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Econometric Analysis of Hungarian Exporting Firms, 1986-1995

by László Halpern and Gábor Kőrösi

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Abstract

Labour market and financial information is combined to explore the effect of the quality of labour employed on the profitability of the firm. The quality of labour is measured as the portion of wage differentials that cannot be explained by the human capital model.

Profitability of Hungarian exporting firms can be explained by economic factors during transition. Beside the quality of labour export share, wage and bank costs, payables, receivables, foreign ownership, inventories, amortisation and equity became significant explanatory variables. Sectors proved to be insignificant explanation for profit differences. Changing effects of monopolistic competition and of the size of the firm reflect turbulent institutional environment for firms.

JEL Classification: C23, D21, D42, J31

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Our previous paper (*Halpern and Kőrösi* [1995]) analysed the profitability of Hungarian exporting firms. This paper extends that analysis to the effects of the labour market situation of the firm.

The aim of this paper is to combine the two approaches and investigate whether the changes on the labour market had any effect on the profitability of Hungarian exporting firms. This is the first step in our reserach aiming at a decomposition of aggregate labour data which could facilitate the description of its effect on corporate performance. One conlusion of our research was that neither wages nor employment can give satisfactory description of labour input in Hungary especially during transition when the fall in output and employment is accompanied by structural changes on different markets. Labour productivity change is a combination of two components: the productivity change of individual employees and the change of labour composition. Separating the two components is important for both analytical and policy purposes. This is offered in this paper.

Our understanding of the Hungarian labour market is fairly deep due to the works of Gábor Kertesi, János Köllő, Gyula Nagy and others. The vast literature on enterprise restructuring during transition also offers many ideas as well as some empirical verification attempts (see references in *Halpern and Kőrösi* [1995]). This paper tries to link these two fields. The first step has already been taken in a study (*Halpern et al.* [1996]) using detailed enterprise data (export ratio, profit margin, size, sector, ownership) for the estimation of wage functions of employees. In this paper we choose the other direction: Aggregate information provided by these wage functions is linked with the profitability of enterprises. There are several methodological problems with both procedures mainly due to the difficulties in merging the two quite different data sets while maintaining representativity of both the individuals and firms as much as possible. Other difficulty stems from the fact that financial accounts refer to different points of time than the labour surveys and if fast changes take place the observations refer to different situations.

1. Labour market

Hungarian labour market substantially changed in the period of our investigation. Serious labour shortages, hoarding, strict wage regulation characterised the labour market in 1986. By 1995, unemployment became the most severe issue; the labour market position of employers and employees was reversed.

Employment declined by roughly 1.5 million during this period (*c.f.*, Table 1). Only a small proportion of this drop can be explained by demographic factors. There were three major exit routes from the labour market: retirement, unemployment and inactivity.

In 1986 there were quite a few people who, although were over the retirement age, continued to work. It was also possible to seek employment after retirement. As there were shortages on the labour market, retired, but able people could usually find jobs. Most of these jobs for the old people ceased to exist around the turn of decade. Many older employees were offered early retirement several years before reaching retirement age at large scale redundancies. Many people sought disabled pension instead of becoming long-term unemployed, thus leaving the labour market permanently. Consequently, the number of pensioners (old age or disabled) increased by more than half million.

Before the late 1980's unemployment was practically non-existent (and illegal) in Hungary. It increased very rapidly in the early 1990's, peaking in February 1993 at 705 thousand (14% unemployment rate). Unemployment is concentrated to some regions, and to some groups of employees. Especially the poorly educated, low skilled workers are hit hard, but there also are several skills which were severely devalued during transition.

After mid-1993 registered unemployment decreased, and levelled at around half million. However, the decline is largely due to the discouragement of the long-term unemployed. Many people became unemployable during transition. They left the unemployed pool not because they were re-employed, but because they overstayed the legal limit for being registered as unemployed person.[1] An unknown portion of the more than quarter million people who disappeared from the labour market are, in fact, moonlighting, but the majority simply ceased to seek employment. Many women with children left the labour market and live on welfare.

Our labour market database represents those who work at companies employing at least 20 people. This is the very segment of the labour market which was hit hardest during transition. Most of the net loss in employment happened at these firms; almost half the jobs was lost between 1986 and 1994[2]. One would expect that such an enormous change brings substantial shifts in the job structure. Table 2 summarises some aspects of these changes. Astonishingly little has changed.

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[1] Registration requirements and the maximum time span have been revised several times. These regulatory changes also helped to decrease the officially registered unemployment.

[2] *c.f.*, last row of Table 1: employment at targeted firms, *i.e.*, firms with more than 20 employees.

As this sample represents only one type of employment, the gender distribution does not necessarily coincide with the overall situation. Female participation. on the average, is higher in the public than in the corporate sector.

In the 1980's, there only was a negligible involuntary unemployment. All women at working age could work, and usually did. However, fewer women were employed for two reasons: First, the retirement age for women is 55, while for men it is 60, thus the pool of employable women is smaller, even though many women stayed at work after retirement age. Second, after child birth one parent can take a 3 year child care leave.[3] Many women choose to stay at home with the new-born baby at least for a couple of years. During the child care leave people received a benefit which amounted up to the 75% of the former income at the initial period of the leave, and employers have the legal obligation to re-employ people in the same position after the leave. This job security, however, has withered away for many in the 1990's, as many companies went bankrupt, or were reorganised in a way that legal obligations became void for the newly formed firms.

It is surprising that the gender balance tipped towards male employment, as female unemployment was much smaller than male unemployment throughout the entire period, usually approximately half of that. However, the majority of discouraged people are women. It may also be linked by the increasing share of public employment within the labour market.

Shifts in educational attainment is clear: The share of low education has greatly diminished. Two different processes lead to this outcome: First, it reflects the gradual ageing process of the population. The eight year primary school was made compulsory in 1946, secondary education largely expanded in the 1950's. Some people, who were employed in 1986, left school before these educational reforms, but they retired by 1995. Second, poorly educated people had a much larger risk of loosing their jobs when the abolition of wage regulation and increased competition forced the companies to rationalise. They also had much smaller chance of finding other employment than well-educated people.

