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## Effects of economic liberalization on gender earnings and the difference: The case of Hungary

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DEPARTMENT OF ECONOMICS WORKING PAPER SERIES

**Effects of Economic Liberalization on Gender Earnings and the Difference:  
The Case of Hungary**

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Working Paper No: 2018-03

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## Effects of Economic Liberalization on Gender Earnings and the Difference: The Case of Hungary<sup>1</sup>

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### Abstract

This paper examines the effects of macroeconomic policy reforms of trade and investment liberalization on gender earnings inequality during the post-transition period using panel data from Hungarian Wage and Earnings Survey and other statistical sources for 21 industrial categories. The results of the econometrics analysis with regression estimations show that while both women and men in foreign-invested enterprises earned more than their counterparts employed in domestically-owned enterprises, women earned less in export-oriented enterprises than in domestic market-oriented enterprises, while men's earnings are not significantly different in export versus domestic. Also foreign direct investment (FDI) inflows and export orientation contributed to a greater gender earnings difference. While FDI enterprises dominantly contribute to export growth in Hungary, the tests indicate that these two features had independent effects on earnings levels and gaps. These results hold after controlling for human capital variables (average age and education level in industry), industrial segmentation (female share of employment), labor productivity, and the economic cycle (unemployment rates). This study, a first for Hungary, contributes to research of wage gaps in post-transition economies.

**Keywords:** Gender earnings inequality, transition economy, economic liberalization, free trade, foreign direct investment

**JEL Classification:** F6, J3, B540

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## **1. Introduction**

By the end of the Cold War in the late 1980s, centrally planned economic model was collapsed along with socialist system. As a result of that political change in Hungary, new institutional arrangements and neoliberal reforms introduced and began to introduce a “free market” policy agenda. Within that framework, new rules and regulations of market liberalization and structural adjustment programs of economic stabilization were introduced such as privatization of state owned enterprises; liberalization and deregulation of commodity, money, capital and labor markets. At the same time, however, new social and economic phenomena such as poverty, inflation, unemployment, and social insecurities started to emerge. Level of inequalities in different dimensions of age, gender and ethnicity increased.

Hungary was distinguished by its higher living standards and flexibility of policies among other former socialist countries in the pre-transition period. After the collapse of the regime, a huge loss of gross national products, income and employment occurred and livelihood of vulnerable and disadvantaged groups of society was decreased. Although some liberal economic measures had been introduced in Hungary in 1968 and onward, the scope and magnitude of the reforms were narrow, so a large part of the economy was still under strict government control until this transformation of 1989-1992. The economic growth in Hungary was driven by a dramatic expansion of international trade and exports in the post-transition period, resulting from the manufacturing industrial boost through a capitalization and technological upgrades. Moreover, Hungary was one of pioneers among former socialist countries to attract foreign direct investment (FDI)

during the post-transition period, and one of the largest recipients of FDI in the region (Figure A1, Appendix). After all, the transition from a centralized to a market economy seemed to expand foreign capital movement to new frontiers in former socialist countries.

International free trade growth was supported by International trade theory, which is based on the comparative advantage condition that presupposes that countries should specialize in producing those specific commodities in which they have the highest comparative advantage. The theory is also supported by the Stolper-Samuelson theorem, which says that the prices of trading goods will be equalized between countries as they move to free trade, so the prices of factors of production (capital and labor) will be equalized afterwards. According to this mainstream theory, all countries should benefit from free trade and average levels of income should rise in each country involved in trade. The whole process would suggest that trading countries would benefit equally from exports and the relative incomes of less skilled workers and women in export processing zones would rise.

This paper aims to answer the question of how increased trade through exports and inward FDI relatively affect workers' in less skilled categories and particularly earnings levels of women in Hungary's manufacturing industry. The study will be the first to examine the impact of export expansion and foreign capital inflows on gender differentiated earnings in the economy of transition using inter-industry gender wage determination model as its main analytical approach. Unlike many other studies on inequality in transition countries, this study will incorporate the effects of macro level changes in gender earnings inequality analysis. Policy designers aimed at promoting a

more equitable macroeconomic environment and activists interested in reducing labor market inequalities between men and women could benefit from this research. The study also possibly serves as an exemplar for other transition countries to rethink or design their respective macro and industrial policies.

Income is one of the means towards promoting people's capabilities (Sen, 1999; Robeyns, 2003). The capability approach is also about how resources do or do not enable woman to function. By comparing the women's and men's earnings as one of the resources for functioning, the central theme of our study had an implication for gender differences in capability. Note in the paper that the term "transition" refers to the transformation of the socialist system which began in 1989 to 1992 while the term "post-transition" refers to the process that continued onward until an accession to the European Union (EU) in 2004 in case of Hungary. Elsewhere, the "pre-transition" period is also known as the "communist" or "socialist" period, and "post-transition" period as the "post-communist" or "post-socialist" era.

## **2. Earnings Inequality by Gender**

Despite a supportive public policy for wage equality, gender earnings disparity still existed in the pre-transition period. Factors such as labor market segregation, hierarchical occupational segregation, social stereotyping and political reasons were reasons driving the differences in earnings. Political factors<sup>2</sup> of earnings disparity weakened to a certain

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<sup>2</sup> Such as affiliation or membership to political party

extent in the post-transition period, and ownership factors<sup>3</sup> became one of the influential factors for earnings level along with increased returns to education (Jolliffe and Campos, 2005). Generally, foreign enterprises paid higher wages than domestic private companies and public sector firms (Vecernik, 2001; Ekes, 2007). Earnings levels disparities were experienced in different sectors of the economy in Hungary. Sectors such as banking and financial intermediation benefitted more from wage increases, while sectors such as agriculture and manufacturing were where wage growth stagnated or even decreased.

It is believed that enactment of equal treatment laws and increased market competition should eliminate discrimination against women and reduce gender earnings inequality (Becker, 1971; Weichselbaumer and Winter-Ebner, 2007) which presumably happened during the period of post-transition of the market liberalization. However, in case of transition countries, abolishment of a centralized wage determination system and a higher degree of labor market liberalization may actually cause the gender wage gap to increase rather than to decrease (Pastore and Verashchagina, 2007). There are several studies on gender earnings inequality for transition countries but the results have mixed conclusions.

Some studies showed that gender earnings inequality is narrowed in post-transition countries (Paci, 2002; UNICEF, 1999; Jolliffe and Campos, 2005; Brainerd, 2000). Paci (2002:25) and UNICEF (1999) reported that the female-to-male earnings ratio remained constant or increased over time in many transition countries after the collapse

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<sup>3</sup> Such as public enterprises, private entities or foreign investment company

of centrally planned economies, including Hungary. They compared aggregate levels of average monthly wages of men and women in the mid 1990s with that of the mid 1980s. Some country-specific studies showed that gender-earnings inequality decreased in Hungary (Brainerd, 2004; Joliffe and Campos, 2005); East Germany (Hunt 2002); Poland, the Czech Republic and Slovakia (Brainerd 2000); Estonia and Slovenia (Orazema and Vodopivec 2000) and Bulgaria (Giddings, 2002). These studies used a technique developed by Juhn, Murphy, and Pierce (1991) to assess the change in gender wage differentials<sup>4</sup>.

Joliffe and Campos (2005) concluded that gender earnings discrimination had declined after market liberalization from comparing pre- and post-transition periods based on a combination of standard Mincerian equation and Oaxaca decomposition methods. However, Newell and Reilly (1996; 2001) were concerned about using Mincerian method for the pre-transition data, especially with return to education being the equation's main determinant for earning, which could be reflecting the labor market institution of the pre-transition period rather than the returns to education. Although reducing the gender wage gap is a major political objective in Europe and Central Asia, these regions show a slow progress (Standing, 1999). Standing states that gender-based wage differences may have been even growing in Eastern European countries in the post-transition era (ibid:593).

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<sup>4</sup> Suen (1997) was concerned about a possible conceptual problem with the Juhn, Murphy, and Pierce approach (JMP) and noted that its primary purpose was to isolate the effects of increased wage dispersion of the gender pay gap.



