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Wages, Employment and Incentives in the Public Sector in Hungary

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Wages, Employment and Incentives in the Public Sector in Hungary

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WAGES, EMPLOYMENT AND INCENTIVES IN THE PUBLIC SECTOR IN HUNGARY*

GÁBOR KÉZDI

The paper analyzes the changes in the relative labor market position of the public sector employees, using both macro-level employment statistics and large wage surveys. While competitive employment decreased by more than 30 per cent during the transition, number of public employees have not change a lot, so a very large public employment ratio was reached in 1995. Due to obvious budget reasons, these trends led to dramatic decreases in relative public sector salaries, within comparable groups. For some occupation groups, unmeasured but not illegal differences can compensate for earnings losses, but the ratio of these employees does not seem to be significant. The widening of private-public salary gap could have than two major effects: increasing ratio of less qualified employees in public institutions and/or major role of illegal benefits in workers' compensation. As none of these results are favorable from social perspective, public sector reform should consider significant changes in public employment incentives.

The study analyses observable trends of employment and salaries in the public sector in Hungary. Instead of investigating the situation of employees in institutions having 'public' functions (providing public goods, regulating social activity, etc.) or financed from public sources, we focus our analysis on some definite branches: public administration, health and education. It is worth noting that a part of public employment are involved in other areas, such as research or cultural activities. Functional distinction cannot be made between private and public institutions in these

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branches, so data concerning them are not reliable enough. In the 1990s, the uncovered branches contain around 10 percent of total public employment. Another problem arises about employees in justice, prosecution, police and armed forces, because published Hungarian statistics and wage surveys do not provide appropriate data concerning these branches. Employees in justice and prosecution are included in 'public administration' in the following analysis. Employees in police and armed forces are also included in 'public administration' in aggregate statistics (consisting at least a half of employment in it), but the absolute lack of data prevents us from investigating their salary position.

In the following analysis, the adjective 'private' or 'competitive' indicates the non-public sector of the economy. It is clear, however, that at the beginning of the transition private firms did not play a major role in the economy. Also the magnitude of monopoly structures questions the appropriate use of word 'competitive'. In the socialist system, the labour demand of the whole economy was much more similar to that of the current public sector than to patterns of capitalist input demand. From labour market point of view, transition itself means the evolution of labor demand patterns of profit-oriented firms. For the sake of simplicity, however we will denote 'private' or 'competitive' sector the rest of the economy (without public administration, helath and education), in the socialist system as well.

The study consists of two major parts. The first part reveals the trends in public employment in Hungary, and tries to provide some comparisons with other Central European transition economies. The second part consists of a description and an analysis of salary changes in the public sector. At the end we try to draw some important conclusions concerning incentive issues.

Employment in public sector in Hungary

The following data provide information on public sector employment in Hungary: changes in the absolute numbers and ratios, and some international comparisons. The published statistics are sometimes inconsistent. This way a careful approach is needed. We have found EC [1992] and EC [1995] the most reliable and appropriate sources for our purposes. The major problems are the followings. First, police, armed forces, prosecution and justice employment is included into 'public

administration'. Second, pre-transitional public employment data should not be compared directly to 1990-95 statistics, because of definition and coverage differences.

Table 1. Public sector employment in Hungary, 1985-1995, selected years

	1985	1989	1992	1995
Public administration	227	258	311	316
Health & education	573	637	548	568
Public sector	800	895	859	884
Private sector	4 103	3 914	3 237	2 780
SUM	4 903	4 809	4 096	3 664

Public sector (public administration, health and education) employment rose by ten per cent from 1985 to 1995, while private sector employment fell by 32 per cent in the same period. The consequences of these trends to the ratio of public employment are summed up in the next table.

Table 2. Public sector employment in Hungary, as percentage of total employment, 1985–1995

Year	Public administration	Health & education	Public sector total
1985[a]	4.6	11.7	16.3
1986	n.a.	n.a.	n.a.
1987	n.a.	n.a.	n.a.
1988	n.a.	n.a.	n.a.
1989[a]	7.5	14.4	21.9
1990	5.9	13.0	19.0
1991	6.2	13.7	19.9
1992	7.6	13.4	21.0
1993	7.8	15.3	23.1
1994	8.6	15.4	24.0
1995	8.6	15.5	24.1

[a] Employment data for 1985 and 1989 are not directly comparable with those from 1990.

