Imports, Offshoring and Wages:
The Case of the Hungarian Food and Textile Industry

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ABSTRACT

I estimate how offshoring affect wages of workers in the Hungarian food and textile industry utilizing Hungarian linked employer-employee data and combined with detailed trade statistics of firms broken down by product. I match workers to imported products that related to the workers' tasks or that are output of the given job by using the product- and firm-level trade statistics and by using the occupation description of the worker. I find that workers exposed to offshoring earn less than workers working at importing firms but not exposed to offshoring. In the case of the food industry the negative direct effect is somewhat offset by the cost-saving mechanism but remain negative, while in the case of the textile industry the positive effect of importing input and the positive effect of cost-saving and productivity increase even reverses the negative direct effect of offshoring. These findings suggest that there is a justified fear of negative effect of offshoring, but the size and its importance vary by industry.

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1 INTRODUCTION

Globalization clearly benefits the world economy, as new industries keep emerging and the gross value of production is steadily trending upwards, despite the rare episodes of setbacks. But what is the cost of the accumulation of total wealth? The environment, for example, is clearly on the losing side at the moment, and it is common knowledge that not all people benefit from it either. There are a lot of channels through which globalization (here understood as dramatic changes in the patterns and the magnitude of trade) affects the lives of people, and for us in the more developed part of the world, the changes in jobs and wages is commonly seen as the most worrisome phenomenon. But how is opening up to trade related to changing the lives of such a vast amount of people? I chose to look at one aspect of this general question in my thesis.

The patterns of trade have changed dramatically in the last decade, and the share of intermediate goods in trade has increased rapidly thanks to trade liberalization and technology changes[1] (Geishecker et al., 2008). Since in the case of any change there will be winners and losers (Geishecker et al., 2008), there is a justified fear that the practice of offshoring will hurt labor. Blinder (2006) calls offshoring the "next industrial revolution", emphasizing the importance of changes in the production process related to the new feature of the trade. According to Blinder (2006) offshoring is "the migration of jobs, but not the people who perform them". This new feature of trade has an important effect on the structure of production, facilitating the specialization of economies (Geishecker et al., 2008). The policymakers should face the new challenges that the practice of offshoring will bring: trade policies, education system and social welfare programs must adapt to the new feature of production, and since Europe is known to be more rigid the challenge is bigger than in case of

[1] reduction is transaction and communication costs (Geishecker et al., 2008)

a more flexible market (Blinder, 2006). Therefore, it is important for policymaker to understand the new feature of the trade and production and their impact on labor.

The subject of my thesis is the effect of offshoring on the wages of workers in the Hungarian food and textile industry. Most studies in the literature examined the effect of offshoring on labor at the industry level. There are only a few cases where firm level analysis was performed (e.g. Balsvik and Birkeland, 2011, Hummels et al., 2011, Anderson and Karpaty, 2007). In the study I use linked employer-employee data taken from the Hungarian Harmonized Wage Survey (*Bértarifa*) from 1994 to 2003. The data set allows for the following of each firm over several years. I am able to control heterogeneity across firms by using firm-level data, since it is reasonable to expect that the effect of offshoring on labor is different at different firms, even within the same industry (Anderson and Karpaty, 2007).

The period I examine in my thesis is an important period of the Hungarian economy. During this time fundamental changes took place within and outside the borders. One of the important consequences was a considerable change of the pattern of Hungarian trade: the emphasis moved from the former socialist market to the common market of the European Union and to East-Asian countries (Békés et al., 2009). These new partners are known to be the origin of cheap imports.

Most of the studies published in the literature define what offshore means at firm or at industry level. In my thesis I would like to go one level deeper and determine the relationship between wages and imports for workers performing different types of tasks (defined as 4-digit occupation group). The motivation for this reconsideration is based on the assumption that even though some goods can be substitutes for the production as a whole at a given firm, they do not necessarily substitute the work performed by a specific occupation. For example, in the case of a firm operating in the food industry, the import of milk is considered in the literature

as offshoring, even if it does not substitute the job of a butcher. Categorizing import at the level of occupation rather than at the level of industry may resolve this problem. It is reasonable to assume that if a firm hires a butcher, then some part of the production needs the output of the given butcher. The use of the 4-digit occupation group "FEOR" and the 6-digit production code "Harmonized System", makes it possible to match workers with products that are related to and/or substitute for their tasks.

The increasing practice of importing may affect workers through many channels. Some channels might have a positive effect on the workers, while others may hurt them. Profit maximizing firms can increase their productivity level by replacing expensive productions with cheaper imports of intermediate goods and services (Anderson and Karpaty, 2007; Ottaviano et al., 2010; Balsvik and Birkeland, 2011, Hummels et al., 2011). Foreign R&D has positive impact on the domestic productivity (Coe and Helpman, 1995) and the productivity effect of international technology may even exceed the impact of domestic R&D (Acharya and Keller, 2007). Several recent studies examined the effect of imports on productivity and concluded the main channels through which imports may influence productivity are learning, the increase of variety and the improvement of quality (Anderson and Karpaty, 2007, Halpern et al., 2011). However, imports may affect firms through cost-saving and increased competitiveness as well (Ottaviano et al., 2010, Anderson and Karpaty, 2007, Balsvik and Birkenland, 2011). The use of imported products might substitute the tasks previously performed within the firm, and this way might substitute workers' performance. This practice may hurt the labor by the decrease in labor demand and by reducing wages (Feenstra and Hanson, 1995, 1996, 1999; Hummels et al., 2011, Balsvik and Birkeland, 2011, Ottaviano et al., 2010; Hsieh and Woo; 2005).

The mechanisms determining the relationship of wages, labor and imports are very complex. Imports may affect wages through different channels, and these forces might work

in opposite directions even for the same worker[2]. The mechanisms might vary by occupation as well (Tóth, 2011). To eliminate the first source of heterogeneity, I focus only on products that could have been produced within the firm, and to eliminate the second source of heterogeneity I consider only on a handful of occupations.

As the focus of my thesis is to examine the effect of offshoring on wages, I focus only on channels through which the practice of offshoring might affect workers. However, this relationship is very complex and is not sufficiently explained yet either empirically or theoretically. On the one hand, the practice of offshoring substitutes foreign inputs for goods previously produced by the firm (Feenstra and Hanson, 1995, 1996, 1999), and through this lowers labor demand and wages. On the other hand, by optimizing the location of production, firms may reduce cost and increase productivity, and this may lead to an increased share in the market. As a result, thanks to the import a firm may even increase its labor force and the wages of its workers, (Balsvik and Birkkeland, 2011, Ottaviano et al., 2010, Anderson and Karpaty, 2007, Grossman and Rossi-Hansberg, 2008).

In order to separate these two effects that shift wages in the opposite direction, I follow the approach of Martins and Opromolla (2009) and of Hummels et al. (2011). To examine the direct effect of offshoring I control for firm characteristics in the regression, and to examine the additional productivity effect I exclude them (Martins and Opromolla, 2009, Hummels et al., 2011). I find that employers using the practice of offshoring pay lower wages than those importing firms that do not import goods that could have been made by their workers. In the case of the food industry, the negative direct effect is somewhat offset by the cost-saving mechanism but remains negative, while in case of the textile industry, the positive

[2] Different kinds of imports may shift wages in different directions (Hummels et al., 2011). Imported machines may increase productivity and thus wages (Koren and Csillag, 2011), imported products that could have been produced within the firm, substitute the workers production thus may lower wages (Feenstra and Hanson, 1996, 1999), while imported inputs - if better in quality or lower in cost - might also increase wages (Hummels et al., 2011).

effect of importing input and the positive effect of cost-saving and productivity increase even reverses the negative direct effect of offshoring.

Studies published in the empirical literature reveal that the effect of offshoring on wages varies from country to country. In the U.S. 15-38% of the increase in the relative wage of nonproduction workers is explained by rising imports (Feenstra and hanson,1995). Hsieh and Woo (2005) found that 40-50% of decline in the relative demand for workers in Hong Kong can be explained by outsourcing to China. However, the picture in Europe is different. In their study Balsvik and Birkenland (2011) report statistically significant, but very small effect on wages in Norway, while Geishecker and Görg (2008) show that in Germany outsourcing has negative impact in low-skilled workers but a positive one on the wages of high-skilled labor. In comparison, the coefficient on international outsourcing is negative and statistically significant in Germany, but insignificant in Denmark and in the U.K. (Geishecker et al., 2008). Amiti and Davis (2008) find evidence on the relationship between input tariff and wages: a decline in the cost of importing inputs increases the wages of workers at importer firms. However, it is not just the employers who adjust to the new trends. For example, in Germany the domestic labor force, while staying mainly within the same sector and occupation, began to specialize in workplaces and activities that are less offshorable (Becker and Muendler, 2012).

The subject of my thesis is also related to the question of inequality: the effect of imports on labor appears in the literature mostly together with inequality. There is a justified fear that the practice of offshoring will hurt labor. This stimulates many researchers (e.g. Feentsra and Hanson, 1996, 1999; Andersson and Karpaty, 2007; Balsvik and Birkeland, 2011) to study the issue and to try to explain the rising inequality between low- and high-skilled workers by the increased practice of offshoring. If products that are substituted by imported goods were produced by relatively unskilled domestic workers, then the increasing

practice of offshoring also changes the skill composition of production even within the firms or within an industry (Johnson and Stafford, 1999, Crino, 2009).

There is an ongoing debate about the main driving force behind the observed increase of relative demand for skilled workers and the observed relative wage increase (and rising inequality) of skilled labor. Some authors argue that skilled-biased technological change is the main driver, while others support the assumption that the root cause is outsourcing, i.e. the importing of goods that would otherwise be produced domestically.[3] Feenstra and Hanson (1995, 1996, 1999) and Sachs and Shatz (1994) came to the conclusion that the increased imports and rising outsourcing practice is an important factor behind the changes in the relative labor demand within industries. However, the observed change in relative demand is too large to be explained only by trade (Acemoglu, 2002; Berman et al., 1994). Berman et al. (1994) found that outsourcing defined as import of materials by US firms is too small in magnitude to account for the wage drop. But new technologies do not favor unskilled workers, and they replace tasks that were performed previously by those (Acemoglu, 2002; Berman et al., 1994)

The rest of the thesis is organized as follows. Section 2 presents the dataset and some descriptive statistics of the main variables. Section 3 demonstrates the effect of offshoring on wages and Section 4 provides the robustness checks. Finally, the conclusions are presented in Section 5.

[3] for more about the literature in the subject see Johnson and Stafford, 1999 and Crino 2009.

2 DESCRIPTION OF THE DATASET

2.1 DATA SOURCES

In my thesis I use data of firms, workers and trade. The data of firms and workers are taken from the Hungarian *Harmonized Wage Survey* (*Bértarifa*[4]), a linked employer-employee dataset for Hungary that includes data for the 1994 – 2003 period. Thanks to the unique identifier of each firm in *Bértarifa*, I can follow each firm over several years. However, the dataset does not allow the following of each worker across the years.

