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Economic Transition in Hungary**

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## Abstract

The paper explores the effect of economic transition on public-private sector pay differential across the pay distribution in Hungary from 1992 until 2003. Over the time period covered by the analysis the public sector had witnessed large-scale privatisations and restructuring through a number of wage reforms. The paper finds that both men and women in the public sector fared significantly worse than their private sector counterparts during 1990s, but this penalty declined to almost zero until 2003. The results from quantile regressions verified that the public sector pay distribution was more compressed than in the private sector and hence workers at and above the median fared significantly worse off having a public sector status even by the end of the period considered. These results are further reinforced by the method of decomposition of differences in distributions. Moreover, the paper examines public sector pay penalties/premia for different skilled groups of workers. These results show that the public sector within-group earnings equalising effect for male graduates in Hungary was three times greater than the similar estimate reported by studies in developed market economies.

JEL classification: J35, J45

Keywords: wages, public sector, Hungary

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# **A közszféra és a magánszféra közötti kereseti különbségek Magyarországon a rendszerváltás után**

Jelena Laušev

## Összefoglaló

A tanulmány a gazdasági átmenet hatását vizsgálja a közszféra és a magánszféra közötti kereseti különbségekre a teljes béreloszlás mentén 1992-2003-ban. A tanulmány azt találja, hogy a közszférában dolgozó nők és férfiak helyzete is romlott a kilencvenes években, de a kereseti lemaradás 2003-ra eltűnt. A kvantilis regressziók igazolják, hogy a közszféra béreloszlása nyomottabb volt, ennél fogva a medián fölött keresők helyzete különösen kedvezőtlen volt. Ezeket az eredményeket a béreloszlások közötti különbség dekomponálása is alátámasztja. A tanulmány megvizsgálja a közszférabeli kereseti jutalom/büntetés mértékét különféle képzett csoportokra is. A közszférának a keresetszóródást csökkentő hatása a diplomás férfiaknál háromszor erősebb volt, mint egyes fejlett piacgazdaságokban.

Tárgyszavak: közszféra, jövedelem, Magyarország

JEL kódok: J35, J45

## **1. INSTITUTIONAL BACKGROUND AND PRIVATISATION**

This paper aims to explore wage differentials between the public and private sectors in Hungary from 1992 to 2003. The question of interests are whether there is evidence of different wage distributions between the public and private sectors and to what extent the public sector wage distribution has changed as a result of the economic transition.

The analysis of the evolution of the wage structures between private and public sectors during the economic transition is particularly interesting for the case of Hungary. During the period observed (1992-2003), the public sector has been largely privatised and restructured through a number of wage reforms. The ownership transformation had a potential effect on the distributions of wages in the two sectors of employment.

In particular, pre-transition Hungary had a similar wage-employment setting to other central planned economies. Köllő (1998) describes the system of pay reward in Hungary as having two main characteristics: first, firms in Hungary were constrained in their scope for discretionary wage-setting; and second, enterprises had an incentive to over-employ workers beyond the efficient level. Public wage policy was intended to minimise wage differentials. Workers were not rewarded according to their skill or productivity. The returns to education were low (Hámori, 2007).

The first market-oriented reforms of the Hungarian labour market started in 1985. Managing rights in labour markets were delegated to firms and political barriers to dismissals were eliminated (Köllő, 1998). As a result, employment in Hungary started to decline as over-employment was reduced.

Commander, Köllő and Ugaz (1994) document that at the start of the economic transition, Hungarian firms in the state sector (relative to other Eastern European comparators) cut employment often by involuntary means and by large magnitudes (for example over 33% between 1989 and 1993). These cuts in employments were seen as a response to very significant labour hoarding and intended to bring employment closer to competitive levels. For example, during the period 1990-1993, the ratio of state sector job losses to private sector job gains was 1.7 (Commander, Köllő and Ugaz, 1994). Consequently, open unemployment grew from virtually zero during the pre-transition period to double digits during the 1990s (Delteil, Pailhé and Redor, 2004).

The organised process of privatising state enterprises started in 1991. Privatisation in Hungary was mainly based on competitive tenders open to foreign participation. Brown, Earle and Telegdy (2008) point out that workers were not given rights to preferentially acquire shares in their companies nor were there mass distribution of shares aided by vouchers unlike in other transition economies (for example in Poland or Czech Republic). The outcome was very little worker ownership (in only about 250 firms), and instead significant managerial ownership and highly concentrated block holdings, many of them by foreign investors.