Stagnant public and declining private employment led to a significant increase in public employment ratio, from 19 per cent in 1990 to 24 per

cent in 1995. The increase between 1985 and 1989 is of the same magnitude (from 16 to 22 per cent), but can be attributed to an increase in public, and a decrease in private employment. The end of the 1980s experienced the start of the transition in private labour demand (see *Köllõ*, [1997]) and in the same time, an increase in the role of public sectors. As we will see, the same strengthening public position can be observed in relative salaries in the last years of socialist system.

Next table provides international comparison for the rates of employment in public sectors focusing on Central and Eastern Europe. Fortunately, comparable data are available for most of the relevant countries (i.e. for those in more or less similar to Hungary, concerning the state of transition). Unfortunately, comparison can be made only for the middle-1990s, this way the roots of differences can not be evaluated directly. Two type of indicators are considered: the ratio of public employment to the total population of the country can be viewed as a rough approximation to the output of the branch (how many people are seved by civil servants); while the ratio to the total employment cen be viewed as a rough approximation to the input of the branch (how many private employees finance the civil servants' work).

Table 3. Public sector employment in Central and Eastern Europe, 1995

Country	Public employment / Population			Public employment/ Total employment
	Public administration	Health & education	Public sector total	
Hungary	3.1	5.5	8.6	24.1
Slovakia	2.5	5.9	8.4	21.1
Czech R.	2.6	5.7	8.3	17.6
Poland	1.8	5.0	6.8	17.6
Romania	2.5	3.4	5.9	12.1

Employment data: 2nd quarter of 1995. Population data: 1994.
Source: EC, [1995]

Among Central and Eastern European countries, Hungary has the largest public sector, from both output and input viewpoints. The size of Hungarian public administration is by far the largest, and that of health and education is also among the largests. However, the picture from the "output" viewpoint is more homogenous, as Hungary, the Czech Republic and Slovakia have very close ratios. Concerning input (financial) issues, Hungary seems to face a much more serious problem than the others.

(Differences in the two types of indicators can be attributed to differences in total employment deterioration, so industry restructuring can move the states of the former Czechoslovakia closer to the Hungarian trouble.)

Ratio of public sector to total employment is close to one fourth in Hungary, (only Slovakia follows it with more than 20 per cent), while relative public employment is more than one-fourth less in the Czech Republic and Poland. While appropriate data are not available for the preceding years, incomplete and distorted information show that at the end of the 1980s, relative positions could not be significantly different to those observed in 1995 (*EC* [1992]).

The cross-country figures and the end of our time series represent the 1995 second quarter positions, the last ‘minutes’ before the introduction of Hungarian public sector reform measures. However, these measures did not result in significant changes in the number of employees during 1995, and only health and education experienced a major (ten per cent) employment loss in 1996 (see *World Bank*, [1997]).

Public sector earnings in Hungary

In the second part, we investigate the trends of salaries in public sector. Like in the first part, we restrict our analysis to public administration, health and education. We treat public (that is, primary and secondary) education and higher education as distinct branches because of the differences in their observed trends. While the most important changes are common, large differences can be found at several points in the story of these four branches.

Data of large cross-sectional surveys on employees’ wage, other salary components, gender, age, education level and occupation are used in our analysis. Six databases (‘wage tariff surveys’) are available, between 1986 and 1996. The data were collected by National Labour Center (Országos Munkaügyi Központ) and contain 150–600 thousand individual observations from middle and large firms and institutions (employing ten or more people). Detailed description of these databases, correction procedures for sampling distortions, and statistics for the whole samples are published by *Kertesi* and *Köllõ* [1995].

During our investigations, we concentrate on total salaries rather than monthly wages to explore the trends in total work compensation. Of course,

non-monetary compensations can play a very important role in compensation, and their magnitude can show large differences in public and private sectors. Only speculative arguments can be used for estimating their effects, because no data can be found on them. We will return to this question at the interpretation of observed trends, but in the following section measurable trends are to be analyzed.

We concentrate on the story of the whole transition, so detailed analysis is evaluated for 1986–1996 differences. Of course, this strategy leads to large simplifications, since the transition process produces many short-term changes. At the same time, results of the whole period are better captured by comparisons of two, more or less stable points at the two ends of the period. In addition, statistical institutions were not exceptions from the institutional changes so their services are more reliable for the more stable states of the economy.

