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(Employment and Wage Setting
in Hungarian Firms 1986–89)

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The paper addresses the question why Hungarian state enterprises cut employment by two-digit percentages in the last years of state socialism. It argues that job destruction was a result of changing incentives and liberties (harder budget constraint, stronger insider power, loosening political restrictions on downsizing) rather than of market-related shocks. Changing the inherited combination of output, employment, and wages could be in the interest of workers, managers, or both parties. The implications for wages and profits were hard to predict but the concievable scenarios of adjustment unanimously implied lower employment. The hypotheses are tested against data on output, employment, wages and profits from a panel of 2666 firms observed in 1986 and 1989.

Transitology, primarily engaged with the post-1989 history of Central and East European societies, pays little attention to the decay of the socialist system preceeding its sudden political collapse. A 'big-bang approach' to transition is certainly appropriate in the case of some countries, like Romania or Czechoslovakia, where the political regime and the economy remained intact until late 1989, but not in Poland, Hungary or the Soviet Union where the system underwent remarkable changes between 1985 and 1990.

This paper analyses an area of evolutive change in the last years of state socialism using Hungarian data.[1] In particular, the paper addresses the

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[1] I started research on employment and wage adjustment in 1993/94 when I was visiting fellow in *János Kornai*'s research group at Collegium Budapest – Institute for

question why employment began to shrink several years before the collapse of the socialist political system. Why Hungarian state enterprises cut employment by two-digit percentages in the late 1980s, in a period of modest economic growth (1.4% per annum in 1985-89) and no dramatic changes in prices, trade relations, or other key economic indicators?

Table 1. The active population in the pre-transition period in Hungary (1. January, thousand)

	1983	1985	1987	1989	1990
Unemployed	-	-	6	14	24
Self-employed[1]	243	n.a.	330	404	501
Employees, of which[2]	4727	(4641)	4555	4418	4267
– Budget sector[3]	764	784	848	853[3]	876[3]
– Enterprises[4]	3963	(3857)	3707	3565	3391

Source: KSH [1991], pp. 19, 38-39, 74.

Notes:[1] Includes assisting household members and full-time members in business partnerhips without a legal personality.

[2] Includes employees on military service and non-retired employees older than the retirement age. Excludes women on child care leave and employed pensioners.

[3] Health, education, culture, and public administration. Institutions employing more than 50 workers in 1989 and 1990.

[4] Calculated from the table by deducting budget sector employment from total employment. Figures in paranthesis are interpolated estimates.

The magnitude of change is illustrated by *Table 1*. Total employment (the sum of dependent-status employment and self-employment) fell slightly, by only 2.9% in 1985–90 but the number of employees decreased by more than 8%. The decline fell entirely on the enterprise sector where it exceeded 12% and implied a loss of about 1/2 million jobs. This figure still underestimates the magnitude of net job destruction in medium-sized and large firms where employment was predictably lower by as much as 17% in 1989 compared to 1986.[2]

One of the reasons why job destruction could remain almost unnoticed was the outstanding role of self-employment (as opposed to open

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[2] This figure comes from the firm sample introduced later in the paper, covers enterprises employing more than 20 workers, and compares yearly average figures.

unemployment) in absorbing redundant labour. Many workers left the enterprise sector to start a business voluntarily but, as emphasised by *Gábor R.* [1997], *Czakó* [1996] and others, self-employment was also a resort for workers losing their jobs, or being at risk of involuntary jobloss.

A fall in labour demand (unrelated to external market pressures) was also observed at the micro level in both Hungary and Poland.[3] In their analysis of Polish state enterprises over the period 1983–1988 *Lehmann* and *Schaffer* [1995] found that employment was shrinking in the majority of firms and they observed roughly the same rate of job destruction in firms paying below and above the estimated marginal product of labour. *Kõrösi* [1997] found that employment fell by 21% in 1986–89 in Hungarian exporting firms. His repeated cross-section estimates of a labour demand equation suggested low output elasticities, gradually rising from 1/3 to 3/4 of the levels observed during the transition. *Estrin* and *Svejnar* [1996] also observed net job destruction and loose linkage between output and employment in their Polish and Hungarian firm samples.

These observations motivate the paper to look at employment decline in detail using enterprise-level information from the period 1986–89.

Section 1 starts by discussing employment and wage setting under state socialist conditions, in a regime where (i) firms were constrained in wage-setting (ii) enterprises had an incentive to raise employment beyond the efficient level (iii) the actual wage-employment combination was achieved in a bargaining process and (therefore) was not optimal for workers.

Section 2 turns to the immediate pre-transition period when the enlargement of enterprise autonomy, the hardening of the budget constraint, and the liberalization of firing practices created incentives for downsizing. It also argues that, given the properties of the state socialist heritage (points ii and iii above), downsizing could be Pareto-improving. Though the conceivable scenarios of downsizing appear to be different in terms of wage and profit change, they are similar in that they unanimously imply a fall in the level of employment.

Following the discussion of causes and possible implications *Section 4* confronts the hypotheses with data from 1986-89 and *Section 5* draws conclusions.

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[3] Though a part of the outflow from the enterprise sector was clearly supply-driven it still remains a question why enterprises, for the first time in socialist history, did not try to fill their vacancies produced by voluntary quits.

1. The Socialist Firm

Wage setting

Under central planning the wage bill was determined by the planners. The wage plan was the single most stringent limit set for enterprises as argued in detail in Chapter 16 of *Kornai* [1980].