The method of case-by-case privatisation (mainly by foreign direct investment), although gradual, was completed earlier than in most other Eastern European countries. Brown, Earle and Telegdy (2008) report that by the end of 1992, 43.6% of Hungarian firms had already been privatised and that the share of firms privatised to foreigner ownership was the highest, relative to other Eastern European countries (nearly 17% of all enterprises by 2004). In terms of employment, this meant that more than 50% of employment of the firms that were privatised was sold to foreign investors (Delteil, Pailhé and Redor, 2004).

Since privatisation, enterprise-level bargaining plays the decisive role in wage determination (Kertesi and Köllő, 2000). A tripartite Commission of Conciliation of Interests was set up in 1988 to help industrial dialogue and to facilitate negotiations between the state, employers' associations and trade unions (Delteil, Pailhé and Redor, 2004). However, even though unions, chambers of commerce and the government enter national-level negotiations, they only publish recommendations rather than effective guidelines (Kertesi and Köllő, 2000). In general, from 1993 in Hungary wages are set at the firm level regardless of the ownership type and the majority of the firms have no collective agreement at the industry branch or region level (Delteil, Pailhé and Redor, 2004).

Kertesi and Köllő (2000) reveal that the emerging institutional patterns of bargaining provide favourable conditions for competitive labour markets. A 'union effect' on wages is not found. In addition, during the 1990s minimum wages were set at low levels and only indirectly influenced the wage-setting through underpinning public sector pay and social benefits (Kertesi and Köllő, 2000).

In 2003, the government adopted a plan to complete the process of privatisation within the next three years, after which only 37 companies would remain permanently in state ownership (EBRD, 2003). Nevertheless, even these companies are market oriented and in terms of wage-setting do not differ from privately owned companies. For this reason the public sector in Hungary now comprises only "budget sectors": government administration, education, health and social services.

Overall, Hungary has been considered as one of the most successful countries in transforming its economy from state socialism to modern capitalism (Kézdi, 2002). The EBRD (2003) Transition Report records that, even during post-privatisation phase of foreign investment (from 1998), Hungary continues to attract foreign capital owing to the wide availability of skilled and 'knowledge workers' and also because of the implementation of supportive economic policies.<sup>1</sup>

The paper is organised into five parts. In the first part we examine the macroeconomic context and wage reforms during the economic transition. The second part explains the data and variables used in the empirical analysis. The following part contains wage trends and inequality. The fourth part estimates public-private sector earnings differentials by gender on average and at different points of the distribution. In addition, the pay effects of public sector status across groups differentiated by educational qualifications attained are estimated. The final part concludes the paper.

## **2. MACROECONOMIC CONTEXT AND WAGES**

The economic transition in Hungary can be divided into three periods.<sup>2</sup> The first period, from 1990 to 1997, relates to so called 'transformational' phase and stabilisation package. The second time period, from 1998 to 2000, is known as 'the boom of the Hungarian economy'. The third time period from 2001 to 2003 is characterised by the set of wage reforms.

During the 'transformational recession' real gross wages declined (by 7.6% in 1995 relative to 1994) coupled with a decrease in the rate of real GDP growth (by 1.4% in 1995 relative to 1994) and an increase in the inflation rate (by 10% in 1995 relative to 1994) (Tables 1a and 1b). In 1995, the *'Bokors Csomag'* stabilisation programme was adopted. This programme constrained the growth of nominal public sector wages and the government budget. These measures increased the GDP growth rate (by 4-5% per year) and decreased the inflation rate from around 28% in 1995 to 10% by 2000 (Hámori (2007) and Table 1a). Moreover, in 1995, apart from fiscal restrictions and changes in monetary policy, the banks and public utilities were privatised to foreign strategic investors (Kézdi, 2002).

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<sup>1</sup> The supportive economic policies to the business sector included: low corporate tax rate at 16% (which is one of the lowest among OECD countries) as well as the tax exemption of inbound dividends, tax deductions on interest income and a system of direct budgetary support in favour of certain types of companies in both private and state ownership (EBRD, 2004).

<sup>2</sup> Division based on Horváth and Hudomiet (2005) and Hámori (2007)

During the 'boom' of the Hungarian economy, from 1998 to 2000, real wages started to increase (by 4% on average per annum) as well as labour force participation (by 1% average per annum) and the unemployment rate declined to 6.4% in 2000 (Table 1b).