In this dataset the method of sampling used for collecting that data changed during the time of the study and it also varies by firm size. As a general rule, there is a lower threshold for the number of employees (20) above which every firm is included in the sample. Below the threshold, the survey contains only a sample of firms. Large firms (above 20 employees) report only a sample of their employees, while small firms (below 20 employees) provide data for every worker. The selection process is based on the date of birth and results in a random sample of workers, about 6.5 % of the production workers are selected (*Bértarifa – felvételek*, 2006; Halpern and Kőrösi, 2000; Earle and Telegdy, 2008).

The other dataset used in the thesis is the *Hungarian Customs Statistics*. The data set contains the firms' imports and exports disaggregated by product (in 6 digit *Harmonized System* break down) and by origin. The data set covers both types of imports, (intermediate) inputs for production (including raw material as well) and also final goods for consumption (consumer products). For a more detailed description of the dataset, see Békés et al. (2009).

[4] The data set is created by the Institute of Economics, Hungarian Academy of Sciences from the original data. The data set is work in progress. Although the IEHAS made effort to clean the data, it can not be held liable for any remaining error.

Thanks to the unique firm identifier, it is possible to merge the two data sets. The merged dataset contains information on the characteristics of firms and workers, especially earning, occupation, gender, education, ownership, industry, size, balance sheet data and information about the disaggregated trade flows.

The sample used in the analyses is restricted as follows. I focus only on firms that hire workers of a specific occupation, regardless of the firm's stated industry. I classify workers according to their 4-digit occupation category. For the list of included occupation see Table A.1 in Appendix A. I further limit my sample to those workers whose earnings are above the minimum wage and are full-time workers (this is needed because the data set does not contain part-time workers before 2002). However, the inclusion of part time workers does not change the results (see robustness checks; section 5.3). Table 1 below presents the number of workers and the number of firms in the dataset for each year.

Table 1: Number of workers and firms in the sample

year	Workers	Firms
1994	4 413	1 013
1995	4 518	1 021
1996	4 698	1 012
1997	4 373	1 008
1998	4 778	997
1999	4 286	1 000
2000	4 973	1 135
2001	5 128	1 141
2002	5 439	970
2003	5 014	870
Total	47 620	10 167

The final dataset includes for each worker the specific product (at 6 digit HS code level) that his/her employer imports. Through this I can match the 4-digit occupation code (FEOR) to the 6 digit HS codes. As mentioned earlier, I restrict my sample to specific

occupations, thus I restrict my attention only to products that relate to these occupations (see Table 2 below for the specific HS1 codes).

Table 2: HS codes

Food Industry	
I	Live animals, animal products
II	Vegetable products
III	Animal or vegetable fats and oils and their cleavage products, prepared edible fats
IV	Prepared foodstuffs; beverages, spirits and vinegar
Textile Industry	
VIII	Raw hides and skins, leather, fur-skins and articles thereof
XI	Textiles and textile articles
64	Footwear, gaiters and the like, parts of such articles

2.2 DEFINITIONS

The aim of the thesis is to study the relationship of wages and imports. The former is defined as the (log) net monthly earnings plus the regular and irregular bonus (1/12 of overtime and other bonuses paid in the previous year)[5]. The results do not change by using gross wages instead (see robustness checks, section 5.2). In the thesis I use data on firm level, such as employment, export, foreign ownership status, net sales, region of operation, industry code up to two digits level, capital-labor ratio and productivity (defined as the per worker value added, where value added is the net sales reduced by the purchase value of goods sold and by the cost of material purchased) and on worker level, such as experience, education and gender. In the following section I clarify the definitions and measurements of imports and import related variables.

In order to determine the effect of imports on wages first it should be clarified how the observed imports are related to the tasks performed by the workers, whether it potentially substitutes or complements the labor within the firm (Hummels et al., 2011).

[5] 1989 = 100%

In the literature "broad offshoring" is defined as the total import value of a given firm in a given year (Feenstra and Hanson, 1996, 1999). Hummels et al. (2011) argue that firms may purchase goods that are not substitutes for the labor within the firm, such as raw materials, products of different industries or machines: none of these would substitute the workers performance within the firm. Feenstra and Hanson (1999) prefer to use the other definition of offshoring, which is referred to in the literature as "narrow offshoring". It is the import of inputs from the same industry as the one in which the given firm operates. The idea behind the "narrow" definition is that goods that are produced by the same industry could have been made by employees at the specific firm (Feenstra and Hasnon, 1999; Hummels et al., 2011).

Following the ideas of Hummels et al. (2011) about distinguishing between different types of imports that could affect wages through different channels, I created two categories of imports. I reconsidered the "narrow" and "broad" definition of offshoring used throughout the literature (Balsvik and Birkenland, 2011, Feenstra and Hanson 1996, 1999, Hummels et al., 2011) and redefined them, while keeping the idea behind them. Most studies in the literature focus on the relationship between imports, labor demand and wages to explain the rising inequality between low- and high-skilled workers, thus they define what offshoring is, at firm (or at industry) level. In my thesis I would like to determine the relationship between wages and imports for workers performing different types of tasks (defined as 4-digit occupation group).

The idea behind my reconsideration is that even though some goods can be substitutes for the production as a whole at a given firm, they do not necessarily substitute the work performed by a specific occupation. Illustrating the problem with a theoretical example, in the case of a firm operating in the food industry, the import of milk is defined as offshoring even according to the "narrow" definition in the literature, while it does not substitute the job of a

butcher. This problem could be solved by using more detailed industry categorization (4 digit level), but that may under-measure the offshoring by using the narrow definition, since it may happen that the given firm also operates in another industry. Categorizing import at the level of occupation and not at industry level may overcome this problem: we can assume that if a firm hires a butcher, then some part of the production needs the output of the given butcher.

Following the above thinking, the definitions of the import categories are as follows:

Total import: The value of the total import of the given firm.

Imported related product: any kind of import is categorized as related import that is related to the task performed by the worker of the given occupation category. I put into this category every product that joins the production process at any stage: all input, intermediate goods and outputs that are directly related to the worker's tasks. The category is even wider: I classify in this category every product that would be theoretically the worker's outcome in the production process, or would be the outcome of anybody following him/her in the process. For example, in case of a weaver, imported yarn is obviously inputs for his/her job and woven material substitute his/her task, but any kind of woven final goods, such as clothes, carpets made of woven textile substitutes his/her production (for a better understanding of the idea, see Figures 1-3 in the Appendix A about the production process with examples).

Imported outputs: all goods (intermediate and final as well) that are at least partly produced by the worker of a given occupation are put into this category. I classify in this category every product that would be theoretically the worker's outcome in the production process, or would be the outcome of anybody following him/her in the production process. For example, in the case of a spinner any imported yarn would obviously substitute his/her task, and not only the yarn import would substitute his/her job, but any kind of textile or even ready clothes made of

yarn as well (for better understanding the idea, see Figures A. 1-3. in the Appendix A about the production process with examples).

I match the examined 4-digit occupation codes to the restricted 6 digit HS codes. For example, HS6 010391 "live swine weighing less than 50 kg" matched with FEOR 7211 "worker in the processing industry related to meat, fish and poultry", or HS6 520531 "cotton yarn, containing 85% or more weight of cotton, not put up for retail sale, multiple or cabled yarn" is matched with FEOR 7312 "spinner", with FEOR 7313 "weaver" and with FEOR 7314 "knitter" as well (for more examples see Table A.2. in Appendix A). While at HS6 level it is ambiguous whether the products relate to specific occupation or not, it is not always explicit at what stage the product joins the production process, whether it is an input, an intermediate good or an output.

For example, in the case of HS6 080240 (CN8 08024000) "Chestnuts, fresh or dried, whether or not shelled or peeled" or HS6 080250 (CN 08024000) "Pistachios, fresh or dried, whether or not shelled or peeled", it is not evident even at 8 digit level whether they are input, intermediate goods or output for fruit and vegetable processing workers (occupation code 7212). Another example is HS6 030710 "Oysters, whether in shell or not, live, fresh, chilled, frozen, dried, salted or in brine, fit for human consumption"; in this case the 6 digit (even 8 digit) level does not differentiate between input (live oysters), intermediate good (fresh, chilled, frozen or processed anyway but not fit to human consumption) and final goods (fit for human consumption). To make the measurement consistent across occupation, I include inputs, intermediate and final goods for every occupation in the *Imported related products* category and *Imported Outputs* contain only those goods where it can be unambiguously determined that the product is the output of the given occupation. By using these definitions I can get a lower bound for the effect of offshoring, since in the case of *Imported related*

products by including inputs I lessen the effect, while in the case of *Imported Output* leaving out goods that may substitute the worker's jobs will underestimated the true effect.

Import values are divided by the number of employees, so their meaning is mHUF per worker[6]. Since the distribution of per worker import is very skew (half of the firms import less than 0.03 mHUF per worker, the mean is above 1.06 mHUF per worker), I use dummy variables that reflect the type of the import. I define three dummies that indicate the type of the products that are imported. *Importing dummy* is 1 if the value of per worker import exceeds a given threshold, while *Imported related products* dummy equals 1 if the per worker value of imported products that are related to the worker's tasks exceed a given threshold, and *Imported output* indicates whether the firm imports more than the given threshold from products that are the output of a given occupation's job. The thresholds are arbitrary, so I use different thresholds to evaluate whether it affects the results or not. For the results of different thresholds see robustness check in section 5.1.

Table 3 below shows the median of the per worker imports in mHUF by industry and by type of import. It is evident from the data that workers in the textile industry are more exposed to imports than their counterparts in the food industry: more firms are importing, and the value of imports is much larger. Therefore, throughout the analysis I use different thresholds in the two cases: 10 000 HUF per worker for the food industry and 40 000 HUF per worker for the textile industry. However, as shown later in the section of robustness (section 5.1), where I present calculations performed using other thresholds, (1 000 HUF, 20 000 HUF and 60 000 HUF), the results of the analyses do not depend on the thresholds used.

[6] deflated by Importe Prices (source: KSH), measured in millions of 1994 Huf.

Table 3: Median of the mHUF per worker imports value

Median of the mHUF per worker imports value	Total Import	Related products	Outputs
Food industry	0.12	0.04	0.03
Textile industry	0.95	0.51	0.04

note: imports are measured in millions of 1994 HUF.

One shortcoming of the dataset is that it does not show whether a firm uses imported inputs that are not directly imported from abroad. In this case the firms' status is mis-specified, firms buying foreign goods from Hungarian retailers are categorized as non-importers even though these products are foreign goods. The wholesale and retail sectors are responsible for a sizable share of import volume (30-40 %). Even though most of these are sold to consumers directly, some will be sold for firms as input (Békés et al., 2009).