Pollert (2003) believes that the narrowing of the gender earnings gap in some of those studies was just a temporary phenomenon of the early years of transition and should be explained more as the deterioration of men's pay as well as employment rather than an improvement in women's economic situation. Pollert's argument was a counter to Brainerd (2000) claiming that Brainerd's conclusion for reduced gender pay inequality was due to the exclusion of low-paid female workers in the study. Rice (1999) found that following the process of the market transformation, the earnings inequality was higher and relative position of women was weaker in Hungary compared to EU and other Western European countries like Denmark, the UK, Portugal, Spain and Italy. Her study employed the method developed by Juhn, Murphy, and Pierce (JMP)<sup>5</sup> to compare gender earnings differences using 1995 data from the European Community Household Panel Survey and 1994 data from the Hungarian National Household Panel Survey. Newell and Reilly's (2001) study that was based on the Mincerian equation and Oaxaca decomposition, using the mean income in Hungary and 15 other countries of transition as the baseline, showed that the gender earnings gap increased as it moved to higher percentiles of income.

The results of the studies conducted on different countries to examine trade effects on gender earnings show a mixed picture. While some studies (Black and Brainard, 2002; Lim, 1983; Artecona and Cunningham, 2002) show that the gender earnings gaps had decreased and that women's economic situation has improved with increased trade, a

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<sup>5</sup> Blau and Kahn (1995, 1997) noted that the JMP method is most valid when men and women are affected in similar ways by labor market institutions and by other factors that influence wage distribution.

number of other studies argue that gender pay gaps did not decrease considerably during the liberalization era and may have even worsened with increased trade (Berik, 2000;; Fussell, 2000; Seguino, 2000b; Berik et al., 2004; Dominquez-Villalobos & Brown-Grossman, 2010).

Black and Brainard (2002) believe that trade may benefit women's situation by reducing firms' ability to discriminate. Their study showed that trade-induced competition contributed to relative improvement in wages of female workers in concentrated industries in the United States between 1976 and 1993. Artecona and Cunningham (2002) came to the similar conclusion as Black and Brainard in the Mexican industries with higher foreign trade activities the gender earnings inequality generally decreased. Study done by Berik et al. (2004) showed that wage disparities between men and women increased with free trade in Taiwan and Korea, which is counter to Becker's theory about increased competition reducing or eliminating discrimination.

Berik (2000) found that in Taiwan, where technological change and greater export orientation were experienced, outward FDI as a share of GDP was positively correlated with the male-to-female wage ratio but both male and female wages were decreasing. In a macroeconomic study, Seguino (2000b.) found a positive correlation between total FDI (inward plus outward) and the gender wage gap in the case of Taiwan but not in Korea. She explained the case of Korea that FDI is more capital intensive and goes to more male-dominated industries, and also has a strict control on capital mobility in female-dominated industries. In the case of China, Braunstein and Brenner (2007) analyzed that FDI has a sizable and statistically significant positive wage effect on both male and female

earnings, but women's earnings gain was declined relative to the men's earnings in 2002 compared to 1995. The diminishing of women's earnings gain was explained by the shift of foreign-invested enterprises from lower to higher productivity sectors and the production increase towards Chinese domestic markets.

However, gender earnings outcomes might be biased if the institutional and conditional differences exist, like industrial employment were more feminized, export-oriented production were based on "cheap labor" of women, labor market institutions were biased, or if women were generally face more discrimination or have a lower bargaining power than men. Our study attempted to overcome these deficiencies by considering institutional gaps, industrial differences and structural characteristics that could possibly impact wage determination. Besides studies on wage, there are many studies on the post-transition period for employment reduction and falling activity rates, especially of women workers (Anderson and Pompret, 2004; Brainerd, 2000; Giddings, 2002; Hunt, 2002; Paci and Reilly, 2004). But these topics are excluded from the scope of this study.

### **3. Capital and Trade Liberalization**

Uniqueness of Hungarian privatization was the combination with FDI that gives possibility of selling state enterprises to foreign investors. While FDI was mostly in brown field investments at the beginning of 1990s; it changed to reinvested earnings, follow-on investments and greenfield investments towards the end of 1990s. In 2000s, Hungary alone captured up to 40 percent of all FDI in the region (Hungarian Investment Trade Development/ITD, 2010). The amount of net inward FDI sharply rose after the accession

to the EU in 2004 (Figure A1, Appendix). Hungary also had the highest ratio of inward FDI to GDP (192.8 percent in 2009) among other, so called transition countries (Table A3, Appendix).

When more than 5,000 units of state-owned enterprises operated in Hungary in 1992, as a result of privatization, less than 2,000 were left by 2005 (Hungarian Central Statistical Office, 2008). The majority of telecommunications, banking, utilities, manufacturing and television sectors are in private hands now. As a result of mass privatization, the private sector accounted for up to 80 percent of GDP by the end of 2000s (Economist Intelligence Unit, 2010). Hungary's geographical proximity to EU; "cheap", skilled and flexible workforce and a huge government incentive for foreign investors were attractive forces to international capital inflow.

After the collapse of Council for Mutual Economic Assistance (COMECON or CMEA) and the Warsaw Pact, trade was liberalized in March 1991 in Hungary. Free trade was highly promoted, trade in goods and services dramatically increased, and trading partners were also expanded. Total import and export value increased from about 70 percent in the mid 1980s to more than 160 percent of GDP in 2007. Although Hungary is an industrialized country, due to a resource scarcity, imports mostly raw materials and semi-finished products and exports finished and value-added products to the world market. Moreover, foreign-owned enterprises were said to be the driving forces of Hungarian exports (Riboud, 2000:17; ITD, 2010). Because the foreign investment was largely capital-intensive, it boosted productivity in overall manufacturing industries and further stimulated growth of the total production. Exports rose from 25 percent of 1992 to

60 percent by 2008. Nearly 70 percent of this export increase was produced partly or fully by foreign-owned enterprises (ibid).

Hungarian accession to the EU had a positive effect on the economic performance in 2004, but the growth rate decreased from 2005 onwards (Economist Intelligence Unit). Despite the outstanding performance of exports, the GDP growth was only 1.2 percent in 2007 and overall private consumption decreased by 2.1 percent as well as government consumption by 3.2 percent that same year. All was likely to be attributable to the sharp fall in domestic demand. The unemployment rate, which steadily fell from 12 percent in 1992 to 5.7 percent in 2001, started to increase in 2004. It reached back to 12 percent in 2013. Furthermore employment levels and economic condition were negatively affected by austerity measures of the winning government in the 2006 parliamentary election. Following the fiscal austerity measures after the 2006 election, substantial layoffs in the public sphere happened, thus a number of jobs declined in 2007. Public expenditures were reduced following the election in order to balance the 2006 election over-spending. The situation was not much different from the previous elections in its effect on government budget expenditure. The effect impacts business cycles to match to “election cycles” that grow before an election and decline after an election. Another burden for the Hungarian government was the need to implement directives of the EU government and the Maastricht criteria and to meet the economic conditions of the International Monetary Fund (IMF).

The economy was later hit by the financial crises of 2008. The level of inactivity and unemployment rate increased. As a consequence of the crises, unemployment

increased by more than two digits, and the economy contracted by 6.4 percent in 2009 alone. Shadow economy or informal sectors, which lie outside of social safety net, taxes and national accounts, went to grow further. Falling rate of real wages due to high inflation and wage stagnation, created disincentives for the people to be employed formally and remain in the informal sector or not to work. Various types of activities at the informal market range from occasional cleaning and sales to professional services such as accounting and consultancies. Those informal activities are taken up to generate additional income for families even by those who have a job in the formal sectors.

Nevertheless, people were welcomed to a new system and a “free market” economy with new hopes and great expectations. Through a series of economic reforms and liberalization policy in the post-transition period, Hungary’s economy got more integrated with the West and the rest of the world. In order to observe how people’s incomes are affected in this new economic system, we conducted a gender earnings analysis, in particular for the Hungary’s manufacturing industry, a backbone of the export-led economic growth.