The third period of economic transition begun after 2000 and coincides with the period of wage reforms when the Socialist-led government came into the office in 2002. During this period the minimum wage increased from around 29% of average earnings in 2000 to 41% in 2002 (Hámori, 2007).<sup>3</sup>

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<sup>3</sup> The statutory minimum wage relates to gross monthly earnings net of overtime pay, shift pay and bonuses. The minimum wage is legally binding and covers all employment contracts (Hámori, 2007).

Table 1a

### Main macroeconomic indicators in Hungary, 1990-2008

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
<i>Growth in real GDP (%)</i>	-3.5	-11.9	-3.1	-0.6	2.9	1.5	1.3	4.6	4.9	4.2	6.0	4.3	3.8	3.4	5.2	4.1	3.5	1.2	0.6
<i>Inflation (%)</i>	28.9	35.0	23.0	22.5	18.8	28.2	23.6	18.3	14.3	10.0	9.8	9.2	5.3	4.7	6.8	3.6	4.0	6.7	11.7
<i>Govn't Balances (% GDP)</i>	0.0	-2.9	-6.1	-6.0	-7.5	-6.7	-5.0	-6.8	-8.0	-5.6	-3.0	-3.5	-8.4	-6.4	-5.4	-6.1	-8.6	-4.9	-3.4
<i>Current Account (% GDP)</i>	0.4	0.8	0.9	-9.0	-3.7	-4.0	-4.5	-7.2	-7.8	-8.5	-6.1	-7.1	-8.7	-8.6	-7.4	-7.8	-7.6	-6.4	-8.4
<i>Foreign Direct Investment</i>	311	1459	1471	2328	1097	4772	3335	3715	3070	3060	2151	3573	2722	479	3542	5353	3500	2197	4685

*Notes to Table 1a:* Foreign Direct Investment net inflows recorded in the balance of payments in US\$ million. *Data Source:* EBRD Transition Report various years

Table 1b

### Economy and labour market indicators in Hungary, 1994-2008

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
<i>GDP per capita (in US\$)</i>	4052	4359	4425	4495	4641	4757	4683	5140	6467	8219	9971	10829	11215	13785	15382
<i>Nominal Gross Earnings (%)</i> <sup>1</sup>	22.6	16.8	20.4	22.3	18.3	13.9	13.5	18.2	18.3	12.0	6.1	8.8	8.2	8.0	7.5
<i>Real Gross Earnings (%)</i> <sup>1</sup>	3.8	-11.4	-3.2	4.0	4.0	3.9	3.7	9.0	13.0	7.3	-0.7	5.2	4.2	0.0	1.4
<i>Labour force (%)</i> <sup>1</sup>	-3.3	-2.6	-1.2	-1.3	0.4	2.1	0.6	-0.4	0.2	1.4	0.1	1.3	1.0	-0.2	-0.7
<i>Employment (%)</i> <sup>1</sup>	-2.0	-1.9	-0.8	0.0	1.4	3.1	1.2	0.3	0.1	1.3	-0.3	0.0	0.7	-0.1	-1.2
<i>Unemployment (%)</i> <sup>2</sup>	12.4	12.1	11.8	11.6	10.1	9.9	6.4	5.7	5.8	5.9	6.3	7.3	7.5	7.4	7.8
<i>Private Sector Share Emp't (%)</i> <sup>3</sup>	na	71.0	76.8	83.3	81.4	82.1	80.4	79.6	79.3	79.1	79.1	79.4	77.3	78	78.1
<i>Industry Share in Emp't (%)</i> <sup>4</sup>	27.6	26.7	26.7	26.7	27.8	27.4	33.7	34.1	34.1	33.3	32.9	32.4	32.3	32.6	32.1
<i>Privatisation Revenues</i> <sup>5</sup>	123	20.8	23.4	27.5	28.6	29.8	30.2	30.3	30.7	31.1	33.5	34.2	33.3	33.5	33.6
<i>Private Sector (% GDP)</i> <sup>3</sup>	55	60	70	75	80	80	80	80	80	80	80	80	80	80	80
<i>Share of industry (% GDP)</i>	21.9	23.1	23.5	25.0	25.9	26.7	27.9	27.2	26.8	27.5	28.3	25.9	26.0	25.5	25.1
<i>Share of agric. (% GDP)</i>	5.9	5.9	6.1	5.8	5.4	5.3	4.6	5.5	4.7	4.4	4.6	3.6	3.5	3.4	3.7
<i>Population, millions (end-year)</i>	10.2	10.2	10.2	10.2	10.1	10.0	10.0	10.2	10.1	10.1	10.1	10.1	10.1	10.1	10.1