The case of Hungary is more complex since the country abolished central planning already in 1968 and controlled wages by means of taxes since then. Firms were free to set wages within broad limits suggested (rather than prescribed) for occupational categories. Taxes were levied on the wage *increment* with rates depending on the relation of wage change to a reference indicator. The details of the tax system changed rather frequently but in the typical setting the tax was a function of the ratio of wage bill growth to value added growth. The tax was punitive with extremely high marginal rates.

It is important to note that the ruling tax regime punished the growth of the wage bill but (in principle) opened an unlimited range for the differentiation of average wages. With the exeption of a few years of stringent wage policies enterprises could raise the average wage tax-free by reducing labour hoarding. The tax regime is insufficent for explaining why inter-enterprise wage differentials remained modest. At least three equally important reasons might be mentioned.

First, though the tax rules explicitly encouraged the trading off of jobs for wages other rules and incentives strongly discouraged it. Severe political constraints were imposed on 'firing without a cause': a firm dismissing workers for wage gains would have risked serious political sanctions.[4]

Second, employment cuts resulting in lower output were at odds with other incentives like the rewards attached to growth, market share, capacity utilization, or responsibility for supplies and CMEA-exports.

Third, wage cuts potentially resulting from productivity losses were usually averted by wage subsidies, exemptions from taxation, or value added growth rates themselves were manipulated by transfers or via prices

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[4] The only case when hundreds of workers were dismissed collectively under János Kádár's regin (Rába, city of Gyõr, 805 workers) was put on the agenda of a Politburo session on 29 May 1979.

(*Kornai* and *Matits* [1986]). The allocation of subsidies followed relatively simple rules. Bargaining power increased with firm size because the number of established communication channels between the firm and the Party – hence ability to bargain at all – was a function of size. Keeping firm size in terms of employment constant the likelihood of subsidies increased with capital assets. *Cukor* and *Kertesi* [1987] provided empirical evidence on that and argued that the cost of refusing subsidies was higher, other things equal, if low wages reduced the utilization of large assets of fixed capital. Finally, subsidies were more likely when 'equalizing wage differentials' had to be adjusted.[5]

Prohibitive taxes, political constraints, and manager's incentives on the one hand, subsidies on the other, thus operated as an equalizing mechanism: the risk that some firms set wages high above the industry average, or lag behind substantially, was actually rather small. The assumption of a wage level (or a wage range) quoted by the state seems to be a relevant assumption even in the special case of post-1968 Hungary where firms had limited freedom in wage setting.

Employment

To illustrate the difference between socialist and capitalist firms we draw *Figure 1*. The curves emanating from the bottom left corner of the wage-employment plane are iso-profit curves: the loci of wage-employment combinations resulting in the same level of profit.[6]

An iso-profit contour is increasing and concave left of the turning point – where marginal product equals the wage – and falls afterwards. The curvature of the iso-profit contour beyond the turning point is shaped by

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[5] As, for instance, the price of hard manual work increased – reflecting a general improvement of educational levels, the ceasing of migration from villages to industrial centers, and a consequent fall in the supply of unskilled labour – the wage levels generated by the 'value added-wage growth rule' would have been insufficient to maintain staff levels at firms with predominantly unqualified jobs. Subsidies were often explicitly targeted to mitigate 'labour shortages' of this kind.

[6] Let R(n) be a revenue function with the usual properties R'(n)>0 and R''(n)<0. If (w*,n*) is a wage-employment combination for which R'(n*)=w* and R(n*)-w*n*=π* then R(n) - wn = π* defines an iso-profit curve in the wage-employment plane the slope of which is given by [R'(n) - w]/n and thus it's turning point is at (w*,n*). The iso-profit curves serve as indifference contours with lower curves representing higher profit. The framework used here follows the introductory sections of *McDonald* and *Solow* [1982]

decreasing marginal revenue (implying successively increasing wage cuts as we move to higher employment levels) and a size effect (making higher profits available at the cost of successively decreasing wage cuts). As suggested in *Appendix 1* an iso-profit curve is likely concave in the relevant range where marginal product is well above zero.

Under state socialism firms employed more workers than a capitalist enterprise facing similar wages and prices. The profit-maximising firm (subject to w* quoted by a union or government) is likely to choose $E(w^*, n_E)$ where the wage equals the marginal product.[7] The choice of the socialist firm is $S(w^*, n_S)$, East of the efficient point.

Chart 1
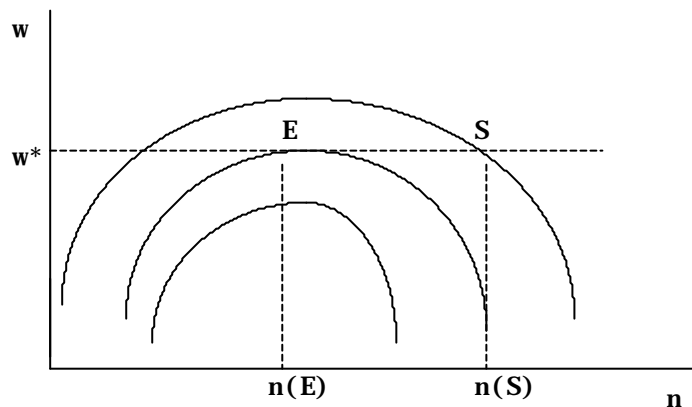
E is an equilibrium point in the sense that, other things unchanged, the firm has no motivation to leave it. S is different in that state socialist firms were always ready to expand employment beyond its current level. In the short run firms were prevented from doing so by their budget constraint but the management could bargain for higher prices or fiscal transfers making higher employment compatible with enlarged post-subsidy revenues. In this sense the assumption of a binding level of profit (setting a maximum for n_S at a given wage) would miss the important point about firm behavior. *Kornai*'s notion of an 'unconstrained' demand for labour ([1980], Chs. 11, 16) refers exactly to that: irrespective of the level of the wage, in lack of a binding level of profit n_S has a tendency to move to the right.