On the other hand, as I have illustrated through some examples earlier in this section, due to the standardized code system (HS code), in some cases it is impossible to distinguish between raw material and processed goods. To overcome this problem, I use two different definitions for measuring offshoring: *imported related products* and *imported outputs*. Using these definitions I can get the lower bound for the effect of offshoring. The estimated effect of *imported related products* is the result of two opposite forces. Theoretically, imported inputs have positive or no effect on workers' performance because of the higher quality or of the lower cost, and depending on the firm's policy, the gain from imported inputs may or may not be shared with the workers. While imported intermediate goods and outputs are working in the other direction, they are products that could have been produced by the worker, so they substitute the worker's performance, thus may lower the wage. Therefore, the sum of the two forces will always be higher than the effect of the second force. On the other hand, the effect of i*mported outputs* is also upward biased, since it excludes products that can also substitute the worker's tasks. If the estimated effect is negative in either case, then it can be assumed that there is offshoring, i.e. firms import goods to substitute the workers, while if the

estimated effect is positive, nothing can be said, since the sign might be positive only because of the shortcomings of the used definitions.

The third problem comes from the fact that I divide the occupation related import value with the number of employees. It may happen that a large firm (in terms of number of employees) hires only very few workers from an occupation category. In this case even if the workers of the given occupation are highly exposed to import, the applied definition will not indicate this. Using a dummy may overcome this shortcoming and will lessen the problem by indicating that someone is exposed to import if the per worker import exceeds a given threshold and it will make no difference in addition to that.

2.3 DESCRIPTIVE STATISTICS

As Békés et al. (2009) observe, importers (and also exporters) are special: they show better performance, they are larger and pay higher wages. These findings are in line with the empirical findings of Bernard et al. (2009) in the case of the U.S.. In my sample the percentage of importers are above the Hungarian average (42% in the food industry and 69% in the textile industry in the 1999 sample, while in Hungary in 1999, only about one third of firms imported, Békés et al., 2009). This pattern might be explained by the special feature of the selected occupation, and those of the selected firms. Both the textile and the food industries need special inputs that cannot be produced within the borders, mostly because of geographic and climate conditions. For example, Hungary does not have a sea, so seafood must be imported, while the textile industry is known to be more import related than average industries. Most of the importers export as well: in the case of the food industry 60%, while in the case of textile industry 85% of importers are connected to the international market via export as well. On the other hand, there are only a few exporters that do not import: on the average 11% of exporters in the food industry and 14% of exporters in the textile industry. In

both markets about one third of importers are foreign owned and more than 95% of non-importers have domestic owner.

Table 4: Firm-level descriptions

	Food Industry		Textile Industry	
	Importer	Non-Importer	Importer	Non-Importer
Number of firms	1 816	2 775	3 310	2 266
Share of firms in the sample	42%	58%	69%	31%
Share of exporters	60%	11%	85%	14%
Share of foreign owned	31%	3%	33%	5%
Life span	6.5	5.0	6.5	4.6
	(3.1)	(3.0)	(2.9)	(3.1)
Number of employment	468.9	127.4	293.9	240.6
	(1792.2)	(270.7)	(1735.9)	(2413.3)
Productivity	0.58	0.06	-0.05	-0.47
	(0.94)	(0.70)	(0.74)	(0.90)
Capital-labor ratio	0.84	-0.02	-0.69	-1.27
	(1.16)	(1.45)	(1.40)	(1.86)

Note: a firm is defined as importer if it imports at least 10 000 HUF per worker (measured in 1994 HUF) in the case of the food industry, and if it imports at least 40 000 HUF per worker (measured in 1994 HUF) in the case of the textile industry. A firm is defined as exporter if its export revenue is more than zero. Productivity is measured as the logarithm of the per worker value added, capital-labor ratio is the logarithm of the capital-labor ratio.

In Table 4 I also present some basic descriptions of importers and non-importers. The data clearly shows, that importers are larger in terms of the number of employees and they are older as well. Importing firms are on the market at least one and the half year longer. Importers hire more than 3.5 times as many workers as non-importers in the food industry, while in the textile industry the difference is much smaller, they have only 1.2 times as many workers. In the food industry the difference is similar to the average Hungarian difference: in the case of the whole Hungarian economy traders employ more than three times as many workers as non-traders (Békés et al., 2009). Both productivity and capital-labor ratio values are lower in the case of non-importers as compared to importers.

Looking at worker-level statistics, it seems that importers are special in other aspects as well: they pay higher wages and the labor composition is different as compared to non-importers. Importers employ more female and more less-educated workers as well. In terms of experience, the difference in the two groups is not that obvious: in the case of the food industry importers employ more experienced workers, while in the case of the textile industry it is the other way around.

Table 5: Worker-level descriptions

	Food Industry		Textile Industry	
	Importer	Non-Importer	Importer	Non-Importer
Net real wage in 2003	79 633	63 515	63 833	53 978
	(25501)	(18428)	(20 969)	(19 559)
Experience	20.1	19.2	19.2	20.1
	(10.9)	(11.0)	(10.8)	(10.8)
Gender	55%	71%	10%	12%
	(0.50)	(0.45)	(0.31)	(0.33)
Elementary or less	43%	33%	35%	29%
	(0.49)	(0.47	(0.48)	(0.45)
Vocational	46%	60%	56%	62%
	(0.50)	(0.50)	(0.50)	(0.48)
At least high school	11%	7%	9%	9%
	(0.32)	(0.25)	(0.28)	(0.29)

Note: a firm is defined as importer if it imports at least 10 000 HUF per worker (measured in 1994 HUF) in the case of the food industry, and if it imports at least 40 000 HUF per worker (measured in 1994 HUF) in the case of the textile industry. Net real wages are measured in 1989 HUF.

As part of the analysis, I use firm fixed effect; therefore, I have to rely on within firm variation. Table 6 presents the share of the firms by industry that switches status and also the share of observations exposed to different types of import. In the table below I define a firm switcher if at least in one occupation it switches status[7]. The top panel of Table 6 represents the shares within the food industry, while the bottom panel shows it for the textile industry. Table 6 shows the share of observations where at least one of the statuses (import/related or

[7] a firm is switcher if in the given and in the previous year it hired at least one worker with the given occupation but the import status of the given occupation changed. For example, if a firm hired a butcher in the previous year and in the given year it still hires butcher, but it stops importing goods are that related to the tasks performed by butchers. A firm is not defined as switcher if it stops or starts hiring workers with the given occupation.

import/output) switches, and also the share of those firms where one and only one status switches (import/related import/output import status).

In the food industry 6%, in the textile industry 2% of observations show a change of only import status without changing related, and 7% and 4% of observations indicate a change only in the import status without a change in the output status. The employers of these workers became new importers that import goods not related to the tasks performed by their workers or goods that are not the output of the workers' performances, or they became an old-importer (stop importing) while they did not import products that relates or are output of the workers' tasks. In the case of the food industry 4% and 4%, while in case of the textile industry 3% and 7% of the cases switch related or output import status while remaining importers. This can also happen also in two ways: they were importers in the past and remain to be but started to import goods related to the given worker, or they were and remain to be importers but stop importing related products.

While the importer status is defined at the firm level, the other two dummies (related importer and output importer) are determined at the firm-occupation level. This kind of definition has the result that the related and output status may vary even within the firm-year level. Even within the firm-year some occupations may be exposed to imports while others are not. For example, if a firm hires butchers and bakers but imports only ham and sausage, then only butchers are exposed to imports. In this theoretical case in a given firm-year the related (and output) dummy is 1 only for the butchers, while it is 0 for bakers. To represent how important this within firm-year variation is, the second column of Table 6 gives the share of observations where there is a within firm-year variation. In the case of the food industry, on average 2%-2% of observations have different related import or different output status within firm-year. While the share of switchers from year to year is smaller in the case of the textile industry, within firm-year variation is much higher, on average 4-4%.

Table 6: Switchers

	Share of Observation	Switchers within firm-year
Food Industry		
Share of observation exposed to import	57%	
Share of observation exposed to import that relates to his/her job	30%	
among these		
share of switchers (switches at least one status)	11%	
share of only import status switchers	6%	
share of only related status switchers	4%	2%
Share of observation exposed to import that could have been the output of his/her job	22%	
among these		
share of switchers (switches at least one status)	11%	
share of only import status switchers	7%	
share of only output status switchers	4%	2%
Textile Industry		
Share of observation exposed to import	70%	
Share of observation exposed to import that relates to his/her job	60%	
among these		
share of switchers (switches at least one status)	7%	
share of only import status switchers	2%	
share of only related status switchers	3%	4%
Share of observation exposed to import that could have been the output of his/her job	30%	
among these	11%	
share of switchers (switches at least one status)	4%	
share of only import status switchers	7%	4%
share of only output status switchers		

3 ESTIMATING THE EFFECT OF IMPORT AND OFFSHORING

3.1 MODEL SPECIFICATION

Although Martins and Opromolla (2009) showed that firm-level imports are at least as important wage determinants as exports, in the past the focus in the trade literature was on export and export premia. Recently researchers turned to the problem of understanding the influence of imports on the wages. The mechanism behind the relationship of wages and imports is not as evident as that of the export premia. Imports may affect wages through different channels, and these forces might work in the opposite directions even for the same worker. On the other hand, mechanisms might vary by occupations as well (Tóth, 2011). To eliminate the second source of heterogeneity, I focus only on a few occupations (see Table A.1. in Appendix A), and examine the effect separately for the food and the textile industry[8]. I have only a handful of occupations within each subsample and I use occupation fixed effect in each specification to eliminate the second source of heterogeneity.

The effect of imports on the wages is very complex. First, different kinds of imports may shift wages in different directions (Hummels et al., 2011). Imported machines may increase productivity and through this may increase the wages (Koren and Csillag, 2011). Imported products that could have been produced within the firm, substitute the workers' production and might lead to lower wages (Feenstra and Hanson, 1996). But also, imported inputs - because of better quality or lower cost - might result in increased wages (Hummels et al., 2011). As the focus of this thesis is to examine the effect of products that relate to the production of the workers and goods that could have been produced by them, I focus only on the mechanisms connected to these types of imports.

[8] Industries are defined at occupation level, the food industry includes firms hiring workers with food industry related occupations (e.g. butcher), while the textile industry is defined as firms hiring workers who have textile industry related occupation (e.g. spinner). For the specific occupations see Appendix A.

Furthermore, import products that could have been produced within the firm might affect wages through different channels, and these mechanisms may shift wages in opposite directions. Firms might import these products to substitute the workers' performance, thus lowering the wages, but it might be the case, that the cheaper and better quality goods increase productivity and the gain is shared with the workers (Martins and Opromolla, 2009). Martins and Opromolla (2009) argue that controlling for sales will rule out the productivity effect, while Hummels et al. (2011) distinguish the direct effect of offshoring and the additional productivity effect of offshoring by including output and capital to estimate the former one and excluding it to examine the later. The size of the rent is directly affected by outsourcing (Kramarz, 2008). Importing final goods by firms may weaken the bargaining power of workers, and lower the rent (Martins and Opromolla, 2009).