*Notes to Table 1b:* Earnings are monthly; na denotes that data is not available; <sup>1</sup> annual average; <sup>2</sup> % of labour force (end-year); <sup>3</sup> rough EBRD estimates, based on available statistics from both official (government) sources and unofficial sources. The underlying concept of private sector value added includes income generated by the activity of private registered companies, as well as by private entities engaged in informal activity in those cases where reliable information on informal activity is available; <sup>4</sup> includes electricity, power, manufacturing, mining and water; <sup>5</sup> cumulative (% GDP): government revenues from cash sales of enterprises, not including investment commitments. *Data Source:* EBRD Transition Report various years

In addition, between September 2002 and 2003, public sector nominal wages increased by 50% on average affecting various groups of public service employees (approximately 800,000 employees which represents around 20% of the labour force) (Hámori, 2007).

Hámori (2007) provides a detailed explanation of the Hungarian public sector wage scale (*Közalkalmazotti bértábla*) according to which wages increase mechanically both horizontally and vertically along ten educational categories (A – J). Within each qualification category wages increase with seniority along 14 brackets of different magnitudes. The wage scale is justified as assuring equal wages for public sector employees for a given job with the same qualification and seniority. There are however separate wage scale for tertiary education and research institutes and civil servants. According to Hámori (2007) the government revised the wage scale in 2002 such that the wages in the lowest qualification and seniority category (A1) are equal to the statutory minimum wage and those in the lowest seniority bracket of the highest qualification category (J1) earn 2.65 times more than the minimum wage. Moreover, the government introduced a minimum monthly wage for tertiary graduates, whereby the wages of the lowest education and seniority bracket of tertiary graduates (F1) were set to be twice the statutory minimum wage (Hámori, 2007).

According to Telegdy (2006), the motivation behind the significant wage increases for public service employees between September 2002 and 2003 was to combat losses of highly skilled labour in the public sector due to the private selection. Furthermore, the intention was to impede negative selection by labour quality into the public sector because the public sector wages were lagging behind private sector wages during the whole period of economic transition in the 1990s (a phenomenon documented by Nickell and Quintini (2002) for the UK).

Although, the general government deficit more than doubled in 2002 (Table 1a), it was argued that generous public sector wage increases were important for the government to retain the human capital needed to improve administrative capacity and absorb European Union (EU) funds during following years (EBRD, 2003). Hungary joined the EU on the 1<sup>st</sup> of January, 2004. The next sections present the wage trends in public and private sectors and estimates the public sector pay 'gap' for different groups of workers during the economic transition in Hungary before EU accession.

### **3. DATA AND VARIABLES USED IN EMPIRICAL ANALYSIS**

The empirical analysis is carried out by using microdata for Hungary from the Harmonised Hungarian Wage Survey (WS). The WS is an employer-provided cross-sectional microdataset. The data host is the Hungarian National Employment Office and the harmonised database is created by the Institute of Economics of the Hungarian Academy of Sciences.

The target population of the WS includes all budget institutions and companies above a certain size. Waves are available for 1986, 1989, and annually since 1992. From 1992 the data is collected from both the private and public sectors.

The sampling frame for firms until 1994 includes every tax-paying legal entity using double-sided balance sheet with at least 20 employees. From 1995 firms employing at least 10 employees and from 2000 employing at least 5 employees are included in the survey. On the other hand all budgetary institutions, independent of size, provide information on their full-time employees. From 2002 the data also cover part-time employees. The selection procedure provides a random sample of workers by collecting the data from sampled employers on individual workers born on 5<sup>th</sup>, 15<sup>th</sup> and 25<sup>th</sup> of any month.<sup>4</sup> The sampling weights are defined in a way that the ratio of the business and public employees included in the unweighted sample reflects the same ratio as aggregate data for the Hungarian economy. The frequency weights are used in the empirical analysis in order to make harmonised sample representative.

In order to provide sample consistency over the years the analysis is restricted to employers with more than 20 employees. This selection procedure may potentially cause a bias (constant over time) due to the well-known employer size – wage effect. In particular, if small private firms pay lower wages this would affect the measured public-private sector pay gap. Therefore, the estimates must be interpreted with caution and as conditional on the selected samples. On the other hand, the possible problem of underreporting wages in the private sector which is characteristic of small employers is mitigated in this analysis. For example, Kertesi and Köllő (2003) find that, although generally high, the compliance rate to minimum wage regulations in Hungary is lower among smaller private employers and Hámori (2007) points out that especially small enterprises are more likely to report workers at the officially declared minimum wage but pay them above that level.