#### **4. Disparities in Employment and Earnings in Manufacturing Sectors**

##### *4.1 Employment and Earnings by Gender*

Total manufacturing employment numbered some 1,250 thousand workers in 1989 was decreased to 870 thousand in 2005 with 10 percent decrease for men and 27 percent for women (Hungarian Central Statistical Office, 2006). Between 1992 and 2005, employment recovered about 25 thousand jobs for women in the machinery industry and about 21 thousand jobs for men in the metals and furniture industries. The total

employment loss occurred in nearly all industries except machinery, metals and furniture in the post-transition period. The textile industry, whereas women occupied 75 to 80 percent of total employment, was one of the hardest hit by the transition that experienced 50 percent shrinkage in employment.

In terms of (real) earnings, manufacturing industry experienced a steady increase between 1992 and 2008 with few exceptions in 1995 and 1996 for both male and female workers. Table 1 provides earnings levels of industries at the two-digit classification level in 1992 and 2008 using the Hungarian Industrial Classification (NACE), which is compatible with the International Standard Industrial Classification (ISIC) from the International Labor Organization (ILO). In the table, we divided all industries into three earnings categories: bottom, middle and top based on average earnings. Industries that were in the bottom earnings group include manufacture of textile, manufacture of wearing apparel, and manufacture of dressing, and tanning of leather; whereas some of the top earnings group included manufacture of tobacco, manufacture of office, accounting and computing machines; manufacture of chemicals, and manufacture of basic metals. The same industrial categories will be used for earnings analysis in the next section.

**Table 1 Monthly Real Earnings, Manufacturing Industries, 1992 & 2008***Note: GDP Deflator in 2000=1*

Industry name	Industry code	Real Earnings level	Real Earnings (HUF), 1992	Real Earnings(HUF), 2008
19 Tanning and dressing of leather, manufacture of luggage, handbags, saddlery, harness and footwear	19	low	54,866	78,568
18 Manufacture of wearing apparel; dressing and dyeing of fur	18	low	56,679	65,094
20 Manufacture of wood and products of wood and cork	20	low	62,227	101,567
17 Manufacture of textiles	17	low	63,851	79,253
36 Manufacture of furniture; manufacturing N.E.C	36	low	66,590	88,122
32 Manufacture and repair of radio, television and communication equipment and apparatus	32	low	72,273	140,047
29 Manufacture of machinery and equipment	29	low	77,004	123,451
<b>Average of the above</b>			<b>64,784</b>	<b>96,586</b>
33 Manufacture and repair of medical, precision and optical instruments watches	33	medium	78,276	130,020
15 Manufacture of food products and beverages	15	medium	78,772	110,848
28 Manufacture of fabricated metal products, except machinery and equipment	28	medium	79,683	107,159
35 Manufacture and repair of other transport equipment	35	medium	80,661	151,752
34 Manufacture of motor vehicles, trailers and semi-trailers	34	medium	83,707	150,411
26 Manufacture of other non-metallic mineral products	26	medium	83,834	141,794
25 Manufacture of rubber and plastic products	25	medium	85,795	128,010
<b>Average of the above</b>			<b>81,533</b>	<b>131,428</b>
31 Manufacture and repair of electrical motors, generators and transformers	31	high	88,975	113,899
27 Manufacture of basic metals	27	high	99,369	148,695
21 Manufacture of (pulp), paper and paper products (Papir, papírtermék gyártása)	21	high	99,430	157,339
24 Manufacture of chemicals and chemical products	24	high	102,401	199,292
30 Manufacture of office, accounting and computing machinery	30	high	105,220	155,841
22 Publishing, printing and reproduction of recorded media	22	high	108,292	147,080
16 Manufacture of tobacco products	16	high	136,035	226,713
<b>Average of the above</b>			<b>105,674</b>	<b>164,123</b>

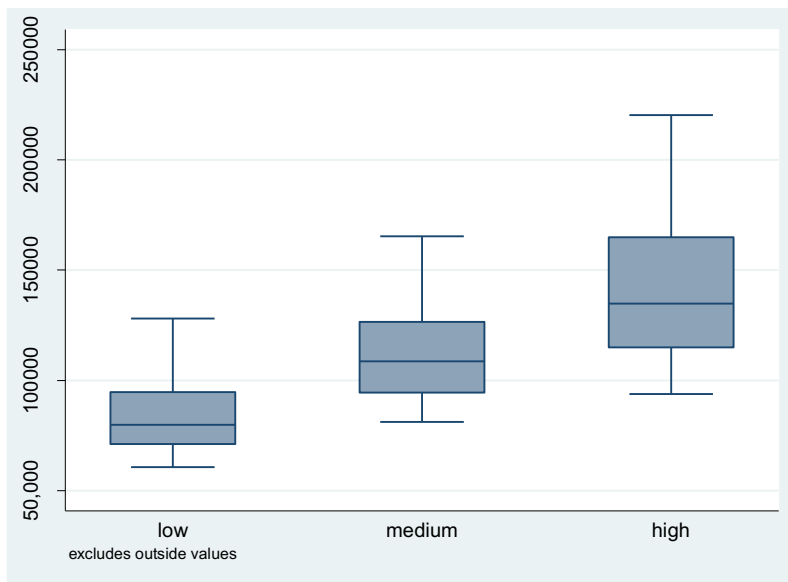


The earnings spread became wider in the top earnings group than in the bottom earnings group (Figures 1a). The earnings spread were different by gender, which can be seen from Figure 1b. Inequality increased among men more than among women between 1992 and 2008. Furthermore, the earnings spreads became wider over time (Figure 1c), with higher median earnings for men than for women.

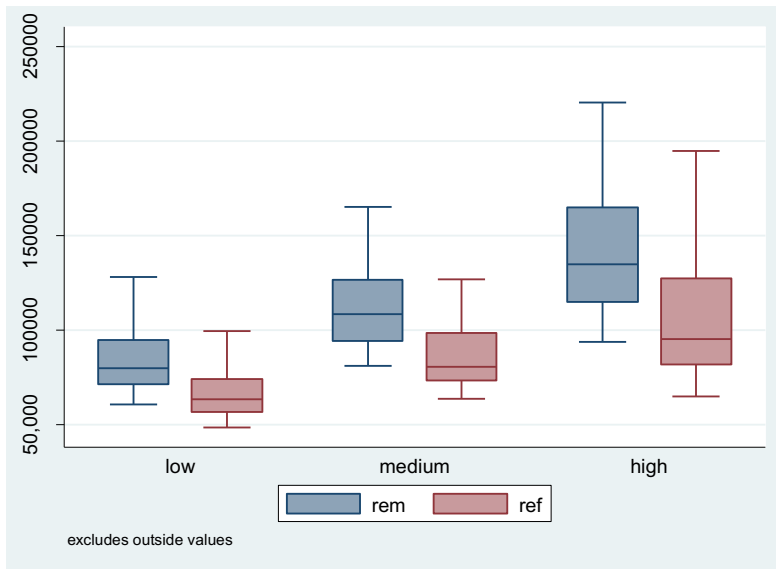
**Figure 1 Industrial Wage Scale and Earning Distributions (HUF - Hungarian Forint), without Outside Values**

*Note: 'rem' - denotes real monthly earnings for males and 'ref'- denotes real monthly earnings for females*

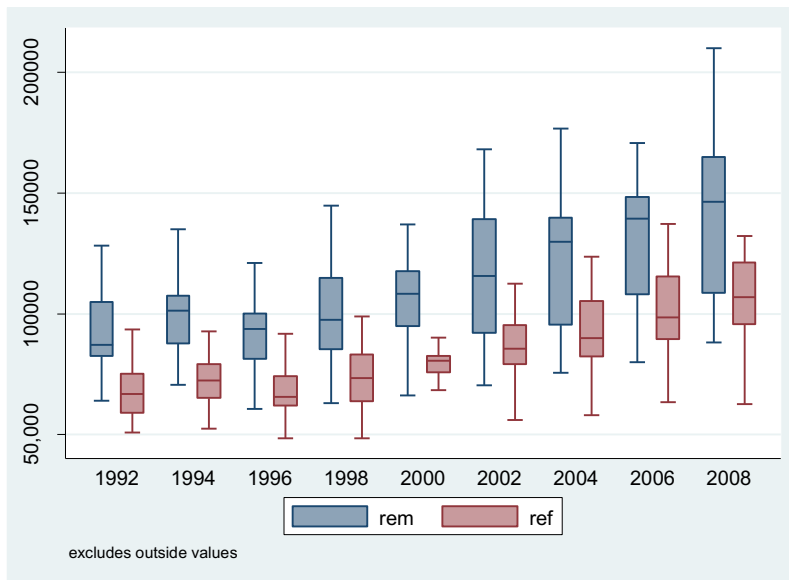
**a. Earnings Distribution by Earnings Level**