However, it is useful to follow the year-to-year general changes. Let us glance at the average earnings trends of the public sectors.

Table 4. Real salary[a] dynamics, 1986=100

	1986	1989	1992	1994	1995	1996
Public administration	100	124	117	123	113	94
Public education	100	112	104	112	93	85
Higher education	100	128	107	119	102	93
Health services	100	113	102	111	91	86
Private sector	100	109	104	113	100	98
Employees, total	100	110	104	114	99	96

[a] Total work compensations, deflated by average CPI.

On the eve of political transition, public sector earnings rose substantially (12–28 per cent real growth), while the rest of the economy faced a more modest increase (9 per cent). Relative positions of public sectors remained surprisingly stable after 1989: the 1989–1996 decrease in the higher education was 27 percent, and the other three public sectors all experienced a 24 per cent loss. In contrary with trends within public sector, salaries show different path after 1989 if we look at public-private differences. The following table contains direct comparisons:

Table 5. Public-private earnings comparisons
(private sector=100)

	1986	1989	1992	1994	1995	1996
Public administration	101	114	113	109	113	96
Public education	94	96	94	92	88	81
Higher education	104	121	107	109	107	99
Health services	92	95	90	89	83	80

Transition itself produced serious devaluation of public wages, compared to private ones. The trend was continuous for the whole period (with the exception of temporary gains in public administration in 1995), and in public education and health services it was smooth as well. Employees in public administration and higher education were more successful in keeping their position until 1995, but in 1996 their 1989 relative positions were reestablished.

The overall figures, however, hide very different employment structures. Public administration, education and health services are all human capital intensive sectors, relative to the competitive branches of the economy. In addition, transition resulted a robust growth in returns to human capital in the whole economy: the ratio of average earnings in the upper (at least college) and median education level (vocational school) raised from 146 percent in 1986 to 220 percent in 1996. Measuring human capital is not without serious problems, and using education level is only the simplest but not obviously the best solution. Human capital acquired at the workplace (learning-by doing or on-the-job training), different human capital depreciation paths in education categories, or different returns in different occupations cannot be captured by education level. For our purposes, this very simple solution can also be satisfying as it can reveal the basic differences in trends for the whole economy and for the public sector.[1] The following table contains the above public-private comparisons, but instead of providing whole sector averages, the comparisons are given for comparable educational level groups. In addition, figures 1-4 reveal the qualitative characteristics of the trends.

[1] One-way analysis of variances within the sectors show that in the private sector 25–30, and in the public sectors 30–75 per cent of total sum of squares of earnings can be attributed to variation between simple three-class schooling level categories.

Table 6. Public-private earnings comparisons, by education level (private sector=100)

Sector	1986			1996		
	0-11 classes	secon-dary	higher	0-11 classes	secon-dary	higher
Public administration	73	88	90	76	84	63
Public education	70	84	75	65	63	42
Higher education	80	87	77	71	61	53
Health services	80	80	98	78	70	55

Figures 1-4: Time series of public/private earnings ratios, by schooling level categories