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<sup>4</sup> This includes on average 6.5% of production workers and 10% of non-production workers within firms and 10%-12% random samples in the case of budgetary institutions.

Particularly useful for the analysis of wage levels and wage dispersion is that the WS data sets are very large cross-sections, ranging from 130,000 to 220,000 observations, depending on the year. We employ data from the selected waves from May 1992 until May 2003. The sample includes full-time wage earners aged between 15 and 64 who are working in the public or private sector. The non-profit sector is excluded.

The public sector relates to the budgetary institutions. From 1994 it is possible to distinguish between civil servants, public servants, judges and prosecutors within the budgetary sector. Business employees in the companies represent the private sector. Since there is no information on employer ownership structure within the private sector, even companies with the majority share owned by the state are classified into the private sector. Hence, the public sector in this dataset consists of the budgetary institutions that are under direct government supervision only, whereas the companies comprise the 'business' i.e. private sector whether or not they are fully privately owned or of mixed ownership. It is argued by the data providers that this classification does not impede the analysis of public-private sector wage differentials because the market-related wage setting mechanism within the 'business' sector holds for all companies irrespectively of the precise ownership structure. However, we cannot test whether this is the case given these definitions.

*Table 2*

**Annual sample sizes by ownership type and gender, 1992-2003**

Sector:	Public Sector				Private Sector			
Gender:	Men		Women		Men		Women	
Year:	Number of obs.	as % of Men	Number of obs.	as % of Women	Number of obs.	as % of Men	Number of obs.	as % of Women
1992	9,751	15.20	25,879	39.27	54,402	84.80	40,014	60.73
1995	9,429	12.85	31,459	40.97	63,936	87.15	45,326	59.03
1996	11,881	18.35	40,233	51.41	52,859	81.65	38,026	48.59
1997	11,977	18.69	41,840	52.67	52,101	81.31	37,600	47.33
1998	11,650	18.16	40,176	52.12	52,500	81.84	36,903	47.88
1999	11,442	18.27	38,420	51.69	51,171	81.73	35,907	48.31
2001	10,394	17.19	36,374	49.37	50,072	82.81	37,299	50.63
2002	10,239	15.40	36,922	48.96	56,262	84.60	38,485	51.04
2003	9,704	14.82	32,788	44.95	55,782	85.18	40,155	55.05

*Data Source:* The Harmonised Hungarian Wage Survey (WS), 1992-2003

The number of observations in the working sample by sector and gender is summarised in the Table 2. Since the public sector includes the budgetary institutions only, there are approximately five times more male workers in the private than in the public sector sample. Female workers are more equally distributed across sectors in the working sample.

Table A1 in the Appendix describes the variables used in the empirical analysis. The first variable, earnings, is the natural logarithm of the monthly gross earnings. This is defined as the monthly gross wage in May plus regular premia and bonuses in May plus one twelfth of the sum of all other payments and irregular incomes connected to the full-time job paid over the previous year denoted in Hungarian currency (forint) and converted to 2003 earnings by the annual consumer price index.<sup>5</sup> The irregular incomes and all other payments include the 13<sup>th</sup> month's salary, year-end bonuses and other pecuniary payments but do not include in-kind benefits (such as car and cellular phone usage, representation expenses, meals and transportation subsidies etc.). There are, however, differences in the amount of unobserved benefits across sectors. For example, teachers have long holidays and nearly all public sector employees receive meal vouchers. Hence, these public sector advantages may bias the level of sector pay gap but not its changes over time given that these differences are constant. In addition, the data on earnings are considered to be more precise in WS than those gained by the household survey because the earnings information is provided by the employers (Horváth, Hudomiet and Kézdi, 2004)<sup>6</sup>.

The WS contains weekly hours as specified by the employment contract but only for 1992, 2002 and 2003 and monthly paid hours are recorded from 1999. Due to this limitation we base our analysis on monthly gross earnings for the whole period observed from 1992 until 2003. The hourly gross earnings equations are estimated only for three last years of the observed period.

The WS contains a rich set of employee and employer information. We use variables on individual employee's gender, educational qualification and occupation and employer's industry branch, size and ownership as well as geographical location by urban type and region as dummies as in previous paper.

