The Wage Premium of International Trade: Who Wins and Why?

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Abstract

In my thesis I explore the behavior and the relation of the three international premia, the wage differential on export status, capital imports and foreign ownership using matched employer-employee data. After documenting the basic findings of the literature about export premium for Hungary, I start to analyze the three variables of interest jointly. On the plain cross-section model the export premium turns out to be insignificant. I find robust and significant heterogeneity in the foreign ownership premium, and to a lesser extent in the import premium. However, after including firm fixed effects I find that there is a huge difference between the estimates of the previous OLS and the firm fixed effects (FE) model; sometimes coefficients even switch sign significantly, and the patterns across the groups disappears. I conclude that this large difference in the results is partly due to self-selection in trading and the existing time heterogeneity of the premia.

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1 Introduction

1.1 Research question and theoretical environment

The opening to the world economy during the 1990s was one of the main aspects of the transition from the socialist system in Hungary. There are many channels through which this policy change might have affected the level and the distribution of wages (for a survey see Pavcnik and Goldberg 2004). While the main focus in the literature is on the effects that are heterogeneous across skill groups (for example the Stolper-Samuelson effect) or industries (the changes of the industry wage premium), the effects that come through occupational groups has been rather neglected until recently. But in a transition economy that is catching up to the West technologically, these effects might be more prevalent, for example in the evolution of the upper-tail inequality. In this thesis I examine the wage premia related to capital import, export and foreign ownership across different types of managers and workers.

In their survey article about the relationship of international trade and inequality Pavcnik and Goldberg (2004) enumerate many mechanisms through which trade, sometimes together with foreign investment, influence the wage distribution. One can sort these according to which groups across their effects are heterogeneous, thus creating (relative) losers and winners. For example the well known Stolper-Samuelson effect arises because as a result of specialization skill abundant industries are supposed to shrink in emerging economies, so that the relative demand (and equilibrium factor price) of unskilled labor increases, regardless of industry or occupation (Feenstra 2004 1-31. p.). On the other hand, after trade liberalization domestic producers of a protected industry lose their former rent, because they are exposed to international competitors; this mechanism affects the industry premium directly (an example is Kumar and Mishra 2008). The only mechanism mentioned

by Pavcnik and Goldberg that impacts wages through occupation is connected to capital imports.

Imported machines in a developing country are of better quality compared to domestically produced ones, so the operators working on them are supposedly compensated for their increased marginal product. However, since this is a form of technology import, operating the machines requires higher (possibly unobserved) generic skills as well; that is why many authors (for example Acemoglu 2000) consider capital imports as a factor that induces skill biased technological change. Nevertheless, as Spitz-Oener (2006) emphasizes, to be able to identify the effect of a technological advancement, the researcher needs to look at the changes at the task level; this underlines the importance of the occupational groups framework. Csillag and Koren (2011) examine the effect of capital import on the wages of machine operators. They manage to link machines with their direct users, and estimate a sizable import effect of 6-10% on the wage; this estimate takes into account the selection issue that the workers who operate the imported machines are on average more skilled. Taking advantage of this robust effect, one can argue that other employees of the firm also benefit from the capital import, especially the supervisors, whose monitoring and organizational activity worth more now. Analogously, mechanisms linking exporting and productivity changes (for example product upgrading as seen in Verhoogen 2008) may have the same effect as well, since the successful upgrading requires more skills and efforts.

In general, any productivity enhancing change in the firm might increase the value of the supervisor and other managers as well. As Mion and Opromolla (2011) state, managers are special because their generic skills are needed to reorganize the production when the technology changes via trading, and because they might earn an extra wage premium for their (mostly unobserved) skills to lessen the fixed cost of exporting. Eaton, Eslava, Kugler and Tybout (2009) also underline the significance of the latter factor focusing on searching and

marketing costs in international trade. Araujo et al. (2010) model the importance of building-up trust between two traders in the export-import process. This new line of literature discusses the role of the managers in the export dynamics identifying the value of managerial skills and networks. Last but not least, Grossman and Rossi-Hansberg (2008) model "task trading" instead of trading of goods. They suggest that modeling the heterogeneity of trade across occupations – which would be highly correlated with skills though – offers a better way to describe for example the dynamics of trade and inequality, where the standard Heckscher-Ohlin approach fails.

Their offshoring model is conceptually different, but it is based on a similar mechanism as Feenstra and Hanson's model of outsourcing (Feenstra and Hanson 2003); the firm in the developed country outsources domestically less skill-intensive tasks, which may or may not be skill-intensive in the developing country. So according to these models the share of trade that can potentially be associated with occupational effects is connected to foreign ownership as well. Because the effects of exports and imports are connected with foreign ownership, in order to get a full picture, it is essential to include this variable in the analysis together with exports and imports.

1.2 Some empirical findings

The overwhelming share of the literature is concerned with the export premium (the "first reference" is Bernard and Jensen 1995). It is a robust finding that there is a positive export premium (Mion and Opromolla 2011 14. p.). This means that exporting firms (even on the plant level) pay more even after controlling for individual and firm effects. Nonetheless, there is some disagreement in the literature whether this is mostly due to self-selection (Bernard and Jensen 1999, 2004) or causal relationship between exports and productivity (more on this in Schank Schnabel and Wagner 2006). For another emerging economy (Chile) Alvarez and Lopez (2005) find a robust export premium of 21% for the average worker in the

manufacturing sector. However, interpreting this result as an effect of exporting may be misleading, since they can only rely on cross-sectional techniques.

Schank et al. (2006) find that for Germany the coefficient of the export share int the wageregressions still remains significant even after controlling for unobserved heterogeneity, although its magnitude is small.[1] Nonetheless, the export premium indicated by an export dummy remains usually insignificant in their specifications. The merit of this paper is that the authors are able to exploit the benefits of a linked employer-employee dataset (LEED) and can control for worker and firm heterogeneity with fixed effects. Moreover, they also take into account the heterogeneity of the effect of exporting; they estimate separate coefficients for blue-collars and white-collars. Although the coefficient is often twice as high for blue-collars as for white-collars, they are not different to a statistically significant extent, at least in the regressions with categorical variable on export.[2] Another example of the use of panel methods on LEED[3] data is the article of Munch and Skaksen (2006). They find positive coefficients for the export intensity in the wage equation even after controlling firm- and individual-level unobserved heterogeneity. Moreover, they argue that the effect of exporting on wages is heterogeneous through skill-groups, because after including the interaction between export intensity and the share of skilled workers (measured on plant level) it takes away the effect of the plain export intensity variable. Since the sign of the interaction is positive, this means that workers with high skill-level obtain relatively higher export premium.

These results give a rather confusing picture about the behavior of the export premium. Although both are developed countries, according to the article we would suggest negative correlation between education and export premium for Germany, but positive for Denmark based on the second article. It might be the case that these two countries are inherently

[1] 0.1-0.2% increase of the wage after 1% increase in the export share
[2] these are my calculations based on the regression results and on Greene (2008) 56. p.
[3] Danish manufacturing data

different, but it is also possible that the source of heterogeneity is not the skill-intensity, or even the estimate of the export premium is inconsistent and biased because of omitted variables.

Making the same argument that I was following in the first half of this section via the examples of mechanisms, Martins and Opromolla (2009) say that export and import activity is correlated (they have the same fixed costs in theory), and being an importer has a positive impact on wages through increased productivity[4]. Therefore it is inevitable to control for imports, and analogously for foreign ownership when we estimate the effect of exports on wages.

It is difficult to find an article in the literature that includes the export, import and foreign ownership premia in the analysis as well; the work of Martins and Opromolla (2009) is one exception.[5] To put the question of the import activity as an omitted factor in a different way, they ask how important the import premium is compared to the export premium. Their results imply that in Portugal the presence of import activity is at least as important in determining wages as the export status. They use very similar methods with the previous articles, with firm and individual controls in a cross-section model the coefficient of the "exporter only" categorical variable implies a 1.8% effect of exporter status on individual wages, whereas the coefficient of the "importer only" dummy unfolds a much higher, 6.8% impact.[6] In the model with spell fixed effects[7] these coefficients are much lower – 0.6% resp. 0.7% – and they are only significant at 10% level. When the authors only control for firm fixed effects they get 0.7% for the impact of the export status, and 0.12% for the impact of the import status; both of these estimates are significant at 5% level, but they are not significantly different from each other anymore. Martins and Opromolla interpret the positive signs in a

[4] for the latter relationship in Hungary see Halpern, Koren and Szeidl (2009)
[5] According to the authors until 2010 their article is the only exception.
[6] The coefficient of the dummy variable that tags the firms which are both importers and exporters is not significantly different from the coefficient of the „importer only"variable – it is 0.058.
[7] equivalent with putting one dummy variable for every employment contract (except for one)

similar manner as it would follow from the arguments delineated above.[8] These results also suggest that there is plenty of room for the effect caused by self-selection; that is, the trading firms are more productive/hire above-average skilled workers to begin with, even before entering the international markets. The article is important because it shows that the import status matters, and it can be identified, even if including in the model potentially introduces multicollinearity.

As mentioned above, Mion and Opromolla (2011) argue that managers are inherently different from production workers from the international trade point of view. In the first half of their article they try to identify the effect of previous export experience of the managers on their wages today. More experienced managers can lower the fixed cost of international trade (because they speak languages, already have they trusted network etc.); therefore they are able to make the exporting activity (more) profitable. For the skill associated with this extra-profit they and only they are supposed to be compensated. This is one way to buttress that the export status has significantly different effect on manager wages compared to its impact on the wages of other workers. They use matched employer-employee data from Portugal to estimate a Mincerian equation with two additional dependent variables: one that represents previous export experience and its interaction with a manager dummy. After controlling for observed and unobserved heterogeneity of workers with fixed effects Mion and Opromolla find a relatively high, 7.3% effect of previous export experience for the group of managers, and (depending on the specification) a negative/insignificant effect for other employees. As they estimate later in their article, previous export experience of the manager has no or positive effect (depending on size and previous export status of the firm) on the current and future export status of the firm, and this leads to the conclusion that managers have a positive component in their export premium that non-managers do not have at best. As the authors

[8] In the case of exports: product upgrading because of need for product-differencing/higher quality on the international market; in the case of imports: technology import with the import of intermediate inputs.

emphasize, because of the nature of the variable of their interest, there are many mechanisms other than the one just mentioned that can be associated with this result. Moreover, since they do not include foreign ownership and import status as control variables, the mechanism behind the significant coefficient might not even be related to current exports at all.

1.3 Outline of the thesis

In the following sections I analyze how the Hungarian wage premia behave jointly during the liberalization of the movement of goods between 1994 and 2003. This thesis does not focus on identifying the effects of the specific variables on wages, the purpose is rather to explore the data, and interpret how different estimation results change after disaggregation or the change of the underlying econometric model. After describing the dataset and giving some background information on the Hungarian labor market and trade liberalization process I examine the export premium in its aggregated form as well as separately calculated for occupational groups for the whole period and through time. In accordance with the results for other countries it will be usually significantly positive with standard OLS, and vanishing when I include firm fixed effects.

In the next step I include the variables that represent the import status and foreign ownership in the regressions. I estimate the premia with pooled OLS, firm fixed effects (within estimator) over the whole period and year by year for every managerial group. The pooled OLS results (after controlling for important individual and firm factors) reveal interesting patterns in the premia across the occupational groups (managerial statuses) in question. First of all, the export premium turns out to be insignificant, even negative most of the time. Second, unlike in most of the papers mentioned in this section, while being consistent with the results of Earle and Telegdy (2007), I find robust and significant heterogeneity in the foreign ownership premium and to a lesser extent in the import premium as well. Third, while interpreting the evolution of the premia and their pattern across

managerial groups, I form hypotheses about which mechanism shapes the relationship between international trade and wages the most. Fourth, after including firm fixed effects I find that – as in the literature in general – there is a huge difference between the estimates of the previous OLS and the firm fixed effects (FE) model; sometimes coefficients even switch sign significantly, and the (significance) of the patterns across the groups disappears. I conclude that this large difference in the results is partly due to self-selection in trading. Moreover, while from the FE model we expect more reliable estimates that are less biased, they should be interpreted with caution due to the small sample sizes, and because some possible mechanisms are working on the firm-level. The qualitative results seem to be robust for some checks I do in the last section.

2 Description of the data and key variables

2.1 Data

In this paper I use the Hungarian Harmonised Wage Survey (*Bértarifa*) from 1994 to 2003, which is a matched employer-employee data set. Unfortunately it does not track individuals over time, but firms preserve their identification number throughout the years. The method of sampling slightly changes over time. There is a threshold regarding the number of employees (20 for most of the years) above which every company is involved in the sample; below this size the data set contains only a sample of firms the size of which is higher than 10 employees until 1999 and 5 after 1999. Moreover, larger firms report only a random sample of their employees, while firms under the threshold give data for every worker. The Wage Survey did not collect data on part-time workers until 2002, but this will not be a major concern for our analysis, because managers rarely work part-time. In Table 1 I included the number of workers and firms in the data for each year.

year	observations	firms
1994	152 702	15 526
1995	152 779	14 911
1996	159 891	14 971
1997	323 440	14 803
1998	159 994	16 743
1999	161 613	17 374
2000	178 937	19 660
2001	181 443	20 140
2002	191 950	17 800
2003	200 887	17 684
all years	1 863 636	169 612

Table 1. Numbers of observations and firms in the sample.

