Heteroskedasticity-Consistent Standard Errors & Covariance				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	34.97143	4.100360	8.528869	0.0000
PRO03	0.011332	0.002809	4.033852	0.0002
R-squared	0.231983	Mean dependent var		41.34511
Adjusted R-squared	0.214122	S.D. dependent var		29.09591
S.E. of regression	25.79346	Akaike info criterion		9.381545
Sum squared resid	28608.01	Schwarz criterion		9.461842
Log likelihood	-209.0848	F-statistic		12.98831
Durbin-Watson stat	1.689810	Prob(F-statistic)		0.000809

Model 2.2

$$U_t = c + \beta_1 * B_{t+3} + \mu$$

Table 10 Econometric test results data, model 2.2.

White Heteroskedasticity-Consistent Standard Errors & Covariance				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	36.54745	4.339646	8.421757	0.0000
PRO04	0.004658	0.001607	2.899086	0.0059
R-squared	0.150952	Mean dependent var		41.34511
Adjusted R-squared	0.131207	S.D. dependent var		29.09591
S.E. of regression	27.12003	Akaike info criterion		9.481849
Sum squared resid	31626.33	Schwarz criterion		9.562145
Log likelihood	-211.3416	F-statistic		7.644954
Durbin-Watson stat	1.742944	Prob(F-statistic)		0.008353

Model 3.1-3.5

$$W_i = c + \beta_1 * U_i + \mu$$

Model 3.1: 2001

Table 11 Econometric test results data, model 3.1.

White Heteroskedasticity-Consistent Standard Errors & Covariance				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	518.5901	49.93417	10.38548	0.0000
FOREIG2001	-2.250733	0.805604	-2.793845	0.0077
R-squared	0.135372	Mean dependent var		425.5333
Adjusted R-squared	0.115265	S.D. dependent var		177.9881
S.E. of regression	167.4162	Akaike info criterion		13.12227
Sum squared resid	1205212.	Schwarz criterion		13.20257
Log likelihood	-293.2511	F-statistic		6.732389
Durbin-Watson stat	2.308770	Prob(F-statistic)		0.012897

Model 3.2: 2002

Table 12 Econometric test results data, model 3.2.

White Heteroskedasticity-Consistent Standard Errors & Covariance				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	513.1245	44.83319	11.44519	0.0000
FOREIG2002	-1.898528	0.792845	-2.394575	0.0211
R-squared	0.099979	Mean dependent var		435.8000
Adjusted R-squared	0.079048	S.D. dependent var		172.8000
S.E. of regression	165.8297	Akaike info criterion		13.10323
Sum squared resid	1182478.	Schwarz criterion		13.18352
Log likelihood	-292.8226	F-statistic		4.776641
Durbin-Watson stat	2.307525	Prob(F-statistic)		0.034342

Model 3.3: 2003

Table 13 Econometric test results data, model 3.3.

White Heteroskedasticity-Consistent Standard Errors & Covariance				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	516.1333	34.89499	14.79104	0.0000
FOREIG2003	-1.786977	0.652899	-2.736987	0.0094
R-squared	0.123243	Mean dependent var		436.1750
Adjusted R-squared	0.100171	S.D. dependent var		149.6192
S.E. of regression	141.9277	Akaike info criterion		12.79722
Sum squared resid	765452.3	Schwarz criterion		12.88166
Log likelihood	-253.9444	F-statistic		5.341554
Durbin-Watson stat	2.358575	Prob(F-statistic)		0.026343

Model 3.4: 2004

Table 14 Econometric test results data, model 3.4.

White Heteroskedasticity-Consistent Standard Errors & Covariance				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	518.2837	25.13432	20.62056	0.0000
FOREIG2004	-1.631616	0.545263	-2.992347	0.0045
R-squared	0.149328	Mean dependent var		442.6087
Adjusted R-squared	0.129995	S.D. dependent var		121.9697
S.E. of regression	113.7661	Akaike info criterion		12.34867
Sum squared resid	569479.7	Schwarz criterion		12.42818
Log likelihood	-282.0194	F-statistic		7.723818
Durbin-Watson stat	2.225212	Prob(F-statistic)		0.007985

Model 3.5: 2005

Table 15 Econometric test results data, model 3.5.

White Heteroskedasticity-Consistent Standard Errors & Covariance				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	511.7402	29.81263	17.16522	0.0000
FOREIG2005	-1.112266	0.757112	-1.469090	0.1489
R-squared	0.051915	Mean dependent var		459.5217
Adjusted R-squared	0.030368	S.D. dependent var		140.8263
S.E. of regression	138.6715	Akaike info criterion		12.74460
Sum squared resid	846110.4	Schwarz criterion		12.82410
Log likelihood	-291.1257	F-statistic		2.409338
Durbin-Watson stat	2.227179	Prob(F-statistic)		0.127777

Appendix II

Table 16 List of companies

AB ANGPANNEFORENINGEN	LINDAB INTERNATIONAL AB
AB WESTERGYLLEN	MICRONIC LASER SYSTEMS AB
ADDTECH AB	MIDWAY HOLDING AB
ALFA LAVAL AB	MUNTERS AB
ATLAS COPCO AB	NEFAB AB
B&B TOOLS AB	OEM INTERNATIONAL AB
BEIJER ALMA AB	PARTNERTECH AB
BEIJER ELECTRONICS AB	POOLIA AB
BROSTROM AB	PRICER AB
BTS GROUP AB	PROFFICE AB
CARDO AB	PROFILGRUPPEN AB
CASH GUARD AB	REDERI AB TRANSATLANTIC
CONSILIUM AB	SAAB AB
DUROC AB	SANDVIK AB
ELEKTRONIK GRUPPEN BK AB	SCANIA AB
FIREFLY AB	SECO TOOLS AB
G & L BEIJER AB	SECURITAS AB
HEXAGON AB	SEMCON AB
HL DISPLAY AB	SKF AB
INTELLECTA AB	TRELLEBORG AB
INVESTMENT AB LATOUR	VOLVO AB
KAROLIN MACHINE TOOL AB	XANO INDUSTRI AB
LAGERCANTZ GROUP AB	XPONCARD GROUP AB