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<sup>5</sup> The harmonised WS also include information on net wages. The net wage is calculated from the gross amount using the tax brackets of the given year and is not used in our analysis.

<sup>6</sup> Horváth, Hudomiet and Kézdi (2006) compare the household Tarki Monitor survey with the WS and find that the average after tax earnings are about 15% lower in the self-reported data (i.e. household survey data)

Due to significant changes in the Hungarian occupational code the harmonised dataset provides the longitudinal analysis only from 1995 until 2003 and hence, the occupational affiliation is not used as an explanatory variable in the 1992 year data set. Potential labour market experience is created as age minus years spent in education minus six and is used as a continuous variable together with its squared term. Years spent in education are estimated as follows: 6 if the employee has not finished primary education, 8 in case he/she finished primary education, 11 in the case of completed vocational training, 12 in the case where the employee has completed secondary education, 16.5 if the employee obtained a university degree before 1996 and 16.3 if he/she obtained a university degree after 1996. The educational information in the dataset allows for the differentiation of four education groups: primary school or less (unskilled), vocational degree (low-skilled), high school degree (middle-skilled) and tertiary degree (high-skilled).

Proportions and means of the variables used in analysis are presented in Tables A2 and A3 in the Appendix. The t-squared tests shows that there is a significant difference between the vectors of the means of the variables in the public and private sector for both genders. This confirms that the characteristics of the public sector workers differ from those of the private sector in a number of dimensions.

Public sector employees are on average older than private sector employees for both genders. Moreover, public sector employees have more years of experience and are better educated than private sector employees for both genders. The majority of public sector workers are employed in establishments employing between 50 and 300 employees. There are more private than public sector employees, for both genders on average, that work in companies larger than 300 employees. The distribution of workers across urban and rural type is similar across sectors.

Since the public sector includes budgetary institutions only, the public sector employees are concentrated in public administration and education, health and social work (50% of public sector male workers and 60% of public sector female workers are hired in education, health and social work and the rest in public administration). In the private sector, the dominant industry branch is manufacturing (around 40% for both genders), followed by transport, telecommunications and trade. Agriculture is a more important industry branch for male private sector workers compared to female private sector workers, whereas financial services are more important employers for female than for male private sector workers. The industry branch affiliation will not be used in the empirical analysis as an explanatory variable because of the collinearity with the public-private sample distinction in this data.

Professionals represented a dominant occupation for both genders on average in the public sector (around 35%). Conversely, in the private sector professionals represent around 5% of work-force for both genders. The proportions of male and female managers is almost equal across sectors. Blue collar men (such as industrial workers and operators) and white collar women (such as technicians and clerks) workers represent the majorities in the private sector occupational structure.

In general, observed differences in the public-private sample composition should explain a good deal of the differences in earnings between two sectors.

#### **4. PUBLIC-PRIVATE SECTOR EARNINGS DIFFERENTIALS**

This section illustrates the unconditional earnings distribution by sector and gender and provides measures of earnings inequality as well as a brief summary of previous studies of Hungarian public-private sector earnings differentials. It is followed by a section containing econometric analysis.

##### **4.1 TRENDS IN PUBLIC AND PRIVATE SECTOR PAY DURING ECONOMIC TRANSITION**

The unconditional public and private gross monthly real earnings distribution from 1992 until 2003 for male and female workers are plotted in Figures 1 and 2. For men, the raw average gross monthly earnings are higher on average and across most of the percentiles in the public than in the private sector from 1992 until 2003, with the exception of the year 1996. The same holds for women, apart from the 90<sup>th</sup> percentile at which the private sector earnings are higher than public sector earnings during most of the years reviewed. Public sector earnings for both men and women showed more variation over the period than private sector earnings. In particular, all percentiles presented saw a decline in public sector earnings until 1996, a modest increase until 2001 and a sharp increase during the last two years observed.