The data set contains wages and variables that describe the most important firm and individual characteristics[9]. For more information on *Bértarifa* – especially the changing standards of industry classifications and sampling – see Halpern and Kőrösi (2000) and Kertesi and Köllő (2001). However, the Wage Survey does not have information on any kind of imports; so my categorical variable on capital import[10] originally comes from the Hungarian Customs Statistics (a universal data set). Both data sets identify firms with the tax identification number; this makes it possible to merge the information on capital imports to the Wage Survey data.

2.2 Definitions and descriptive statistics of key variables

2.2.1 Firm-level statistics

In the forthcoming analysis I use variables that contain the following information on the firm: employment as appeared on the balance sheet, the value of export, the presence of imported capital, foreign ownership status, the county where the firm is based, industry information up to two-digit codes ("old industry codes" and NACE-2), (log) capital-labor ratio, the (log) ratio of the revenues reduced by the costs of non-labor inputs to employed labor.

The dummy on capital imports are the same that Koren and Csillag (2011) use to identify the effect of machine imports on the wages of the operators; the variable equals one if the firm ever imported a machine in the past, and the value of this import is greater than the average wage of the workers in the firm. The structure of the variable corresponds to the idea that while for example the mechanism of product upgrading as an effect of exporting most possibly stops working after quitting the international markets, the worker will work on the

[9] *inter alia* industry, size, ownership, export status, other balance sheet data, settlement information for firms, and occupation, gender, age, education for individuals. Unfortunately, the variable that gives information about the hours worked per month is not available until 2000.
[10] I will explain how exactly I constructed this variable in the next subsection.

imported machine for a longer period. Since I could only obtain a dummy variable on capital imports, I needed to define a categorical variable related to the export status as well. I call a firm exporter if at least 10% of its revenue comes from exports. This threshold is not the highest one, for example Meller (1995) uses 30%, but not the lowest one either, since Arnold and Hussinger (2005) use 5% to generate an indicator variable for export status. I included the basic descriptive statistics of these variables except for the industry codes and the county codes[11] in Table 2. As it can be seen, there is an obvious time trend in the variables, which underlines the necessity to control for time fixed effects whenever possible.

year	export		foreign ownership		capital import		employment		productivity		capital-labor ratio	
	mean	deviation	mean	deviation	mean	deviation	mean	deviation	mean	deviation	mean	deviation
1994	21.14%	0.408	10.49%	0.306	40.49%	0.491	185	1 243	-0.283	0.823	-1.183	3.081
1995	23.19%	0.422	12.57%	0.332	46.56%	0.499	173	1 075	-0.035	0.870	-0.471	1.397
1996	24.04%	0.427	13.49%	0.342	49.85%	0.500	164	1 014	0.157	0.874	-0.314	1.347
1997	26.70%	0.442	17.68%	0.382	53.26%	0.499	154	931	0.324	0.898	-0.148	1.370
1998	25.03%	0.433	15.69%	0.364	54.26%	0.498	164	930	0.476	0.894	-0.125	1.708
1999	24.25%	0.429	15.70%	0.364	55.90%	0.497	144	877	0.599	0.929	0.171	1.355
2000	23.06%	0.421	16.07%	0.367	56.08%	0.496	122	789	0.778	0.953	0.278	1.365
2001	22.22%	0.416	15.26%	0.360	56.16%	0.496	110	759	0.662	0.920	0.428	1.357
2002	24.11%	0.428	16.66%	0.373	58.30%	0.493	138	865	0.779	0.937	0.580	1.372
2003	22.52%	0.418	15.69%	0.364	58.74%	0.492	134	855	0.836	0.961	0.691	1.376

Table 2. Descriptive statistics of the main firm-level variables for each year; export, foreign ownership and capital import are dummy variables, productivity is the logarithm of the ratio of the revenue decreased by the value of non-labor costs to employment.

Table 3.1-3 show the average values of some firm-level variables for firms that are maintaining connection with the world economy and for those which are not. It is clear that the basic findings of Bernard et al. (2007) for American exporters are true in Hungary as well: globally involved firms are larger, more productive, live longer and have higher capital-labor ratio. The averages buttress this claim can be seen in Table 3.1.

[11] For more information on trade and these variables see Békési, Harasztosi and Muraközy (2011)

year	number of firms		life span		employment		productivity		capital-labor ratio	
	non-exporter	exporter	non-exporter	exporter	non-exporter	exporter	non-exporter	exporter	non-exporter	exporter
1994	6317	1693	5.16	6.27	152	308	-0.31	-0.17	-1.31	-0.73
1995	6136	1853	5.85	6.82	139	286	-0.08	0.12	-0.51	-0.35
1996	5922	1874	6.18	7.01	131	270	0.11	0.30	-0.35	-0.20
1997	6040	2200	6.36	6.67	135	207	0.28	0.48	-0.19	0.00
1998	5954	1988	6.48	7.23	136	247	0.43	0.62	-0.20	0.11
1999	6503	2082	6.18	6.89	120	219	0.55	0.75	0.12	0.32
2000	8180	2451	5.25	6.16	99	198	0.73	0.94	0.23	0.44
2001	8753	2500	4.72	5.72	89	184	0.62	0.81	0.39	0.57
2002	5999	1906	4.75	6.10	115	209	0.74	0.91	0.52	0.76
2003	6118	1778	4.50	6.02	111	214	0.77	1.05	0.63	0.88

Table 3.1 Some descriptive statistics to compare the characteristics of exporters and non-exporters (averages throughout the years). The definition of the variables is the same as in Table 2.

As it could be anticipated, the same correlations are present if we examine the other two variables (foreign ownership and capital imports); the differences between the importers and non-importers are even more pronounced than in the case of the export dummy. Table 3.2-3 describe how different importers and foreign owned firms are from the others in the exact same manner as Table 3.1 did with exporters.

year	number of firms		life span		number of employees		productivity		capital-labor ratio	
	non-importer	importer	non-importer	importer	non-importer	importer	non-importer	importer	non-importer	importer
1994	1424	969	5.52	6.82	200	711	-0.49	-0.05	-0.75	0.21
1995	1319	1149	6.01	7.25	135	653	-0.27	0.16	-0.35	0.23
1996	1189	1182	6.33	7.60	115	582	-0.12	0.39	-0.26	0.37
1997	997	1136	6.55	7.81	100	565	0.05	0.57	-0.07	0.49
1998	1051	1247	6.62	7.92	97	552	0.17	0.70	-0.07	0.59
1999	1031	1307	6.53	7.68	82	500	0.25	0.86	0.19	0.76
2000	1155	1475	5.77	7.19	76	441	0.48	1.00	0.30	0.87
2001	1127	1444	5.24	6.90	70	437	0.42	0.90	0.52	0.99
2002	1015	1419	4.72	6.98	80	416	0.50	1.00	0.52	1.15
2003	979	1394	4.52	6.86	76	403	0.46	1.11	0.72	1.27

Table 3.2. Some descriptive statistics to compare the characteristics of importers and non-importers (averages throughout the years). The definition of the variables is the same as in Table 2.

Comparing the numbers of firms it is also obvious that there are much more firms with capital imports than exporters; this is probably due to the way how the import dummy is constructed, because the import variable remains 1 forever after the first year treatment. On the one hand this is good news, because there will be room for econometric inference, but it also causes that the differences between importers and non-importers become larger. The "importers" are older (consequently bigger for example) not just because older firms are more likely to be importers, but also because I measure the importer status with a variable of this nature. This can be a problem, because later on it will be hard to distinguish possible self-selection from the productivity effect of import.

year	number of firms		life span		employment		productivity		capital-labor ratio	
	domestic	foreign	domestic	foreign	domestic	foreign	domestic	foreign	domestic	foreign
1994	7093	831	5.27	6.58	182	221	-0.35	0.34	-1.28	-0.04
1995	6985	1004	5.95	6.95	161	258	-0.14	0.68	-0.58	0.28
1996	6686	1043	6.29	7.00	149	270	0.04	0.91	-0.43	0.46
1997	5512	1184	6.30	7.01	107	265	0.22	1.07	-0.34	0.57
1998	6668	1241	6.60	7.09	138	304	0.34	1.20	-0.27	0.68
1999	7237	1348	6.30	6.64	118	281	0.46	1.34	0.04	0.88
2000	8923	1708	5.39	5.82	99	243	0.64	1.46	0.16	0.89
2001	9536	1717	4.84	5.48	89	231	0.55	1.28	0.32	1.03
2002	6588	1317	4.90	5.95	112	266	0.66	1.37	0.47	1.13
2003	6657	1239	4.67	5.77	108	275	0.71	1.49	0.59	1.20

Table 3.3. Some descriptive statistics to compare the characteristics of foreign and domestically owned firms (averages throughout the years). The definition of the variables is the same as in Table 2.

2.2.2 Worker-level statistics

The LHS variable of almost every regression in this thesis will be the net monthly wage adjusted with regular and irregular bonuses (sum of last year bonuses divided by twelve). The most important worker characteristic for now is occupation, because this information contains which managerial group the employee belongs to. I use the 4-digit HSCO-93 (FEOR '93)

codes from the Wage Survey to divide the population into four groups according to what kind of managerial task they do[12] (if any). The observations with occupation code 1311 constitute the group of top managers, the employees with HSCO codes between 1321 and 1349 (department managers and managers of functional units) are the middle managers, and the workers with a 3-digit code 135 belong to the group of supervisors. I also decided to include the "general managers of small enterprises" (HSCO-2 code 14) into the group of top managers. Although they probably cause a bias towards zero in the estimates, the results are not affected by this choice. All the remaining employees are in the group of production workers.

Other worker-level variables I include in the regressions are part of a usual Mincerian equation. I use experience and a dummy variable for gender; moreover, I include two variables on education, one for high school (12 years of schooling and obtaining certificate of secondary education), and another one for college degree (15 or more years of schooling). Since I am more interested in the upper tail of the wage distribution, I decided not to include other categorical variables for lower levels of schooling. Table 4.1 indicates the mean values and standard deviations of the worker-level variables over years, while Table 4.2 shows sample means of some variables in the four managerial categories.

[12] As a first step, I excluded the private sector

year	net wage		experience		high school		college	
	mean	deviation	mean	deviation	mean	deviation	mean	deviation
1994	26219	16275	21.59	10.40	33.33%	0.471	16.38%	0.370
1995	28758	17497	21.52	10.52	33.05%	0.470	17.91%	0.383
1996	31580	23103	21.52	10.40	32.76%	0.469	19.86%	0.399
1997	40046	30760	21.50	10.34	32.45%	0.468	22.41%	0.417
1998	47151	38635	21.64	10.46	31.96%	0.466	22.14%	0.415
1999	56838	49392	22.15	10.90	32.30%	0.468	22.30%	0.416
2000	62577	61012	22.14	11.05	32.85%	0.470	21.54%	0.411
2001	70470	62375	22.33	11.12	33.47%	0.472	22.08%	0.415
2002	79426	70730	22.64	11.30	33.34%	0.471	22.64%	0.419
2003	93017	76780	24.40	11.67	34.00%	0.474	21.94%	0.414

Table 4.1. Some descriptive statistics of worker characteristics over the years; *net wage* is monthly, and includes regular and irregular bonuses; *high school* and *college* are the indicator variables that the highest degree acquired is a high school resp. college degree. The dummy variable for *gender* is not reported.

The expected trends in the wages and the share of college graduates appear; however, the initial decrease of the percentage of high school graduates is a surprise. It only gets back to its normal path around 1999. According to Kézdi (2002) the Hungarian labor market only starts to show the characteristics of a labor market of a developed country towards the end of the decade. He argues that the Hungarian economy had the first phase of the transition, which was marked by recession, until around 1996; during this episode the main dynamics on the market was the job reallocation *between* industries. In the second phase however, the labor market was shaped by the forces of skill biased technological growth, as a consequence, the *within* industry demand for skilled labor rose.

category	experience		high school		college		foreign		import		export	
	N	mean	N	mean	N	mean	N	mean	N	mean	N	mean
production workers	1 721 664	21.9	1 723 228	32%	1 723 228	19%	1 047 427	23%	579 720	77%	1 096 156	31%
supervisors	67 919	24.3	67 927	57%	67 927	21%	61 270	20%	37 440	80%	65 163	26%
middle managers	38 542	24.4	38 603	25%	38 603	70%	18 768	27%	9 594	80%	19 546	30%
top managers	33 874	25.9	33 878	32%	33 878	62%	29 913	11%	7 471	47%	30 689	18%

Table 4.2. Some descriptive statistics of worker characteristics over the managerial categories and share of workers who are working at a foreign owned/exporter/capital importer firm. N means the number of observations (the non-missing values).

As one can see in Table 4.2, among higher-ranked managers there are around 5% those who do not have at least high school education. It is remarkable that among top managers the share of college graduates is lower; this can be partly the result of the decision that I included the "general managers of small enterprises" in this group. Also, the table clearly shows that (maybe because of the cumulative nature of the import variable) the export and the import treatment dummies must differ in the data set, so normally there should not be problems with joint identification. In Table 4.2 we can see one of the serious problems of the forthcoming analysis, the huge share of missing values. I make the assumption that this does not influence the external validity of the results, that is, there is no big selectivity on unobservables behind the non-responses.

2.2.3 The liberalization of trade and capital flows

In Table 2 I included the changes of the share of globally involved firms in the data set. While the share of firms who are importers continuously rises, the ratios of exporters and foreign-owned firms in the data both have a peak at 1997, and after some decrease, they tend to stabilize (especially if we do not focus on the years of 2001-2 because of the .com crisis).

Although trade has not been fully liberalized, a great deal of the opening was already over by 1998. If we look at the worker level (Figure 1), we see that the peak was really at 1997 for foreigners, and that the share exporter *workers* is rather decreasing than increasing from year to year. The two lines in Figure 1 start to become almost completely parallel after 1998.