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[7] The optimum is different if both employment and wages are set in a bargain as shown by *McDonald* and *Solow*.

Cooperation and conflict between workers and managers

When the budget constraint is soft workers and managers are interested in cooperating against the state, since they can mutually benefit from subsidies, but it does not follow that they agree on how to distribute the subsidies among themselves.

The optimal choice of workers lies in the tangency of an iso-profit curve, regarded as binding momentarily by the management, and the highest worker indifference curve available at that profit level. For finding the place of this point we need reasonable assumptions about the representative worker's indifference curve (his evaluation of wages and employment). Since employment was full under socialism higher employment in the firm had no extra value for the workers. Lower employment, by contrast, implied a loss of utility for them because of the cost of job search, or the loss of seniority-related wage returns, among others. We may assume therefore that the representative worker's indifference curve was flat right of the actual level of employment, but upward-sloping left of that point.

Chart 2
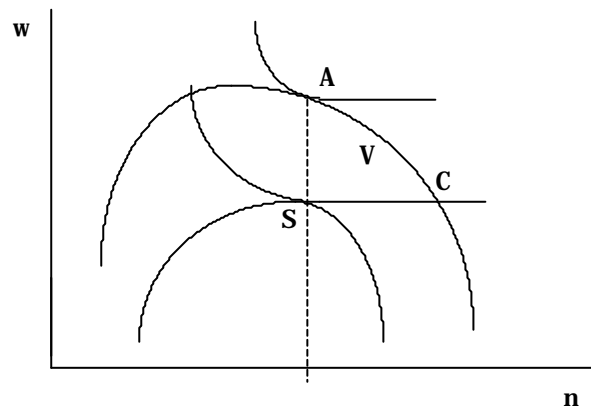
Suppose that the point S chosen by the firm accidentally provided the highest utility available for workers, at a given profit, as on *Chart 2*. Workers and managers could always gain from state subsidies so they kept on bargaining for state support. We may think of subsidization as a permission to move to a lower pre-tax profit rate, somewhere to the SAC area. Workers obviously preferred A to other points and pressed the management to fight for *wage* subsidies.

The managers of state socialist enterprises benefited from higher wages for a number of reasons (peace within the firm, lower labour turnover) but they were also rewarded for higher output, as well as for higher profit. The success criteria actually applied by goverment and Party officials under socialism suggested that a 'proper' mixture of a number of indicators – rather than a single criterion - was what mattered in evaluating managers (*Laki* [1985]). If we assume, accordingly, that managers strived for a combination of relevant success criteria – wage, employment and profit in our presentation – the point they wanted to achieve was somewhere in the SAC triangle (V). If they had at least some bargaining power the outcome was different of A - the firm moved away from worker's optimum.[8]

2. The Pre-Transition Reforms and their Implications

Unlike in Czechoslovakia, Romania or the GDR the transition process in Hungary was preceeded by a period of evolutive change. The following paragraphs give a brief list of market-oriented reforms relevant to the labour market by grouping them into three clusters:

The delegation of managing rights to firms. The transferring of rights to manage came in both formal and informal ways. The establishment of elected Enterprise Councils, Delegate's Assemblies and General Assemblies (instead of subordination to branch ministries) created a legal framework for these changes in 1985. By the end of the period most Hungarian firms could autonomously decide upon corporate structure, factor inputs and the output mix.

Hardening of the budget constraint. A series of market-oriented reforms contributed to the monetization of the economy and the gradual hardening of the budget constraint. These reforms included cuts of fiscal subsidies, wide-ranging price liberalization, tax reforms (Western-type value added and personal income taxation), the establishment of commercial banks and the foundation of the Stock Exchange. Though these early reforms did not mean the end of goverment intervention, fiscal subsidization, and the bailing-out of bankrupt enterprises (huge loss-makers typically remained under direct government control even after 1985) they

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[8] Note that after a shift to higher employment levels (say from S to V) the union indifference map should be rescaled. This is so because in this presentation worker's utility is a function of the change, not the level, of employment. Their preferences are transitive on the $(w, \Delta n)$ plane but not on the (w, n) plane.

certainly signalled a departure from a comprehensive system of paternalistic income redistribution. The nature of change is well shown by time series presented in *Kornai* ([1996], p.18): the proportion of firms mentioning demand-side factors among the causes of capacity underutilization considerably increased in this period, while the number of complaints on input 'shortages' substantially decreased.

Freedom to trade off employment for wages. The pre-transition reforms made the employment-wage trade-off a feasible option by removing the political barriers to dismissals and changing the management's incentives. The government introduced the first elements of an unemployment benefit system in 1987, signalling the end of political constraints on mass layoffs, demolishing the taboo of full employment, and allowing managers to reduce employment without risking their own jobs. It should be added that wage bill taxation was maintained until 1991 (in a more sophisticated form in some years). Increasing wages without reducing employment remained a costly option at the eve of transition.