Figure 1

**Gross Monthly Real Earnings Percentiles for Male Employees in public and private sectors in Hungary, 1992-2003**

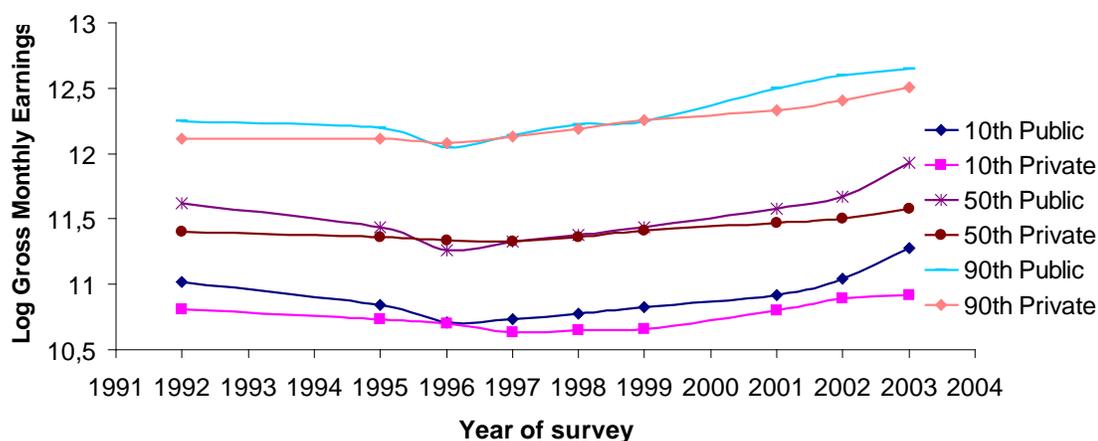
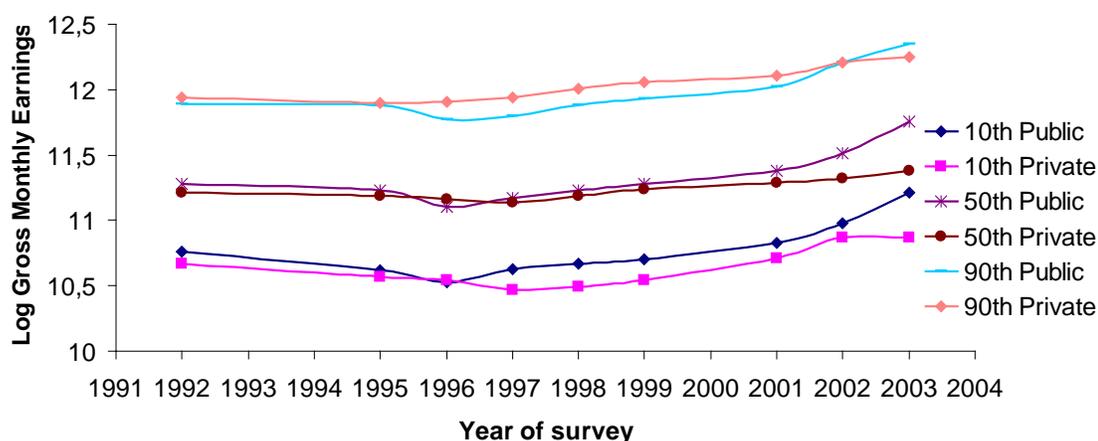


Figure 2

**Gross Monthly Real Earnings Percentiles for Female Employees in public and private sectors in Hungary, 1992-2003**



*Notes to Figures 1 and 2:* Earnings at 10<sup>th</sup>, 50<sup>th</sup> and 90<sup>th</sup> percentiles are given in natural logarithm values. The gross monthly real earnings relate to before tax and include regular wage in May plus regular premia and bonuses in May plus one twelfth of the sum of all additional payments and irregular incomes connected to the full-time job paid over the previous year denoted in Hungarian currency (forint) and converted to 2003 earnings by the annual consumer price index.

*Data Source:* The Harmonised Hungarian Wage Survey (WS) from 1992 until 2003

On the other hand, in the private sector, earnings for both male and female workers at the 90<sup>th</sup> percentile have been increasing over the whole period. The earnings of the workers at the median remained rather stable whereas those at the 10<sup>th</sup> percentile saw a decline during the 1990's and sharp increase in 2001 and 2002.

The magnitude of pay inequality is summarised by using three measures of inequality: the standard deviation of the log gross earnings, the 90/10<sup>th</sup> decile ratio and the Gini coefficient. All measures of inequality presented in Table 3 show greater dispersion of earnings in the private than in the public sector for both male and female workers during most of the years considered. In addition, there is almost no difference in monthly and hourly earnings dispersion, as estimated for the last three years for which the data on monthly hours are available.