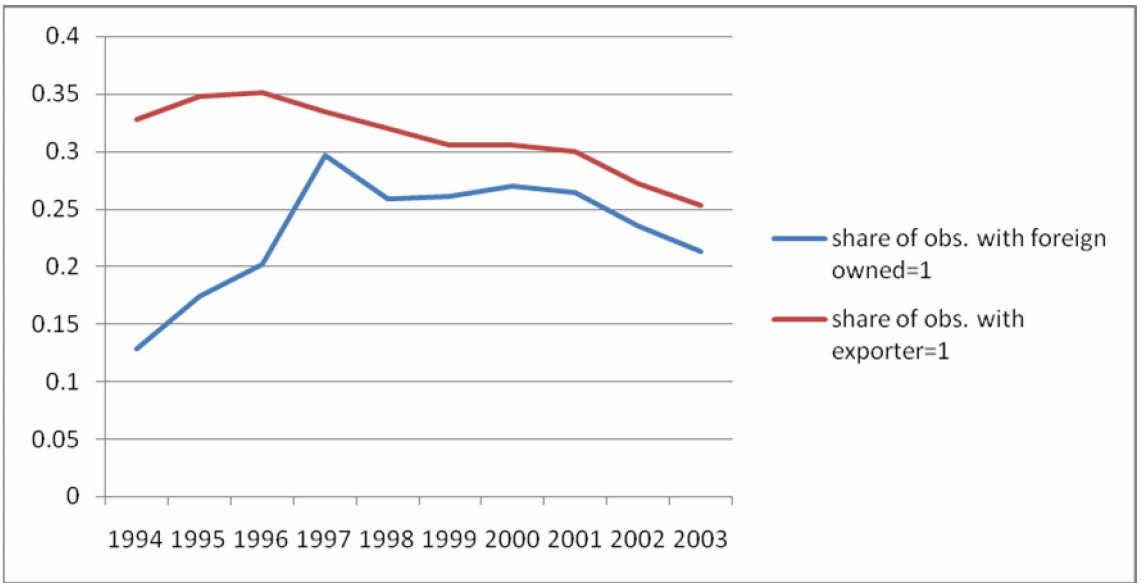

Figure 1. Share of workers who are working for a foreign owned/exporter firm for each year 1994-2003.

Of course this is not true for the import dummy, but it might be again the result of how it was constructed. Nonetheless, the descriptive statistics of Halpern et al. (Halpern, Koren, Szeidl (2009), page 7, Table 2) show that the share of imports in intermediate inputs had also a peak between 1996 and 1998. Together with the mentioned article of Kézdi (2002) the data tell us that there might be time heterogeneity in the effects of the variable of interest. Trade liberalization took place together with the restructuring of the labor market and huge policy changes on other areas of the economy. Therefore it is important to see the dynamics of the premia and to control for general policy changes; in the next sections I find that the time heterogeneity in the export/import premium might be important, just like it was important in the labor market in general.

In the second step in the analysis when including firm fixed effects I have to rely on the within variation of the variables of interest. As a last additional information on the three global dummy variables in Table 5 I included the number of firms that changed import/export/ownership status in a particular year (columns 1-2), and the numbers and shares of the firms for which the change was only in one of the 3 statuses (it changed only its exporter/importer/ownership status). The results show that the within variation is rather weak, and given the sample size of the top managers, it will be difficult to get significant effects if there are any.

year	Status switchers		Switchers solely in export		Switchers solely in imports		Switchers solely in ownership	
	number	% of firms	number	% of firms	number	% of firms	number	% of firms
1995	222	14.5%	87	5.7%	87	5.7%	34	2.2%
1996	202	12.0%	104	6.2%	53	3.1%	32	1.9%
1997	159	12.3%	88	6.8%	26	2.0%	34	2.6%
1998	139	9.9%	76	5.4%	31	2.2%	25	1.8%
1999	160	9.1%	102	5.8%	22	1.2%	33	1.9%
2000	175	9.7%	97	5.4%	34	1.9%	40	2.2%
2001	165	9.0%	108	5.9%	25	1.4%	22	1.2%
2002	110	7.6%	63	4.4%	22	1.5%	21	1.5%
2003	128	7.3%	77	4.4%	20	1.1%	24	1.4%
All years	1 460	-	802	-	320	-	265	-

Table 5. Within firm variation of variables on global involvement. Firms with missing values on any of the three variables have been dropped.

2.3 Classical approach: The evolution of the export premium

In this subsection I replicate a simpler version of the Bernard and Jensen (1995) paper, to get comparable results with the literature. Although this is not a standard part of the chapters describing and defining variables, I include the analysis of the pure export premium here, emphasizing that even with it is merely a statistics that shows some correlations. The export premium is defined in the framework of wage differentials as the coefficient of the exporter status categorical variable in a Mincerian equation. Beyond documenting the structure of the plain export premium, this subsection serves also as introduction to the models I will use to obtain the main results after including the other two variables of interest.

First I estimate the export premium separately for every manager categories in pooled OLS models with control variables for firm and worker observable characteristics, then I report a specification with firm fixed effects as well. In the second part of this subsection I further disaggregate the premium; I consider the magnitude of the possible heterogeneity of export premium across educational groups, and reestimate the cross-sectional OLS specification of the first part but separately for every year now.

2.3.1 Pooled OLS and firm FE

The first specification includes firm level control variables such as industry dummies, the logarithm of the number of employees (*size*), county (*region*); I also control for observed worker heterogeneity such as experience (*experience*), education (*high school* and *college* dummies), *gender* and occupation (*occupation*) if applies (only in the category of the production workers[13]). The second model contains firm fixed effects and all the control variables from the first model except for non-varying firm-level variables, such as *region* and

[13] since I already defined the other groups according to 3-digit occupation codes, and industry means the fourth digit basically.

industry.[14] This is in accordance with the descriptive statistics I showed in the last subsection; I do not control for the capital-labor ratio, because some articles do not do it either, and capital might be the part of the mechanism through which import or foreign ownership influences the wage.[15] However, both models contain year dummies and estimated with clustered standard errors (for firms). I report the export premia for each managerial category and the main characteristics of these two regression models[16] in Table 6.1 and 6.2.

	(1)	(2)	(3)	(4)	(5)
dependent variable	wage	wage	wage	wage	wage
manager category	production workers	supervisors	middle manager	top manager	whole sample
export (dummy)	**0.0725*** **	**0.0418*** **	**0.140*** **	**0.211*** **	**0.0759*** **
	(0.0100)	(0.0145)	(0.0261)	(0.0254)	(0.00996)
Individual controls	yes	yes	yes	yes	yes
Firm controls	yes	yes	yes	yes	yes
Firm FE	no	no	no	no	no
Year FE	yes	yes	yes	yes	yes
Observations	1,035,957	62,513	18,922	29,238	1,146,630
R-squared	0.678	0.594	0.538	0.435	0.671

Table 6.1. Regression results for the cross section model containing only the export dummy, firm- resp. individual level control variables (region, size, industry, occupation, experience, experience^2, education, gender) and year dummies. *** p<0.01, ** p<0.05, * p<0.1

As we can see in Table 6.1, the export premium is very significant and positive for every group. The estimate for the whole sample is rather low, at least compared to the premia of other emerging economies (see Schank et al. Appendix A). However, the results in column (5) are governed by the majority of the non-managers; there is a big, statistically significant difference between the coefficient of the top managers and the supervisors or the production workers. While a top manager of an exporter earns on average 21% more than a top manager

[14] Over the years less than 2% of the firms switch industry, county even less; not to mention that these „switchers" often come from improperly filled in questionaires. Also, I ran two more specifications for every FE models included in this thesis: one with those omitted control variables, and one even without *size*; no results changed.

[15] The section with robustness checks includes these specifications, the results will be the same even after including it.

[16] For more information, see the Appendix.

of a non-exporter, the supervisors at the exporter firms make only 4.2% more than their non-exporter fellows on average. It will be generally true that we will not be able to say too many things about the level of the effect in the first group (other production workers), because it contains too many different persons from the professionals to the unskilled workers. But at this stage we can see a nice pattern, the first two groups have statistically the same export premium (even though supervisors have 3% lower coefficient), and then the export premium starts to increase sharply, it has an upward trend. At the first glance this could be a very nice illustration for the above mentioned paper of Mion and Opromolla. Managers who have export experience are compensated for it, and probably continue to work for an exporter today as well; the more task the manager has to do with export networks and complex export strategies (lowering the fix costs) the more premium the firm pays for her/him; these tasks are increasingly the jobs of the middle and top managers, so based on this mechanism, we could have expected the pattern of the coefficients from the above regressions.

	(1)	(2)	(3)	(4)	(5)
dependent variable	wage	wage	wage	wage	wage
manager category	production workers	supervisors	middle manager	top manager	whole sample
export (dummy)	**-0.00908**	**0.0368***	**-0.0134**	**-0.00317**	**-0.00416**
	(0.00955)	(0.0197)	(0.0284)	(0.0239)	(0.0110)
Individual controls	yes	yes	yes	yes	yes
Firm controls			only for size		
Firm FE	yes	yes	yes	yes	yes
Year FE	yes	yes	yes	yes	yes
Observations	1,082,488	64,265	19,308	30,245	1,196,306
R-squared	0.818	0.860	0.890	0.918	0.805

Table 6.2. Regression results for the firm FE model containing only the export dummy, individual level control variables (occupation, experience, experience^2, education, gender), firm size and year dummies. *** p<0.01, ** p<0.05, * p<0.1

After controlling for unobserved firm heterogeneity with firm fixed effects even the highest coefficient becomes highly (negative) insignificant, only the previously lowest

premium of the supervisors survive surprisingly well the model change. This tells us three things that may well be the three (?) sides of the same coin.

Apparently, there might that determining wage is a firm policy for many companies that is not related to any of the control variables; for example if a supervisor comes to a company, and there is a firm policy for wages, it is likely that the future employee will not be able to negotiate, and gets the same amount of compensation depending on observable skills, *regardless* whether she/he has unobservable skills for exporting (or export experience) or if the firm is or will be involved in international trade. If this is the case, the wage effects will be wiped out by the FE estimation.

The second chance that there is strong self-selection among firms to the exporter status; that is, a large multinational firm closed to the motorways with originally high productivity in the car industry almost surely will export cars, but its characteristics would assure the employee to have a firm premium anyway (Earle and Telegdy 2007). The problem is that we cannot control for productivity for example, because the exporting status most probably affects wages through the increased productivity.

The third possibility that could explain the sudden drop of the coefficients, that there is some sort of complementarity between exports and some firm-level (unobservable) variable, and exports have only large effect on productivity if it is present in the firm, otherwise they are just costly for the company (hence the negative coefficients). Especially with our small within variation[17], it is likely that the firms that do not possess the complementary factor and only paid for the fixed costs of exporting without benefits would outweigh the firms that have the ability to boost their profits via exporting and decide to export after several years of non-exporting.

[17] For the in 1994 already existing firms the event that the exporting firms without the complementary factor would get rid of the exporter status not to pay the costs of exporting (or simply dies) is more likely, than the event that a firm who was non-exporter in 1994 starts to export. This third ”cause” requires though that the firm does not now the key factor in advance, and the distribution of the „firm ability” is uneven enough.

2.3.2 Annual estimates and heterogeneity in education

Although I found significant differences in the export premium across managerial groups, it is important to see whether the result is robust through the whole period, or only one or two years are driving the results. Also, estimating separately for every year allows for more heterogeneity in the model, which may be needed because of the changing policy environment of the period. I estimated the same model that can be seen in Table 6.1, but now for each year (and without the time dummies). I am not reporting the results here, the table of the coefficients with significance levels can be found in the Appendix. Figure 2 depicts the evolution of the estimated export premium from 1994 to 2003.

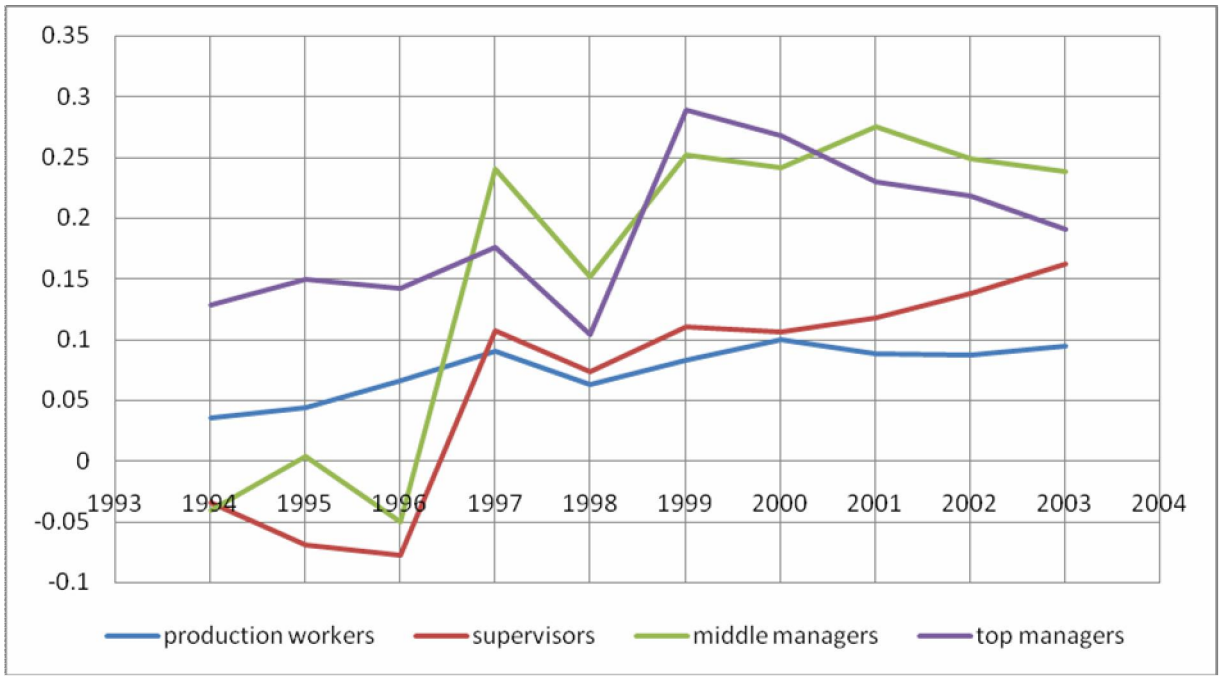

Figure 2. The estimated export premium for each year from 1994-2003; the model of Table 6.1 was used without the time fixed effects.