The occupation structure did not really change substantially. The share of low skilled jobs gradually declined. Most changes before 1995 actually occurred in the late 1980's which is confirmed by the detailed analysis in *Kertesi and Köllő* [1995].

The regional or sectoral distribution of jobs is pretty stable. The greatly depressed North-Eastern counties lost more jobs than other regions (regional unemployment is over 20 %). Agricultural jobs disappeared faster, service jobs slower, than average. This shift, however, is exaggerated as a result of two processes. On the one hand, it is partly due to the changes in land ownership: Family farms are organised on the fields formerly cultivated by cooperatives, thus a large portion of agricultural employment moved out of larger organisations included into the survey to unreported small enterprises. On the other hand, agricultural employment was very much inflated in the 1980's, as cooperatives had many service outfits (and also some industrial plants).

[3] In practice, the leave was almost always taken by the mother.

Most of these outfits became independent around the turn of decade, thus the apparent shift from agricultural to service jobs is, in fact, partly due to a more appropriate classification of these activities.

Labour market changed substantially during the transition period. This change, however, is much more visible in the aggregate figures than in the job structure at these companies. While the labour market position of employees clearly changed as a result of the collapse of the socialist system, most of the structural changes started in the mid-1980's, and transition rarely changed the former trends. One question we want to study in this paper is, how this dichotomy was reflected in the wage structure.

2. Data used

We use two different Hungarian databases in our study: A labour market survey database and the corporate balance sheet data.

The labour market survey is regularly conducted; formerly in every third year, since 1992 every year. The survey covers all firms with at least 20 employees and is organised by the National Labour Centre.[4] Companies are supposed to report on a randomly selected sample of their employees. A complex stratified weighting scheme was prescribed in the 1980's: Different groups of workers were sampled with different frequencies. In the 1990's all persons born on the 5^{th}, 15^{th} or 25^{th} day of the month should have been included in the sample. The sample consists of standard data regularly recorded at the employers: age, highest educational attainment, position, income (regular wage and the annual sum total of different bonus payments), etc. Companies also report, how many unreported workers are employed in similar positions. Unfortunately, working hours are not reported.[5] As the survey only uses data available to firms, family background variables describing marital status, number of children, etc. are missing.

Employees have no unique identifier, thus the survey data cannot be organised into a panel, even though many employees are regularly reported upon due to the new design of the survey. Firms, however, are uniquely identified by their standard company code (used as tax file number).

The second data base for our exercise consists of the profit and loss account and balance sheet data of the main Hungarian exporting firms between 1985 and 1995. A firm has been selected and defined as main exporter if it exported more than one million US$ in any year between 1985 and 1995. During this period a great number of new firms were established. Some were starting firms founded by domestic or foreign investors, but many were created from the assets of existing SOEs. Our main problem with the dataset was to identify firms in case of which the commercialisation only meant the

[4] Separate surveys of public sector employment were also conducted in the same years.

[5] Most employees work in standard 40 hours working weeks. Part-time employment is largely restricted to students and pensioners. Many employees, however, regularly work overtime. The overtime payment is included in the bonuses, but the amount of extra working hours is not reported.

change of the name. In other cases they were treated as totally new entities following the natural way of entry and exit.

The two datasets use the same code for identifying the firms in the sample. Thus the two samples can be linked. However, this linkage is frequently not possible, for various reasons. Some companies fail to participate in the labour market survey, thus the sample is incomplete. Other large exporters are, in fact, small, highly specialised companies employing less than 20 people, and thus missing from the labour survey. The labour survey is usually started early spring, but some companies report at a much later date, thus the actual timing of the survey (and the period covered) is uncertain. Balance sheets consist of information on the calendar years, stock variables are measured at the end of the year. Thus, there may be close to a year long gap between the labour survey and the financial report. If a company was reorganised (*e.g.,* from SOE to limited company) during this period, the financial report has a new identifier. Companies may have gone bankrupt, been broken up, new companies started, etc. As a result of all these discrepancies approximately one third of our corporate sample was lost when the two datasets were merged.

The labour survey information represents the year long period immediately before the survey date. Many companies provide this information in spring. Thus, in some cases data in the 1989 survey may represent the 1988 situation better than the labour income in calendar 1989, covered by the financial accounts. Thus, we linked labour surveys to both the actual and previous years, whenever it was possible. For 1992 1993 and 1994 we have two options. 1992b, 1993b and 1994b indicate that the labour survey was assembled before the financial accounts, *i.e.,* in the same year, while 1992a,1993a and 1994a indicate that labour market information is taken from the survey conducted after the financial year.

3. The estimated models

Our model consists of two equations measured at different levels of aggregation. Firstly, we describe the wage distribution of employees with a human capital model. This model defines the expected wage of a person with specific labour market characteristics. However, the quality of labour is described by some standard variables only, diligence and innovativeness cannot be measured this way. Firms may offer higher wages to workers who are more productive than the average. This higher productivity may also influence the profitability of the firm. Thus, the residual of the human capital model reflects this unmeasured profitability among others. The expected value of the random components is zero. If the average residual of this wage equation is positive for a company, then the firm could attract more productive labour than others. The spread of corporate average residuals was substantially larger in the 1990's than in the 1980's reflecting the more diversified labour market situation of firms after transition.

The second equation of our model describes the profitability of the exporting firms. We augment our profit equations (*c.f., Halpern and Kőrösi* [1995]) with labour productivity. We assume that more productive labour results in higher profit margins. The

productivity of labour is measured as the above corporate average error of the wage equation.

Our corporate sample is restricted to the exporting firms, thus we cannot describe the selection process, how a firm becomes large exporter. However, this selection process may be related to the productivity. Instead of restricting the wage equations to the same exporting firms we estimated them using all available observations. This facilitates an implicit analysis of the selection process: If the average residuals for these firms is positive than exporting firms are more productive than others. It was statistically zero in 1986, and positive in all consecutive years, and increasing over time.