I estimate the effect of offshoring on wages with the following regressions:

$$\ln(w_{ifot}) = \alpha_0 + \beta_0 I_{ft} + \gamma_0 O_{fot} + \delta_0 X_{it} + \vartheta_0 Z_{ft} + \tau_0 t + \varphi_0 firmFE + \omega_0 occupationFE + \sigma_0 regio + \pi_0 industryFE + \varepsilon_{ifot} \quad (1)$$

and

$$\ln(w_{ifot}) = \alpha_1 + \beta_1 I_{ft} + \gamma_1 O_{fot} + \delta_1 X_{it} + \tau_1 t + e_1 E_{ft} + f_1 F_{ft} + \varphi_1 firmFE + \omega_1 occupationFE + \sigma_0 regio + \pi_0 industryFE + \varepsilon_{ifot}\,, \quad (2)$$

where the index *i* denotes an individual, *f* denotes his/her firm at time *t*, and *o* is his/her occupation.

The dependent variable is the (*log*) monthly net earnings plus the regular and irregular bonus (1/12 of overtime and other bonuses paid in the previous year)[9]. The left hand side of the equations includes the import related variables and control variables. The dummy I_{ft}

[9] measured in 1989 HUF

indicates whether the firm imports in the given year, while the measurement of offshoring, O_{fot} shows the exposure the occupation specific imports. I have two proxies to measure the workers' exposure to offshoring: *imported related products* and *imported outputs*. Depending on the specification, O_{fot} indicates whether the firm imports products that are related to the workers' jobs or it indicates whether the firm imports products that are the output of the given occupation.

The vector X_{it} contains the worker level controls such as *gender, education, experience* and the *square of experience*. The vector Z_{ft}, is a vector of firm control. Trading companies are special in terms of the number of features: trading firms seem to be more productive, employ more workers, and are more capital intensive than non-trading ones (Békés et al., 2009, Bernard et al., 2009). All, all of this might affect wages as well. Therefore I include in the regression the *log of employment, log of net sales, productivity* and *capital-labor ratio*. But other firm characteristics may be crucial as well. Most of the importing firms export also (see Table 4, and Bernard et al., 2009; Martins and Opromolla 2009), and Martins and Opromolla (2009) argue that leaving out the export status from the examination of the effect of importing would lead to a biased estimator, since the export status of a firm is a good predictor of its import status. Also, leaving out ownership status might bias the estimator as well, because firms owned by foreigners benefit more from the imports, since they have the knowledge about the market (Halpern et al., 2011) and foreign ownership is also correlated with wages (Earl and Telegdy, 2008). The full set of firm level control variables are as follows: *log of employment, log of net sales, productivity* (measured as the logarithm of the per worker value added), *log of capital-labor ratio, region dummy, , industry dummy, ownership dummy,* variable indicating whether the firm is an *exporter* or not (dummy equals 1 if the firm exports any amount in the given year).

The vector of worker level controls is always the same and is included in each specification. Firm level controls are included to measure the direct effect of offshoring (Equation (1)), while they are excluded to examine the extra productivity effect (Equation (2)). As mentioned earlier, offshoring may increase productivity and decrease costs. Therefore by controlling for firm characteristics (especially controlling for net sales, number of employees, productivity and capital-labor ration) I eliminate an important channel through which imports may affect wages (Hummels et al., 2011). In order to examine the additional productivity effect of offshoring, I follow the proposal of Hummels et al. (2011) and exclude all firm level controls except exporting and ownership status. In this specification, import values are divided by the entry-year number of employees, but the same thresholds are used (10 000 HUF per worker in the case of food industry and 40 000 HUF in the case of textile industry). Firm fixed effects are responsible for the time-invariant firm differences, while any changes during the observed year represent channels through which import might affect wages (Hummels et al., 2010).

The total direct effect of offshoring on wages is $\beta_0 + \gamma_0$, while the total effect (direct plus productivity effect) of offshoring is $\beta_1 + \gamma_1$. Here β captures the wage premia of import as compared to non-importers. However, these wage premia are not necessarily a causal effect, they may also reflect some differences between importers and non-importers (Koren and Csillag, 2011). The β coefficient might reflect the workers' unobserved quality, since in the dataset less information is available than what is used in the hiring process (Martins and Opromolla, 2009, Koren and Csillag, 2011). The quantity γ measures the wage effect of offshoring. By controlling for firm characteristics and using firm fixed effect it reflects the direct effect of offshoring (eliminating the productivity channel), while by excluding firm controls but including firm fixed effects it measures the direct and the productivity effect together.

4 RESULTS

4.1 POOLED CROSS SECTION

The results of the pooled cross section analyses are presented in Table 7. They are estimated with OLS using cluster standard errors[10]. I include *region dummy*, *industry dummy* (up to two digit level), *occupation* and *year fixed effect*, *export* and *ownership status* in each specification. The first block represents the estimation containing only worker characteristics, and exclude firms related control variables other than mentioned above (other than *export, ownership status, region* and *industry dummy*). The second block's estimations control for both firm and individual characteristics as well.

In all of the cases, when controlling is only for worker characteristics, the import premia is very high. When firm level controls are also included, the premia drop considerably. In the food industry it remains significant, while in the textile industry it became insignificant. In the food industry importing firms, after controlling for firm characteristics, pay at least 4% wage premia, while in case of the textile industry the sign of the premia turns to negative and becomes insignificant. Workers exposed to imports that are related to their tasks earn an extra 3.9% wage premia in the food industry, while in textile industry the premia are negative and insignificant. Measuring offshore by the imports of goods that are related to workers tasks might overestimate the true effect, since theoretically imported inputs (because of quality improvement and/or cost savings) might result in an increase of the wages. However, in the case of the other measurement of offshoring, *imported output*, the wage premia for the food industry are still positive and even higher than in case of the related goods. In case of the textile industry the output premia is 2.7% and it is significant.

[10] clusters are firm*year

In both industries it seems that imports do not substitute workers, thus they do not lower the wage of workers who are exposed to product imports that could have been made by them. Several reasons might explain this finding. On the first hand, it might be the case that firms do not adjust wages but instead, they change the labor demand, and the skills of workers who are hired might differ from employees working at firms that do not use the opportunity of offshoring and this way the wage premia might reflect the unobserved skill differences (Martins and Opromolla, 2009). For example, routine tasks are better candidates for moving them abroad (Levy and Murannane, 2004 cited by Grossman and Rossi-Hansberg, 2008), as a consequence more complex tasks remain within the border and increase the wage of those performing them. On the other hand, rent sharing might also be the reason behind the observed wage premia: importers of intermediate products may provide employees with hold-up opportunities (if the company has to order imported goods in advance), and thus they may pay higher wages (Martins and Opromolla, 2009, Kramarz, 2008). Another possible explanation could be that the observed positive effect is only due to self-selection. Firms importing products that relate to the production within the firm, or goods that are final goods, differ from non-importers and from importers importing only not production related goods.

Table 7: Cross sectional pooled OLS estimations

	Without firm control				With firm control			
	Food Industry		Textile Industry		Food Industry		Textile Industry	
	Related	Output	Related	Output	Related	Output	Related	Output
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Importing	0.199***	0.202***	0.068**	0.047*	0.044**	0.047***	-0.006	-0.020
	(0.018)	(0.017)	(0.029)	(0.027)	(0.018)	(0.017)	(0.026)	(0.025)
Related	0.081***		-0.004		0.039**		-0.008	
	(0.018)		(0.024)		(0.019)		(0.021)	
Output		0.095***		0.059***		0.047***		0.027**
		(0.017)		(0.014)		(0.017)		(0.011)
Firm Control	no	no	no	no	yes	yes	yes	yes
Indiv. Control	yes	yes	yes	yes	yes	yes	yes	yes
Region dum.	yes	yes	yes	yes	yes	yes	yes	yes
Ind. dummy	yes	yes	yes	yes	yes	yes	yes	yes
Year FE	yes	yes	yes	yes	yes	yes	yes	yes
Occup FE	yes	yes	yes	yes	yes	yes	yes	yes
Observations	17 478	17 478	21 356	21 356	17 443	17 443	21 241	21 241
R-squared	0.72	0.72	0.73	0.74	0.78	0.78	0.78	0.78
N of cluster	3 884	3 884	4 271	4 271	3 870	3 870	4 215	4 215

note: Standard errors (in parentheses) are clustered by firm*year. *** p<0.01, ** p<0.05, * p<0.1. For the coefficients of control variables see Table A.3. in Appendix B.

4.2 Firm Fixed Effects

As a second step, I estimate firm fixed effects to control for unobserved firm heterogeneity. As mentioned above to estimate the direct effect of offshoring, I include individual and firm related characteristics as well, while to examine the effect of productivity channel I exclude most of the firm-level controls (only export and ownership status are included). Table 8 shows the result of the firm fixed effect estimations. The first block represent the total effect (productivity and direct effect together), while the second blocks shows the results of the estimated direct effect. The direct effects, second block, are estimated by including *gender, occupation, education* (*vocational, high school* and *university*), *experience* and its *square*, *logarithm of number of employees*, *logarithm of net sales*, *foreign ownership* and *export*

status. *Region* and *industry fixed effects* are excluded, since they do not vary much on firm-level (and probably much of the variation is due to inappropriately filled questionnaires). The first block shows the outcomes of the estimated total effect (productivity and direct effect together), by including the same individual-level controls as in case of the direct effect estimations and by excluding most of the firm-level controls (only export status and foreign ownership are included). In this case in each year the import values are divided by the entry year number of employees, but the thresholds are the same as previously.

In the case of the food industry (5^{th} and 6^{th} columns), using either of the measurements, the direct effect of offshoring is negative and significant as expected, while importers in general do not pay wage premia comparing to non-importers. According to the data in the 5^{th} column, firms importing products that relate to the workers' production, pay 3.1% lower wages than those importers which do not import related goods. It seems that the direct effect of offshoring offsets the direct effect of importing inputs. As discussed in section 2.2, measuring offshoring by imports of related products would underestimate the true effect because of the inclusion of inputs, since the later has (at least theoretically) positive (or no) effect on the wages.

The 6^{th} column of the Table 8 shows the measure of offshoring by those imported outputs, where we can be sure that they are outputs of the specific occupation (leaving out products where even at 6 digit HS level does not indicate clearly whether the given product is an input or output for the occupation; see the example in Section 2.2). The direct effect of offshoring is still negative and significant, but it drops considerably. Firms importing outputs pay 1.4% lower wages than those importers who do not import goods that are the output of the given occupation. The sign of the output coefficient coincide with the expectation, but the drop in its size is surprising. There might be several reasons for this drop. It might be that importing inputs, after eliminating the productivity effect, have negative impact on wages and

contradicts the expectation. However, it is more likely, that the second measurement of offshoring leaves out important products that have negative effect on wages, while imported inputs do not have wage effect.

In any case, it can be concluded from the 5th and 6th columns that there is clear evidence of offshoring in the case of the food industry. Both proxies reinforce this finding and they give a lower bound for the absolute magnitude. By assuming that inputs do not have a negative effect on wages (i.e. they do not have an effect at all, or have a positive effect), one can conclude that that in the case of the food industry, workers exposed to offshoring get at least 3% lower wages than those working at importer firms but are not exposed to offshoring. On the other hand importers do not have wage premia over non-importers: the coefficients of the importing dummy are insignificant but somewhat negative. Comparing the results of the OLS estimation (Table 7) and the results of the firm fixed effect estimation (Table 8), it seems that there is a large positive selection that have driven the results of the previous section.