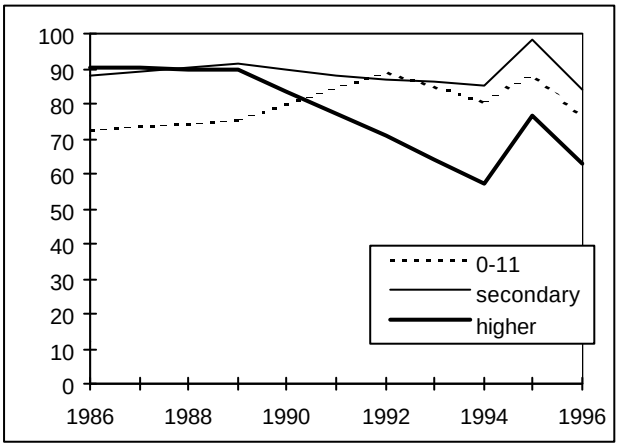

Figure 1: Public administration

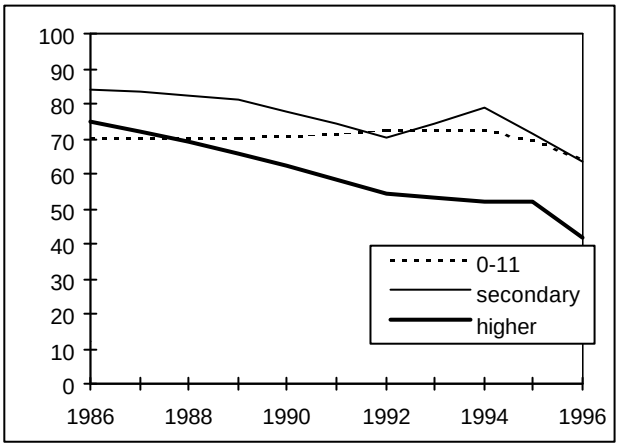

Figure 2: Public education

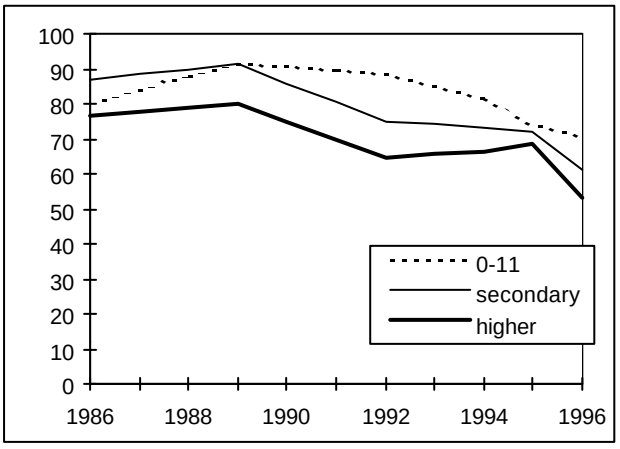

Figure 3: Higher education

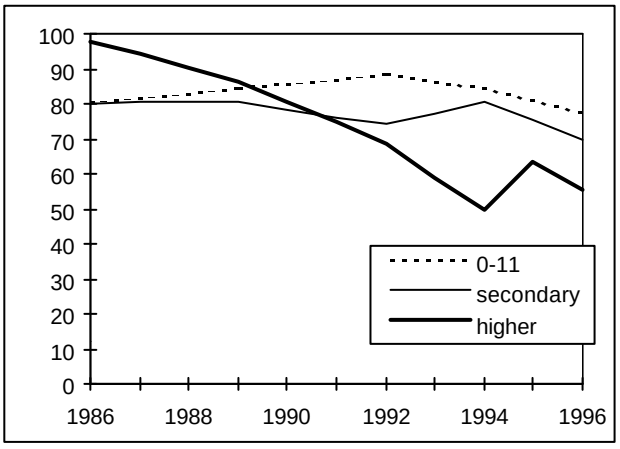

Figure 4: Health servides

The processes that led to the observed changes in sector averages were the results of trends in returns to human capital and of education level composition changes. The serious depreciation of public sector-related human capital, relative to the competitive sector (see *Table 6* and *Figures 1-4*) should have resulted in larger decline of public sector average earnings than the observed one. The trends that interfered with the effects of the above mentionned processes have to be a subject of a more detailed analysis.

The effect of changes in human capital composition and earnings can be separated by a simple decomposition model (see *Annex*). The change in public-private average wage difference can be attributed to four distinct components, each measuring 'ceteris paribus' effects of structural and relative changes in earnings[2]. First, the *overall growth in returns to human capital* would have raised the average earnings in public sectors relative to the rest of the economy since public employment is far more human capital intensive. Second, only *overall changes in human capital stock* in the economy (that is, changes in the composition of the employees resulted by demographic trends and massive unemployment of less educated in the competitive sector), would have moderate effect on inter-sector earnings differences, because these trends have not changed significantly the human capital stock of the economy in comparison to the inter-sector differences. Third, *public-private differences in returns to human capital* would have, ceteris paribus, widen far more the observed average earnings gap. And fourth, *changes in human capital composition differences*, alone, would have raised the public administration-private sector difference, because of the shift towards less educated categories in the administration, but