From 1997 all the coefficients are significant on 1% level; before that year only the coefficients of the department managers are not different from zero statistically (they are only significant at 10%). We can see that there was a big change in the order of the groups, before 1997 the middle managers and the supervisors had zero/insignificant export premium. Then at

1997 there was a sudden jump, the supervisors got to the level steadily above the production workers, while the middle managers took the first place for 5 years, and the second place for two years. Such a big jump suggests either change in the data (which actually might have occurred in the Wage Survey), but as I mentioned above, these years brought about big structural changes in the whole labor market according to Kézdi (2002), so it remains worthwhile to check the time series of the export premium at later stages of the analysis as well.

We saw in subsection 1.3.1 that the export premia are significantly different from each other in some of the four regressions. Nevertheless, we also saw in Table 4.2 that the occupational groups show association with educational groups (top managers are better educated). Then it follows that heterogeneity in education should be an issue for the export premium as well, just like for the premium for foreign ownership, as Kézdi (2002) says. Maybe we perceive the effect of the educational groups, not the heterogeneity of the export premium across occupations as I presented above.

This argument can be discarded for three reasons. First, it is inconsistent with Figure 2; it would require that middle managers take the first place for their observable education before 1997 too, and as we will proceed further, we will see that the ordering of the groups will not remain the same in the premia for international trade. This suggests that there is another important source of heterogeneity in the effect as well. Second, I estimated the cross-sectional models with an interaction between trade and college education, and the results are not confirming the presence of important educational heterogeneity in managerial groups.[18] For the different groups the coefficients are not significant (even at 10% level), for the whole population[19] the interaction has a rather small effect (2.5%), which is nothing compared to the shown differences in managerial groups. Unfortunately, including the high school level as

[18] The regressions with *college*export* interactions are reported in the Appendix.
[19] slightly confusing con arise from the fact that because of computational reasons in the regression for the whole sample I could only control for 3-digit codes and regions (7) instead of counties (20).

interaction makes the regressions rather unstable in higher level of managerial groups (probably because *high school + college* give near a vector of ones). But since we concerned with upper-tail wage differentials, intuitively high school level education should not be an important problem. Third, even if we control for the interaction of exports with the *high school* dummy, although the new interaction will be significant, but the heterogeneity remains in place.[20] Therefore in the followings for the sake of parsimoniousness I will not control for the heterogeneity of the premia across education groups.

[20] In fact, behind the non-significance there is some time heterogeneity in the effect of the *college*export* interaction – it is negative until 1996, and positive from 1998 -, but it is not so prevalent in higher managerial groups that are now in the centre of our interest.

3 Mechanisms and models for the international premia

In this section I describe the mechanisms which might be behind the heterogeneity of the trade premia. Then I estimate very similar regressions to those in the previous subsection, but now I also include the other two indicator variables (of capital imports and foreign ownership).

3.1 Mechanisms and patterns

Csillag and Koren (2011) identified[21] a lower bound for the effect of machine import on the wages of its operator. We know that the impact is at least 6%. They also list some of the possible mechanisms why this wage differential exists. There are mechanisms related to trade that raise productivity, and because of the increased marginal product of the worker we expect higher wages as well. Alfaro and Hammel (2007) argue that capital imports raise the level of available capital more cheaply; Coe and Helpman (1995) state that capital imports may create R&D spillovers. Also, Csillag and Koren showed that there are differences between the effects of imports of countries from different places of the technological frontier; or as they reference Sutton (2000), for emerging economies it is true that imported machines are more sophisticated and of better quality, which has a direct effect on productivity in the firm being a form of technology import. The latter mechanism appears in Martins and Opromolla (2009) as well, they argue that this is the source of their significant positive coefficients on import, and partly this is behind the results of Halpern, Koren and Szeidl (2009) as well.

[21] This paragraph heavily relies on what they highlight as possible mechanisms through which machine imports can affect the operators' wages.

For the effect of export on productivity Pavcnik and Goldberg (2004) have numerous mechanisms. I have already mentioned one of them, which is examined by Verhoogen (2008) for Mexico. Trade liberalization lowered the costs of exporting, but in order to produce for the international market, where the consumers are pickier and the competition is potentially fiercer, firms have to upgrade their product, increasing their productivity and average wages (for more skilled people).

But there is an example for an effect mechanism of imports on wages (also mentioned by Csillag and Koren) that is not necessarily related to productivity. Since the cost of the imported equipment is usually high (we constructed the variable this way), it may well be that the employer pays a rent to the employee to treat the equipment more carefully. Moreover, the above mentioned articles usually find that imports are complementary to skills at the operator level. This may corresponds to some sort of rent-sharing coming from a principal-agent problem; if there is asymmetric information, it is intuitive that the rents for the operators are increasing in their education, since the better educated they are, the more unique information they have.[22]

This leads us directly to managers, who might be considered as principals. We see that there is extra income for example for the machine operators, because they increased productivity; but this means that the supervisors who are monitoring this worker now have also higher marginal product by preventing them from shirking (which now has higher opportunity cost for the company) or from damaging the equipment. This possible mechanism provides a lot for the supervisors, who are the closest to the workers, so they are in charge of monitoring, but they also have the most well-informed about the production process among the managers. This is our first mechanism that solely affects managerial wages and which is related to trade.

[22] to my knowledge the first source when this comes up (in a not formalized way) is from Galbraith (1967), the technostructure.

I have already discussed a second source of the possible trade premium for managers in the introduction and in the previous section (2.3.1). It encompasses the compensations for the different skills that are not related to productivity, but the managers need them for easing the costs of exporting. This means they need to be able to interact internationally, to find the optimal business partner and bid with low marketing, matching costs and risks. These tasks are very complex; they require strategic planning and possibly an extensive social network and experience on markets. For this reason I argue that these mechanisms are benefiting the top managers the most. These kinds of effects are the core of the Mion and Opromolla (2011) paper; according to the authors it is the characteristics of these skills that they might not be captured by most productivity measures.

Lastly, I would like to mention a third possible mechanism that links international wages and specifically the wages of managers. This is related with probably the most important unobservable skills of managers, the ones that help in organizing the production process in the optimal way. It is up to the manager whether he/she assigns the more skilled person to the more productive imported machine, or whether the organization is able to incorporate the new technology. This generic groups of skills that makes it possible to change the production process flexibly and adapt to the newest demand trends is connected with export/import premium, because all mechanisms mentioned at the worker level that affect wages through productivity include some changes in the technology. Our arguments are that importers/exporters are exposed to technological or demand shocks that drive them to become more productive, but this means that the skills mentioned in this paragraph pay more for the manager. To use this generic skill managers need information on the production process and need to know the workers' many times unobservable skills. On the other hand, making large-scale changes in the organization of resources needs to be authorized. For these reasons I expect that this mechanism pays for middle managers and supervisors.

The last two mechanisms provide good examples for the complementarity with the export/import status I explained in the previous section (2.3.2). It is useless to buy new, expensive machines from the US if the production process is not organized in a way that the firm can make use of it (for example other machines in the plant are not compatible with it). Also, it is just costly for the firm to establish relationships and send products that are badly produced from the importer point of view (but maybe perfectly fine at home), because the managers were not able to reorganize the production process according to the new demands. If (top) managers cannot anticipate the lack of these skills (of middle managers), this phenomenon produces bad exporters (or importers). Moreover, the presence generic skill is not necessarily the characteristics of the manager, but rather the firm, and in a rather short sample, because of the path dependence of organizational relationships (a firm does not hire a completely new supervisor team) it may be wiped out with the fixed effects. Moreover, as I mentioned earlier, it is likely that bad exporters will die or leave the international markets with more probability than the chances that newly-born firms with the complementary skill would become exporters.[23] This would introduce negative bias in the estimates of a plain fixed effect model (neglected heterogeneity in the coefficients that is related to an unobservable).[24]

In this thesis I am *not* able to identify these mechanisms, but there is a possibility to check which mechanism the data are consistent with. Maybe all of them are present, but the most important one must shape the pattern of the import/export premium across managerial groups. First of all, I check whether the import or export effects are more prevalent according to the data, then I take a look at the heterogeneity patterns of the three premia across the groups to see which mechanisms could not be the most important ones.

[23] or non-exporters would start export successfully, but by 1995 old firms have probably considered if they wanted to try to export.
[24] Unfortunately, this also means that the cross-sectional bias are likely to be positive.

3.2 Model specifications and results

3.2.1 Cross-sectional OLS

First I estimate a pooled cross-section model (without firm fixed effects) with OLS using clustered standard errors (the cluster is the firm) separately for every group of managers and the production workers. I control for the firm and individual observable characteristics I mentioned in subsection 2.3.1, so I include industry dummies, the logarithm of the number of employees (*size*), county (*region*), experience and its square (*experience*), education (*high school* and *college* dummies), *gender* and occupation (*occupation*) if applies (only in the category of the production workers[25]). The difference between this model and the model seen in Table 6.1 is that now I have three variable of interest: capital import (*import*), exporter status (*export*) and foreign ownership (*foreign*).

I included the control variables because according to the section on descriptive and the standard labor literature they can heavily influence earnings; I did not include any measure of productivity and the capital labor ratio, because they can be parts of the mechanisms I described in the previous subsection. However, for example when we estimate the import premium we might want to distinguish between the coefficient that includes the variation caused by the fact that capital imports increase the capital-labor ratio just like any domestic source would[26] and the import premium which contains only the effect that the imported capital is of higher quality. For this reason I reestimate every specification with an additional control for the capital-labor ratio (*log(k/l)*) as well as *productivity*[27] in the robustness checks subsection.

[25] since I already defined the other groups according to 3-digit occupation codes, and industry means the fourth digit basically.
[26] we do not know if the firm would make a purchase from home without import opportunity (the machines are substitutes); I assume here that the firm needed capital in general to get more productive; it is just more profitable to get the machine from abroad.
[27] defined as (revenue-non-labor costs)/employment

Table 7.1 includes the results of the estimation for the variable of interests together with the main characteristics of the regressions. The export dummy became (negative) insignificant in most of the times; it is only significant at 10% level in the group of the supervisors; it would mean that controlling for all other variables supervisors earn 4% less on average at an exporter firm than at a non-exporter. However, the import variable is always positive significant at all conventional levels; production workers and top managers earn 7-8%, more if they work for a firm that imported capital in the past, while supervisors and middle managers make 13-14% more money if they made the same choice.

If we assume that the coefficients are independent conditional on the dependent variables (just like for the groups of male and female workers Oaxaca and Blinder (1973) did), it is easy to test if the coefficient of the supervisors higher than the import premium of the production workers or the top managers (see Greene 2008 56. p.). The t-tests yield that the import premium of supervisors is higher than the premium of the production workers and the top managers at a 5% resp. 10% significance level. So the import premium is heterogeneous across occupational groups, and the pattern that we observe across groups an inverted U-shape.

The third variable of interest, the dummy for foreign ownership is very significantly positive for all groups, as for its magnitude I got very similar result as Earle and Telegdy (2007). Here we observe a continuous rise in the premium, the coefficients of the first and second resp. the second and third groups are significantly different from each other. After controlling for the individual and firm characteristics a supervisor at a foreign owned firm earns on average 25% more than his/her counterpart at a domestically owned company. The same statistics is around 35% for middle managers.

	(1)	(2)	(3)	(4)	(5)
dependent variable	log wage	log wage	log wage	log wage	log wage
manager category	production workers	supervisors	middle managers	top managers	whole sample
export (dummy)	**-0.00281**	**-0.0412***	**-0.0328**	**-0.00564**	**-0.00553**
	(0.0100)	(0.0242)	(0.0331)	(0.0445)	(0.00990)
import (dummy)	**0.0763*****	**0.129*****	**0.139*****	**0.0755****	**0.0811*****
	(0.0115)	(0.0213)	(0.0418)	(0.0359)	(0.0118)
foreign (dummy)	**0.197*****	**0.249*****	**0.348*****	**0.475*****	**0.203*****
	(0.0161)	(0.0257)	(0.0429)	(0.0563)	(0.0163)
Individual controls	yes	yes	yes	yes	yes
Firm controls	yes	yes	yes	yes	yes
Firm FE	no	no	no	no	no
Year FE	yes	yes	yes	yes	yes
Observations	501,590	33,155	8,712	6,928	548,845
R-squared	0.740	0.663	0.613	0.554	0.743

Table 7.1. Regression results for the cross-section model with (firm) clustered standard errors containing all three variables of interest, individual level control variables (occupation, experience, experience^2, education, gender), firm characteristics (size, industry, region) and year dummies. More coefficients are available in the Appendix. *** p<0.01, ** p<0.05, * p<0.1

To see whether these patterns are present in the different time periods I also calculated the premia in the same model (only without time fixed effects) for each year separately. Again, I do not report all regressions, only insert three tables that show the evolution of the three premia of global involvement for the four managerial groups throughout ten years.[28] Figure 3 shows the coefficients of the export dummy in the equations. The premium is usually not significant even at 10%; the exception are the first two groups in 1994, the first three groups in 1998 and the middle managers in 2001. Needless to say, the results are probably due to the crises in those last two years (the Russian and the .com crisis). It is clear that the export premium is reduced now close to zero for the whole sample (which follows the production workers), although there are some fluctuations around the crises. Also, although the very negative coefficients for the top managers are not significant (the sample size is small), judging from the middle managers it is likely that although managers do not seem to get positive export premium, but the volatility of their premium is asymmetric to negative

[28] For the exact coefficients with significance levels see the Appendix.

movements of the mean and it is higher than for lower-ranked managers. However, this might be just the effect of the small yearly samples, because otherwise the lines are moving together.