3.1. Wage equation

We use a fairly standard human capital model. The log of wages is explained by a quadratic function of experience (representing decreasing returns to experience) and standard status variables on gender, education, occupation, location of job[6] and sector. The reference group for education is primary school (8 years), for occupation is unskilled work, for region is Budapest, for sector is engineering. As the sample only consists of employed people, we are unable to analyse selection bias. We expect that selection bias will influence estimates in the 1990's only, as the 1980's were characterised by full employment, thus comparative statics may be influenced by this unknown bias. As representativity is by no means uniform, the equations were estimated by weighted least squares, where the weights restore the representativity of the sample. Estimation results are summarised in Table 3.

All diagnostic tests[7] indicate problems with the specification. These specification problems can be the result of both measurement and theoretical problems.

The theoretical problems are obvious: The human capital model describes wage determination on a well functioning competitive labour market. In the 1980's wage regulation seriously influenced the wage distribution, labour market was competitive to a limited extent only. These wage regulations (except for the minimum wage) were abolished in 1989-1990, however, other labour market disruptions emerged with transition. Both firms and employees were caught unprepared for the new situation and were uncertain about possible strategies. The speed of adjustment was unpredictable and relatively high inflation also worsened the transparency of the situation, thus all actors faced unexpectedly high uncertainty.

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[6] The location of job is measured as a product of two indicators: regions and type of settlement. Regional classification is based on the counties. The type of settlement consists of three categories; centres are the administrative centres of the counties, other towns and villages.

[7] Legend to the table: JB normality: Jargue–Bera test (an approximate χ^2_2 distribution, *c.f., Jarque and Bera* [1981], [1987]); Reset is a general misspecification test (F distribution, *c.f., Ramsey* [1969]) which may indicate incorrect functional form, omitted variable or heteroscedasticity; PE is a model selection test for the appropriate transformation of the dependent variable (t distribution, *c.f., MacKinnon et al.* [1983]).

There also are important measurement problems. The dependent variable is the monthly wage plus one twelfth of the sum total of all other payments (bonuses, overtime, etc). However, the actual number of hours worked for this wage is not reported, thus we are unable to measure hourly earnings which would be the appropriate dependent variable of the model.

Experience is computed as the age of the person less the average length of education. This measure is appropriate for most male employees, but not for females, as we cannot account for carrier breaks due to child care leave. The negative effect of the inflated female experience is partially picked by the gender. This, however, is a nonlinear effect which depends on the (unknown) number of children and is linearized and unified in our equation, thus increasing the heterogeneity of our model.

We had problems with measuring sectoral and occupational effects, as both classifications changed in 1992 and 1993. As we aimed to have a uniform classification for all years, we had to specify pretty broad categories. It results in far too heterogenous groups. However, we were unable to construct a more detailed classification which is stable over time and still manageable. This heterogeneity may be the most important source of omitted variable bias.[8]

All these problems suggest that results should be interpreted cautiously. The most important characteristics of our empirical results, however, seem to be very robust to changes in sample or in model specification, thus we are reasonably certain that these indicate real changes of the labour market.

One interesting feature of our estimates is that the net gender wage gap narrowed substantially. *Kertesi and Köllő* [1995] analysed this wage gap in detail and found that this is largely the result of composition effects, thus selection bias. The measured gender discrimination, after accounting for distributional changes, even increased somewhat in this period.

The decreasing returns to experience is represented by a quadratic function which peaks at the expected approximate 30 years in all years (in 1993 at 37 years), in accordance with the human capital model.

Returns to education and occupation changed as expected. Socialist wage policy tried to diminish wage differentials. As a result of the political changes this pressure largely disappeared and wage (and income) differentials opened up. The returns to higher educational and/or occupational status increased substantially compared to the previous situation represented by the 1986 regression. In the case of returns to education the most important changes occurred before 1989, while in case of returns to occupational status the process was more gradual, but even more pronounced. (These two factors are obviously not independent.)

[8] *Kertesi and Köllő* [1995], [1996] detail the difficulties of creating a uniform and stable sectoral classification. Even their 34 sectors seem to be rather heterogeneous. Despite all their efforts the coverage of some of their sectors changes substantially with the definitional changes. And even when using that more detailed classification, they can rarely identify clear trends in sectoral returns. During transition sectoral classification may not represent a relevant environmental effect.

Budapest is the privileged location to work in. The central region, surrounding Budapest, shares some of its advantages. However, returns (or rather losses) to regions and type of settlement became much more widespread during transition than they used to be. Villages always were the least favoured work locations, however, losses increased sharply, especially in the more distressed southern and eastern regions.

It is hard to distinguish clear trends in sectoral effects. This may partly be due to the fact that our sectoral classification consists of rather heterogeneous groups. The most visible tendency is the consistently high and increasing gain in the chemical industry which is largely due to the pharmaceutical industry.

3.2. Profit equation

Our previous paper (*Halpern and Kőrösi* [1995]) presented the estimated profit function of major exporting firms for Hungary between 1986 and 1993. The explanatory variables originated from the profit and loss account and the balance sheet data. The profit was explained by exports, fixed assets, payables, receiveables, wage costs, bank costs, inventories, depreciation, negative assets and by foreign ownership. All but one variable are ratios, usually relative to the sales or to the fixed asset in case of depreciation rate or to the equity capital in case of foreign ownership. The negative asset variable is a dummy indicating firms for which accumulated losses exceed equity capital. Lagged variables—dependent included—were also used.

Our present analysis attempts to incorporate labour market information into the profit function. We tried two different approaches. First, we tried to estimate the effect of the quality of labour directly, using aggregate indicators derived from the labour survey on education, age distribution, etc. This attempt largely failed, with the notable exeption of 1995 when the share of professionals within employees is an important variable. Second, we tried to measure this quality indirectly, through the residuals of the wage equations. In our view these residuals may carry the information related to efficiency, hence profitability. Assuming that labour market is perfect, then higher wages are paid at those firms which are able to use the labour of the same characteristics (gender, sector, education, age, region, qualification) more efficiently, that is, in these firms the marginal product of labour, the wage is higher. If the labour market is imperfect, then some combination of the degree of imperfections and efficiency may result in wage differences. Of course some caution is required, since our wage equations have some statistical problems, as explained previously.