Turning to the textile industry, surprisingly the previously insignificant but slightly negative coefficients of the OLS estimations (Table 7) turned to be significant and changed signs in each case, this might reflect a negative selection. In the textile industry, firms importing products that are not related to the workers' tasks do not pay wage premia. This finding is similar to that of the food industry. Measuring offshoring by imports of related products, the third column of the Table 8 shows the unexpected result that, offshoring has a positive direct effect on wages. One has to bear in mind that due to the fact that this definition includes imported inputs that could positively affect wages, we cannot conclude that workers exposed to offshoring are better off than those that are not. By looking at the 8th column and using the other proxy for offshoring, the coefficient turns negative, and now there is a significant and positive wage premia of importers. The dramatic drop and even sign change might be the result of the large and positive effect of imported inputs on wages. Most

probably what we see in the 7th column is due the phenomena that the positive effect of imported inputs offsets the negative effect of imported outputs. By using the other definition of offshoring most probably the effect is still under estimated by leaving out goods that also substitute the workers' job.

The results indicate that there is a negative direct effect of offshoring in both industries. While in the case of the food industry this effect offsets the effect of imported inputs, in the textile industry it seems to be the other around, the large positive effect of imported inputs offsets the effect of offshoring. This difference might be explained by the differences between the two markets. In the case of the food industry imported goods and domestic products are probably perfect substitutes: it does not matter whether the butcher used Hungarian pigs or foreign pigs to make the sausages. Even though because of climate and geographic issues some products are not available within the border (e.g. sea fish or orange), it is more likely that these goods are imported in a somewhat processed form. For example, it is more likely that orange juice makers import concentrate of orange juice instead of raw orange, thus they substitute the workers' performance and not complement it. On the other hand, in the textile industry this is not necessarily true: Italian textiles are of a better quality, Chinese silk is famous, and therefore Hungarian inputs and foreign inputs are not perfect substitutes. However, the observed wage premia still might be due to selection, and workers at importing firms might be different. Employers when hiring workers have more information than observed in the dataset, and it is very likely, that working with special Italian textile and Chinese silk need more skill and more attention from the workers. But the same rent sharing argument as in case of OLS estimation holds here as well: importers of intermediate products may provide employees with hold-up opportunities (if the company has to order imported goods in advance), and thus they may pay higher wages (Martins and Opromolla, 2009, Kramarz, 2008).

Table 8: Firm fixed effect estimations

	Total effect				Direct effect			
	Food Industry		Textile Industry		Food Industry		Textile Industry	
	Related	Output	Related	Output	Related	Output	Related	Output
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Importing	0.000	-0.004	-0.012	0.018**	-0.005	-0.009	0.009	0.026**
	(0.008)	(0.008)	(0.011)	(0.010)	(0.008)	(0.008)	(0.011)	(0.010)
Related	-0.028***		0.054***		-0.031***		0.025***	
	(0.007)		(0.010)		(0.007)		(0.009)	
Output		-0.008		0.016**		-0.014*		-0.014**
		(0.007)		(0.016)		(0.007)		(0.007)
Individual Control	yes	yes	yes	yes	yes	yes	yes	yes
Firm Control	no	no	no	no	yes	yes	yes	yes
Export dummy	Yes	yes	yes	yes	yes	yes	yes	yes
Ownership	Yes	yes	yes	yes	yes	yes	yes	yes
Firm FE	Yes	yes	yes	yes	yes	yes	yes	yes
Year FE	Yes	yes	yes	yes	yes	yes	yes	yes
Occipation FE	Yes	yes	yes	yes	yes	yes	yes	yes
Observations	17 478	17 478	21 356	21 356	17 478	17 478	21 356	21 356
R-squared	0.77	0.77	0.74	0.74	0.77	0.77	0.74	0.74
N of anonid	1 285	1 285	1 352	1 352	1 285	1 285	1 352	1 352

Note: In the case of the productivity effect import values are divided by the entire firm size when defining categories. *** p<0.01, ** p<0.05, * p<0.1. For the coefficients of control variables see Table A.4. in Appendix B.

Including of firm controls eliminates an important channel through which imports might affect wages. Profit maximizing firms are motivated to offshore task by the hope of cost savings. Cost savings may raise productivity, and workers could benefit from that (Grossman and Rossi-Hansberg, 2008), even though offshoring some production processes directly reduces the demand for workers. The cost savings of such restructuring of production increases the productivity and size of the firms and improves their competitiveness. The potential cost saving effect of offshoring could offset or even reverse the "direct effect" on employment (Ottaviano et al. 2010).

The finding that the estimation with firm controls shows a larger wage drop for workers exposed to offshoring than the estimation without controls, is consistent with the findings of Hummels et al. (2011) in the case of Danish firms. It is also consistent with the predictions of the models (Ottaviano et al., 2010, Grossman and Rossi-Hansberg, 2008). In the case of the food industry, the direct effect of offshoring is offset by the productivity effect; while in the case of the textile industry the cost saving effect even reverses the direct effect.

5 ROBUSTNESS CHECKS

5.1 THRESHOLD

Throughout the analyses I have used a threshold, above which a firm is defined as importer and below as non-importer. In this section I represent the results of using different thresholds, a very low and a very high one. Using other thresholds should not alter the results. I present only the firm fixed effects estimations, as they are the focus of the thesis.

Table 9 shows the results for the food industry, while Table 10 contains the results for the textile industry. In both tables the top panel represents the outcome of using the first definition of offshoring: importing goods that relate to the workers' tasks. The bottom panel includes the estimation for the second definition: importing products that could have been the outcome of the worker's production. In order to make the comparison easier, in both cases the first two columns show the estimation of the baseline specification, when the threshold is 10 000 HUF per worker in the food industry, and 40 000 HUF per worker in the textile industry. I compare this with the results using a very low threshold (1 000 HUF per worker in both industries), and with a very high threshold (20 000 HUF per worker in the food, and 60 000 HUF per worker in textile industry). The top threshold is different in the two industries, because in the case of food industry firms do not import that much, thus using a higher threshold would give an estimation for the outliers only.

In case of the food industry, the pattern of the wage premia is very similar to the baseline estimation, although the magnitude changes somewhat. At all thresholds we can conclude, that workers exposed to the practice of offshoring are worse off than those workers whose employer imports only other goods. The total effect of offshoring (direct plus

productivity) is somewhat lower than the direct effect, thus we can assume that the cost-saving and productivity-increasing mechanism somewhat offset the negative direct effect.

Table 9: Firm fixed effect estimation in case of the food industry, using different thresholds

	Baseline (10 000 HUF per worker)		1 000 HUF per worker		20 000 HUF per worker	
	Total	Direct.	Total	Direct.	Total	Direct.
	(1)	(2)	(3)	(4)	(5)	(6)
	Importing products that relates to workers job					
Importing	0.000	-0.005	-0.000	-0.006	-0.002	-0.005
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
Related	-0.028***	-0.031***	-0.020***	-0.020***	-0.024***	-0.034***
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
Indiv. Control	yes	yes	yes	yes	yes	yes
Firm Control	no	yes	no	yes	no	yes
Export status	yes	yes	yes	yes	yes	yes
Ownership status	yes	yes	yes	yes	yes	yes
Firm FE	yes	yes	yes	yes	yes	yes
Year FE	yes	yes	yes	yes	yes	yes
Occup. FE	yes	yes	yes	yes	yes	yes
	Importing products that are output of the workers tasks					
Importing	-0.004	-0.009	-0.003	-0.008	-0.005	-0.009
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
Output	-0.008	-0.014*	-0.017**	-0.017**	-0.004	-0.022***
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
Indiv. Control	yes	yes	yes	yes	yes	yes
Firm Control	no	yes	no	yes	no	yes
Export status	yes	yes	yes	yes	yes	yes
Ownership status	yes	yes	yes	yes	yes	yes
Firm FE	yes	yes	yes	yes	yes	yes
Year FE	yes	yes	yes	yes	yes	yes
Occup. FE	yes	yes	yes	yes	yes	yes

Note: In the case of the productivity effect, import values are divided by the entire firm size when defining categories. R-square is 0.77 in each specification. The number of observations is 17 478 in each specification, while the number of firms is 1 285. *** p<0.01, ** p<0.05, * p<0.1.

Table 10: Firm fixed effect estimation in case of the textile industry, using different thresholds

	Baseline (40 000 HUF per worker)		1 000 HUF per worker		60 000 HUF per worker	
	Total	Direct	Total	Direct	Total	Direct
	(1)	(2)	(3)	(4)	(5)	(6)
	Importing products that relates to workers job					
Importing	-0.012	0.009	-0.000	-0.006	-0.009	0.006
	(0.011)	(0.011)	(0.015)	(0.016)	(0.011)	(0.011)
Related	0.054***	0.025***	0.026*	0.036**	0.067***	0.034***
	(0.010)	(0.009)	(0.015)	(0.015)	(0.009)	(0.01)
Indiv. Control	yes	yes	yes	yes	yes	yes
Firm Cont	no	yes	no	yes	no	yes
Export status	yes	yes	yes	yes	yes	yes
Ownership statis	yes	yes	yes	yes	yes	yes
Firm FE	yes	yes	yes	yes	yes	yes
Year FE	yes	yes	yes	yes	yes	yes
Occup. FE	yes	yes	yes	yes	yes	yes
	Importing products that are output of the workers tasks					
Importing	0.018*	0.026***	0.024**	0.025**	0.022**	0.025**
	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)
Output	0.016**	-0.014**	-0.008	-0.003	0.031*	-0.012*
	(0.006)	(0.007)	(0.007)	(0.008)	(0.009)	(0.007)
Indiv. Control	yes	yes	yes	yes	yes	yes
Firm Cont	no	yes	no	yes	no	yes
Export status	yes	yes	yes	yes	yes	yes
Ownership statis	yes	yes	yes	yes	yes	yes
Firm FE	yes	yes	yes	yes	yes	yes
Year FE	yes	yes	yes	yes	yes	yes
Occup. FE	yes	yes	yes	yes	yes	yes

Note: In case of the productivity effect, import values are divided by the entire firm size when defining categories. R-square is 0.74 in all specifications. The number of observations is 21 356 in all specifications and the number of firms is 1 352 *** p<0.01, ** p<0.05, * p<0.1.

In the case of the textile industry (see Table 10), the findings are not that robust. In case of a very low threshold the negative effect of importing output disappear. Using the first definition of offshoring, importing products that relate to the worker's tasks, the significant positive effect is robust over all thresholds. The only surprise is that when using a very low threshold the total (direct plus productivity) effect is smaller than the direct effect, while in the baseline estimation and in the case of high thresholds it is the other way around (as the

models predict, Grossman and Rossi-Hansberg,2008; Ottaviano et al., 2010). All in all, we can conclude that in the case of large importers the negative effect of offshoring is offset by the positive effect of imported input and also by the positive effect of cost-savings.