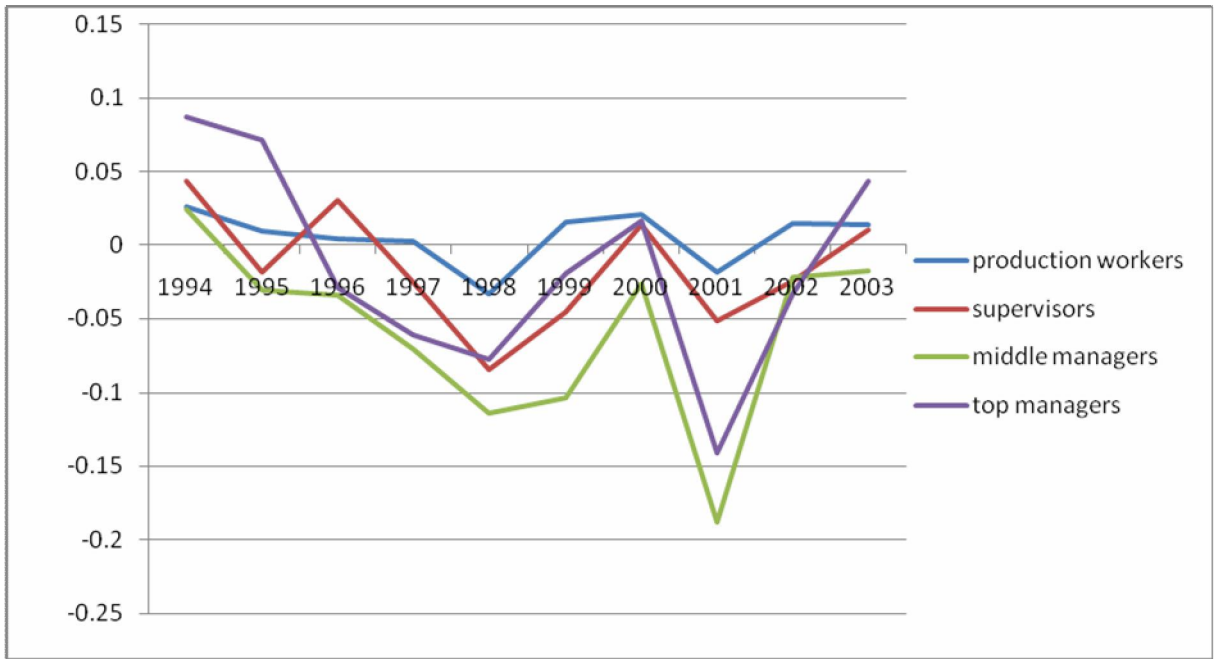

Figure 3. The estimated export premium for each year from 1994-2003; the model of Table 7.1 was used without the time fixed effects.

In Figure 4 we can see the same graphs for the import premia throughout the 10 years. The import premium inherited some characteristics of the evolution of the statistics shown in Figure 2. The middle managers started from negative, and yet from 1997 they got the highest import premium (except from 2000). Again, it can be seen from the figure that until the end of the decade there are other forces in charge on the labor market than in the last five years. However, this graph might make the results of the cross-section somewhat less credible, since we can see now that the last years drive the results with their higher observation number (see Table 1), and the suspiciously high import premium of 2003 for the middle managers. What we can see that top managers are now quite close to the huge mass of production workers. The import premia are not significant for top managers usually, but they are mostly significant (although sometimes only at 10%) after 1997 for the first three groups. Also, here

it is not true that as we are looking at the higher levels of managers the volatility of the premium would increase (heuristically).

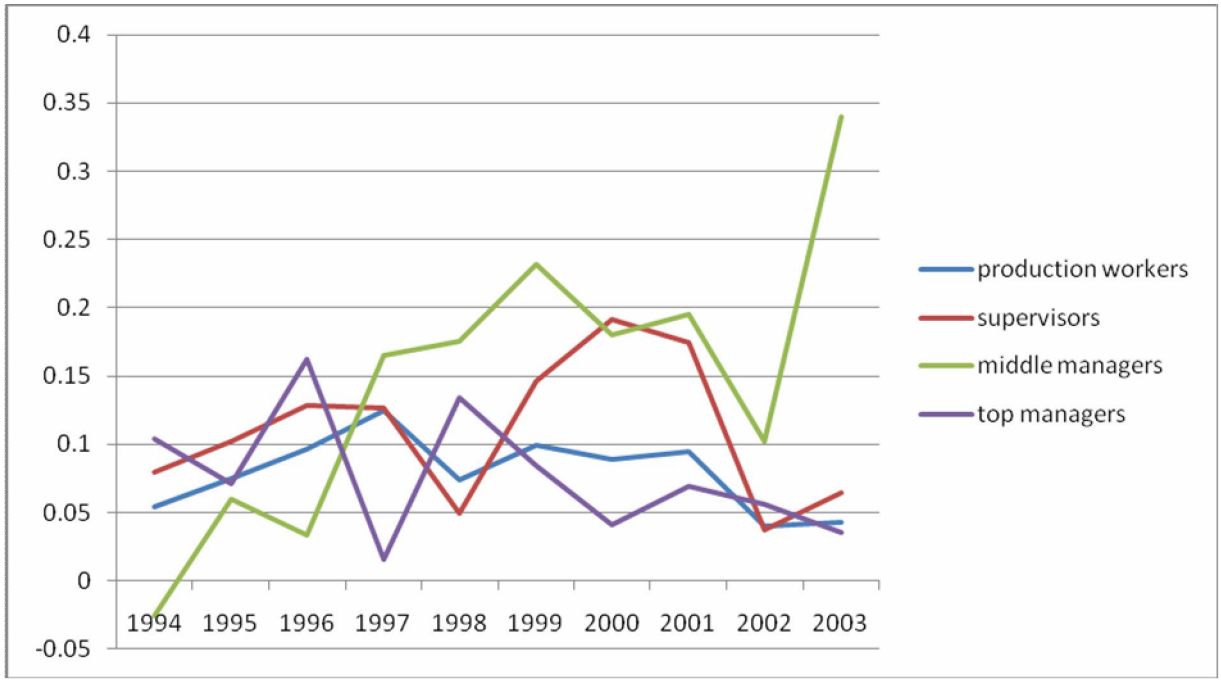

Figure 4. The estimated premium of capital imports for each year from 1994-2003; the model of Table 7.1 was used without the time fixed effects.

As a last point of this subsection, Figure 5 shows the evolution of the premium on foreign ownership. Here the picture is clearer; the coefficients are more stable and always significant at 1% throughout the whole period, except top managers, probably because they have the smallest samples, and because higher earnings may have higher volatility as well (irregular and regular bonuses are also more important at this level). We can conclude that these results from the cross-section regression are rather robust.

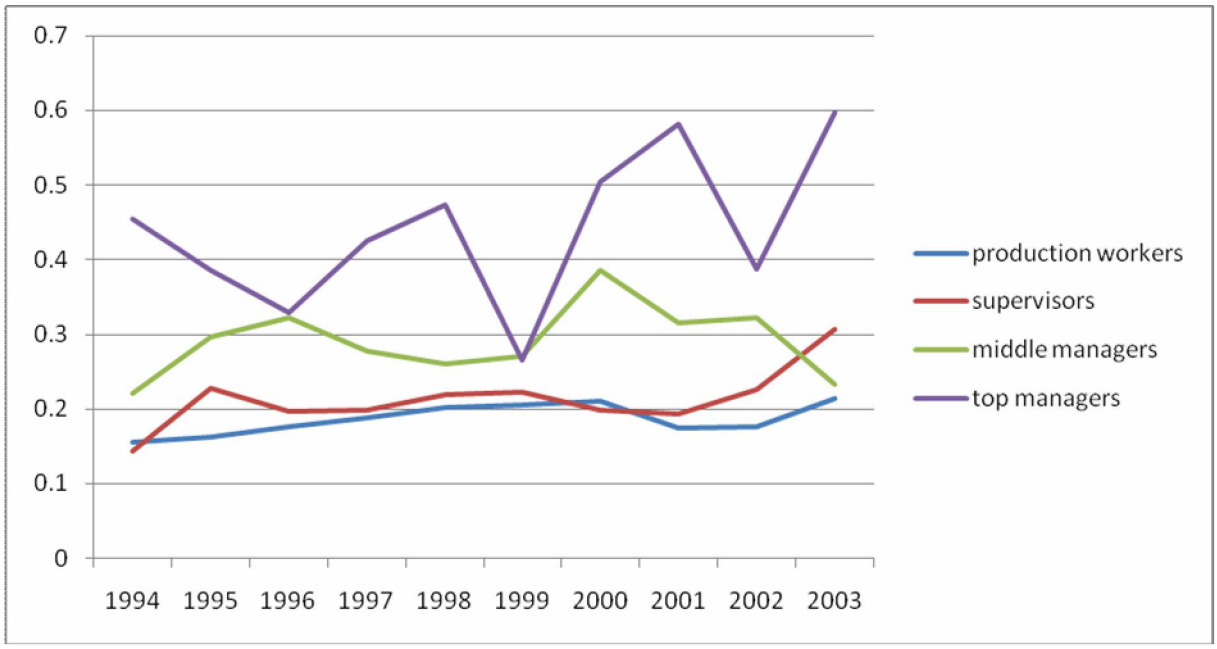

Figure 5. The estimated premium of foreign ownership for each year from 1994-2003; the model of Table 7.1 was used without the time fixed effects.

Now I turn to the specification with firm fixed effects (FE). As I mentioned above, the coefficients are partly the results of self-selection. With FE we are able to control for observed and unobserved heterogeneity. However, since many mechanisms are a subject of a firm level policy (for example there are traditions at foreign companies how the organization should look like), putting FE wipe these parts of the mechanisms out. Also, as I showed in section 2, there is only little within variance in the variables of interest. All in all, we can expect insignificant coefficients due to these effects and self-selection.

3.2.2 Firm fixed effects

To control for unobserved firm heterogeneity I estimated firm fixed effect models. The included control variables are the same as in the model in Table 6.2, but this time I put all the three variables of interest in the regressions. This means that besides the three categorical variable (*foreign*, *export* and *import*) and the two-way fixed effects the RHS variables of the regression are log number of employees (*size*), *experience* (and its square), education (*high school* and *college* dummies), *gender* and *occupation*. Because of the reasons already

described in this section I expect that the coefficients vanish. However, as Table 7.2 shows, this is not the case. In fact, the results get rather unstable for the premia related to international trade. For the supervisors the export premium will be quite high (5%) and significant; on the other hand, for the top managers the point estimate, although it is far from significant, is about the same magnitude with negative sign. The import premium gets significantly negative (-2.1%) for the production workers, hence for the whole population as well. These results are troubling; the only premium that remains consistent with its previous behavior is the foreign ownership. The value for the whole sample is a bit lower than the values that Earle and Telegdy (2007) get, but since we excluded many firms from the service sectors (because we needed machine operators to define the import variable) that are potentially foreign owned, the estimated 3.3% foreign ownership premium is not inconsistent with their findings. Especially, that the other values are higher in magnitude – for the supervisors the coefficient (0.054) even remains significant at 5% level.

	(1)	(2)	(3)	(4)	(5)
dependent variable	log wage	log wage	log wage	log wage	log wage
managerial group	production workers	supervisors	middle managers	top managers	whole sample
export (dummy)	**0.00488**	**0.0587****	**0.0250**	**-0.0420**	**0.00987**
	(0.0120)	(0.0271)	(0.0332)	(0.0480)	(0.0140)
import (dummy)	**-0.0212****	**0.00485**	**-0.0703**	**0.00561**	**-0.0215****
	(0.00980)	(0.0161)	(0.0507)	(0.0686)	(0.0100)
foreign (dummy)	**0.0310***	**0.0539****	**0.0460**	**0.0726**	**0.0332***
	(0.0184)	(0.0272)	(0.0548)	(0.0939)	(0.0184)
Individual controls	yes	yes	yes	yes	yes
Firm controls			only for size		
Firm FE	yes	yes	yes	yes	yes
Year FE	yes	yes	yes	yes	yes
Observations	524,393	33,155	8,712	6,928	573,188
R-squared	0.818	0.849	0.852	0.929	0.819

Table 7.2. Regression results for the firm FE model containing all three variables of interest, individual level control variables (occupation, experience, experience^2, education, gender), firm size and year dummies. *** p<0.01, ** p<0.05, * p<0.1

4 Main results and conclusion

After stating the regression results in the previous section I interpret them and answer the questions from the first section. In subsection 4.2 I will report some robustness checks I did. It turns out that in some cases the cross-sectional patterns are even more pronounced. Subsection 4.3 concludes.