[2] Traditionally, regression models are evaluated for ceteris paribus economic investigations. However, *Kertesi* and *Köllõ* [1995] estimated earnings functions with large numbers of significant right-hand-side variables, and even their extensive specifications failed at the reset test of omitted variables. In addition, their specifications robustly faile at parameter-stability tests. For example, separating the samples (or the sector-specific subsamples) into categories by gender gives Wald's Chi^2 = 30911 for 1986 and 5591 for 1996. Structural problems indicate that a large number of cross-product right-hand side variables should be added to the basic specifications to deal with interaction effects. It is clear, that our simple method suffers from even larger hidden composition ant interaction effects, but it does not seem to be possible to get rid of these effects and avoid complications in interpretation. As indicated in footnote 4 and by the following results as well, our simple methode provides robust results for our purposes and gives a clear background for incentive conclusions.

somewhat lower the gap for the other three public sectors, because of reverse trends.

Table 7. Results of the simple decomposition model: Ceteris paribus human capital related changes in public-private real earnings differences (measured in pctage of 1986 competitive earnings), between 1986 and 1996

Public sector	Average effects, in the percentage of relative total earnings difference changes[a]				Relative total earnings diffe-rence changes[a]
	Overall changes in HC returns	Overall changes in HC stock	Sector specific changes in HC returns	Sector specific changes in HC stock	
Public administration	24	0	-19	-11	-6
Public education	29	-6	-45	6	-16
Higher education	28	-1	-29	-2	-4
Health services	10	-2	-24	-1	-16

[a] Measured as the ratio of total real earnings difference change and 1986 competitive average earnings.

Human capital produced the lowest returns in public education in 1986, and it has suffered the largest depreciation as well. The 45 per cent loss decreased the public education - private sector salary rates from 75 to 42 per cent among the most educated from 1986 to 1996, but this trend was balanced in two thirds by the overall rise in returns to human capital. In other words, while most educated employees in private branches earned 1.6 times more than the economy average in 1986 and 2.5 in 1996, primary and secondary school teachers experienced a decline from 1.2 to 1.04. The effects of human capital stock changes indicate that the composition in public education has changed just like the average, so the observed 16 per cent point widening of private sectors-public education earnings gap can be attributed fully to relative devaluation of teachers' human capital.

The same is true for health services. Physicians earned 56 per cent more than the average in 1986, and this difference declined to 38 per cent in 1996, while lower educated medical employees earned 85 per cent of the average in 1986 and 80 per cent in 1996. The gap widened significantly, from 8 to 20 per cent between health services and competitive sectors, and this mainly resulted from the devaluation of physicians' activity.

Processes in higher education are different. The least observed decrease of relative average earnings among public sectors can be attributed to the fact that college and university teachers' salaries fell behind the most educated employees in private sector, but did not fell behind the economy average: they earned 1.2 times more than the average Hungarian employee in 1986, while this ratio was 1.3 in 1996.

The story is almost the same for public administration where changes in returns to education level would have somewhat decrease the average public-private earnings gap. But, interestingly enough, significant shifts can be observed in human capital composition of the sector: ratio of higher educated employees fell from 31 to 26 per cent, with a similar decrease in high school-level educated employment. This change led to the 6 per cent widening of average earnings gap.

Teachers in higher education and educated employees in public administration are closer substitutes for private sector employment than public school teachers or physicians. In competitive environment, this fact would result in narrower earnings gap for the former – and our findings are partly consistent width this prediction. Public-private salary differences were three times bigger for primary and secondary school teachers and for physicians, in absolute value, compared to educated employees in public administration or higher education. While higher educated public sector employees suffered a huge loss in their earnings position, the same is not true for less educated groups (or, for public and higher education, their loss was less significant), see *Table 6.* This fact also supports our interpretation, since sector-specific human capital can play a minor role in the case less educated employees' (e.g. administrative or maintenance occupations) productivity. If we think that transition led to a closer relationship between productivity and earnings in the private sector, the above mentioned trends can be interpreted as the revelation of substitution relations among occupations. The immediate consequence of this interpretation is that that these processes resulting in public sector salaries are not completely resistant to labor demand structural changes despite the lack of ownership and output competition.

But how close substitutes are public and private employees? Earnings comparisons in *Table 6.* show that less educated public sector employees earned 65-85 per cent, and most educated earned 40-65 per cent less then comparable group of employees in private sector, in 1996. These large

groups contain many occupation types, so direct comparisons are usually misleading. Of course, public school teachers and medical occupations have modest chances to find employment out of their sectors. But higher education and public administration occupations can also be also different from this point of view. Next table shows some wage trends in comparable occupation groups in public administration and private sector.