We believe that the reforms changed the motivation of the players and the rules of the game in many ways. The ceasing of stringent state control on the one hand, and the lack of outside private owners on the other, provided the managers and core workers of state enterprises with an unprecedented degree of autonomy. Equally important, they had stronger motivation to find an optimum within the limits of sales revenues. They also had new options including downsizing. The targets chosen by firms may have been different – depending on who made the decisions – but the conceivable scenarios were common in that they all implied job destruction.

Some of the possible scenarios are based on worker control. One can assume that workers do not seek higher profit but they do not want to drive the firm out of the market by pushing profit deep below zero. What they likely try to do is maximising utility at close-to-zero profit. If at the outset the firm's profit was low (and we may assume it with state socialist firms) they look for points on, or left of, the current iso-profit curve. This is shown on *Chart 3*. Apart from the special case when S is a tangency optimum the 'union' indifference curve crosses the iso-profit curve at S and C.[9] The points between the indifference curve and the profit curve are Pareto-superior to S. If workers have their own way they choose B.

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[9] Whether the worker's indifference curve is kinked or well-behaved bears no importance in this case.

In a variant of this scenario decisions are made by, and in the interest of, a small group of core workers. With respect to profit such a small group is likely to behave as the community of all workers but its utility curve is kinked at the level of group membership as argued in *Carruth* and *Oswald* [1987]. If decisions are made by such a group the likely outcome is D, the highest possible wage consistent with the prevailing level of profit. The position of D with respect to C is uncertain but it is North-West of S as well as B. The scope for Pareto-impovement is even larger in this case.[10]

Chart 3
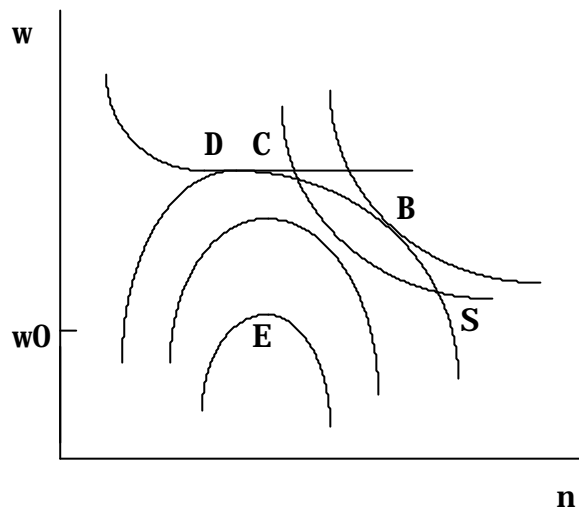
In other scenarios control is taken over by managers. Managers in the period under examination had several reasons to seek higher profit: high profit could raise their reputation on the emerging managerial labour market; it could help them in the newly-born commercial banking system; or they wanted to become owners of the firms. A profit-maximising manager is generally interested in reaching point E, a wage at the reservation level w^0 and an employment level at which marginal product is equal w^0. Whether this point can be reached is a matter of bargaining power but the manager certainly wants to move West or South-West of S.

In principle, workers or managers uninterested in profit may have tried to maintain employment and raise wages at the expense of profit but we do not regard it as a highly relevant option given the proximity of n_S to a level exhausting the firm's intakes at any particular point in time, under socialism. In principle this option would have implied a move to the North of S.

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[10] The boundaries of the area Pareto-superior to S are the actual iso-profit curve, the demand curve, and a horizontal line at height w_s.

A common corrolary of the more relevant scenarios of pure worker control, profit-maximising managerial control - or a mixture of the two – is that the reforms bring about labour shedding without any external market impetus. The degree to which employment cuts are accompanied by wage increase depends on the nature of decision-making. Similarly, expectations concerning profits are uncertain but the guess is that even under strong worker influence profits do not change considerably.

The aim of the following empirical analysis is to identify typical paths on the wage-employment plane between 1986 and 1989, that is, to assess how output, employment, wages and profits were changing, and how they related to each other. There are two important details to be adressed before starting the analysis.

The first point is connected with the nature of labour shedding. If workers are fired on a non-random basis the observable outcome of the adjustment process is affected in two ways. On the one hand, productivity-based selection weakens the link between employment change and output change since the dismissal of the least productive workers has a minor impact on output. On the other hand, by shedding the least productive workers the firm's staff changes in favour of the more qualified and more experienced workers. The average wage increases for that reason but we can not take it for granted that the remaining workers are better paid. The wage gain from labour shedding can only be measured by the evolution of residual wages, that is, wages controlled for demographic and human capital variables. This problem will be addressed in *Section 4*.

A second difficulty is raised by the fact that personal income taxation, started in 1988 in Hungary, introduced a wedge between the dynamics of gross and net wages. In the paper we shall deal with *gross* relative wages and their relation to output, employment and profit. *Appendix 4* discusses some problems potentially stemming from this choice.

Keeping these warnings in mind the following sections will analyse the path of firms in three steps. First we look at the typical path in terms of output, employment and wages by estimating a model of simultaneous employment and wage setting. Second, residual wages and their relation to labour shedding will be analysed in order to check whether the observed link between average wages and labour shedding is real or spurious. Finally, we relate profit change to employment and wage change in order to capture the impact of downsizing on employers.