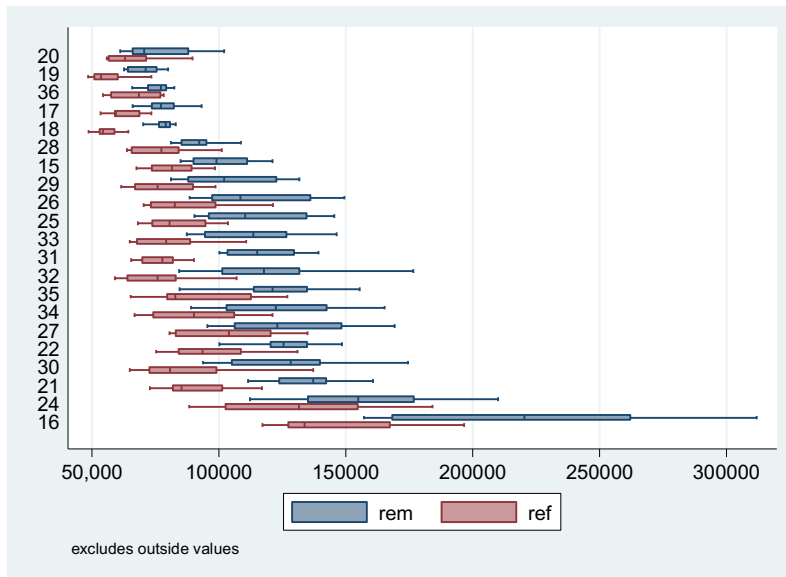
**b. Earnings Distribution by Gender and Earnings Level**



**c. Earnings Distribution by Gender and Year, 1992-2008**

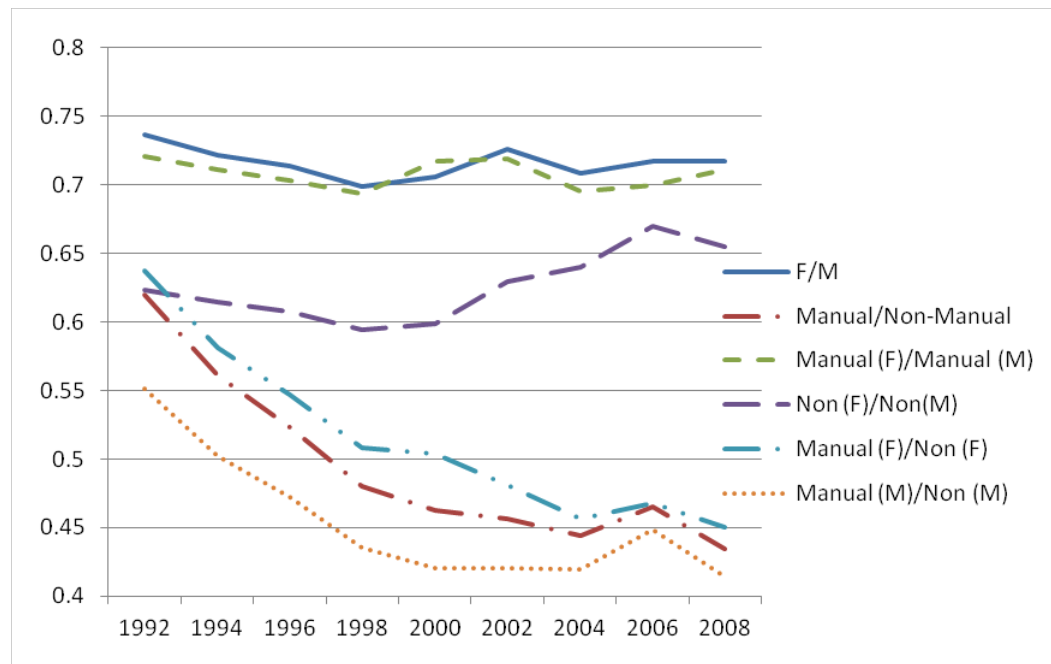


**d. Earnings Distribution by Gender in Manufacturing Industries**



Measured by different earnings ratios between male and female workers, Figure 2 shows the trend for earnings difference between manual and non-manual workers as well as for two genders during the period from 1992 to 2008. The earnings ratio of manual to non-manual workers had worsened as well among women as men. The earnings ratio of female to male manual workers had somewhat decreased as well as female to male earnings ratio. Only vivid earnings ratio improvement was of non-manual female workers in relation to their non-manual male counterparts.

**Figure 2 Earnings Ratios**



Source: Wage and Earnings Survey, Hungary, 1992-2008

#### 4.2 Trends in Earnings Inequality: Regression Analysis Results

Traditionally, gender earnings and other forms of inequality are sought to be explained by human capital or demographic differences between genders and other groups. In this study, we used the methodology originated in Hodson and England (1986) for finding inter-industry determinants of women's and men's earnings. Berik (2000) adopted the same concept to formulate a 3-equation model with macro variables for wage determination in a case of Taiwan. The merits of this analytical approach are to provide industrial and macro-level insights into industrial earnings determination and to allow us to track the direction and magnitude of earnings differentials. By considering the effects

of free trade and industrial FDI inflow, which are potentially associated with earnings level, the model is advantageous in capturing labor market outcomes of policy impacts.

If low-cost labor was advantageous in attracting greater FDI, then earnings would determine FDI, not vice versa. Thus, before estimating the earnings equations, we had to make sure that on the direction of causal effects between earnings and FDI as well as exports. We used Granger's technique to check these causalities. And the result of Granger's test showed that FDI inflow and export-orientation determines earnings, not the other way around. Therefore FDI and export-share were able to include as independent variables in the earnings equation. The reason of this result could be even if the low labor cost of production was one of the main reasons for initial investment decisions, it disappears basically once the investment decision is made or trade is launched.

The earnings estimation is laid out in the following formula:

$$\begin{aligned} \ln(E)_{ijt} = & \beta_{0j} + \beta_{1j} \ln(xshare)_{it} + \beta_{2j} \ln(fdishare)_{it} + \beta_{3j} (edu)_{it} + \beta_{4j} (age)_{it} \\ & + \beta_{5j} (age^2)_{it} + \beta_{6j} \ln(fshare)_{it} + \beta_{7j} \ln(prod)_{it} + \beta_{8j} \ln(uemprate)_{it} + e_{ijt} \end{aligned}$$

*With,*  $i=1$  to 21 industries

$j=1$  to 3, where, 1 - for men, 2 - for women and 3 - for female to male earnings ratio

*t= 1996-2008 with gaps (total 7 years)*

for earnings of men and women and women's to men's earnings ratio for 21 manufacturing industries (see industrial categories given in the Table A4, Appendix) during the period from 1996 to 2008. The detailed description of the variables and data sources is given in the Table 2.