Using residuals of wage equations for the explanation of profit margin resulted in a clear loss of corporate sample information. For 1987 and 1990 no labour data were available. In other years our new sample only consists of those firms for which labour market information was also available and were included into the wage equation as well.

Table 5 presents the results.[9] The inclusion of the relative error of the wage equation did not change the overall characteristics of the profit equations; the explanatory power, measured by R^2 is between 36 and 73%, Reset does not indicate misspecification—1994 and 1995 partly excepted—, but residuals are non-normal and heteroscedastic. The sign of all explanatory variables corresponds to our expectation. The relative error of the wage equation was significant in all years 1986 and 1993 excepted.

The loss of sample information made some parameters of our previous study insignificant. For all but one year (1986), our new specifications are nested into the full sample equations, if we disregard the relative error of the wage equation. The remaining coefficients are, as a rule, within the 99% confidence interval estimates of the full sample, and most of them are within the 95% confidence interval. For a couple of cases, however, Chow test indicates significant structural break when using the narrow sample.

The relative error of the wage equation does not seem to be related to the other explanatory variables: Both pairwise correlations and principal component analysis of the explanatory variables indicate that it is an independent cause to the variations in the profit margin, if at all.

There are two estimated equations for 1992, 1993 and 1994. For these years it is also true that the estimates of other coefficients are different mostly because of using different subsamples, and not because of the different value of the labour market indicator. For the common part of the subsamples we get similar estimates using either relative error.

We use the lagged profit margin as an indicator for the change in the effect of other, ignored variables. The closer this coefficient to 1, the less these relationships changed. In 1986 most of the explanatory power of the estimated equation stems from the lagged profit margin, clearly indicating that not much changed in the relative position of firms. Later years were much more turbulent, and lagged profit seems to regain some of its former significance only by the end of our sample period, indicating a relative stabilization of the corporate sector.

Export ratio explains profit differences only in 1991-92 which was the period of drastic export reorientation. The lack of the relevance of exports, however, may be the result of a selection bias, as all firms in our sample are large exporters. The increasing trend in the average of the mean errors for these firms indicate that firms in our sample, as a group, are increasingly more productive than others. Thus exports had an implicit role in our model, driving sample selection.

Net capital became significant in 1988 and in one version for 1993. Neither payables, nor receivables played significant role after 1992, which confirms the result of the previous paper that inter-enterprise credit ceased to be one determining factors of profitability.

[9] Additional legend to the table: White hetero: *White* [1980] LM test for heteroscedasticity (χ^2 distribution); LM test for sectors has χ^2_{10} distribution. One asterisk (*) indicates that the (t or diagnostic) test is significant at 5% level, while two asterisks (**) indicate significance at 1% level. (The same applies to the consecutive tables.) Standard errors are heteroscedasticity consistent estimates (*c.f., White* [1980]).

The relative wage cost is a significant explanatory variable of the profit since 1991, 1993 excepted. The wage increase in 1994 was higher than in other years, special events may explain it (election), although its role in profit differentiation requires further examination. *Köllő* [1996] pp. 46-48 also warns that using wage data from financial reports of firms may lead to biased results, because firms settle payments from the wage bill to workers not formally employed. On the other hand, not all the employees are paid: Workers on maternity leave, military service or unpaid leave appear as full time employees in the financial report. The problem is serious since the financial report is the only database where figures on employment, wages, and economic performance appear jointly.

With the increase of real interest rate the bank costs have become one of the most important determinant of the profit. Inventory level has played role in 1986, 1991, 1993 and 1995. It can be related to some expectations about devaluation which increased the propensity to absorb intermediate inputs from imports. Negative asset dummy has always been significant since 1992. Similarly to our previous results the foreign ownership increases profitability only in 1989 and 1991. The explanation for that lies in fast increase what reduces its differentiating effect.

In 1995 the share of professional within labour is significant, and has a negative effect on profitability. If wages are payed according to the marginal product of the employees the composition of labour should not matter, especially if we take the unobserved efficiency of labour into account. The sign of this coefficient is also surprising: Using highly qualified labour apparently decreased profitability. It may be related to economic policy: An important tool of the 1995 'stabilization' package was a very substantial erosion of real wages. Highly qualified employees could have resisted more forcefully than other groups. However, this phenomenon has to be investigated further.

Sectoral effect

Similarly to the situation seen in our previous paper: Profit differences ar not sector-specific. The LM test for sectors becomes significant only in one version for 1992.[10]

Market share effect

The profit margin is different according to the market share classification defined in the following way: Either the number of firms within a sector or the share of sales receipt of a firm within its four digit sector. For both measures we used two thresholds; in the first case less than 3 or 4 firms in an industry; in the second case if a firm has more than

[10] *Kambhampati* [1995] found persistent sectoral differences in profit rates for Indian firms between 1970 and 1985 which can be explained by concentration ratio, ratio of advertisement costs to sales, output growth, cost disadvantage ratio and public sector dummy. The hypothesis was that industries in which advertisement costs are high are those which are likely to have succeeded in creating brand loyalty. They are therefore able to increase the costs that new entrants have to meet to operate in the industry. This sets up a barrier to the entry, thus high profit differentials can be maintained over time. High cost disadvantage ratio implies that low scale entry into the industry is unprofitable.

25 or 40% share in total sales refers to special market position.[11] Table 6 includes the distribution of the sample according to monopoly status, the average profit margin in the different partitions and the results of Chow test on parameter constancy. The profit differences are not really high and there only is a significant market share effect in 1986, 1988, 1989 and 1993. It is somewhat different from previous results for the full sample, but the general tendency is the same. We would have expected to preserve significant monopoly effect for 1994. However, the effect of further liberalisation of the Hungarian market may have played a role. The inclusion of imports as an additional information for the market position of a firm may contribute to a better classification. It may also be related to the more favourable market conditions in 1994-95 which resulted in better profit results.

Size effect

The size of firms may have effect on the profit margin and on the set of explanatory variables.[12] Table 7 presents the distribution of firms, the average profit margin and the Chow test for the structural break.