4.1 International premia: who wins and why?

4.1.1 Export or import premium or foreign ownership?

Our first question refers to the relationship of the three premia. What gives the highest premium; what is the stronger force, the rents of productivity upgrading from export, the mechanisms related to capital imports, or foreign ownership? We can see from the cross-sectional results that the export premium vanishes, and gives way to the imports and to an even greater extent to the premium of foreign ownership.

In the cross-sectional equations foreign ownership provides the highest premium to the managers and it is the most stable over time. The import dummy has also a sizeable effect, although it is not significant for some early years for the managers at higher levels, this suggests that the effect on the higher levels might be related to the changes of the Hungarian labor market between 1996 and 1998.

4.1.2 Patterns of heterogeneity in the premium for foreign ownership and capital import, some possible interpretations

In the cross-sectional model I found statistically significant heterogeneity across managerial groups in the values of two international premia. The largest differences appear in the pattern of the premium for foreign ownership; it is increasing as we examining higher-

ranked managers. It is remarkable that the order of the premium remained the same for all years. This suggests that foreign firms had firm policy on wages, and constituted a separate part in the Hungarian labor market with its own (Western) logic, as Kézdi (2002) argues as well.

The capital import premium had an inverted U shape, a significant peak at the supervisors and probably at the department managers, with an even higher point estimate. This means that the mechanism emphasizing the importance of top managers in exporting is not consistent with the data at least if we allow for – possibly endogenous – productivity effects. Instead, it is more probable that the mechanism that stresses the generic skills of managers as a complementary and necessary ingredient for successful productivity upgrading is more important. This inverted U shape is also inconsistent with the argument that the occupational heterogeneity found in the cross-sectional regressions is due to the heterogeneity of the international premia across skill groups, because that would also suggest a continuous increase of the premia through the managerial groups. The result is somewhat vague if we look at the time series of the import premium. One could again hypothesize whether the first five years are different because the evolution of this premium is connected to the larger changes of the Hungarian labor market. The robustness checks strengthen the results and this belief in the next section.

The export premium is not significant throughout the years and groups. The main fluctuations seen in Figure 3 are easy to interpret, mostly due to the crises of 1998 and 2001, when export markets were shattered. Although I did not present evidence on it, but it seems as the volatility of the export premium increases as we look at higher-ranked managers. This could be due to the decreasing sample size, but the same is not true for the import premium for example. Moreover, there could be found an economic interpretation for it; since exporting is more like a strategic decision, so managers on a higher level take responsibility

for its success or failure; also this is in accordance with the stylized fact that the share of bonuses in the income is higher on the top manager level than among the supervisors.

4.1.3 Discussion of fixed effects results

It is important to keep in mind that the results above refer to the cross-sectional regressions, which possibly allow for lots of endogenous variation. On the one hand, those results are easier to interpret, but they are also biased since we cannot control for the possible self-selection and unobservable heterogeneity. Looking at the firm FE model unfortunately does not help to get a clear picture.

The negative sign for an earlier highly positive estimate is stunning, but in fact it does not really say anything, because the overwhelming majority of people in the first group is not directly connected to the imported machines. So they only enjoyed some sort of general equilibrium effect of the capital import (if any) to begin with. As the firm-level effect for the higher-ranked managers vanished, this general equilibrium effect might have gone as well, and we cannot really predict what remained there.

Nevertheless, the contradictory results for the export premium in the FE model are rather alarming, mostly because there is no economic reason to explain why only and exactly the group of supervisors got significantly positive premium, and why the coefficients are sometimes very negative (although not significant). Other features of the specification (like negative, but not significant gender gap or return on high school) are also signs for some kind of overfitting or not sufficient (within) variation in the data.

Furthermore, there might be another problem that is related to the time heterogeneity and the structural changes of the Hungarian labor market. It might well be that the Hungarian

corporate culture underpaid the supervisors[29] in the beginning of the 1990s as a heritage from the socialist era, and in general there are changes in the roles of managers that were brought about by the foreign-owned firms as Kézdi (2002) argues. Considering this time heterogeneity, our estimates are not consistent. I check the FE models for the last five years as well in the next subsection, to see how much the coefficients change. To sum up, the FE results do not seem credible; one needs probably more variation, so other, more efficient estimation methods that use also some between variation (FGLS) would be required instead of the usual within estimator.

4.2 Basic robustness checks, self selection

4.2.1 Including capital-labor ratio

As Table 3.1-3 show there is correlation between the categorical variables representing the involvement of the firm in the global economy and the (log of the) capital-labor ratio. I did not control for it because one possible mechanism related to the capital import exercise its effect through this ratio. However, since the results show that there are other mechanisms in place as well, including this variable in the regressions (from Tables 7.1.2) should not alter the qualitative results drastically. I only report the cross-sectional results; the FE regressions did not change.

[29] Many times supervisors are simply more experienced workers rather than trained managers; the „new" supervisors of the service sor more skill-intensive industries fit more into the second phase of the transition, when the SBTG started rather than the reallocation among not skill-intensive industries.

	(1)	(2)	(3)	(4)	(5)
dependent variable	log wage	log wage	log wage	log wage	log wage
managerial groups	production workers	supervisors	middle managers	top managers	whole sample
export (dummy)	**-0.00557**	**-0.0229**	**-0.0448**	**-0.0280**	**-0.00821**
	(0.0101)	(0.0200)	(0.0307)	(0.0433)	(0.00992)
import (dummy)	**0.0622*** **	**0.0918*** **	**0.121*** **	**0.0466**	**0.0673*** **
	(0.0120)	(0.0185)	(0.0379)	(0.0364)	(0.0122)
foreign (dummy)	**0.178*** **	**0.212*** **	**0.307*** **	**0.457*** **	**0.184*** **
	(0.0175)	(0.0225)	(0.0405)	(0.0537)	(0.0176)
log(k/l)	0.0343***	0.0382***	0.0265*	0.0434***	0.0343***
	(0.00551)	(0.00789)	(0.0148)	(0.00970)	(0.00546)
Individual controls	yes	yes	yes	yes	yes
Firm controls	yes	yes	yes	yes	yes
Firm FE	no	no	no	no	no
Year FE	yes	yes	yes	yes	yes
Observations	499,157	31,971	8,491	6,561	546,180
R-squared	0.744	0.692	0.627	0.566	0.747

Table 7.1. Regression results for the cross-section model with (firm) clustered standard errors containing all three variables of interest, individual level control variables (occupation, experience, experience^2, education, gender), firm characteristics (size, industry, region, capital-labor ratio) and year dummies. *** p<0.01, ** p<0.05, * p<0.1

As we can see in Table 8, the pattern of the premia remains the same. In fact, the relationships are getting even clearer, especially if we look at the time series of the newly calculated import premium, which has improved. This confirms the earlier results now from a dynamic point of view as well (see Figure 6).

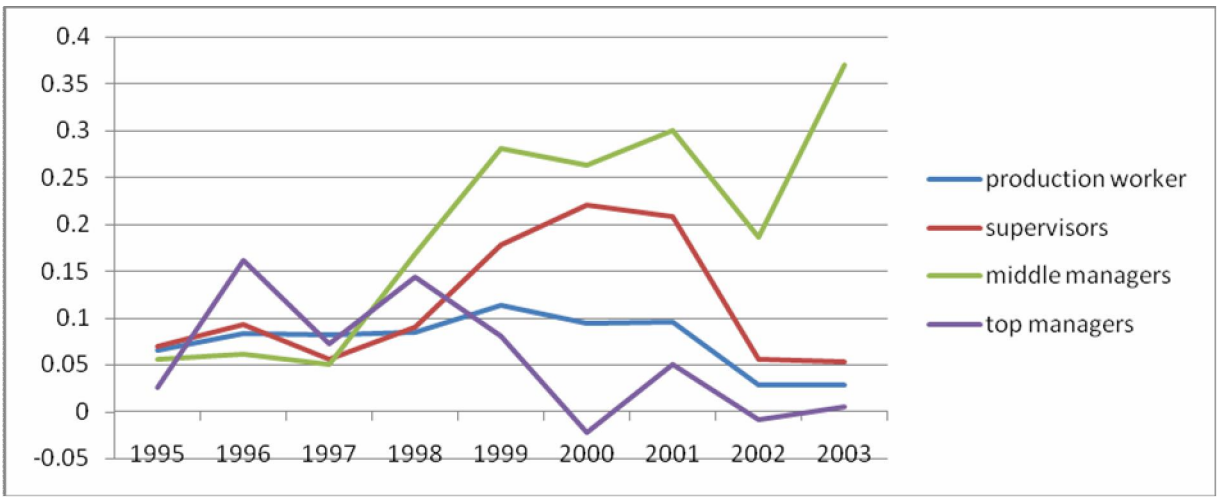

Figure 6. The estimated premium of capital imports for each year from 1995-2003; the model of Table 8 was used without the time fixed effects.

4.2.2 Presence of selection, including lagged productivity

As I said earlier, according to a great share of the literature the drop of the coefficients when estimating the fixed effects models is due to self selection. That is, before entering the international markets, future exporters are paying more compared to the future non-exporters even today, mostly because they are more productive today as well. Similarly to Bernard and Jensen (1999) I will check whether there is this kind of self selection.

I run 2*3 regressions, where the LHS variable is three times the *productivity* variable[30], and three times the average wage of the firms[31]; I regress the 1999 value of these variables once on the export status of the firm in 2003, once on the importer status of the firm in 2003 and eventually on the 2003 value of the *foreign* dummy. It is important to restrict the sample to firms that are non-traders in 1999.

This is a somewhat confounded measure of the importance of self-selectivity, because we assume when putting the data in the regressions that every firm exists in 2003 that existed in 1999. In fact, the numbers we will get are probably understating the difference between the firms who will become exporters and who will not. This is because intuitively it should be true that less productive firms are dying with a greater probability, but since we do not have observation on the already dead firms, we leave the really not productive firms (who are not becoming traders if there is self-selection) out of the regression (truncation). However, the results are significant mostly anyway[32], we can state there is strong self-selection in general. For example the firms that were non-importers in 1999 and became importers by 2003 paid on average 11,910 HUF more and had higher productivity ratio by 53%. The same statistics

[30] see footnote 27
[31] theoretically this is estimated consistently for every firm because of the random sample
[32] the coefficient are in the Appendix. As I discussed earlier, this is not really convincing in the case of the import variable though (see section 2 on the import dummy).

for the foreign owned group are 42,500 HUF and 130%. The only exception is that the firms which are becoming exporters by 2003 do not tend to pay more in 1999 (when they are still non-exporters). This shows that there is self-selection indeed (although maybe on observables).

If self-selection according to productivity is such an important factor, then the first lag of *productivity* must have a serious effect on our results. As it turns out, this is not the case; although the coefficients drop, they remain significant. This means that there might be other mechanisms in place that are not related to productivity. However, the observed pattern of the foreign premium is not so clear in this case, and although the order of the groups according to the premia is still the same, the differences are no more significant. The FE results are now very close to zero, even for the foreign dummy, but the supervisors' export premium is still 5% and significant (some results are included in the Appendix).

4.2.3 Results for the years 1999-2003, for employment > 50

We saw that it is possible that the phases of transition in the labor market as described by Kézdi (2002) also appear if we look at the behavior of the import premium (especially Figure 6). Also, some mechanisms and the difference between the managerial categories are probably only really important in a larger firm. For this reason, I looked at the earlier regressions after dropping the first five years and the firms whose size is smaller than 50.[33] Since I picked the years according to this, the cross-section results are even more pronounced. The interesting part is how the fixed effects coefficients behave after dropping all the years that – according to cross-section results – possibly do not show the same behavior as the last five years. First of all, the results are not much more credible that in the FE model of the previous subsection. Also, the significance of the foreign ownership dummy disappears

[33] I also controlled for the capital-labor ratio.

(which contradicts to the results of Earle and Telegdy 2007), although the import and export premia both behave the expected way: they are also insignificant[34].

4.3 Conclusion and further research

In my thesis I explored the behavior and the relation of the three international premia, the wage differential on export status, capital imports and foreign ownership. After documenting the basic finding in the literature for Hungary, since they are the part of one phenomenon, I started to analyze the three variables of interest jointly.

In the models without fixed effects the export premium turns out to be insignificant, even negative most of the time. Also, I find robust and significant heterogeneity in the foreign ownership premium, and to a lesser extent in the import premium. However, after including firm fixed effects I find that – as in the literature in general – there is a huge difference between the estimates of the previous OLS and the firm fixed effects (FE) model; sometimes coefficients even switch sign significantly, and the patterns across the groups disappears. I conclude that this large difference in the results is partly due to self-selection in trading and the existing time heterogeneity of the premia.

The main message of the thesis is that imports probably matter even more than exports; moreover, the heterogeneity of the effects across occupation is significant and has interesting patterns. The patterns and the FE results suggest that there are generic organizational skills for managers which are necessary to become a successful exporter/importer. These skills make it possible for imports to take an effect on productivity, and for these skills are the managers compensated with their premium. The latter hypothesis is worth examining for further research; also, the obvious limitation of the data set and the used econometric methods leaves room for improvement of the results.

[34] only the variable on capital imports has a positive significant coefficient in the group of production workers. This shows that the two period must be really different (it switched sign significantly, though the sample size is about the half of the previous).