3. Data

The data come from an enterprise panel covering 2666 firms observed in both 1986 and 1989 in the framework of the Wage Survey of the National Labour Centre of Hungary. The firms are randomly selected. The sample covers 51.7% of firms employing more than 20 workers in 1986. The firms in the sample employed 68.1% of all workers in the respective size categories. In addition to enterprise-level information the records comprise individual data of a 10% random sample of workers in 1986 as well as in 1989 (but the persons interviewed are not identifyable across waves). The individual data will be used to draw residual wages. The samples are described in detail in *Kertesi* and *Köllõ* [1995].

Unfortunately, enterprises involved in spin-offs, dismantling, mergers or any other change affecting their legal personality (and hence their identification code) are automatically excluded from a longitudinal sample. This restriction is severe in an economy where thousands of firms dismantle or merge with others in search of more efficient organizational forms, in order to seek rents, avoid taxes or hide from the eyes of creditors. From the 4032 firms observed in 1986 we could follow 3250 over the period 1986-89, and a further 584 had to be excluded because their data were strongly biased by changes of corporate structure.[11]

4. Results

Output, employment and wages

As shown in *Table 2* the output of the median firm did not change between 1986 and 1989 but it cut employment by more than 20 per cent. The employment cuts were virtually equal at firms with falling and rising output. At first glance employment seems uncorrelated with sales performance but wages appear to differ in expanding and contracting firms.

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[11] The methods of data cleaning are presented in *Köllõ* [1996].

Table 2. The median of basic variables in 1989 (1986=100)

Median:	All firms (N=2666)	Firms with falling output (N=1334)	Firms with rising output (N=1332)
Output*	99.0	80.6	125.7
Employment	78.4	76.7	80.1
Real wage*	131.2	124.1	138.2

*Deflated with the branch-level producer price index

For obtaining more informative results we estimate a model of simultaneous employment and wage setting (1):

(1) $\quad \Delta \log n = b_{11} \cdot \Delta \log q + b_{12} \cdot \Delta \log (w/p) + b_{13} \cdot \underline{X} + e_1$

$\quad \Delta \log w = b_{21} \Delta \log(q/n) + b_{22} \log(p) + b_{23} \underline{Z} + e_2$

where p is the producer price index , q is output (sales revenues net of material cost, deflated with p) and $\underline{X}$ and $\underline{Z}$ are vectors of control variables. q, p, $\underline{X}$, $\underline{Z}$ are exogeneous. Delta refers to change between 1986 and 1989. Estimations of (1) and related calculations are available for a similar enterprise panel from 1989–92 in *Köllõ* [1996], therefore we have the possibility to compare the results from the late eighties with ones coming from the times of transition.

The elasticity of employment to output estimated from (1) is 0.19. This figure compared to a similar estimate from 1989–92 (0.35) seems rather low, supportive of the conjecture that the sudden change of employer behavior was a result of institutional change rather than of market pressures.

The rate of job destruction was highest in the medium size category: large firms (employing more than 1000 workers) had a 12.5 per cent higher level of employment than had medium sized firms, in 1989 relative to 1986, other things equal. This outcome also seems consistent with the framework developed earlier. While the state held important positions in the Enterprise Councils of large firms (and kept some large firms under direct ministry control) the transferring of managing rights to the enterprise was fully completed in the case of medium-sized firms. Therefore more severe employment cuts are expected here than at large firms (or small ones where the management had a higher degree of freedom even before).

The employment equations of *Table 3* suggest strong trade-off between wages and employment: a one per cent higher rate of change of the average wage appears to reduce employment by more than a half per cent. (The causation can be reversed as the equation was normalized for employment by choice). The parameter (-0.56) is three times as high as in 1989–92
(-0.17). Though the intepretation of this coefficient can be a matter of debate, in the particular case of the pre-transition firm assuming direct linkage between the reduction of employment and fast-growing average wages is supported by at least two arguments. Firms with an accumulated stock of low-productivity jobs could downsize employment without a major effect on output (and hence with a positive effect on productivity and wages). In addition they could choose to cut both output and employment with the very aim to achive higher wages, as was discussed in *Section 1*.

Table 3. Estimation of employment and wage adjustment
(Model (1), two-stage least squares regression)

Employment equation			Wage equation		
	Coeff.	(t)		Coeff	(t)
Output	0.190	18.7	Productivity	0.060	6.2
Real wage	-0.564	-11.9	Price index	0.064	1.7
Exporter (Rbl)	-0.006	-0.5	Ratio of manual workers (log)	- 0.068	-7.0
Exporter ($)	0.082	7.2	100% non-manual	0.086	0.6
Small firm (<100)	0.087	2.8			
Large firm (>1000)	0.125	12.3			
Constant	-0.197	-15.4	Constant	0.790	17.2
aR^2 , N	0.365	2666		0.092	2666

The wage equation in *Table 3* suggests relatively week connection – an elasticity of 0.06 – between wages and productivity (or the branch-specific price index). It might be added that by regressing the producer real

wage on productivity in a univariate model we get a far higher elasticity of 0.2. This is consistent with the finding of a highly significant trade-off between employment and wages because the parameter of the univariate estimation combines the effect of a 'sharing rule' (higher productivity leads to higher wage) with a feedback effect (that leads from higher wages to lower employment at given sales revenues, hence to higher productivity and back to wages).

The first results suggest that the typical Hungarian firm substantially reduced employment between 1986 and 1989; employment cuts were loosely related to sales performance; and more labour shedding was associated with higher wage increase. However, the wage gains from labour shedding indicated by model (1) may be spurious, calling for the study of residual wages.