Small firms behaved differently all along the period under investigation, 1991 excepted. The 1992 credit crunch hit them much harder than the larger firms. Large firms did not reveal any structural break partly 1992 excepted, while medium sized firms are in between, but in most samples their behaviour is different. Here again, the general picture is similar to the one seen in our former paper, some cases, however, are different.

3.2. Conclusions

The interaction between labour market and enterprise restructuring during transition in Hungary offers at least two research topics. One of them, the effect of enterprise performance and other corporate characteristics on wages was investigated in *Halpern et al.* [1996]. This paper discusses the other side of the topic: The effect of labour characteristics on enterprise performance is investigated.

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[11] The solution is admittedly rather rudimentary. We plan to remedy the neglect of the effect of import competition in a further study. Growing imports may weaken the monopoly position of a firm. In static term the industry dummy incorporates the effect of import liberalisation.

[12] The size of the firms was measured by four variables: Capital (net and gross), sales, and the wage bill. In the years 1986–91, a firm is large, if any of these four variables is greater than the annual average plus standard error of the variable. In 1992–94, a firm is large, if any of these four variables is greater than the annual average plus 0.75 times the standard error of the variable. (The average and the standard error is computed for the sample used in the regressions. Relative errors were much greater in the last three years.) A firm is small, if any of the four variables is smaller than its annual average minus a constant share of the standard error. The constant share was 0.20 until 1991, 0.15 afterwards. We have to emphasise that those are small firms within our sample covering important exporters only. Very few really small family firms are among them.

Transition brought about major changes on labour market. The shift of labour composition and the change of return of different characteristics suggest that large part of recent wage increases can be explained by these two factors. As a result recent fast increase of labour productivity and slower wage increase have led to decreasing unit labour cost. As a consequence, the worries about the loss of international competitiveness looking at only growing wages proved to be unfounded. Policy design should take into account that any attempt to cap wage increases may have effect on the speed of restructuring. The same applies to minimum wage regulations.

The results confirm that traditional labour characteristics (gender, experience, occupation, skill) have no effect whatsoever on profit differences. Assuming almost perfect labour market and having estimated satisfactory wage function it can be asserted that residuals of the wage function provide information on the efficiency of firms, since the actual marginal product of labour is different from that estimated by the labour characteristics and the difference has enterprise specific component associated with efficiency. It was found that these exporting firms have an increasing competitive edge over the others.

Our results point at signs of restructuring: Small and medium sized firms reveal behavioural changes, large firms seem to preserve their habits, market share position has changing influence on profit in different years, while sectors have no effect at all. Some changes were induced by regulation, and by reactions to them, others may be results of some strategies initiated by firms in which employment policy has played central role.

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Labour market characteristics

Table 1: National aggregates (end of year, in thousands)

	1986	1989	1992	1993	1994	1995
Active earners	4885.2	4795.2	3866.9	3700.7	3636.4	3595.2
Employed pensioners	479.0	432.0	223.0	181.1	156.8	142.2
Unemployed	6.4	24.2	663.0	632.1	519.6	497.1
on child-care leave	224.8	244.7	262.1	254.6	252.0	247.2
Total	5595.4	5496.1	5015.0	4768.5	4564.8	4481.7
Employed at targetted firms	4356.8	4039.7	2899.8	2688.8	2538.0	2512.4

Table 2: Sample information

	1986	1989	1992	1993	1994	1995
Number of firms	4032	4608	6593	7090	8583	8494
Number of observations	592281	418419	98498	100854	110839	109673
Gender (%)						
Female	44.29	43.90	42.17	43.39	41.83	40.76
Male	55.71	56.10	57.83	56.61	58.17	59.24
Education (%)						
Less than 8 classes	10.82	8.30	3.53	2.73	1.97	1.72
8 classes	37.07	34.24	27.80	28.05	23.28	22.35
Vocational	25.08	27.62	31.60	32.61	30.77	31.76
12 classes	21.32	23.77	28.89	29.39	33.43	33.44
Tertiary	5.71	6.07	8.18	7.22	10.54	10.74
Occupation (%)						
Unskilled	7.81	6.18	6.20	7.54	6.24	6.46
Semi–skilled	26.22	24.83	22.45	25.09	21.23	21.12
Skilled	38.24	37.49	38.45	36.31	32.89	33.42
Professional and clerical	16.23	19.96	21.23	20.16	25.60	26.13
Managerial and supervisory	11.50	11.53	11.67	10.90	14.05	12.87
Region (%)						
Budapest	23.62	24.02	24.84	23.28	26.43	25.66
Centre	13.01	12.73	13.32	12.69	12.81	13.07
North-West	14.37	14.26	15.80	16.46	15.98	16.00
South-West	9.58	9.36	8.99	11.10	9.08	9.32
North-East	22.67	23.10	20.10	20.26	19.62	19.78
South-East	16.75	16.53	16.95	16.21	16.08	16.17
Sector (%)						
agriculture and food	27.34	24.09	22.13	19.36	18.01	17.63
mining and energy	4.45	4.67	3.71	6.82	6.86	6.47
siderurgy	2.64	2.58	1.73	1.69	1.69	10.57
engineering	12.67	12.55	12.75	11.27	11.45	4.85
chemical	3.36	3.66	4.62	4.71	4.84	1.75
building materials	2.00	1.83	1.79	1.75	1.90	1.66
textile, paper and other	10.17	9.80	8.90	10.74	10.64	11.80
construction	8.78	7.82	5.88	6.03	6.50	6.53
trade and services	17.71	21.15	23.47	22.77	24.01	25.24
transport and telecom	10.88	11.86	15.02	14.86	14.09	13.49