**Table 2 List of Variables**

<i>E<sub>j</sub></i> : real gross monthly earnings (j=1 for average of males, j=2 for average of females and j=3 for ratio of women's real monthly earnings to men's real monthly earnings)
<i>xshare</i> : ratio of export to output
<i>fdishare</i> : ratio of foreign capital to output
<i>edu</i> : highest number of schooling attained (industrial average)
<i>age</i> : industrial average age
<i>agesqr</i> : industrial average age squared
<i>fshare</i> : share of female workers in total manual workers
<i>prod</i> : real output per worker
<i>uemprate</i> : unemployment rate

In the estimation, we controlled for human capital characteristics of the workforce, such as education and age, at the industry level, a proxy measurement for occupational segregation. Also, controlled for unemployment rate (as labor demand and supply), for female share of employment (as industrial segregation), export share of output and foreign capital to output ratio (as macro and industrial policy impact), and labor productivity level (as structural effect). *Our assumption was that higher competition is stimulated in industries of Hungary by the increased inflow of foreign capital investment and trade expansion, i.e. exports.*

Advantage of employing a three equations model over a single equation of gender earnings ratio is that it allows to show insights of gender earnings to provide interplays into the gender earnings difference. Only even numbers of years are taken, due to data accessibility, however, the study benefited from a smoother data. Means and standard deviations of the variables are summarized in the Table 3.

**Table 3 Means and Standard Deviations of Variables**

Variables	1996-2008	
	Mean	Standard Deviation
Women's real monthly earnings (in 2000 constant HUF)	90,082	29,109
Men's real monthly earnings (in 2000 constant HUF)	119,731	42,517
Education (years of schooling)	11.18	0.61
Age	39.21	2.35
Female to Male earnings ratio (in percent)	76.87	9.99
Real productivity (in 2000 constant million HUF)	24.48	37.23
Female share (in percent)	55.40	23.61
Export share of output (in percent)	52.76	25.15
Foreign capital share of output (in percent)	24.87	12.11
Non-manual to manual ratio	0.34	0.26
Unemployment rate (in percent)	7.22	1.28
N	147	..

*Note: Average exchange rate: 1 USD=213 HUF for the period of 1996-2008.  
(90,082 HUF = \$423 and 119,731 HUF = \$562)*

While FDI flowed mostly into export-oriented firms, judging by the correlation coefficient ( $r=-0.04$ ) between FDI and export-orientation, there is no correlation in-between the two variables. Each variable factor played independent effects on earnings levels and earnings ratio. All estimations of ordinary least square (OLS), run by robust estimations corrected by the number of employees of each industry, in order to avoid estimations bias. Here reports the results of the estimations covering the period of 1996

and 2008 (Table A7.1, Appendix). It shows that more export orientation exerts downward pressure on women's real earnings as well as on the female to male earnings ratio statistically significantly. Men's real earnings were higher in export oriented sectors compared to domestic market oriented industries but the result was statistically insignificant. While, export orientation was associated with lower levels of women's real earnings compared to domestic market oriented industries, FDI share, productivity, education raised women's earnings statistically significantly. Men's real earnings are positively associated with FDI share, productivity, education, export orientation and female share of employment statistically significantly. Moreover, the direction, magnitude and significance of the effects of all the variables are different for earnings of men and women. Through the interplay of these effects on men's and women's earnings, we were able to trace gender earnings differences.

In OLS estimations, while men's real earnings increase was .2percent and statistically insignificantly for 10 percentage increase in export orientation, women's earnings increase was negative.32 percent and statistically significantly for the same change in export orientation (a similar effect in FE and IV estimations). By imposing pressure on women's earnings, higher export orientation increases gender earnings inequality. This was provided by all three estimations, with statistically significant results. While, both women and men are paid higher wages in foreign direct investment enterprises, FDI rewards men higher than women (1.26 percentage increase in men's earnings and .86 percentage increase in women's earnings for 10 percentage increase in FDI share of output). By the interplay of the above gender effects of FDI on earnings



of female and male, FDI increased gender earnings inequality statistically significantly. Despite some methodological differences, the result of more FDI increasing gender earnings inequality was comparable with both studies of Berik's (2000) and Seguino's (1996). While Berik used industrial level FDI data for the case of Taiwan (with export-led growth policy), Seguino used a pooled data of international capital mobility for Korea and Taiwan.

Both men's and women's real earnings are increased by higher education and industry productivity growth (a proxy measure for technological upgrade). Returns to education were higher than the remuneration of FDI (men and women benefited .188 and .122 percentage increase in their log earnings, respectively, when industrial average education is increased by 1 more year). With a higher return to education for men than for women, it increased gender earnings inequality statistically significantly. The variable of education that used here could be a proxy measure of industrial occupational levels. Productivity growth favored both men's earnings and women's earnings by about the same magnitude. Therefore, female to male earnings ratio was not affected significantly by productivity.

According to a crowding effect (reflected by the variable, fshare), women's domination in a particular sector lowers the level of wages of the sector, thus lowers men's earnings in that sector as well compared to other sectors. In the case of Hungarian manufacturing industries, a similar crowding effect could not be noticed. Moreover, a higher share of female employees in the particular industry induced men's earnings to increase statistically significantly. The reason for this effect could be men occupying more

administrative and managerial positions, while women are pushed to the production sites. Usually the pay upgrade of administrative positions happens much faster than those of production lines. Since men's earnings were more favored by higher female shares, gender earnings inequality is increased statistically significantly in female dominated industries (all three methods).

The convex parabola similar to the wide U shaped curve for the age variable for both men's and women's earnings is explained by that both young workers and a lot more experienced old workers were paid higher wages. This effect could be interpreted as very skilled and highly educated young professionals are present at the labor market, while experienced older generation keeps working in the manufacturing. No significant correlation was found between the unemployment rates, and earnings of working people in these estimations.

During the transition, all countries were exposed to economic liberalization to various extents, but Hungary was one of the few countries that pursued export-led strategy on top of liberalization. The outcomes of the reforms impacted economic sectors and the people disproportionately. Women's earnings in export oriented industries might not been had a big impact, however the direction of the earnings change is negative and only for women. Compared to some of the East Asian experiences, Hungarian manufacturing industry is capital intensive and technologically up-scaled. However, women's earnings are still negatively impacted in the export processing industries.

## **Conclusion**

Economic restructuring and intensive global integration through foreign trade and capital investment were not a great contribution to closing or reducing gender earnings difference in the Hungarian manufacturing industries during the transition period. A three equation inter-industry model of wage determination was employed in order to capture possible effects of macroeconomic policy and industrial decisions on industrial earnings and earnings inequality. We used a panel data of 21 manufacturing industries during the period of 1992 and 2008.

The macroeconomic and industry-level variables of interests are export orientation and FDI share of output. The results of the analysis showed that while inward foreign direct investment had a positive effect on both women's and men's earnings, greater export orientation of industries negatively affected women's earnings compared to domestic market oriented industries. These results hold after controlling for a proxy measure of industrial segregation such as female share of employment; for a rough measure for industrial occupational level such as workers' education level; for so called human capital differences such as average age and education at the industry level, and unemployment rate for economic cycles. In our study, both export orientation and FDI exercise statistically significant negative effect on gender earnings equality which is measured by the ratio of female to male earnings.

In the post-transition period, women were succeeding in the competitive labor market environment by upgrading their skill and ability and moving from traditional sectors such as textiles to the industry of machinery. Women's earning is lower in export oriented

industries than domestic market-oriented industries. The inverse relationship between export orientation and women's earnings is consistent with gender concerns regarding the lower women's earnings in export processing industries. These results can be attributable to women's position that might be disadvantaged or discriminated in work places due to their potential child bearing and raising responsibilities.

The economic growth of post-transitional Hungary was extensively based on exports, however foreign trade was exempted from taxes and tariffs, thus the government's ability to generate tax revenue from exporting was limited. Although our study is concentrated on labor market outcomes of economic liberalization of FDI and export-led growth only, it has some implications on gender balance and overall well-being of people through its income dimension at the industrial level.