5.2 Gross Wages

In the baseline analyses I have used (log) net monthly earning plus the regular and irregular bonus (1/12 of overtime and other bonuses paid in the previous year) as the left hand side variable. Although the net wages also matter for the workers, an employee may care more about the gross earnings. I have estimated the baseline specification (firm fixed effect, using 10 000 HUF per worker as a threshold in the food industry and 40 000 HUF per worker in the textile industry) using (log) gross monthly earnings as the dependent variable. Neither the pattern, nor the size of the estimated effects have changed in the case of the food industry, while in the textile industry the patterns are the same but the size of the effects have slightly changed.

Employers using the practice of offshoring pay less gross wages for workers in the food industry, while the cost-savings mechanisms offset this negative wage premia. In the case of the textile industry, the negative effect of offshoring is probably offset by the positive effect of importing input and by the positive productivity effect.

Table 11: Gross wages

	Total effect				Direct effect			
	Food industry		Textile industry		Food industry		Textile industry	
	Related	Output	Related	Output	Related	Output	Related	Output
	log gross wages (regular monthly income plus 1/12 of previous year bonuses)							
Importing	0.001	-0.004	-0.010	0.020*	-0.006	-0.010	0.010	0.026**
	(0.009)	(0.009)	(0.013)	(0.011)	(0.009)	(0.009)	(0.013)	(0.011)
Related	-0.028***		0.055***		-0.031***		0.023**	
	(0.008)		(0.011)		(0.008)		(0.010)	
Output		-0.008		0.018***		-0.014*		-0.016**
		(0.008)		(0.007)		(0.007)		(0.007)
Indiv. Charact.	yes	Yes	yes	yes	yes	yes	yes	yes
Firm Charact.	no	no	no	no	yes	yes	yes	yes
Firm FE	yes	yes	yes	yes	yes	yes	yes	yes
Year FE	yes	yes	yes	yes	yes	yes	yes	yes
Occup. FE	yes	yes	yes	yes	yes	yes	yes	yes
Region	yes	yes	yes	yes	yes	yes	yes	yes
N of Obs.	17 478	17 478	21 356	21 356	17 478	17 478	21 356	21 356
R-square	0.65	0.65	0.63	0.63	0.65	0.65	0.63	0.63
N of firm	1 285	1 285	1 352	1 352	1 285	1 285	1 352	1 352

note: In case of the productivity effect, import values are divided by the entry firm size when defining categories, but the same thresholds are used. *** p<0.01, ** p<0.05, * p<0.1

5.3 Part Time Workers

In the baseline analysis I have restricted my sample to full time workers, since the practice of offshoring might have different impact on full and part time workers. In the case of the later it is more likely that the firms change their demand and not the wages when they start to implement offshoring. I have run the baseline regressions (firm fixed effect, using 10 000 HUF per worker in case of the food and 40 000 HUF per worker in case of the textile industry as threshold) by including part time workers as well. The pattern of the results does not change in either industry. In case of the food industry the size of the effect remains at the same level as in the baseline estimation, while in the textile industry the values are slightly smaller.

Table 12: Including part time employees

	Total effect				Direct effect			
	Food industry		Textile industry		Food industry		Textile industry	
	Related	Output	Related	Output	Related	Output	Related	Output
Importing	-0.001	-0.005	-0.009	0.020**	-0.005	-0.010	0.011	0.027***
	(0.008)	(0.008)	(0.011)	(0.010)	(0.008)	(0.008)	(0.011)	(0.010)
Related	-0.028***		0.052***		-0.031***		0.023**	
	(0.007)		(0.009)		(0.007)		(0.009)	
Output		-0.009		0.016***		-0.014**		-0.014**
		(0.007)		(0.006)		(0.007)		(0.007)
Indiv. Charact.	yes	yes	yes	yes	yes	yes	yes	yes
Firm Charact.	No	no	no	no	yes	yes	yes	yes
Firm FE	yes	yes	yes	yes	yes	yes	yes	yes
Year FE	yes	yes	yes	yes	yes	yes	yes	yes
Occup. FE	yes	yes	yes	yes	yes	yes	yes	yes
Region	yes	yes	yes	yes	yes	yes	yes	yes
N of Obs.	17 598	17 598	21 616	21 616	17 598	17 598	21 616	21 616
R-square	0.77	0.77	0.74	0.74	0.77	0.77	0.74	0.74
N of firm	1 289	1 289	1 361	1 361	1 289	1 289	1 361	1 361

note: In case of the productivity effect, import values are divided by the entry firm size when defining categories, but the same thresholds are used. *** p<0.01, ** p<0.05, * p<0.1

6 CONCLUSION

In my thesis I estimated the effect of offshoring on wages of workers in the Hungarian food and textile industry. Workers are matched with imported products that are related to their work and with those that are output of their production using occupation description and detailed trade statistics of firms broken down by product. This matching enables me to define what offshore means at occupation level, instead of the firm level definitions used throughout in the literature.

I find that workers exposed to offshoring earn less than workers working at importing firms but not exposed to offshoring. In the case of the food industry, the negative direct effect is somewhat offset by the cost-saving mechanism but remains negative, while in the case of the textile industry, the positive effect of importing input and the positive effect of cost-saving and productivity increase even reverses the negative direct effect of offshoring. The finding that the direct effect of offshoring shows a larger wage drop for workers than in case of the total effect (direct and productivity effect together), is consistent the findings of Hummels et al. (2011) and with the predictions of the modes (Ottaviano et al., 2010; Grossman and Rossi-Hansberg, 2008).

The main drawback of my analysis are that using these two proxies, *imported related products* and *imported outputs*, to estimate the effect of offshoring on labor, I underestimated the true effect and that I am not able to follow each worker over several years, thus I can only control for observed worker characteristics.

All in all, the findings of my thesis suggest that there is a justified fear of negative effect of offshoring, but the size and its importance vary by industry.

REFERENCES

Acemoglu, Daron (2002). "Technical Change, Inequality and the Labor Market." *Journal of Economic Literature, Vol*. XL, pp. 7-72.

Acharya, Ram C. and Wolfgang Keller (2007). "Technology Transfer through Imports" NBER Working Paper13086, National Bureau of Economic Research.

Amiti, Mary and Donald R. Davis (2008). "Trade, Firms, and Wages: Theory and Evidence." NBER Working Paper 14106, National Bureau of Economic Research.

Andersson, Linda and Patrik Karpaty (2007). "Offshoring and Relative Labor Demand in Swedish Firms." Örebro University, Swedish Business School Working Papers 2007:5.

Bálint Mónika (2006). "Bértarifa-felvétel." MTA Közgazdaságtudományi Intézet Adatbank, Budapest

Balsvik, Ragnhild and Sigurd Birkeland (2011) "Offshoring and Wages: Evidence from Norway." www.eea-esem.com/files/papers/eea-esem/2011/2090/draft_balsvik_birkeland.pdf

Becker, Sascha O. and Marc-Andreas Muendler (2012). " Trading Tasks: A Preliminary Exploration with German Data." EFIGE Working Paper 45.

Békés, Gábor, Péter Harasztos and Balázs Muraközy (2009). "Firms and Products in International Trade: Data and Patterns for Hungary." IEHAS Working Paper 2009/18.

Bernard, Andrew B., J. Bradford Jensen, Peter K. Schott (2009). "Importers, Exporters and Multinationals: A Portrait of Firms in the U.S. that Trade Goods." in T. Dunne, Jensen J. B. and M.J. Roberts (eds.), Producers Dynamics: New Evidence from Micro Data (University of Chicago Press).

Berman, Eli, John Bound and Zvi Griliches (1994). "Changes in the Demand for Skilled Labor within U.S. Manufacturing: Evidence from the Annual Survey of Manufactures." *The Querterly Journal of Economics*, Vol. 109, No. 2., pp. 367-397.

Blinder, Alan S (2006). "Offshoring: The Next Industrial Revolution?," *Foreign Affairs*, March/April 2006, 85 (2), 113-28.

Coe, David T. and Elhanan Helpman (1995). "International R&D spillovers." *European Economic Review*, 39 (5), 859-887.

Crino, Rosario (2009). "Offshoring, Multinationals and Labour Market: A Review of the Empirical Literature." *Journal of Economic Surveys* , Vol. 23, No. 2, pp. 197-249.

Earle, John and Álmos Telegdy (2008). "Ownership and Wages: Estimating Public-Private and Foreign-Domestic Differentials with LEED from Hungary, 1986 to 2003," in Stefan Bender, Julia Lane, Kathryn Shaw, Fredirk Andersson, and Till von Wacher (eds.), The Ananlysis of Firms and Employees: Quantitative and Qualitative Approaches (University of Chicaho Press).

Feenstra, Robert C. and Gordon H. Hanson (1995). "Foreign Investment, Outsourcing and Relative Wages." NBER working paper No. 5121, National Bureau of Economic Research.

Feenstra, Robert C. and Gordon H. Hanson (1996). "Globalization, Outsourcing, and Wage Inequality." NBER Working Paper No. 5424, National Bureau of Economic Research.

Feenstra, Robert C. and Gordon H. Hanson. (1999). "The Impact of Outsourcing and High-Technology Capital on Wages: Estimates for the United States, 1979-1990." *The Quarterly Journal of Economics*, Vol. 114, No.3. pp 907-940.

Geishecker, Ingo and Holger Görg (2008). "Winners and Losers: A Micro-level Analysis of International Outsourcing and Wages." *The Canadian Journal of Economics,* Vol. 41, No. 1, pp 243-270.

Geishecker, Ingo; Holger Görg and Jakob Roland Munch (2008). "Do Labour Market Institutions Matter? Micro-level Wage Effects of International Outsourcing in Three European Countries." Kiel working Paper No. 1404.

Grossman, Gene M. and Esteban Rossi-Hansberg (2008). "Trading Tasks: a Simple Theory of Offshoring." *American Economic Review,* 98(5), pp. 1978-1997.

Halpern, L. and Kőrösi, G (2000). "Efficiency and Labor Market Share in Hungarian Corporate Sector." William Davidson Institute Working Paper No 333.

Halpern, László; Miklós Koren and Ádám Szeidl (2011). "Imported Inputs and Productivity." http://miklos.koren.hu/view/kmwprs/32/

Hsieh, Chang-Tai and Keong T. Woo (2005). "The impact of outsourcing to China on Hong Kong's labor market." *The American Economic Review,* Vol. 95, No 5, pp. 1673-1687.

Hummels, David; Rasmus Jorgensen, Jakob R. Munch and Chong Xiang (2011). "The Wage Effects of Offshoring: Evidence from Danish Matched Worker-Firm Data." NBER Working Paper 17496, National Bureau of Economic Research.

Johnson, George and Frank Stafford (1999). "The Implication of International Trade, in Handbook of Labor Economics." in Orley Ashenfelter and David Card (eds.), *Handbook of Labor Economics*, Vol. 3 of *Handbook of Labor Economics*, Elsevier, chapter 34, pp. 2215-2291.

Koren, Miklós and Márton Csillag (2011). "Machines and Machinists: Capital-skill Complementarity from an International Trade Perspective." http://miklos.koren.hu/view/kmwprs/36/

Kramarz, F. (2008). "Offshoring, wages, and employment: Evidence from data matching imports, firms, and workers."
www.crest.fr/ckfinder/userfiles/files/Pageperso/kramarz/Offshoring072008.pdf

Levy, Frank and Richard Murnane (2004). "The New Division of Labor," Princeton: Princeton University Press.