Table 3: Wage equations

Variable	1986	1989	1992	1993	1994	1995
Constant	8.039	8.408	9.196	9.383	9.621	9.844
Gender	0.255	0.273	0.184	0.192	0.166	0.151
Experience	0.027	0.030	0.024	0.020	0.021	0.019
Experience sq./100	-0.040	-0.046	-0.035	-0.027	-0.029	-0.027
Education						
≤ 7 years	-0.051	0.000 N	-0.066	-0.075	-0.019 N	-0.007 N
vocational	0.065	0.067	0.064	0.043	0.036	0.022
12 years	0.140	0.196	0.202	0.200	0.183	0.164
tertiary	0.448	0.617	0.581	0.606	0.581	0.560
Occupation						
Semi–skilled	0.173	0.186	0.146	0.168	0.166	0.172
Skilled	0.239	0.279	0.225	0.262	0.262	0.258
Professional	0.208	0.261	0.306	0.372	0.354	0.334
Managerial	0.360	0.399	0.592	0.638	0.705	0.671
Region						
C centre	-0.069	-0.105	-0.131	-0.125	-0.099	-0.134
C town	-0.071	-0.125	-0.148	-0.130	-0.170	-0.129
C village	-0.061	-0.122	-0.217	-0.199	-0.258	-0.242
NW centre	-0.078	-0.147	-0.157	-0.165	-0.139	-0.134
NW town	-0.123	-0.171	-0.190	-0.184	-0.189	-0.162
NW village	-0.146	-0.224	-0.294	-0.288	-0.280	-0.276
SW centre	-0.111	-0.156	-0.194	-0.162	-0.188	-0.205
SW town	-0.093	-0.145	-0.253	-0.219	-0.207	-0.197
SW village	-0.154	-0.219	-0.345	-0.144	-0.324	-0.323
NE centre	-0.130	-0.177	-0.195	-0.189	-0.215	-0.209
NE town	-0.145	-0.216	-0.242	-0.251	-0.289	-0.285
NE village	-0.153	-0.247	-0.294	-0.290	-0.298	-0.348
SE centre	-0.109	-0.140	-0.161	-0.132	-0.165	-0.157
SE town	-0.140	-0.200	-0.254	-0.238	-0.265	-0.257
SE village	-0.152	-0.275	-0.353	-0.316	-0.401	-0.378
Sector						
agriculture and food	0.020	0.031	-0.037	-0.005 N	-0.007 N	-0.019
mining and energy	0.246	0.194	0.280	0.269	0.276	0.217
siderurgy	0.004	0.016	-0.015	-0.059	-0.073	-0.100
chemical	0.160	0.209	0.322	0.294	0.267	0.262
building materials	0.044	0.069	0.182	0.153	0.155	0.152
textile, paper and other	0.150 n	0.159	0.242 n	0.193	0.231	0.196
construction	0.020	0.037	-0.015 n	-0.007 N	-0.081	-0.125
trade and services	-0.026	-0.055	0.049	0.018	-0.031	-0.116
transport and telecom	0.004 n	-0.065	0.072	0.103	0.107	0.066
Nob	591528	417752	97190	99766	110716	109673
S.dev of dep.var	0.372	0.450	0.516	0.535	0.573	0.561
SEE	0.275	0.341	0.379	0.401	0.421	0.426
R^2	0.456	0.426	0.462	0.439	0.459	0.424
$\overline{R}^2$	0.456	0.426	0.462	0.439	0.459	0.424
JB normality	33868	119698	6260	16838	6979	688485
Reset $\widehat{y}^2$	807.52	1825.27	167.68	155.71	74.89	18.26
Reset $\widehat{y}^2$, $\widehat{y}^3$	711.50	1142.67	141.63	91.79	38.26	9.49
PE H_0: logarithmic	-23.82	-37.59	-10.46	-11.02	-8.99	-4.48
PE H_0: linear	-120.60	-117.88	-56.89	-44.63	-59.45	-52.90

All tests (t and diagnostic) are significant at 0.1 % level, except those marked by n or N. n indicates that the test is significant at the 1% level, while N indicates its insignificance at 1 % level.