Table 8. Relative salary position of certain occupations in public administration and private sector, 1986-1996
(whole economy average of the year = 100)

Occupation	1986		1996	
	Public administration	Private sector	Public administration	Private sector
Chief executives[a]	191	208	243	379
Business administration[a]	148	148	180	234
Higher educated bureaucrats[a]	138	147	173	221
Lower educated bureaucrats[b]	82	105	108	121
Administrative occupations[b]	78	83	89	93

[a] With higher education level.
[b] With secondary school education level.

The above figures tell the same story as simple education-level comparisons. In most human capital intensive occupations, public sector earnings have increased a lot, but they could not keep up with private trends. First lines in *Table 8* suggest (but, of course, do not proove alone) that the more important role human capital plays in productivity, the larger relative public earnings depreciation can be observed.

Incentive effects of relative public sector salary losses

Incentive effects of observed trends can be estimated using several assumptions. If we focus on monetary work compensations only, depreciation of sector-specific returns to human capital should result in decreasing human capital stocks in public institutions, within observable education level groups. That is, if returns to knowledge are larger in private sector, qualified people will choose private employers (in substitutable occupations, e.g. some higher education teachers), or talented young people will not choose schools providing devaluated knowledge (for less

substitutable occupations, e.g. public school teachers). These processes will obviously result (in the short run for the first, or in the long run for the second group) in a less qualified (less qualified in terms of unobserved human capital) public sector employment.

It is clear however, that not only present salary conditions matter but future prospects also. But if we glance at figures 1 to 4, we face a more or less continuous decline in relative public/private returns to human capital. If we add that it is not a well grounded belief that a deep public sector restructuring and this way a reversing of the above trends would take place, anticipation of significant higher future public/private earnings ratio is not a likely background for the above described decisions.

But if we turn to non-monetary (or non observable monetary) components of workers' compensation, other effects should also be considered. Let us take the example of educated health employment. We have seen that physicians experienced a significant devaluation of their salaries, while their occupation is one of the most knowledge-based ones. In addition, out-of-public sector employment possibilities are not open to these employees, or at least, not in a large number. At the same time, no significant decrease can be observed in the popularity of medical schools or in the students' human capital stock (measured e.g. by entrance exam scores required by schools).[3] These facts indicate that anticipated returns to physicians' human capital could not decrease much, so observed salary decline was balanced by other benefits. While massive privatisation of health services is not very likely at least for the following years, it is not impossible in the long run. However, better founded beliefs can also play a major role in the decisions: illegal and thus unobserved direct patient-doctor payments are very well known attributes of Hungarian medical system. Moreover, the same kind of arguments can be developed for other public services as well. Compensating differences like the above can narrow the above observed earnings public-private differences, and speculative arguments can reveal important possibilities. In the following arguments we try to find out if there are such differences and evaluate their possible consequences.

First, let us consider the in-kind or simply hidden employer-to-employee benefits. We have no reason to suppose that public sector non-salary benefits given by employers (e.g. official cars or welfare expenditures)

[3]The application/admission ratio has remained around 500 per cent, and the required examination scores are still among the highest, around 108/120 pts. See *Ministry of Education* [1997].

exceed private ones, because these compensation techniques are the best ways to avoid taxes and other public charges, so profit maximizing employers will use these cheaper compensating possibilities until their optimal ratio.

Three other factors can comensate for salary differences: working conditions, work possibilities besides major job and illegal benefits. It is clear, that a part of public institutions require less efforts and/or less time (e.g. school holidays), but these attributes are not the products of the last ten years, so they could compensate for the gap of the 1980s but not for its widening. Civil servants' and public servants' special employment conditions guaranteed by 1992 acts aimed at providing compensating differences to balance the depreciation of relative earnings. But the significant results of these regulations were either irrelevant (firing obstacles) or discouraging (strict seniority rules) for the best qualified employees, so they could not narrowed the gap.

Work revenues besides major job can be relevant compensation only for several occupations. While a major part of higher education professors and also some physicians are obviously involved in research programmes or in business activities, these opportunities do not exist for primary and secondary school teachers or for the most of the physicians. Employees in public administration are serously constrained in their activities by law.