Residual wages

Residual wages are obtained from Mincer-type earnings functions estimated for 1986 and 1989 using the individual data of workers employed in the firms under examination (The equations are presented in *Appendix 2*). We calculate the error terms of the equations, take enterprise means, and study how they relate to other indicators of the firm. In case the finding is that more labour shedding between 1986 and 1989 was associated with a rise of the residual wage, at given sales dynamics, we have more reason to believe that the jobs of fired workers were traded off for higher wages paid to the remaining insiders.[12]

The calculations are restricted to firms employing at least 500 workers in both 1986 and 1989 and thus providing a sample of 50 or more workers for the Wage Survey (where the sampling quota is roughly 10%).

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[12] Deviations from predicted wages may reflect a series of unobserved factors like work intensity, polluted workplace, or the risk of corruption but they can also hint at rents paid above (or below) the market level of wages. The equalizing differentials probably do not change considerably over a relatively short period of time but the rents are certainly more variable and are expected to respond to changes of the average product.

Table 4. The effect of output change and employment change on average wages and average residual wages (Ordinary least squares regressions)

Dependent	w89		r89	
	Coeff.	(t)	Coeff.	(t)
Lagged term (w86, r86)	0.998	31.1	0.634	18.1
Change of output	0.200	14.2	0.071	5.1
Change of employment	-0.494	32.9	-0.038	3.8
Constant	0.162	0.6	-0.025	4.1

Wage equation: $aR^2 = 0.5993$, F=643.9 (.0000), Nobs=1164
Residual wage equation: $aR^2 = 0.2352$, F=120.22 (.0000), Nobs=1164

Table 4 presents two wage equations. In the first column the average wage in 1989 (w89) is regressed on a lagged term (w86), change of output, and change of employment. In the second column the average wage figures are replaced for the residual wage figures (r89, r86). All variables are in logs.

In the equations the lagged terms have been used as indicators for the change in the effect of ignored variables - the closer their coefficients to 1, the less these relationships changed. In the wage equation the parameter is close to 1 suggesting that the ignored wage effects were rather stable. In the residual wage equation the coefficient is far lower than unity, indicating that some unobserved reasons leading to positive or negative deviations from 'expected' earnings may have changed during the period.

The effect of both output and employment is markedly stronger in the average wage equation. The coefficients of the employment terms bear special importance from our point of view: they appear to be negative and significant in both equations.

It seems that more labour shedding at given output led to higher wages indeed, even after allowing for changes in the staff's composition, but this effect was actually very weak. Evaluating the outcome at the mean change of sales and two relevant points of employment change (one standard deviation range around the mean) gives the following results. Cutting employment by 2% had no effect on the residual wage; cutting jobs by 47% induced a 2.4% residual wage increase. Undoubtedly, two and a half per cent is a very small gain from shedding half of the firm's staff, raising doubts whether labour shedding was indeed beneficial for the incumbent workers.

Table 5. Output and employment in four quartiles of residual wage change

	Quartiles of residual wage change		
Median 1989/Median 1986	Lowest	2. and 3.	Highest
Output	0.96	0.97	1.07
Employment	0.77	0.82	0.80
Mean errors in the quartiles:			
Mean error 1986	.038	-.003	-.031
Mean error 1989	-.121	-.009	.130

Note: Firms employing more than 500 workers

We may reverse the question, however, and ask how the actual wage gains emerged. *Table 5*. gives median figures of output and employment in the quartiles of residual wage change. The data suggest that in the firms where residual wages grew fast employment decreased substantially (in line with other groups) while output exceeded its 1986 level by 7%.

The conclusions encouraged by the evidence in this section might be summarized in two statements. First, it seems that in many cases the increase of the average wage (associated with massive labour shedding) covered no more than the rising cost of labour due to its improving quality. Second, we nevertheless observe that the typical firm gaining in terms of residual wages eliminated a relatively large proportion of its jobs despite a minor growth of its output.

It should be added that by restricting the analysis to a longitudinal sample of large firms we certainly underestimate the importance of downsizing – as a source of wage gains – in the economy. The dissolution of large state firms often took the form of spin-offs, cases when smaller groups of managers and core workers shifted assets from the master enterprise to new firms and set higher-than-average wages (financed from higher *labour* productivity)

Profits

For a brief overview of how profits were affected by downsizing we grouped the enterprises into quintiles by change of employment and change of the real product wage and looked at profit change in these groups. The

change of the profit rate in a cell is affected by the relation of productivity change and wage change. We are particularly interested in the question whether the productivity gains associated with large-scale labour shedding could cover the rapid growth of wages at downsizing firms.

To reduce the disturbances caused by industry and price effects the deviation of the observed profit change from its predicted value was used as a success indicator of employers. The prediction was calculated from a model regressing the percentage change of the profit rate on the producer price index, output change, and dummies for exporters and one-digit industries (*Appendix 3*). The residual profit change obtained in this way is expected to respond to firm-level decisions, concerning employment and wages, more than does the raw variable. *Table 6* shows the mean change of the residual profit and the number of firms in each cell. (In the calculation of the mean firms were weighted with employment in the base year.)

The cells where profits grew, or decreased by less than 1%, are separated from the others by a winding line in *Table 1*. The impression is that large-scale downsizing was associated with relatively favourable profit records. (Cells left of the line). It seems that the major source of profit squeeze was the *lack* of downsizing, especially when it was accompanied by above-the-average wage growth.