Table 4: 99.9 % confidence intervals of coefficients

Variable	1986	1989	1992	1993	1994	1995
Constant	8.03 , 8.05	8.40 , 8.42	9.17 , 9.22	9.36 , 9.41	9.59 , 9.65	9.82 , 9.87
Gender	0.25 , 0.26	0.27 , 0.28	0.17 , 0.19	0.18 , 0.20	0.16 , 0.18	0.14 , 0.16
Experience	0.03 , 0.03	0.03 , 0.03	0.02 , 0.03	0.02 , 0.02	0.02 , 0.02	0.02 , 0.02
Experience sq./100	-0.04 , -0.04	-0.05 , -0.04	-0.04 , -0.03	-0.03 , -0.02	-0.03 , -0.03	-0.03 , -0.02
Education						
$\leq$ 7 years	-0.06 , -0.05	-0.01 , 0.01	-0.09 , -0.04	-0.10 , -0.05	-0.05 , 0.01	-0.04 , 0.03
vocational	0.06 , 0.07	0.06 , 0.07	0.05 , 0.08	0.03 , 0.06	0.02 , 0.05	0.01 , 0.04
12 years	0.14 , 0.14	0.19 , 0.20	0.19 , 0.22	0.19 , 0.21	0.17 , 0.20	0.15 , 0.18
tertiary	0.44 , 0.45	0.61 , 0.63	0.56 , 0.60	0.58 , 0.63	0.56 , 0.60	0.54 , 0.58
Occupation						
Semi–skilled	0.17 , 0.18	0.18 , 0.19	0.13 , 0.16	0.15 , 0.19	0.15 , 0.18	0.15 , 0.19
Skilled	0.23 , 0.24	0.27 , 0.29	0.21 , 0.24	0.24 , 0.28	0.24 , 0.28	0.24 , 0.28
Professional	0.20 , 0.21	0.25 , 0.27	0.28 , 0.33	0.35 , 0.39	0.33 , 0.38	0.31 , 0.36
Managerial	0.35 , 0.37	0.39 , 0.41	0.57 , 0.61	0.61 , 0.66	0.68 , 0.73	0.65 , 0.70
Region						
C centre	-0.08 , -0.06	-0.12 , -0.09	-0.16 , -0.10	-0.15 , -0.10	-0.13 , -0.07	-0.16 , -0.11
C town	-0.08 , -0.07	-0.13 , -0.12	-0.17 , -0.13	-0.15 , -0.11	-0.19 , -0.15	-0.15 , -0.11
C village	-0.07 , -0.05	-0.13 , -0.11	-0.24 , -0.20	-0.22 , -0.18	-0.28 , -0.23	-0.26 , -0.22
NW centre	-0.08 , -0.07	-0.16 , -0.14	-0.18 , -0.14	-0.18 , -0.15	-0.16 , -0.12	-0.15 , -0.11
NW town	-0.13 , -0.12	-0.18 , -0.16	-0.21 , -0.17	-0.20 , -0.17	-0.21 , -0.17	-0.18 , -0.14
NW village	-0.15 , -0.14	-0.23 , -0.21	-0.32 , -0.27	-0.31 , -0.26	-0.30 , -0.26	-0.30 , -0.25
SW centre	-0.12 , -0.10	-0.17 , -0.15	-0.22 , -0.17	-0.18 , -0.14	-0.21 , -0.17	-0.23 , -0.18
SW town	-0.10 , -0.09	-0.16 , -0.13	-0.28 , -0.23	-0.24 , -0.19	-0.23 , -0.18	-0.22 , -0.17
SW village	-0.16 , -0.15	-0.23 , -0.21	-0.37 , -0.32	-0.17 , -0.12	-0.35 , -0.30	-0.35 , -0.29
NE centre	-0.14 , -0.12	-0.18 , -0.17	-0.21 , -0.18	-0.21 , -0.17	-0.24 , -0.20	-0.23 , -0.19
NE town	-0.15 , -0.14	-0.22 , -0.21	-0.26 , -0.22	-0.27 , -0.23	-0.31 , -0.27	-0.30 , -0.27
NE village	-0.16 , -0.15	-0.25 , -0.24	-0.31 , -0.28	-0.31 , -0.27	-0.32 , -0.28	-0.37 , -0.33
SE centre	-0.11 , -0.10	-0.15 , -0.13	-0.18 , -0.14	-0.15 , -0.11	-0.18 , -0.15	-0.18 , -0.14
SE town	-0.15 , -0.13	-0.21 , -0.19	-0.27 , -0.24	-0.26 , -0.22	-0.28 , -0.25	-0.28 , -0.24
SE village	-0.16 , -0.15	-0.29 , -0.26	-0.38 , -0.33	-0.34 , -0.29	-0.43 , -0.37	-0.40 , -0.35
Sector						
agriculture and food	0.02 , 0.02	0.02 , 0.04	-0.05 , -0.02	-0.02 , 0.01	-0.02 , 0.01	-0.04 , 0.00
mining and energy	0.24 , 0.25	0.18 , 0.20	0.26 , 0.30	0.25 , 0.29	0.26 , 0.30	0.20 , 0.24
siderurgy	0.00 , 0.01	0.01 , 0.02	-0.03 , 0.00	-0.08 , -0.04	-0.09 , -0.05	-0.12 , -0.08
chemical	0.15 , 0.17	0.20 , 0.22	0.30 , 0.34	0.27 , 0.32	0.24 , 0.29	0.24 , 0.29
building materials	0.04 , 0.05	0.06 , 0.08	0.15 , 0.21	0.12 , 0.19	0.12 , 0.19	0.12 , 0.19
textile, paper & other	0.14 , 0.16	0.15 , 0.17	0.21 , 0.28	0.16 , 0.23	0.20 , 0.27	0.16 , 0.23
construction	0.01 , 0.03	0.03 , 0.05	-0.04 , 0.00	-0.03 , 0.01	-0.10 , -0.06	-0.15 , -0.10
trade and services	-0.03 , -0.02	-0.06 , -0.05	0.03 , 0.06	0.00 , 0.03	-0.05 , -0.02	-0.13 , -0.10
transport and telecom	0.00 , 0.01	-0.07 , -0.06	0.06 , 0.09	0.09 , 0.12	0.09 , 0.12	0.05 , 0.08

Table 5: Profit equations

Variable	1986	1988	1989	1991	1992b	1992a	1993b	1993a	1994b	1994a	1995
Profit margin (L)	0.786	0.289	0.230	0.544	0.043	0.273	0.293	0.435	0.673	0.646	0.408
	(0.038) **	(0.160)	(0.066) **	(0.111) **	(0.264)	(0.316)	(0.085) **	(0.106) **	(0.088) **	(0.106) **	(0.064) **
Exports				0.036	0.107	0.119					
				(0.015) *	(0.031) **	(0.032) **					
Net capital		-0.139						-0.088			
		(0.064) *						(0.032) **			
Net capital (L)		0.173									
		(0.062) **									
Payables		-0.071	-0.179	-0.303	-0.257						
		(0.032) *	(0.074) *	(0.070) **	(0.106) *						
Payables (L)		0.075	0.032								
		(0.038) *	(0.007) **								
Recievables		0.041			0.132						
		(0.008) **			(0.054) *						
Wage bill				-0.179	-0.836	-0.497			-0.370	-0.326	-0.264
				(0.062) **	(0.159) **	(0.096) **			(0.101) **	(0.114) **	(0.059) **
Wage bill (L)					0.445				0.493	0.416	0.243
					(0.165) **				(0.152) **	(0.174) *	(0.052) **
Bank cost			-0.434		-0.749	-0.858	-0.543		-0.394	-0.345	-0.918
			(0.111) **		(0.185) **	(0.159) **	(0.102) **		(0.107) **	(0.107) **	(0.236) **
Bank cost (L)		-0.762			-0.864						0.479
		(0.140) **			(0.258) **						(0.193) *
Inventories	-0.116						-0.112	-0.220			-0.150
	(0.048) *						(0.039) **	(0.051) **			(0.046) **
Inventories (L)	0.128			-0.030							
	(0.048) **			(0.014) *							
Depreciation			-0.785	-1.442					-1.999	-1.371	
			(0.355) *	(0.386) **					(0.625) **	(0.428) **	
Depreciation (L)			1.066	1.125					1.522	1.250	
			(0.281) **	(0.278) **					(0.662) *	(0.510) *	
Depreciation rate			-0.327						0.002	0.002	0.002
			(0.087) **						(0.000) **	(0.000) **	(0.000) **
Negative assets					-0.282	-0.304	-0.351	-0.367	-0.207	-0.148	-0.164
					(0.056) **	(0.066) **	(0.080) **	(0.070) **	(0.065) **	(0.052) **	(0.046) **
Foreign ownership			0.332	0.070							
			(0.143) *	(0.018) **							
Share of professionals											-0.048
											(0.012) **
Relative error of wage eq	0.082	0.569	0.234	0.511	0.199	0.625	0.560	0.480	0.556	0.201	0.215
	(0.080)	(0.124) **	(0.118) **	(0.202) *	(0.353)	(0.319) *	(0.291)	(0.266)	(0.162) **	(0.165)	(0.112) *
Constant	0.004	0.012	0.057	0.044	0.063	0.014	0.025	0.058	0.044	0.040	0.081
	(0.002) *	(0.006) *	(0.013) **	(0.011) **	(0.021) **	(0.021)	(0.010) *	(0.013) **	(0.015) **	(0.013) **	(0.013) **
Nob	370	608	611	663	607	540	461	343	517	494	963
Mean of dep.var	0.040	0.024	0.019	-0.025	-0.113	-0.106	-0.068	-0.060	-0.024	-0.001	0.030
S.dev of dep.var	0.035	0.081	0.056	0.144	0.278	0.267	0.258	0.276	0.231	0.181	0.140
SEE	0.018	0.042	0.045	0.107	0.210	0.204	0.179	0.181	0.151	0.128	0.104
R^2	0.734	0.737	0.366	0.451	0.441	0.422	0.524	0.576	0.582	0.503	0.457
$\overline{R}^2$	0.731	0.733	0.356	0.443	0.432	0.416	0.519	0.570	0.574	0.494	0.451
White hetero	33 **	410 **	323 **	311 **	328 **	280 **	43 **	104 **	345 **	370 **	554 **
JB normality	2399 **	68637 **	118763 **	6063 **	4333 **	4371 **	14014 **	7969 **	4080 **	10600 **	5232 **
Reset $\widehat{y}^2$	0.97	0.47	0.52	0.69	0.08	2.28	2.86	3.12	4.55 *	0.90	0.33
Reset $\widehat{y}^2$, $\widehat{y}^3$	1.79	2.28	0.28	2.81	0.27	1.08	1.85	1.68	5.25 **	0.47	8.91 **
LM test for sectors	4.38	11.62	11.79	11.00	15.47	23.24 **	10.28	6.26	6.11	5.81	16.99