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## Appendix

**Table A1 Main Macroeconomic Indicators, Hungary 1989-2008**

	GDP (in billion USD)	Rate of growth of GDP/HUF denominated	Export to GDP ratio	Import to GDP ratio	Current account balance (in % of GDP)	General Government balance (in % of GDP) *	Inflation, consumer prices (in %)	Deposit interest rate (in %)	Average exchange rate (Forint for 1 USD)
<b>1989</b>	29.2	0.7	40.4	38.1	-2.0	..	16.9	9.4	59.1
<b>1990</b>	33.1	-3.5	36.4	33.3	1.1	0.3	29.0	24.7	63.2
<b>1991</b>	33.4	-11.9	36.5	33.9	1.2	-4.4	34.2	30.4	74.8
<b>1992</b>	37.3	-3.1	36.2	34.2	0.9	..	22.9	24.4	79.0
<b>1993</b>	38.6	-0.6	28.4	38.2	-11.0	..	22.5	15.7	92.0
<b>1994</b>	41.5	2.9	25.9	34.5	-9.8	-8.1	18.9	20.3	105.1
<b>1995</b>	44.7	1.5	44.3	44.6	-3.7	-6.5	28.3	24.4	125.7
<b>1996</b>	45.2	1.3	48.3	47.9	-3.9	..	23.6	18.6	152.6
<b>1997</b>	45.7	4.6	54.8	53.9	-4.6	..	18.3	16.9	186.8
<b>1998</b>	47.0	4.9	61.8	63.3	-7.2	-4.6	14.2	14.4	214.5
<b>1999</b>	48.0	4.2	64.2	66.9	-7.9	-3.9	10.0	11.9	237.3
<b>2000</b>	47.9	5.0	72.4	76.1	-8.4	..	9.8	9.5	282.3
<b>2001</b>	53.2	4.1	71.6	73.1	-6.0	-4.02	9.2	8.4	286.5
<b>2002</b>	66.5	4.4	63.5	65.8	-7.1	-8.92	5.3	7.4	258.0
<b>2003</b>	84.3	4.3	61.8	65.7	-8.0	-7.23	4.6	11.0	224.4
<b>2004</b>	102.1	4.7	64.8	67.6	-8.6	-6.4	6.8	9.1	202.6
<b>2005</b>	110.2	3.9	67.6	68.8	-7.5	-7.9	3.6	5.2	199.7
<b>2006</b>	113.0	4.0	76.9	77.7	-7.6	-9.31	3.9	7.4	210.5
<b>2007</b>	138.8	1.2	80.0	78.6	-6.4	-4.99	7.9	6.8	183.8
<b>2008</b>	154.7	0.6	81.9	80.9	-8.4	-3.78	6.1	9.9	171.8

Source: WDI; \*Kiss, 2003, p.8; Statistics, Ministry of Finance, Hungary

**Table A2 Inward FDI in percentage of world total FDI, 1990-2009**

	1990	1995	1997	1998	1999	2000	2005	2006	2007	2008	2009
Developing economies	25.2	25.1	25.1	22.3	23.3	23.2	23.5	23.5	24.8	27.2	27.6
Transition economies	0.1	0.3	0.7	0.6	0.6	0.8	2.4	2.8	3.8	2.8	2.8
Developed economies	74.7	74.6	74.3	77.1	76.0	76.0	74.1	73.7	71.5	70.0	69.6
<i>Europe:</i>											
Hungary	0.03	0.33	0.40	0.37	0.34	0.31	0.54	0.85	1.10	1.63	1.40
Czech Republic	..	0.22	0.21	0.26	0.26	0.29	0.53	0.56	0.62	0.73	0.65
Poland	0.01	0.23	0.33	0.40	0.39	0.46	0.79	0.88	0.99	1.05	1.03
<i>East Asia:</i>											
China	0.99	2.99	3.46	3.16	2.76	2.60	2.36	2.05	1.82	2.44	2.67
China, Hong Kong SAR	9.69	6.73	5.60	4.06	6.00	6.12	4.54	5.20	6.55	5.27	5.14
China, Macao SAR	0.13	0.08	0.06	0.05	0.04	0.04	0.04	0.05	0.05	0.07	0.08
China, Taiwan Province of	0.47	0.47	0.45	0.36	0.34	0.26	0.37	0.35	0.27	0.29	0.27
Korea, Republic of	0.25	0.28	0.32	0.35	0.43	0.51	0.91	0.83	0.66	0.61	0.62

Source: UNCTAD

**Table A3 Inward FDI in percent of GDP, 1990-2009**

	1990	1995	2000	2005	2006	2007	2008	2009
<i>Europe:</i>								
Hungary	1.6	24.6	47.8	56.2	107.1	143.2	162.9	192.8
Czech	..	13.3	38.2	48.7	56.1	64.6	52.1	59.2
Poland	0.2	5.6	20.0	29.9	36.8	42.0	30.9	42.5
<i>East Asia:</i>								
China	5.1	13.4	16.2	11.8	10.5	9.5	8.7	10.1
China, Hong Kong SAR	262.3	157.8	269.3	294.3	390.7	568.4	378.6	432.0
China, Macao SAR	86.8	40.3	45.9	43.4	45.2	47.9	50.8	63.2
China, Taiwan Province of	5.9	5.7	6.1	12.1	13.7	12.6	11.6	13.1
Korea, Republic of	1.9	1.8	7.1	12.4	12.5	11.4	10.2	13.3
Mongolia	0.0	2.6	16.7	30.9	28.3	32.2	37.0	57.0

Source: UNCTAD

**Table A4 Manufacturing activities considered in regression analysis**

Industry Name	Industry	Wage Level
15 Manufacture of food products and beverages	15	middle
16 Manufacture of tobacco products	16	top
17 Manufacture of textiles	17	bottom
18 Manufacture of wearing apparel; dressing and dyeing of fur	18	bottom
19 Tanning and dressing of leather, manufacture of luggage, handbags, saddlery, harness and footwear	19	bottom
20 Manufacture of wood and of products of wood and cork	20	bottom
21 Manufacture of (pulp), paper and paper products (Papir, papirtermek gyartasa)	21	top
22 Publishing, printing and reproduction of recorded media	22	top
24 Manufacture of chemicals and chemical products	24	top
25 Manufacture of rubber and plastic products	25	middle
26 Manufacture of other non-metallic mineral products	26	middle
27 Manufacture of basic metals	27	top
28 Manufacture of fabricated metal products, except machinery and equipment	28	middle
29 Manufacture of machinery and equipment	29	bottom
30 Manufacture of office, accounting and computing machinery	30	top
31 Manufacture and repair of electrical motors, generators and transformers	31	top
32 Manufacture and repair of radio, television and communication equipment and apparatus	32	bottom
33 Manufacture and repair of medical, precision and optical instruments watches and clocks	33	middle
34 Manufacture of motor vehicles, trailers and semi-trailers	34	middle
35 Manufacture and repair of other transport equipment	35	middle
36 Manufacture of furniture; manufacturing N.E.C	36	bottom

**Table A5 Sources of Data**

<i>E:</i>	Wage and Employment Survey, National Employment and Social Office, Hungary; Consumer Price Index, Hungarian Central Statistical Office
<i>xhsare:</i>	Hungarian Central Statistical Office
<i>fdishare:</i>	Hungarian Central Statistical Office
<i>edu:</i>	Wage and Employment Survey, National Employment and Social Office, Hungary
<i>age:</i>	Wage and Employment Survey, National Employment and Social Office, Hungary
<i>fshare:</i>	Wage and Employment Survey, National Employment and Social Office, Hungary
<i>prod:</i>	Hungarian Central Statistical Office
<i>uemprate:</i>	Labor Force Survey, Hungarian Central Statistical Office
<i>nonmratio</i>	Wage and Employment Survey, National Employment and Social Office, Hungary

**Table A6 Means and Standard Deviations of Variables, 1992-2008**

Variables	1992-2008		2000-2008	
	Mean	Standard Deviation	Mean	Standard Deviation
Women's real monthly earnings (in 2000 constant	86203	27716	96405	31148
Men's real monthly earnings (in 2000 constant HUF)	114909	39892	123147	41062
Education (years of schooling)	11.11	0.64	11.2	0.76
Age	39.06	2.17	40.29	2.76
Female to Male earnings ratio (in percent)	76.06	8.71	79.81	14.36
Real productivity (in 2000 constant million HUF)	20.72	33.62	29.98	123.62
Female share (in percent)	56.94	23.66	52.98	39.53
Export share of output (in percent)	48.33	24.92	51.34	25.51
Foreign capital share of output (in percent)	..	..	..	..
Non-manual to manual ratio	0.36	0.26	0.39	0.57
Unemployment rate (in percent)	8.14	2.1	6.57	0.61
N	189	..	400	..