Table 6. Percentage change of the residual profit/sales ratio: Weighted group means by change of employment and change of the real product wage. (Number of firms in paranthesis)

Quintiles by change of wage:	Quintiles by change of employment:					
	1	2	3	4	5	Wage 1989/86
1	-1.02 (246)	-2.97 (96)	-5.18 (69)	-3.18 (57)	-1.67 (66)	1.70
2	-0.41 (101)	-1.68 (117)	-2.78 (105)	-3.71 (109)	-1.50 (101)	1.40
3	1.90 (72)	-0.74 (109)	-1.36 (132)	-2.16 (99)	-1.69 (121)	1.30
4	2.70 (59)	2.01 (103)	-0.94 (118)	-2.24 (136)	-1.14 (117)	1.19
5	4.33 (56)	1.81 (108)	0.20 (109)	-1.61 (132)	0.14 (128)	1.02
Employment 1989/86	0.53	0.71	0.80	0.88	1.00	N=2666

The firms in the upper left cell are particularly interesting from the perspective of the discussion. These enterprises cut the number of jobs by almost 50% and increased the average wage by 70 per cent between 1986 and 1989. The number of firms in the group is large, 246 as opposed to an expected frequency of 107. Despite the fast wage growth characteristic of the group, profits decreased by only 1.02 percentage points, which appears to be a minor fall compared to the average.

The test applied here is undoubtedly elementary but, perhaps, allows the conclusion that contracting firms had relatively favourable profit records. While it is true that large-scale labour shedding tended to induce a rise in the average cost of labour, and sometimes was associated with growing residual wages, it seems that the rising average product of labour could generally accomodate the wage increment.

5. Conclusions

The immediate pre-transition years do not give the impression of a motionless world waiting for the 'big bang'. Actually, the firm-level and individual data suggest substantial changes of employment and wages. The transformation of the labour market definitely started several years before the political collapse of state socialism in Hungary.

The paper attributed massive labour shedding to institutional reforms rather than market-related shocks, arguing that the elimination of labour hoarding on the one hand, and a move to the West from the starting wage-employment combination on the other, was in the interest of workers, managers, or both parties.

The nature of downsizing (in terms of profit change and wage change) is a question to be addressed in empirical research. A short panel of Hungarian enterprises from 1989/86 suggested massive labour shedding that was rather loosely correlated with output. Average wages grew faster in firms shedding a larger proportion of their staff but we found that a large part of the resulting productivity gain was actually used to finance the growing average cost of a smaller (and better) labour force. Worker's gains from labour shedding were relatively modest (albeit positive). Huge residual wage gains were nevertheless achieved in firms where severe employment cuts occured despite a (minor) growth of output. We observed minor impact on profits: it seemed that the returns from downsizing could generally finance the growth of wage cost.

These observations seem to support the conclusion that the elimination of labour hoarding had been started already before 1990 and the bias towards high employment and low wages, characteristic of the state socialist regime, was to some extent corrected in the pre-transition period. Workers remaining in employment gained rather than lost from labour shedding while firms did not lose in terms of profitability (or they lost for reasons other than employment and wage adjustment). The loss of workers pushed out of employment belongs to the full picture and waits for deeper research in the future.

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Appendix 1

The second derivative of the iso-profit curve yields a condition of concavity:

$$R'' < 2(R'-R/n)/n$$

that is difficult to evaluate. We argue that at levels of n where the marginal product is significantly higher than zero the iso-profit curve is concave. We show it for the case of the zero-profit curve.

Let n be an employment level above the efficient point. Along the zero-profit curve the wage is set so that w= R(n)/n. Concavity implies that:

(1) w(n+1)-w(n)<w(n)-w(n-1)

that is:

(2) R(n+1) /(n+1) + R(n-1)/(n-1) < 2R(n)/n

We can rewrite (2) as:

(3) [n/(n+1)]R(n+1) + [n/(n-1)]R(n-1) < 2R(n).

The concavity of R implies that:

(4) [n/(n+1)]R(n+1) + [1-n/(n+1)]R(n-1) < R(n).

If it is true that:

(5) { n/(n-1) - [1-n/(n+1)] }R(n-1) < R(n)

then (3) will hold. By rewriting (5) we get (6) as a conditon of concavity:

(6) $(n^2+1)/(n^2-1) < R(n)/R(n-1)$.

Consider firms with 10, 100,...,1000 employees. Adding one worker to the staff implies a percentage change of 10%, 1% and 0.1% respectively. The critical values $(n^2+1)/(n^2-1)$ are 1.02, 1.0002,..., 1.000002. It follows that unless an 1% change of employment implies less than 0.2%, 0.002%, ... , 0.0002% change in output, (6) holds and we are at the concave region of the iso-profit curve.