Table 6: Monopoly effect in the profit equation

A. Number of observations

Period	Total	Number < 3	Number < 4	Share > 0.4	Share > 0.25
1986	370	25	44	30	64
1988	608	48	68	52	88
1989	611	43	66	53	87
1991	663	24	39	40	64
1992b	607	38	59	66	103
1992a	540	35	56	61	96
1993b	461	45	72	67	93
1993a	343	34	53	49	66
1994b	517	22	34	44	65
1994a	468	15	21	32	54
1995	931	56	94	111	180

B. Weighted mean of profit margin (in percentages)

Period	Total	Number < 3	Number < 4	Share > 0.4	Share > 0.25
1986	2.76	1.04	2.19	1.48	2.18
1988	2.11	1.85	2.47	1.82	1.98
1989	2.28	3.40	2.99	3.06	2.78
1991	-0.020	1.55	1.96	2.27	2.00
1992b	-6.59	-3.83	-4.74	-6.81	-6.74
1992a	-6.43	-4.05	-4.98	-7.51	-7.17
1993b	-3.22	-4.08	-4.62	-5.16	-4.66
1993a	-3.46	-3.67	-4.51	-5.25	-4.99
1994b	1.50	0.25	0.91	1.20	1.24
1994a	0.99	-0.38	-0.30	-0.72	-0.50
1995	2.34	-1.51	-1.07	0.87	1.63

C. Chow test for monopolisation

Period	Number < 3	Number < 4	Share > 0.4	Share > 0.25
1986	6.43 **	3.54 **	5.80 **	2.24 *
1988	13.03 **	13.98 **	1.54	1.33
1989	1.43	9.79 **	1.60	8.77 **
1991	0.68	1.48	0.69	0.74
1992b	1.79	1.31	2.48	1.58
1992a	2.85	1.39	2.66 *	1.40
1993b	11.33 **	7.36 **	4.80 **	6.52 **
1993a	7.47 **	5.53 **	2.90 **	4.07 **
1994b	1.36	8.55 **	1.47	1.37
1994a	1.53	8.55 **	1.50	1.45
1995	0.80	7.14 **	1.19	1.20

Table 7: Size effect in the profit equation

A. Number of observations

Period	Total	Small	Medium	Large
1986	370	272	41	57
1988	608	396	172	40
1989	611	392	180	39
1991	663	386	242	35
1992b	607	307	284	16
1992a	540	271	256	13
1993b	461	235	215	11
1993a	343	144	191	8
1994b	517	252	249	16
1994a	468	268	181	19
1995	931	612	277	42

B. Weighted Mean of profit margins (in percentages)

Period	Total	Small	Medium	Large
1986	2.76	3.24	3.11	2.38
1988	2.11	2.45	2.48	1.65
1989	2.28	1.60	2.29	2.62
1991	-0.020	-3.08	-0.36	1.51
1992b	-6.59	-18.52	-5.25	-5.23
1992a	-6.43	-12.48	-5.81	-5.64
1993b	-3.22	-7.62	-3.10	-2.45
1993a	-3.46	-4.21	-4.02	-2.99
1994b	1.50	-2.33	0.34	2.77
1994a	0.99	3.06	-0.20	1.13
1995	2.34	1.44	2.32	2.64

C. Chow test for structural break

Period	Small	Medium	Large
1986	3.90 **	0.13	6.72 **
1988	4.61 **	4.28 **	1.0
1989	2.50 **	1.69	1.17
1991	0.79	0.87	0.95
1992b	3.72 **	3.77 **	0.98
1992a	3.64 **	4.03 **	2.13 *
1993b	1.67	1.79	0.27
1993a	2.84 *	3.17 **	0.71
1994b	3.12 **	2.61 **	0.79
1994a	2.67 **	1.89 *	0.43
1995	6.66 **	6.67 **	1.33