**Table A7 Determinants of Women's and Men's Earnings and Gender Earnings Ratio in the Manufacturing Industry**  
**A7.1. 1996-2008**

Variables	OLS			Fixed effects			IV		
	$\ln(E)_m$	$\ln(E)_f$	$\ln(E)_{f/m}$	$\ln(E)_m$	$\ln(E)_f$	$\ln(E)_{f/m}$	$\ln(E)_m$	$\ln(E)_f$	$\ln(E)_{f/m}$
$\ln(xshare)$	.021 (.017)	-.032* (.017)	-.050*** (.011)	.0152 (.015)	-.035** (.015)	-.050*** (.011)	.023 (.019)	-.031* (.019)	-.051*** (.013)
$\ln(fidishare)$	.126*** (.021)	.086*** (.022)	-.040*** (.016)	.126*** (0.022)	.083*** (.020)	-.043*** (.016)	.172*** (.034)	.124*** (.035)	-.050** (.020)
$edu$	.188*** (.027)	.125*** (.027)	-.065*** (.025)	.184*** (.026)	.099*** (.024)	-.068*** (.018)	.208*** (.029)	.146*** (.031)	-.059*** (.022)
$age$	-.452*** (.144)	-.533*** (.133)	-0.051 (.105)	-.458*** (.123)	-.519*** (.113)	-.041 (.086)	-.477*** (.145)	-.564*** (.139)	-.045 (.099)
$agesqr$	.006*** (.002)	.007*** (.002)	.001 (.001)	.006*** (.002)	.007*** (.001)	.001 (.001)	.006*** (.002)	.008*** (.002)	.001 (.001)
$\ln(fshare)$	.091*** (.024)	.037 (.027)	-.042** (.017)	.088*** (.024)	.042* (.023)	-.042** (.017)	.081*** (.026)	.029 (.029)	-.040** (.019)
$\ln(prod)$	.182*** (.018)	.177*** (.049)	-.006 (.013)	.176*** (.018)	.180*** (.017)	-.005 (.012)	.164*** (.019)	.162*** (.020)	-.003 (.014)
$\ln(uemp)$	-.097** (.049)	-.100** (.049)	.015 (.036)	-.126** (.052)	-.117** (.049)	.019 (.038)	.081 (.108)	.014 (.100)	-.050 (.070)
N	147	147	147	147	147	147	126	126	126

Note: Standard errors are reported in parentheses. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

## A7.2. 1992-2008

Variables	OLS			Fixed effects			IV		
	$\ln(E)_m$	$\ln(E)_f$	$\ln(E)_{f/m}$	$\ln(E)_m$	$\ln(E)_f$	$\ln(E)_{f/m}$	$\ln(E)_m$	$\ln(E)_f$	$\ln(E)_{f/m}$
$\ln(xshare)$	.013	-.042***	-.056***	.015	-.042***	-.056***	.029	-.031*	-.060***
$\ln(FK/Y)$	..	..	..	..	..	..	..	..	..
<i>edu</i>	.139***	.090***	-.049***	.142***	.083***	-.048***	.180***	.121***	-.059***
<i>age</i>	-.297**	-.429***	-.132*	-.263*	-.411***	-.147*	-.244	-.390***	-.146*
<i>agesqr</i>	.004**	.006***	.002*	.004**	.006***	.002**	.003	.006***	.002*
$\ln(fshare)$	.134***	.066***	-.068***	.134***	.073***	-.069***	.138***	.065***	-.073***
$\ln(prod)$	.212***	.201***	-.011	.211***	.198***	-.010	.200***	.190***	.010
$\ln(uemp)$	.119***	.061	-.058**	.100**	.038	-.065***	-.043	-.060	-.018
N	189	189	189	189	189	189	168	168	168

Note: \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

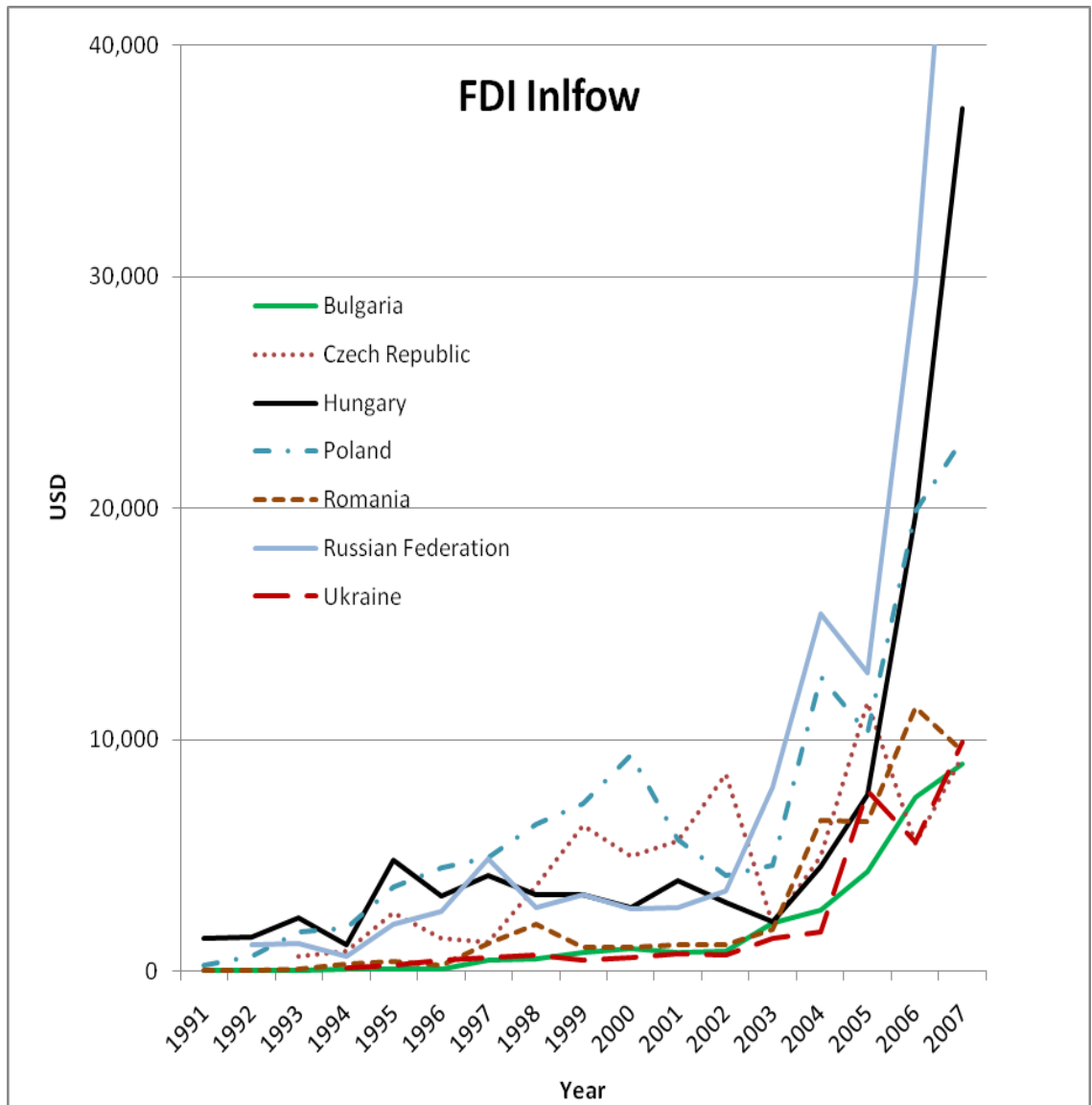
### A7.3. 1996-2008, Lagged values of export share and FDI share