Martins, Pedro S. and Luca David Opromolla (2009). "Exports, Imports and Wages: Evidence from Matched Firm-Worker-Product Panels." IZA Working Paper No. 4646.

Ottaviano, Gianmarco I.P.; Giovanni Peri and Greg C. Wirght (2010). "Immigration, offshoring and American Jobs." NBER Working Paper No. 16439, National Bureau of Economic Research.

Sachs, Jeffrey D. and Howard J. Shatz (1994). "Trade and jobs in U.S. manufacturing." *Brooking Papers on Economic Activity*, No. 1, pp. 1.84.

Tóth Péter (2011). "The wage premium of international trade: who wins and why?" MA thesis, CEU eTD Collection.

APPENDIX

APPENDIX A: MATCHING WORKERS TO IMPORTED PRODUCTS

Table A. 1: List of occupations

Food Industry	
7211	Meat, fish and poultry processing workers
7212	Food preservers, fruit and vegetable processing workers
7213	Vegetable oil manufacturers
7214	Milk processing workers
7215	Milling industry workers
7216	Bakers, pastry industry workers
7217	Sugar industry workers
7218	Sweets industry products manufacturers
7221	Alcohol, alcoholic drinks manufacturers
7222	Wine and champagne producers
7223	Brewers workers
7224	Soft drinks, mineral and soda water manufacturers
Textile Industry	
7312	Spinner
7313	Weavers
7314	Knitters
7315	Dyers, textile printing, finishing workers
7321	Tailors, dressmakers, needlewomen, model makers
7322	Tailor's cutters (in manufacture of garment)
7323	Hatters, milliners, cap makers (except knitters)
7324	Pelt dressers, fur dyers
7325	Furriers
7331	Tanners, leather dressers
7332	Saddlers, leather belt makers
7333	Fancy leather goods and luggage makers
7334	Leather glove makers
7335	Shoemakers
7336	Leather dressmakers