Excepted for higher education professors and some physicians, significant rise in illegal benefits is then the only unmeasured factor that could provide compensations for relative salary losses. These benefits has two characteristics: they result from employee-client relation, not from the employer, and are not covered by taxes. Whether these transfers lead to direct efficiency losses by distorting competitive market outcomes (e.g. in regulation, public investment or public purchasing decisions) or not (e.g. in patient-physician payments), the above mentionned characteristics result in at least central budget revenue losses and serious moral problems. Obviously, we cannot estimate the effect of these compensations, and without empirical evidence it is not possible to judge whether they can balance the effects of salary depreciation. In public educaion, however, illegal benefits cannot play as important role as in health services, and a significant part of employess in public administration do not have an access to these benefits.

Conclusions

While competitive employment decreased by more than 30 per cent during the transition, number of public employees have not change a lot, so a very large (24 per cent) public employment ratio was reached in 1995. These trends c led to decreases in public sector salaries, so after temporary gains at the last years of socialist system, public sector employees' has experienced serious losses in their relative positions. While most educated public employees' earnings has increased, public-private salary gap has widened from 2-25 per cent to 37-58 per cent (occupations that were closer substitutes for private sector, has suffered from less serious relative losses). For some occupation groups, unmeasured but not illegal differences can compensate for earnings losses, but the ratio of these employees is not significant. The widening of private-public salary gap could have than two major effects: increasing ratio of less qualified employees in public institutions and/or major role of illegal benefits in workers' compensation. As none of these results are favorable from social perspective, public sector reform should consider significant changes in public employment incentives. Of course, employment reduction and regulation changes are necessary conditions of increases in salary incentives.

References

EC [1992]: *Employment Observatory. Central & Eastern Europe, 1*. European Community, 1992, Bruxelles

EC [1995]: *Employment Observatory. Central & Eastern Europe, 8*. European Community, 1995, Bruxelles

Kertesi and Köllõ [1995]: Kereseti egyenlõtlenségek Magyarországon, 1986-1994. (Earnings Differentials in Hungary, 1986-1994.) *Institute of Economics mimeo.* 1995, Budapest.

Köllõ [1997]: Transformation Before the Transition. *Institute of Economics Working Papers.* 1997, Budapest.

Ministry of Education [1997]: *Higher Education Admission Bulletin* (in Hungarian). Ministry of Education, 1997, Budapest

Annex

Public-private salary difference change decomposition model

Average earnings are equal the weighted averages of education level earnings in all sectors:

$$W_p^{96} = \sum_i f_{pi}^{96} W_{pi}^{96} \text{ and } W_c^{96} = \sum_i f_{ci}^{96} W_{ci}^{96},$$

where

W denotes the average real earnings in the sector,
p and *c* denote the sector indices (p="public", c="competitive")
i denotes the index of the schooling level category,
f_i denotes the i-th category weight in the sector,
and the upper indices (96 and 86) denote the year of observation.

The data are summarized in the following table.

Sector	Real earnings (in 1990 forints)							
	0-11 classes		Secondary ed.		Higher ed.		Total	
	1986	1996	1986	1996	1986	1996	1986	1996
Public administration	6 903	7 270	9 473	11 774	14 544	19 098	10 264	12 031
Public education	6 662	6 168	9 079	8 874	12 051	12 641	9 610	10 205
Higher education	7 607	6 729	9 343	8 555	12 338	16 092	10 594	12 371
Health	7 657	7 412	8 634	9 768	15 755	16 767	9 338	10 063
Competitive sector	9 514	9 528	10 778	14 005	16 089	30 389	10 187	12 556
Sector	Composition of employment (%)							
	0-11 classes		Secondary ed.		Higher ed.		Total	
	1986	1996	1986	1996	1986	1996	1986	1996
Public administration	29.4	37.7	40.1	35.6	30.5	26.7	100.0	100.0
Public education	28.9	27.1	29.7	18.1	41.4	54.8	100.0	100.0
Higher education	23.0	22.4	21.9	21.6	55.1	56.1	100.0	100.0
Health	50.5	44.1	32.7	36.8	16.8	19.1	100.0	100.0
Competitive sector	72.3	63.0	21.6	28.6	6.1	8.4	100.0	100.0