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6 Appendix

6.1 Chapter 2 (export premium)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(16)	(17)	(18)	(19)	(20)
dependent varable	log wage	log wage	log wage	log wage	log wage	log wage	log wage	log wage	log wage	log wage	log wage	log wage	log wage	log wage	log wage
managerial group	p. worker	supervis.	middle	top m.	pooled	p. worker	supervis.	middle	top m.	pooled	p. worker	supervis.	middle	top m.	pooled
size	0.0603***	0.0731***	0.0896***	0.273***	0.0641***	0.0602***	0.0758***	0.0907***	0.273***	0.0641***	0.00708	0.0250**	0.0497**	0.0586**	0.00301
	(0.00624)	(0.0126)	(0.0260)	(0.0105)	(0.00672)	(0.00638)	(0.0123)	(0.0257)	(0.0105)	(0.00684)	(0.00591)	(0.0112)	(0.0202)	(0.0233)	(0.00609)
experience	0.0137***	0.0149***	0.0109***	0.0121***	0.0134***	0.0137***	0.0155***	0.0114***	0.0122***	0.0134***	0.0159***	0.0161***	0.0208***	0.0231***	0.0163***
	(0.000527)	(0.00151)	(0.0037)	(0.00326)	(0.000520)	(0.000533)	(0.00142)	(0.0037)	(0.00327)	(0.000526)	(0.000464)	(0.00127)	(0.00287)	(0.00363)	(0.000516)
experience^2	-.000212***	-.000149***	-9.2e-05	.000119*	-.000195***	-.000220***	-.000171***	-.000105	.000118*	-.000203***	-.000247***	-.000171***	-.000240***	-.000303***	-.000243**
	(9.59e-06)	(2.78e-05)	(7.92e-05)	(6.39e-05)	(9.86e-06)	(9.71e-06)	(2.81e-05)	(7.85e-05)	(6.41e-05)	(1.00e-05)	(6.20e-06)	(2.32e-05)	(6.31e-05)	(7.40e-05)	(6.59e-06)
college	0.351***	0.422***	0.622***	0.628***	0.397***	0.262***	0.312***	0.421***	0.448***	0.298***	0.283***	0.300***	0.309***	0.200***	0.389***
	(0.00834)	(0.0298)	(0.0348)	(0.0265)	(0.00742)	(0.00990)	(0.0256)	(0.0226)	(0.0170)	(0.00912)	(0.00928)	(0.0201)	(0.0319)	(0.0332)	(0.00883)
high school	0.0997***	0.145***	0.239***	0.211***	0.105***						0.0831***	0.0972***	0.0957***	0.0887***	0.0907***
	(0.00351)	(0.0185)	(0.0389)	(0.0250)	(0.00321)						(0.00401)	(0.0104)	(0.0330)	(0.0296)	(0.00327)
gender	0.125***	0.0979***	0.103***	0.0189	0.121***	0.127***	0.117***	0.107***	0.0149	0.124***	0.127***	0.101***	0.0836***	0.0653***	0.120***
	(0.00374)	(0.0192)	(0.0206)	(0.0183)	(0.00365)	(0.00392)	(0.0230)	(0.0209)	(0.0184)	(0.00384)	(0.00319)	(0.0103)	(0.0200)	(0.0178)	(0.00342)
export	0.0725***	0.0418***	0.140***	0.211***	0.0759***	0.0727***	0.0535***	0.180***	0.224***	0.0735***	-0.00908	0.0368*	-0.0134	-0.00317	-0.00416
	(0.0100)	(0.0145)	(0.0261)	(0.0254)	(0.00996)	(0.00955)	(0.0140)	(0.0332)	(0.0344)	(0.00940)	(0.00955)	(0.0197)	(0.0284)	(0.0239)	(0.0110)
export * college						0.0111	-0.0253	-0.0518	-0.0125	0.0282*					
						(0.0194)	(0.0278)	(0.0391)	(0.0407)	(0.0165)					
occupation (4)	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
firm controls	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	no	no	no	no	no
FE	year	year	year	year	year	year	year	year	year	year	year, firm	year, firm	year, firm	year, firm	year, firm
Constant	9.486***	9.734***	9.806***	8.975***	9.499***	9.529***	9.813***	10.00***	9.155***	9.550***	10.30***	9.810***	9.881***	9.853***	10.08***
	(0.0409)	(0.0977)	(0.207)	(0.0762)	(0.0432)	(0.0423)	(0.0897)	(0.187)	(0.0749)	(0.0444)	(0.0367)	(0.0777)	(0.188)	(0.102)	(0.0400)
Observations	1,035,957	62,513	18,922	29,238	1,146,630	1,035,957	62,513	18,922	29,238	1,146,630	1,082,488	64,265	19,308	30,245	1,196,306
R-squared	0.678	0.594	0.538	0.435	0.671	0.675	0.587	0.535	0.433	0.668	0.818	0.860	0.890	0.918	0.805

Table A1. The results of the specification in section 2 Table 6.1-2 and Table 6.1 with interaction between export and college.

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
production workers	0.0350***	0.0430***	0.0650***	0.0900***	0.0628***	0.0825***	0.0992***	0.0873***	0.0866***	0.0939***
supervisors	-0.0341***	-0.0697***	-0.0778***	0.107***	0.0736***	0.110***	0.106***	0.118***	0.138***	0.162***
middle managers	-0.0414*	0.00397	-0.0504*	0.240***	0.151***	0.252***	0.241***	0.275***	0.249***	0.238***
top managers	0.128***	0.149***	0.142***	0.176***	0.104**	0.289***	0.268***	0.230***	0.218***	0.191***
whole sample	0.0346***	0.0440***	0.0639***	0.0944***	0.0640***	0.0893***	0.104***	0.0933***	0.0901***	0.0999***

Table A2. The export premia of the specification in section 2 Table 6.1 estimated for each year separately.

6.2 Chapter 3 (main regressions)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
dependent varable	log wage	log wage	log wage	log wage	log wage	log wage	log wage	log wage	log wage	log wage
managerial group	p. worker	supervis.	middle	top m.	pooled	p. worker	supervis.	middle	top m.	pooled
size	0.0462***	0.0407***	0.0805***	0.245***	0.0490***	0.0169***	0.0201	0.0811**	0.203***	0.0176***
	(0.00597)	(0.0104)	(0.0231)	(0.0145)	(0.00616)	(0.00648)	(0.0142)	(0.0354)	(0.0453)	(0.00643)
experience	0.0163***	0.0178***	0.0161***	0.0107*	0.0162***	0.0156***	0.0167***	0.0202***	0.0276***	0.0157***
	(0.000597)	(0.00153)	(0.00436)	(0.00610)	(0.000585)	(0.000665)	(0.00147)	(0.00420)	(0.0102)	(0.000695)
experience^2	-0.000255***	-0.000196***	-0.000148	7.84e-05	-0.000245***	-0.000239***	-0.000180***	-0.000220**	-0.000378**	-0.000233***
	(1.04e-05)	(3.48e-05)	(9.32e-05)	(0.000124)	(1.10e-05)	(8.32e-06)	(2.76e-05)	(9.12e-05)	(0.000189)	(8.36e-06)
gender	0.154***	0.162***	0.137***	0.0879**	0.152***	0.143***	0.0999***	0.0737***	0.0957***	0.141***
	(0.00588)	(0.0171)	(0.0282)	(0.0411)	(0.00587)	(0.00463)	(0.0146)	(0.0279)	(0.0338)	(0.00500)
high school	0.103***	0.135***	0.119*	0.219***	0.104***	0.0865***	0.0961***	0.0790	0.111*	0.0861***
	(0.00448)	(0.0200)	(0.0646)	(0.0566)	(0.00435)	(0.00457)	(0.0166)	(0.0589)	(0.0656)	(0.00408)
college	0.327***	0.372***	0.435***	0.545***	0.348***	0.304***	0.299***	0.347***	0.242***	0.316***
	(0.0106)	(0.0297)	(0.0619)	(0.0594)	(0.0109)	(0.0101)	(0.0302)	(0.0542)	(0.0793)	(0.00933)
export	-0.00281	-0.0412*	-0.0328	-0.00564	-0.00553	0.00488	0.0587**	0.0250	-0.0420	0.00987
	(0.0100)	(0.0242)	(0.0331)	(0.0445)	(0.00990)	(0.0120)	(0.0271)	(0.0332)	(0.0480)	(0.0140)
import	0.0763***	0.129***	0.139***	0.0755**	0.0811***	-0.0212**	0.00485	-0.0703	0.00561	-0.0215**
	(0.0115)	(0.0213)	(0.0418)	(0.0359)	(0.0118)	(0.00980)	(0.0161)	(0.0507)	(0.0686)	(0.0100)
foreign	0.197***	0.249***	0.348***	0.475***	0.203***	0.0310*	0.0539**	0.0460	0.0726	0.0332*
	(0.0161)	(0.0257)	(0.0429)	(0.0563)	(0.0163)	(0.0184)	(0.0272)	(0.0548)	(0.0939)	(0.0184)
occupation (4)	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
firm controls	yes	yes	yes	yes	yes	no	no	no	no	no
FE	year	year	year	year	year	year, firm	year, firm	year, firm	year, firm	year, firm
Constant	9.459***	9.555***	9.550***	8.986***	9.471***	10.18***	9.800***	9.697***	9.159***	10.49***
	(0.0414)	(0.0837)	(0.142)	(0.112)	(0.0419)	(0.0466)	(0.106)	(0.271)	(0.249)	(0.0486)
Observations	501,590	33,155	8,712	6,928	548,845	524,393	33,155	8,712	6,928	573,188
R-squared	0.740	0.663	0.613	0.554	0.743	0.818	0.849	0.852	0.929	0.819

Table A3. The results of the specification in section 2 Table 7.1-2.

xdummy	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
production workers	0.0263*	0.00924	0.00414	0.00299	-0.0332*	0.0156	0.0207	-0.0179	0.0153	0.0139
supervisors	0.0437*	-0.0181	0.0308	-0.0253	-0.0843**	-0.0451	0.0144	-0.0511	-0.0244	0.0105
middle managers	0.0241	-0.0309	-0.0340	-0.0709	-0.114*	-0.104	-0.0264	-0.188***	-0.0218	-0.0174
top managers	0.0868	0.0713	-0.0291	-0.0613	-0.0778	-0.0197	0.0160	-0.141	-0.0332	0.0435

imports	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
production workers	0.0545***	0.0753***	0.0965***	0.125***	0.0738***	0.0995***	0.0886***	0.0946***	0.0399***	0.0432***
supervisors	0.0797***	0.102***	0.128***	0.126***	0.0494	0.146***	0.191***	0.174***	0.0376	0.0645*
middle managers	-0.0258	0.0599	0.0333	0.165*	0.175**	0.232***	0.180**	0.195**	0.102	0.340***
top managers	0.104	0.0710	0.162*	0.0158	0.134	0.0839	0.0409	0.0693	0.0558	0.0353

foreign	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
production workers	0.156***	0.163***	0.177***	0.189***	0.202***	0.205***	0.210***	0.175***	0.177***	0.214***
supervisors	0.144***	0.227***	0.197***	0.198***	0.219***	0.222***	0.198***	0.194***	0.225***	0.306***
middle managers	0.221***	0.297***	0.321***	0.277***	0.260***	0.270***	0.385***	0.315***	0.322***	0.233***
top managers	0.455***	0.386***	0.329***	0.425***	0.474***	0.266**	0.504***	0.582***	0.388***	0.597***

Tables A4.1-3. The export, capital import and foreign ownership premia of the specification in section 3 Table 7.1 estimated for each year separately.

6.3 Chapter 4 (robustness checks)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
dependent varable	log wage	log wage	log wage	log wage	log wage	log wage	log wage	log wage	log wage	log wage
managerial group	p. worker	supervis.	middle	top m.	pooled	p. worker	supervis.	middle	top m.	pooled
size	0.0409***	0.0442***	0.0807***	0.234***	0.0436***	0.0208***	0.0269*	0.101**	0.208***	0.0217***
	(0.00579)	(0.00660)	(0.0163)	(0.0148)	(0.00600)	(0.00664)	(0.0141)	(0.0406)	(0.0456)	(0.00657)
experience	0.0159***	0.0172***	0.0152***	0.0123**	0.0158***	0.0156***	0.0168***	0.0203***	0.0277***	0.0157***
	(0.000566)	(0.00154)	(0.00439)	(0.00599)	(0.000556)	(0.000666)	(0.00147)	(0.00421)	(0.0103)	(0.000696)
experience^2	-0.000248***	-0.000193***	-0.000145	3.18e-05	-0.000238***	-0.000239***	-0.000181***	-0.000222**	-0.000380**	-0.000233***
	(9.76e-06)	(3.22e-05)	(9.39e-05)	(0.000121)	(1.02e-05)	(8.33e-06)	(2.75e-05)	(9.19e-05)	(0.000192)	(8.37e-06)
gender	0.149***	0.119***	0.122***	0.0857**	0.147***	0.144***	0.0995***	0.0721**	0.0998***	0.141***
	(0.00548)	(0.0144)	(0.0266)	(0.0408)	(0.00547)	(0.00465)	(0.0146)	(0.0281)	(0.0335)	(0.00502)
high school	0.0991***	0.108***	0.112*	0.230***	0.0999***	0.0866***	0.0962***	0.0801	0.107	0.0862***
	(0.00397)	(0.0176)	(0.0631)	(0.0583)	(0.00377)	(0.00457)	(0.0166)	(0.0590)	(0.0669)	(0.00408)
college	0.321***	0.329***	0.418***	0.542***	0.339***	0.304***	0.300***	0.347***	0.242***	0.315***
	(0.00972)	(0.0276)	(0.0621)	(0.0610)	(0.00957)	(0.0101)	(0.0304)	(0.0544)	(0.0808)	(0.00936)
export	-0.00557	-0.0229	-0.0448	-0.0280	-0.00821	0.00400	0.0563**	0.0197	-0.0423	0.00890
	(0.0101)	(0.0200)	(0.0307)	(0.0433)	(0.00992)	(0.0112)	(0.0251)	(0.0313)	(0.0482)	(0.0131)
import	0.0622***	0.0918***	0.121***	0.0466	0.0673***	-0.0235**	0.00164	-0.0723	0.00846	-0.0238**
	(0.0120)	(0.0185)	(0.0379)	(0.0364)	(0.0122)	(0.00984)	(0.0161)	(0.0511)	(0.0692)	(0.0100)
foreign	0.178***	0.212***	0.307***	0.457***	0.184***	0.0301*	0.0521*	0.0459	0.0721	0.0323*
	(0.0175)	(0.0225)	(0.0405)	(0.0537)	(0.0176)	(0.0183)	(0.0268)	(0.0555)	(0.0940)	(0.0182)
log (k/l)	0.0343***	0.0382***	0.0265*	0.0434***	0.0343***	0.0126***	0.0224**	0.0388	0.00518	0.0133***
	(0.00551)	(0.00789)	(0.0148)	(0.00970)	(0.00546)	(0.00409)	(0.00889)	(0.0239)	(0.0165)	(0.00409)
occupation (4)	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
firm controls	yes	yes	yes	yes	yes	no	no	no	no	no
FE	year	year	year	year	year	year, firm	year, firm	year, firm	year, firm	year, firm
Constant	9.501***	9.756***	9.675***	9.096***	9.513***	10.16***	9.742***	9.541***	9.134***	10.46***
	(0.0376)	(0.0541)	(0.136)	(0.132)	(0.0385)	(0.0475)	(0.107)	(0.314)	(0.254)	(0.0503)
Observations	499,157	31,971	8,491	6,561	546,180	521,800	33,042	8,668	6,840	570,350
R-squared	0.744	0.692	0.627	0.566	0.747	0.818	0.849	0.852	0.928	0.819