Appendix 2

Earnings functions for 1986 and 1989

Model: Ordinary least squares regressions. Sample: Workers in the 2666 firms in the panel. Dependent: log gross monthly earnings 1986, 1989

	1986		1989	
	Coeff.	t-value	Coeff.	t-value
Gender= Male	0.298	138.3	0.311	121.2
Age	0.038	66.6	0.040	58.9
Age squared (/00)	-0.037	-52.4	-0.040	-46.1
Education*:				
Less than completed primary	-0.084	-52.4	-0.059	-13.9
Vocational manual	0.083	33.4	0.079	27.1
Secondary	0.090	30.2	0.110	30.7
Higher	0.274	50.2	0.381	60.1
Job category*:				
Non-manual	0.092	30.2	0.178	50.2
Manager	0.544	53.0	0.831	72.3
Region dummies (16 regions)	yes		yes	
Industry dummies (36 branches)	yes		yes	
Constant	7.684		8.022	
aR2, Nobs:	0.4377	88,089	0.4392	87,747

* Reference categories for education and job category are primary school; manual job

Appendix 3

Estimation of profit change in 1986–89
Ordinary least squares regressions

Dependent: Percentage change of profit/sales	Coeff.	(t)
Producer price index	9.909	3.3
Output 1989/86	1.199	8.8
Rubel exporter (1986)	-1.271	2.9
Dollar exporter (1986)	-0.623	1.5
One digit industry dummies	yes	27.2
Constant	-18.959	5.1

aR^2: 0.1114, F = 34.4 (0.0000), Root MSE: 7.66. F-test for the joint significance of industry dummies. Nobs=2666

Appendix 4
On the effect of the personal income tax on labour demand

Preceeding the introduction of the personal income tax in 1988 taxes were charged on various components of the firm's revenues and expenditures. It is difficult, if not impossible, to tell how the tax burden on the factors of production (on their costs and revenues) actually changed as a result of PIT.

Since PIT is a highly progressive tax, the prior is that its introduction induced particularly fast growth of the labour cost in high-wage firms. The expectation therefore is that the higher was a firm's wage level in 1986 the lower was its demand for labour in 1989, other things equal.

If it were indeed the case we would have a simple alternative explanation for massive job destruction before the transition: the introduction of PIT increased the cost of labour and led to a drop of labour demand. The link between output and employment was weak because demand primarily fell where *wages* were high in the base period.

At this point we present evidence suggesting that the effect of PIT on labour demand was probably weak. A possible explanation for that is that higher wages were associated with higher taxes already before the introduction of PIT. Therefore the change in the relative cost of labour was not as dramatic as suggested by the explicit tax rules.

Employment equation (OLS)
Dependent: Employment 1989/86 (log)

	Coeff.	t-value
Output 1989/86 (log)	0.211	23.2
Net wage cost 1989/86 (log)	-0.769	29.9
Average wage 1986 (log)	0.001	0.1
Rouble exporter	0.009	0.7
Dollar exporter	0.043	3.9
One digit sector dummies	yes	
aR^2	0.4055	
F (11, 2654)	164.6	
Nobs	2666	

The first statement is tested by means of a labour demand equation regressing employment on output, net real wage cost (change of the net wage inflated with the branch-level producer price index), controls, and the

1986 level of the average wage.[13] This variable is intended to capture the effect of PIT under the assumption that labour cost grew faster where w^{86} was higher, holding the change of the net wage constant.

The results in *Table A3* suggest no statistically significant difference between low-wage and high-wage firms in terms of employment dynamics between 1986 and 1989. A possible reason is that higher wages implied higher taxes already before 1988. This conjecture is supported by the following figures showing *total outlays for wages and taxes* (net wages plus taxes per employee in 1986, gross wages plus taxes in 1989) as a function of *net wages*. (Gross and net were equal by definition in 1986). It is apparent that taxes were increasing in net wages, already in 1986, though their linkage became undoubtedly stronger by 1989. This is shown by the fitted curves and their estimated slopes b=1.23 in 1986 and b=1.51 in 1989.

Wages plus taxes per employee as a function of net wages in 1986 and 1989
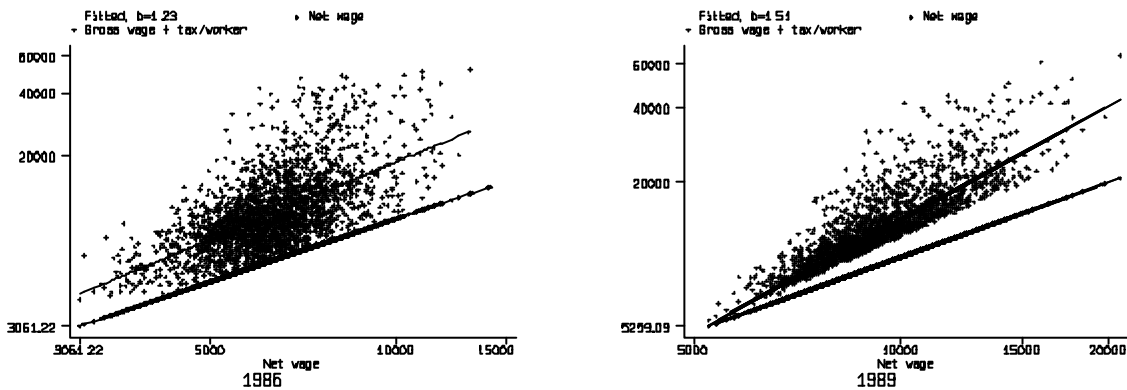
These findings suggest several conclusions. We probably make no serious mistake by ignoring the effect of PIT (or of base-period wage levels) on the dynamics of employment. It should be kept in mind, nevertheless, that the growth of take-home pay lagged behind the growth of labour cost substiantally between 1986 and 1989. Our estimations allow the study of worker's share, or the relative wage gains and losses of various groups. However, *relative* wage gains can actually mean a loss in *absolute* terms.

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[13] The net average wage figure was drawn by 'taxing' the gross average wage, figure using the parameters of the 1989 personal income tax. The calculation is admittedly rough.