Variables	OLS		
	$\ln(E)_m$	$\ln(E)_f$	$\ln(E)_{fm}$
$\text{lag}(-2)\ln(x\text{share})$	.020	-.031*	-.048***
$\text{lag}(-2)\ln(f\text{dshare})$	.134***	.118***	-.046***
<i>edu</i>	.211***	.244***	-.061***
<i>age</i>	-.353**	-.472**	-.073
<i>age</i> <sup>2</sup>	.005*	.006***	.001
$\ln(f\text{share})$	.077***	-.028	-.037**
$\ln(\text{prod})$	.162***	.162***	-.0001
$\ln(u\text{emp})$	-.030	-.035	-.046
R <sup>2</sup>	.815	.810	.458
N	126	126	126

Note: \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

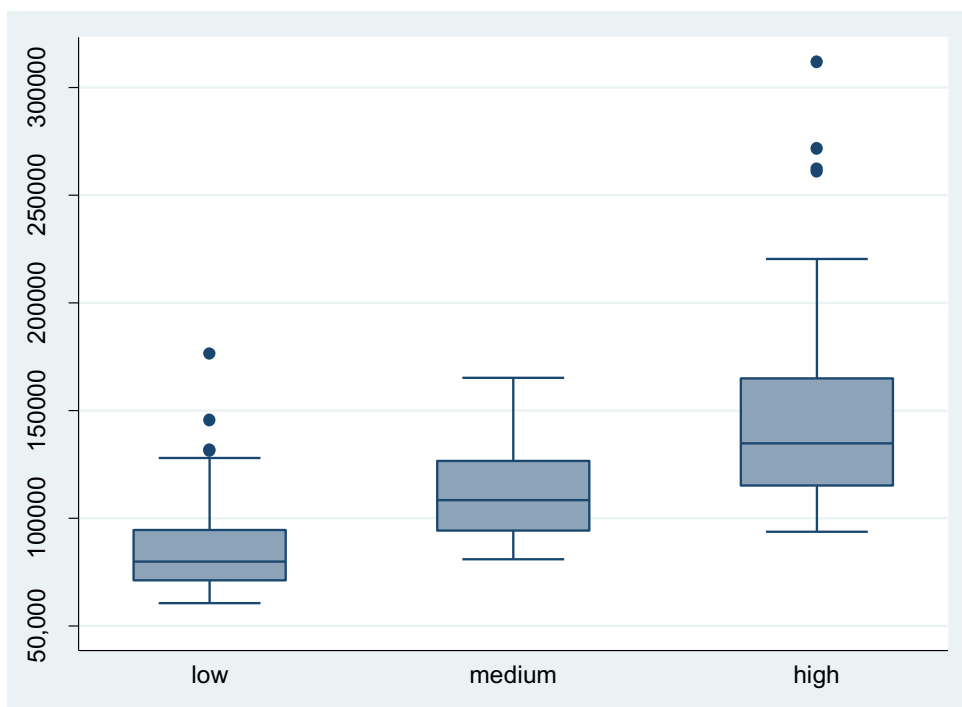


**Figure A1 Net FDI Inflow in Million USD, 1991-2007**

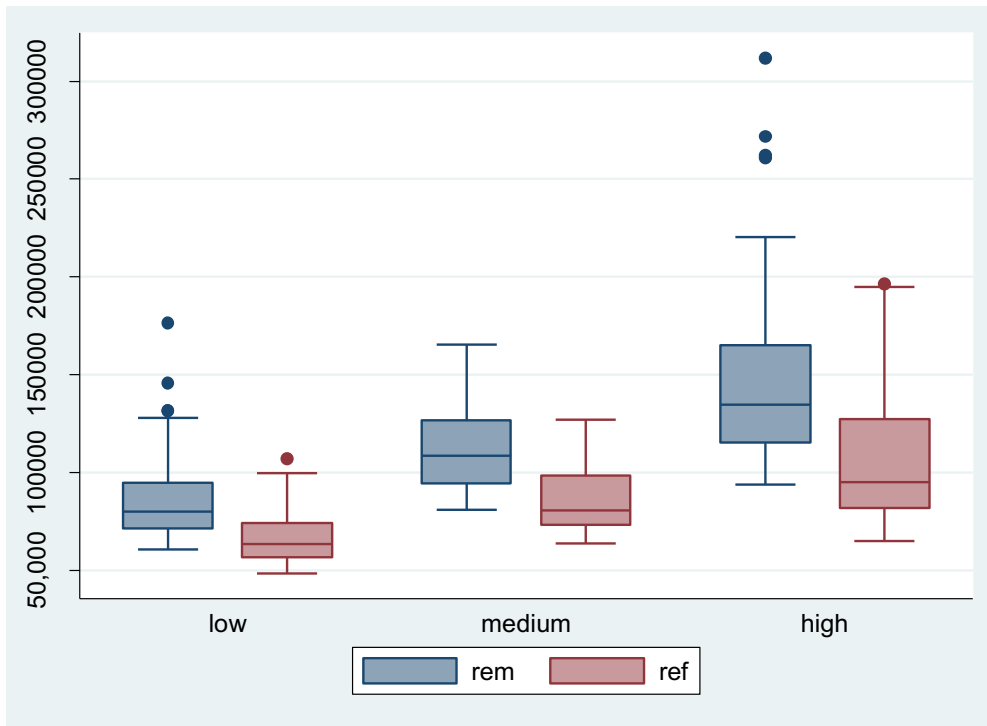


**Figure A2 Industrial Wage Scale and Earnings Distributions, with Outside Values**  
**(Hungarian Forint-HUF)**

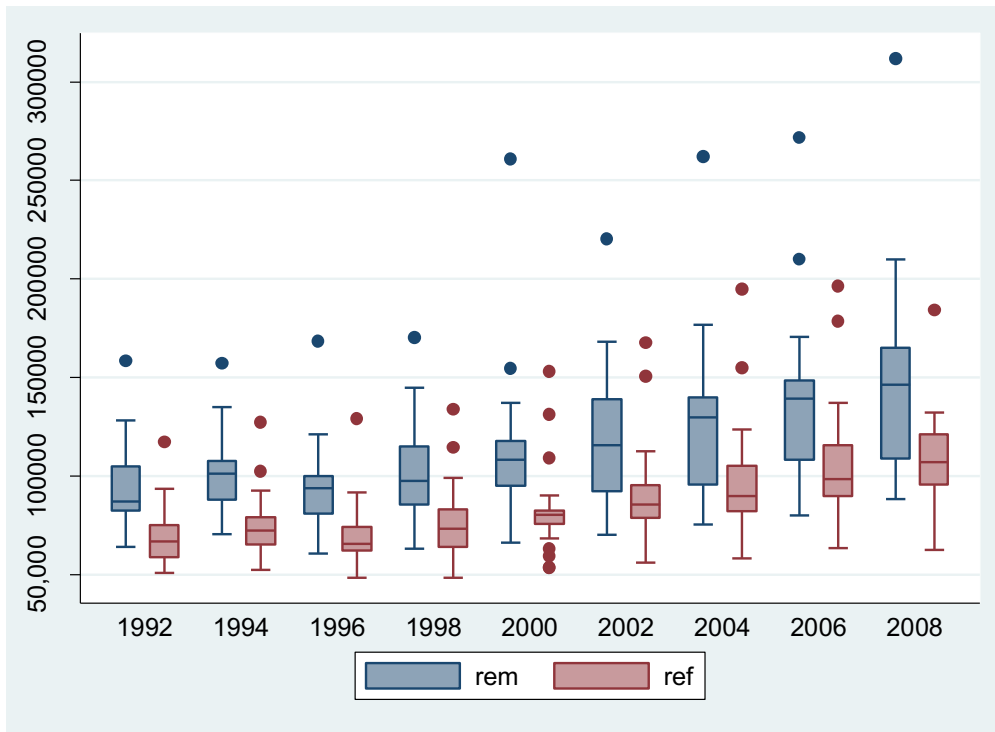
**A2.1 Earnings Distribution by Wage Level**



## A2.2 Earnings Distribution by Gender



### A2.3 Earnings Distribution by Gender and Year, 1992-2008



### A2.4 Earnings Distribution in Manufacturing Industries by Gender