Let us use the following notation, for the two years (with upper indices 86 and 96):

$$D^{96} = W_p^{96} - W_c^{96} = \sum_i f_{pi}^{96} W_{pi}^{96} - \sum_i f_{ci}^{96} W_{ci}^{96} .$$

The public-competitive wage difference, D can be decomposed in two ways:

$$\begin{aligned} D^{96} &= \sum_i \left(f_{pi}^{96} - f_{ci}^{96} \right) W_{ci}^{96} + \sum_i \left(W_{pi}^{96} - W_{ci}^{96} \right) f_{pi}^{96} . \\ &= \sum_i \left(f_{pi}^{96} - f_{ci}^{96} \right) W_{pi}^{96} + \sum_i \left(W_{pi}^{96} - W_{ci}^{96} \right) f_{ci}^{96} . \end{aligned}$$

With these notations, decomposition of change between 1986 and 1996 earnings differences in the public and "private" (competitive) sector, ΔD can be captured by the following equation:

$$\begin{aligned} \Delta D &= D^{96} - D^{86} = \left(W_p^{96} - W_c^{96} \right) - \left(W_p^{86} - W_c^{86} \right) \\ &= \sum_i W_i \Delta D_{fi} + \sum_i D_{fi} \Delta W_i + \sum_i f_i \Delta D_{Wi} + \sum_i D_{Wi} \Delta f_i \text{ , where} \end{aligned}$$

$D_{fi} = f_{pi} - f_{ci}$,
$D_{Wi} = W_{pi} - W_{ci}$, and
Δ denotes the change between 1986 and 1996.

In the decomposition model, one can choose between 2^3=8 different weight-combinations. (2 year-combinations for the first two terms, 2 for the second two terms, and choosing the competitive for the first and the public sector for the second two terms as weight, or vice versa.) Using one of the combinations of weights, the above are the abbreviations of the following terms:

$$\Delta D = \sum_i W_{pi}^{96} \Delta D_{fi} + \sum_i D_{fi}^{86} \Delta W_{pi} + \sum_i f_{ci}^{96} \Delta D_{Wi} + \sum_i D_{Wi}^{86} \Delta f_{ci}$$

The first term of the decomposition captures the effect of the *change in structural differences of the sectors*, the second term captures the effect of *overall relative wage changes of the categories*, that is, the changes in returns to human capital, through the different composition of the sectors. The third term represents the the effect of *relative in-category relative*

wage changes of the two sectors, that is the change in differences of returns to human capital for the two sectors. Last, the fourth term captures the effect of *overall structural changes in the economy.* In some cases, the results are very sensitive to the choice of weights. For instance, very different magnitudes can be assigned to the "overall" wage shift between categories if one considers the competitive sector (index *c*) or the public sector (index *p*). While the absolute effects suffer from these problems, the sign and relative magnitude of the effects are much less sensitive to the choice of weight-combination. The following tables show the effect averages and standard deviations.

Public sector	Average effects, in the percentage of relative total earnings difference changes[a]				Relative to-tal earnings difference changes[a]
	$\sum_i D_{fi} W_i$	$\sum_i D_{wi} \Delta f_i$	$\sum_i f_i \Delta D_{wi}$	$\sum_i W_i \Delta D_{fi}$	
Public administration	24.2	0.4	-19.5	-11.4	-6.3
Public education	28.9	-5.6	-45.2	5.5	-16.5
Higher education	28.1	-0.9	-28.9	-1.9	-3.7
Health	10.3	-1.8	-24.0	-0.7	-16.1

[a] Measured as the ratio of total real earnings difference changes and 1986 competitive average wage (dD/W_c^{86}).

Public sector	Standard deviation of effects, in the percentage of relative total earnings difference changes[a]				Relative to-tal earnings difference changes[a]
	$\sum_i D_{fi} W_i$	$\sum_i D_{wi} \Delta f_i$	$\sum_i f_i \Delta D_{wi}$	$\sum_i W_i \Delta D_{fi}$	
Public administration	14.1	2.4	13.2	5.4	6.3
Public education	26.8	6.7	27.1	5.3	16.5
Higher education	15.2	1.2	15.2	1.2	3.7
Health	8.3	2.1	8.5	0.4	16.1

[a] Measured as the ratio of total real earnings difference changes and 1986 competitive average wage (dD/W_c^{86}).