Figure A. 1: Production process in the food industry

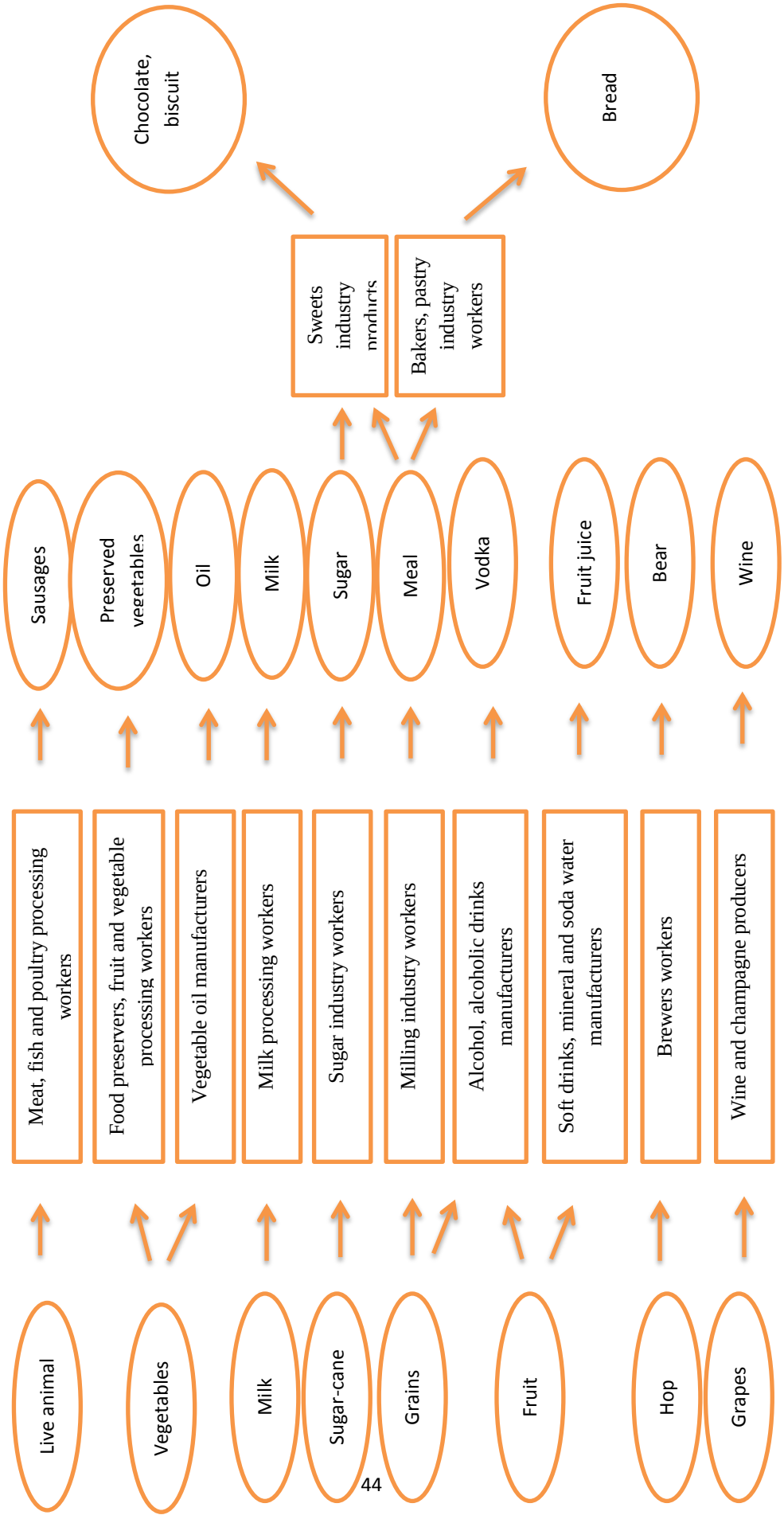

Figure A. 2: Production process in the textile industry - part 1 -

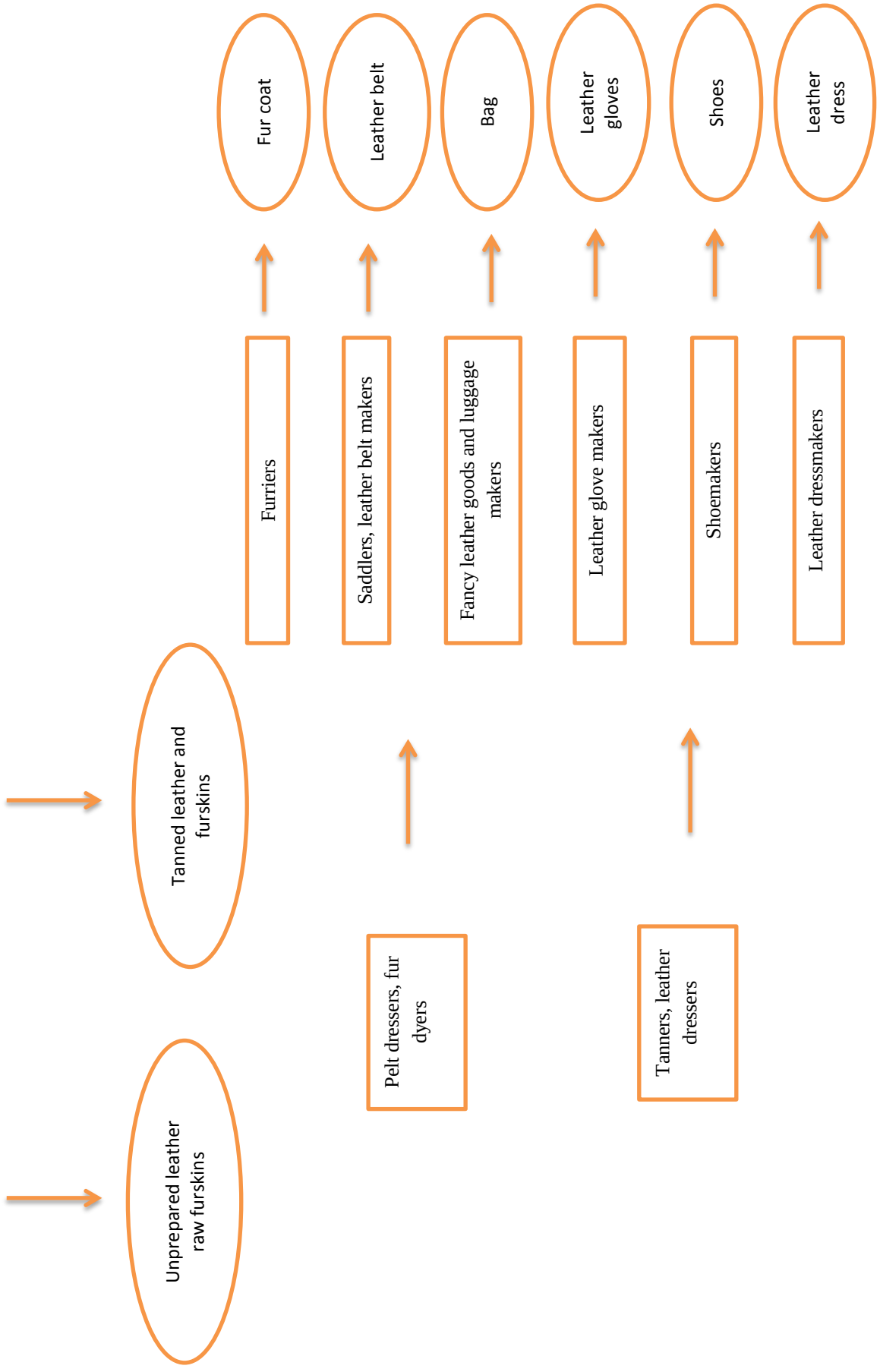

Figure A. 3: Production process in the textile industry - part 2-

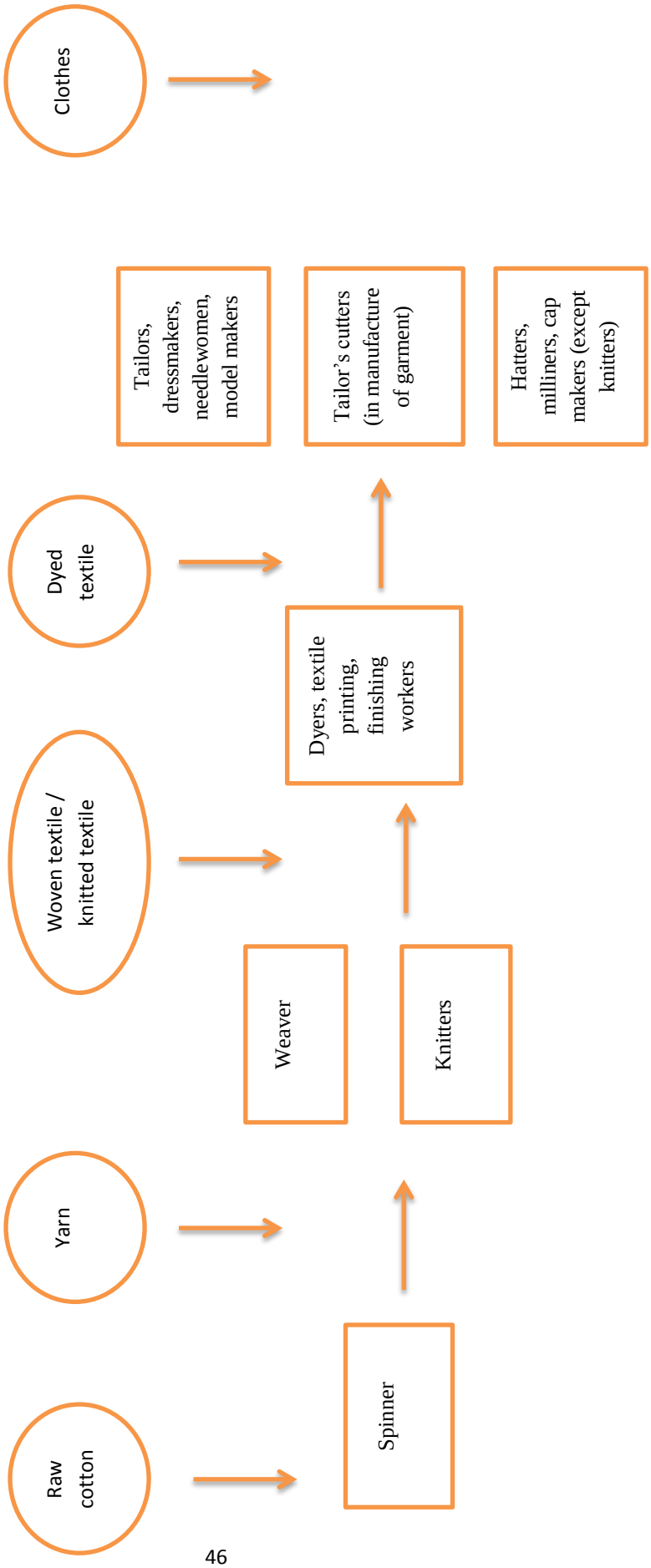

Table A. 2: Random examples of matches

FEOR	Occupation description	HS6	Product description
Related products			
7211	Meat, fish and poultry processing workers	010391	Live swine weighing less than 50 kg
7212	Food preservers, fruit and vegetable processing workers	080510	Citrus fruit, fresh or dried
7215	Milling industry workers	100110	Durum wheat, Cereals
7218	Sweets industry products manufacturers	170410	Chewing gum, whether or not sugar coated
7223	Brewers workers	220300	Bear made from malt
7312	Spinners	600220	Other knitted or crocheted fabrics (of a width not exceeding 30cm)
7313	Weaver	510610	yarn of carded wool, not put up for retail sale, containing 85% or more weight of wool
7321	Tailors, dressmakers, needlewomen, model makers	521212	Dyed woven fabrics of cotton, weighing not more than 200g/meter square
7331	Tanners, leather dressers	420310	Articles of apparel and clothing accessories, of leather or of composition leather; belts and bandoliers
7335	Shoemakers	640411	Footwear with outer soles of rubber or plastics: sports footwear, tennis shoes..etc.
Outputs			
7211	Meat, fish and poultry processing workers	160411	Salmon - prepared or preserved fish, whole or in pieces, but not minced
7212	Food preservers, fruit and vegetable processing workers	200210	Tomato (whole or in pieces) prepared or preserved otherwise than by vinegar or acetic acid
7216	Bakers, pastry industry workers	190520	Gingerbread
7218	Sweets industry products manufacturers	180631	Chocolate in blocks, slabs or bars
7221	Alcohol, alcoholic drinks manufacturers	220830	Whiskies
7312	Spinner	500400	Silk yarn (other than yarn spun from silk waste), not put up for retail sale
7312	Spinner	521141	woven fabrics of cotton, of yarns of different colours (plain weave)
7314	Knitters	610510	Men’s or boy’s shirts, knitted or crocheted (of cotton)
7321	Tailors, dressmakers, needlewomen, model makers	620610	Women’s or girls’ blouses, shirts and shirt-blouses
7321	Tailors, dressmakers, needlewomen, model makers	621822	Women’s or girls’ nightdresses and pyjamas of man made fibres

APPENDIX B: ESTIMATION RESULTS

Table A. 3: Pooled cross section OLS

	without firm control				with firm control			
	Food industry		Textile industry		Food industry		Textile industry	
	Related	Output	Related	Output	Related	Output	Related	Output
	(1)	(2)	(3)	(4)	(5)	(6)	(7).	(8)
Importing	0.199***	0.202***	0.068***	0.047*	0.044**	0.046***	-0.006	-0.020
	(0.018)	(0.017)	(0.029)	(0.027)	(0.018)	(0.017)	(0.026)	(0.025)
Related	0.081***		-0.004		0.039**		-0.008	
	(0.018)		(0.024)		(0.019)		(0.021)	
Output		0.095***		0.059***		0.047***		0.027**
		(0.017)		(0.014)		(0.017)		(0.011)
Expreience	0.013***	0.013***	0.009***	0.009***	0.013***	0.013***	0.009***	0.009***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Exp. square	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Gender	0.117***	0.116***	0.088***	0.089***	0.127***	0.127***	0.074***	0.075***
	(0.007)	(0.007)	(0.012)	(0.013)	(0.006)	(0.006)	(0.010)	(0.010)
Vocational	0.080***	0.079***	0.026***	0.029***	0.092***	0.091***	0.048***	0.050***
	(0.009)	(0.009)	(0.008)	(0.008)	(0.008)	(0.008)	(0.006)	(0.006)
High Sch.	0.192***	0.191***	0.041***	0.044***	0.190***	0.190***	0.069***	0.071***
	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.011)	(0.010)	(0.010)
Univ.	0.230***	0.227***	-0.002	0.001	0.231***	0.229***	0.052	0.053
	(0.052)	(0.052)	(0.075)	(0.076)	(0.047)	(0.047)	(0.065)	(0.065)
Foreign	0.139***	0.136***	0.189***	0.182***	0.068***	0.067***	0.106***	0.103***
	(0.019)	(0.018)	(0.014)	(0.014)	(0.021)	(0.021)	(0.012)	(0.012)
Net sales					0.065***	0.064***	-0.010	-0.010
					(0.014)	(0.014)	(0.012)	(0.011)
Exporting	0.041**	0.042**	0.073***	0.069***	-0.039**	-0.039***	0.011	0.009
	(0.017)	(0.017)	(0.025)	(0.024)	(0.015)	(0.015)	(0.023)	(0.022)
Employment					0.021	0.022	0.081***	0.081***
					(0.014)	(0.014)	(0.012)	(0.012)
Productivity					0.065***	0.065***	0.140***	0.137***
					(0.010)	(0.010)	(0.012)	(0.012)
Capital-labor ratio					0.002	0.002	-0.009***	-0.008**
					(0.005)	(0.005)	(0.003)	(0.003)
Region dummy	yes	yes	Yes	yes	yes	yes	yes	yes
Industry dummy	yes	yes	Yes	yes	yes	yes	yes	yes
Year FE	yes	yes	Yes	yes	yes	yes	yes	yes
Occup FE	yes	yes	Yes	yes	yes	yes	yes	yes
Observations	17 478	17 478	21 356	21 356	17 443	17 443	21 241	21 241
R-squared	0.72	0.72	0.73	0.74	0.78	0.78	0.78	0.78
Number of cluster	3 884	3 884	4 371	4 371	3 870	3 870	4 215	4 215

Note: net sales is the log of net sales, exporting is a dummy indicating whether the firm has income from exporting, employment is the log of employment, productivity is the logarithm of the per worker value added, capital-labor ratio is the log of capital-labor ratio. Standard errors (in parentheses) are clustered by firm*year. *** p<0.01, ** p<0.05, * p<0.1

Table A. 4: Frim fixed effect estimation

	Total effect				Direct effect			
	Food Industry		Textile Industry		Food Industry		Textile Industry	
	Related	Output	Related	Output	Related	Output	Related	Output
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Importing	0.000	-0.004	-0.012	0.018**	-0.005	-0.009	0.009	0.026**
	(0.008)	(0.008)	(0.011)	(0.010)	(0.008)	(0.008)	(0.011)	(0.010)
Related	-0.028***		0.054***		-0.031***		0.025***	
	(0.007)		(0.010)		(0.007)		(0.009)	
Output		-0.008		0.016**		-0.014*		-0.014**
		(0.007)		(0.016)		(0.007)		(0.007)
Experience	0.012***	0.012***	0.010***	0.010***	0.012***	0.012***	0.010***	0.010***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Exp. square	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Gender	0.098***	0.098***	0.059***	0.060***	0.098***	0.098***	0.060***	0.059***
	(0.004)	(0.004)	(0.006)	(0.006)	(0.004)	(0.004)	(0.006)	(0.006)
Vocational	0.095***	0.095***	0.054***	0.054***	0.096***	0.095***	0.054***	0.054***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
High Sch.	0.163***	0.163***	0.093***	0.093***	0.161***	0.161***	0.094***	0.093***
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
Univ.	0.254***	0.254***	0.116**	0.117**	0.253***	0.253***	0.122***	0.123***
	(0.028)	(0.028)	(0.0038)	(0.0038)	(0.027)	(0.027)	(0.038)	(0.038)
Foreign	0.051***	0.046***	0.029**	0.027**	0.051***	0.049***	0.019	0.020
	(0.010)	(0.010)	(0.013)	(0.013)	(0.010)	(0.010)	(0.013)	(0.013)
Net Sales					0.100***	0.099***	0.040***	0.042***
					(0.009)	(0.009)	(0.007)	(0.007)
Exporting	0.005	0.004	-0.032***	-0.026***	-0.001	-0.003	-0.043***	-0.039***
	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)
Employment					-0.052***	-0.052***	0.031***	0.030***
					(0.012)	(0.010)	(0.010)	(0.010)
Productivity					0.018***	0.018***	0.035***	0.035***
					(0.004)	(0.004)	(0.006)	(0.006)
Cap.-labor rat.					0.003	0.003	0.001	0.001
					(0.003)	(0.003)	(0.002)	(0.002)
Firm FE	yes	yes	yes	yes	yes	yes	yes	yes
Year FE	yes	yes	yes	yes	yes	yes	yes	yes
Occipation FE	yes	yes	yes	yes	yes	yes	yes	yes
N of Obs.	17 478	17 478	21 356	21 356	17 478	17 478	21 356	21 356
R-squared	0.77	0.77	0.74	0.74	0.77	0.77	0.74	0.74
N of firms	1 285	1 285	1 352	1 352	1 285	1 285	1 352	1 352

Note: net sales is the log of net sales, exporting is a dummy indicating whether the firm has income from exporting, employment is the log of employment, productivity is the logarithm of the per worker value added, capital-labor ratio is the log of capital-labor ratio. In case of the total effect, import values are divided by the entry firm size when defining categories, but the same thresholds are used. *** p<0.01, ** p<0.05, * p<0.1