Table A5. The results of the specification in section 4.2.1 with log capital.abor ratio

export	1995	1996	1997	1998	1999	2000	2001	2002	2003
production workers	-0.0207	-0.0208	0.0140	-0.0230	-0.00389	0.00620	-0.0389*	0.00629	0.0129
supervisors	-0.0774***	-0.0636*	-0.0447	-0.0691**	-0.0545	0.00328	-0.0861**	-0.0642*	-0.0101
middle managers	-0.100**	-0.0963*	-0.0579	-0.0452	-0.0200	0.0384	-0.164***	0.0164	0.0485
top managers	0.0968	-0.0218	-0.0569	-0.114	-0.0494	0.000437	-0.170**	-0.124	-0.0278

import	1995	1996	1997	1998	1999	2000	2001	2002	2003
production worker	0.0664***	0.0838***	0.0822***	0.0853***	0.114***	0.0941***	0.0962***	0.0287*	0.0290*
supervisors	0.0693***	0.0924**	0.0557	0.0904**	0.178***	0.220***	0.208***	0.0561	0.0531
middle managers	0.0558	0.0613	0.0506	0.169**	0.281***	0.263***	0.300***	0.186***	0.370***
top managers	0.0262	0.162*	0.0726	0.144	0.0807	-0.0227	0.0507	-0.00838	0.00476

foreign	1995	1996	1997	1998	1999	2000	2001	2002	2003
production workers	0.130***	0.140***	0.118***	0.232***	0.229***	0.184***	0.138***	0.183***	0.212***
supervisors	0.190***	0.179***	0.130***	0.279***	0.221***	0.184***	0.156***	0.240***	0.311***
middle managers	0.302***	0.367***	0.188***	0.383***	0.353***	0.347***	0.372***	0.352***	0.232***
top managers	0.381***	0.295***	0.432***	0.454***	0.245**	0.441***	0.552***	0.415***	0.570***

Tables A6.1-3. The export, capital import and foreign ownership premia of the specification in section 4.2.1.1 estimated for each year separately.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
dependent varable	log wage	log wage	log wage	log wage	log wage	log wage	log wage	log wage	log wage	log wage
managerial group	p. worker	supervis.	middle	top m.	pooled	p. worker	supervis.	middle	top m.	pooled
size	0.0398***	0.0473***	0.0779***	0.227***	0.0425***	0.0139**	0.0167	0.0924**	0.227***	0.0148**
	(0.00346)	(0.00599)	(0.0140)	(0.0166)	(0.00370)	(0.00658)	(0.0141)	(0.0384)	(0.0457)	(0.00651)
experience	0.0157***	0.0163***	0.0145***	0.00758	0.0155***	0.0158***	0.0169***	0.0192***	0.0302**	0.0158***
	(0.000578)	(0.00186)	(0.00507)	(0.00657)	(0.000581)	(0.000666)	(0.00165)	(0.00458)	(0.0123)	(0.000719)
experience^2	-0.000241***	-0.000172***	-0.000120	0.000111	-0.000230***	-0.000240***	-0.000177***	-0.000194*	-0.000410*	-0.000234***
	(8.94e-06)	(3.31e-05)	(0.000108)	(0.000129)	(9.31e-06)	(8.22e-06)	(2.80e-05)	(9.99e-05)	(0.000225)	(8.34e-06)
gender	0.143***	0.109***	0.122***	0.0745	0.140***	0.145***	0.0958***	0.0854***	0.116***	0.142***
	(0.00581)	(0.0144)	(0.0276)	(0.0502)	(0.00593)	(0.00516)	(0.0146)	(0.0305)	(0.0422)	(0.00555)
high school	0.0845***	0.0963***	0.0961	0.140*	0.0847***	0.0869***	0.0949***	0.0958	0.110	0.0865***
	(0.00357)	(0.0175)	(0.0608)	(0.0764)	(0.00373)	(0.00490)	(0.0178)	(0.0666)	(0.0870)	(0.00445)
college	0.301***	0.304***	0.397***	0.468***	0.315***	0.311***	0.300***	0.372***	0.271***	0.321***
	(0.00883)	(0.0257)	(0.0597)	(0.0798)	(0.00940)	(0.0102)	(0.0327)	(0.0598)	(0.101)	(0.00981)
export	-0.00374	-0.0251	-0.0391	-0.0232	-0.00592	0.00349	0.0546**	0.0289	-0.0491	0.00926
	(0.0106)	(0.0271)	(0.0351)	(0.0492)	(0.0108)	(0.00934)	(0.0257)	(0.0384)	(0.0523)	(0.0112)
import	0.0605***	0.0771***	0.133***	0.0102	0.0649***	-0.00219	0.0127	-0.0764	-0.0576	-0.00329
	(0.00951)	(0.0202)	(0.0402)	(0.0416)	(0.00981)	(0.0119)	(0.0240)	(0.0540)	(0.0654)	(0.0117)
foreign	0.105***	0.128***	0.191***	0.357***	0.109***	-0.00390	0.00769	-0.00189	-0.0376	-0.00354
	(0.0160)	(0.0170)	(0.0376)	(0.0563)	(0.0155)	(0.0215)	(0.0297)	(0.0525)	(0.0799)	(0.0210)
lag productivity	0.152***	0.178***	0.190***	0.245***	0.155***	0.0401***	0.0719***	0.0366*	0.0731***	0.0426***
	(0.00701)	(0.0114)	(0.0174)	(0.0210)	(0.00693)	(0.00605)	(0.0119)	(0.0217)	(0.0202)	(0.00607)
occupation (4)	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
firm controls	yes	yes	yes	yes	yes	no	no	no	no	no
FE	year	year	year	year	year	year, firm	year, firm	year, firm	year, firm	year, firm
Constant	10.45***	10.57***	10.79***	9.299***	10.47***	11.07***	11.02***	9.698***	10.38***	11.74***
	(0.0230)	(0.0491)	(0.111)	(0.152)	(0.0227)	(0.0483)	(0.105)	(0.299)	(0.273)	(0.0525)
Observations	404,605	25,842	6,889	4,740	442,076	425,625	26,846	7,058	4,967	464,496
R-squared	0.750	0.688	0.624	0.587	0.756	0.801	0.831	0.835	0.929	0.805

Table A7. The results of the specification in section 4.2.2 with lagged log productivity

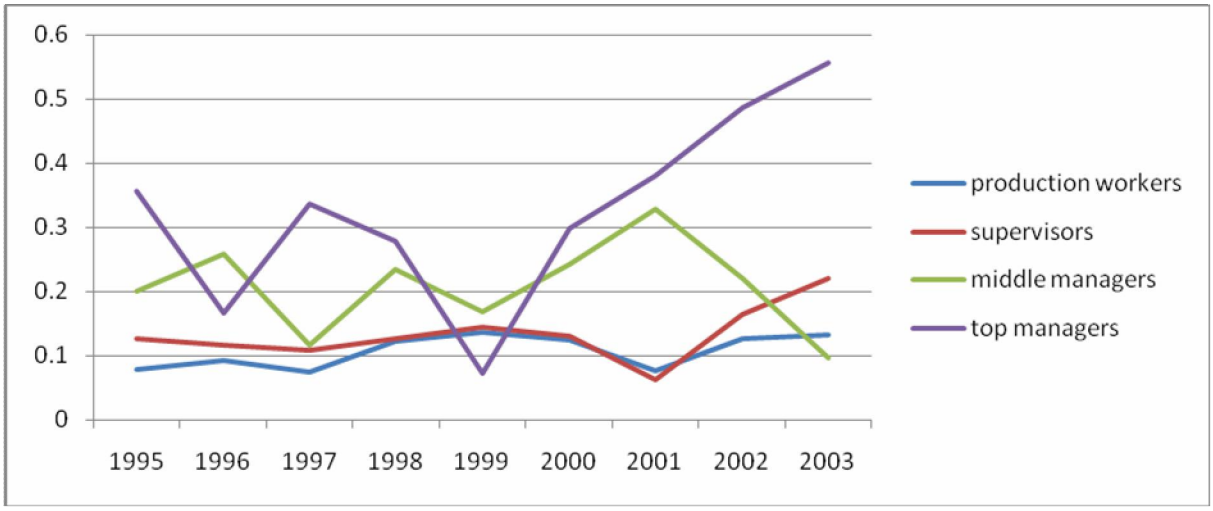

Figure A1. Vanishing pattern of the foreign ownership premium across managerial groups as estimated in section 4.2.2 the benchmark (Table 7.1) with an additional RHS variable the lag of the productivity measure (estimated for every year excluding the time dummies). The order is still more or less the same, but controlling for lagged productivity brings the lines much closer to each other suggesting the presence of strong self-selection.

dependent variable	(1) production	(2) production	(3) production	(4) mean wage	(5) mean wage	(6) mean wage
export status in 2003	0.241***			6,603		
	(0.0929)			(4,024)		
import status in 2003		0.529***			11,910***	
		(0.0626)			(1,918)	
foreign status in 2003			1.228***			42,715***
			(0.0677)			(3,772)
Constant	0.736***	0.348***	0.588***	56,993***	48,692***	51,725***
	(0.0215)	(0.0403)	(0.0190)	(862.3)	(1,212)	(692.7)
Observations	1,875	664	1,875	1,875	664	1,875
R-squared	0.004	0.088	0.210	0.002	0.049	0.157

Table A8. Regreessions tracking the presence of self-selection on import/export status and foreign ownership.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
dependent variable	lnnker	lnnker	lnnker	lnnker	lnnker	lnnker	lnnker	lnnker	lnnker	lnnker
managerial group	prod. worker	supervisor	middle man.	top man.	pooled	prod. worker	supervisor	middle man.	top man.	pooled
export	-0.0178	0.0143	-0.00734	-0.0334	-0.0172	-0.000615	-0.0274	0.0324	-0.0255	-0.00239
	(0.0122)	(0.0237)	(0.0555)	(0.0585)	(0.0120)	(0.0153)	(0.0256)	(0.0491)	(0.0512)	(0.0154)
import	0.0266*	0.00603	-0.00842	-0.0148	0.0262*	0.0690***	0.168***	0.296***	0.00590	0.0791***
	(0.0153)	(0.0304)	(0.0505)	(0.0600)	(0.0151)	(0.0139)	(0.0310)	(0.0578)	(0.0416)	(0.0144)
foreign	0.00645	-0.0169	0.0828	-0.164	0.00442	0.186***	0.255***	0.364***	0.431***	0.191***
	(0.0151)	(0.0202)	(0.101)	(0.115)	(0.0151)	(0.0181)	(0.0354)	(0.0531)	(0.0686)	(0.0187)
log(k/l)						0.0355***	0.0479***	0.0127	0.0787***	0.0350***
						(0.00575)	(0.0123)	(0.0171)	(0.0150)	(0.00592)
Constant	10.95***	11.36***	10.19***	10.93***	11.80***	10.24***	10.73***	10.55***	9.913***	10.68***
	(0.137)	(0.185)	(0.402)	(0.280)	(0.0701)	(0.0345)	(0.0632)	(0.141)	(0.134)	(0.0323)
individual controls	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
firm controls	yes	yes	yes	yes	yes	only for size				
FE	no	no	no	no	no					
year controls	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Observations	256,513	15,983	3,850	3,728	280,074	238,549	15,913	3,825	3,678	260,928
R-squared	0.742	0.777	0.808	0.951	0.750	0.609	0.438	0.431	0.562	0.627

Table A9. The results of the specification in section 4.2.3 for employment>50 and year>1998 with contrilling for capital-labor ratio.