Table 3

**Earnings inequality by gender and ownership type in Hungary, 1992-2003**

	90/10 <sup>th</sup> Ratio				Standard Deviation				Gini Coefficient			
	Men		Women		Men		Women		Men		Women	
	Public	Private	Public	Private	Public	Private	Public	Private	Public	Private	Public	Private
1992	1.24	1.30	1.13	1.27	0.48	0.52	0.44	0.50	0.27	0.31	0.26	0.30
1995	1.36	1.38	1.26	1.32	0.55	0.56	0.49	0.53	0.32	0.33	0.28	0.31
1996	1.34	1.38	1.24	1.38	0.53	0.58	0.48	0.56	0.31	0.35	0.28	0.33
1997	1.41	1.50	1.17	1.47	0.56	0.62	0.46	0.59	0.33	0.37	0.27	0.36
1998	1.44	1.54	1.21	1.52	0.57	0.62	0.48	0.60	0.33	0.37	0.29	0.36
1999	1.42	1.60	1.22	1.52	0.56	0.64	0.49	0.61	0.33	0.39	0.29	0.37
2001	1.58	1.54	1.18	1.40	0.62	0.61	0.48	0.57	0.38	0.38	0.29	0.35
2001 $h$	1.58	1.52	1.16	1.38	0.62	0.61	0.47	0.57	0.38	0.38	0.29	0.35
2002	1.56	1.51	1.23	1.35	0.59	0.61	0.49	0.55	0.35	0.39	0.29	0.35
2002 $h$	1.57	1.50	1.22	1.34	0.59	0.61	0.48	0.55	0.35	0.39	0.29	0.35
2003	1.38	1.59	1.15	1.38	0.55	0.63	0.44	0.56	0.31	0.40	0.26	0.35
2003 $h$	1.36	1.57	1.12	1.37	0.54	0.63	0.44	0.56	0.31	0.40	0.25	0.35

*Notes to Table 3:* The gross monthly earnings relate to before tax and include regular wage in May plus regular premia and bonuses in May plus one twelfth of the sum of all additional payments and irregular incomes connected to the full-time job paid over the previous year denoted in Hungarian currency (forint) and converted to 2003 earnings by the annual consumer price index. The gross hourly earnings are obtained by dividing the gross monthly earnings with monthly hours. The gross hourly earnings inequality measures are reported for 2001, 2002 and 2003 years and denoted by the letter  $h$ . Decile ratios 90/10<sup>th</sup> are calculated as the difference between the log earnings at the 90<sup>th</sup> percentile and at the 10<sup>th</sup> percentile. The Gini coefficient estimates use earnings in unlogged form.

*Data Source:* The Harmonised Hungarian Wage Survey (WS) from 1992 until 2003.

Standard deviations, Gini coefficients and 90/10<sup>th</sup> ratios show that the male public sector earnings inequality has an inverted U shape, first increasing until 2001 and declining afterwards. This period relates to minimum wage increases (by 57% in 2001 and 25% in 2002) and public sector wage increases between 2002 and 2003. For female workers the public sector inequality measures show more volatility during the period. On the other hand, the private sector earnings distribution narrowed only in 2001 and 2002 for both men and women. This is not surprising given the minimum wage increases in these years.

#### 4.2 EMPIRICAL STUDIES ON HUNGARIAN PUBLIC-PRIVATE SECTOR PAY DIFFERENTIALS

To our knowledge, there are only two empirical studies on the Hungarian public sector earnings gap. A detailed analysis of public-private sector earnings differentials for full-time male wage earners was conducted by Hámori (2007) using WS data from 1994 until 2003. This study applied OLS and quantile regression methods to estimate the annual public sector gap at the mean and at five percentiles of the gross monthly real log earnings distribution conditional on education, potential labour force experience and Hungarian capital Budapest.

Hámori (2007) found substantial public sector earnings penalties between 1994 and 2002, at all estimated quantiles (other than at the 10<sup>th</sup> quantile in some cross-sections) which increased across the distribution. For example, the negative public sector earnings gap was estimated to be 13% at the bottom quantile and 40% at the top quantile in 1994 and 25% at the bottom quantile and 62% at the top quantile in 1997. In the later period, from 1998 until 2000 the public sector pay penalty amounted to around 3% and 55% at the 10<sup>th</sup> and 90<sup>th</sup> quantiles respectively. In the final year of the observed period (i.e. 2003 which was the year of public sector pay reforms) the public sector pay gap became positive for male employees at the 10<sup>th</sup> and 25<sup>th</sup> percentiles of the earnings distribution but remained negative at other percentiles.

Separating samples by educational qualification, Hámori (2007) found that changes in the size of the public-private sector earnings gap over time were uniform across the distribution for the unskilled (primary school and less educational level) and low-skilled (vocational school level) groups. For middle (high school level) and especially for high skilled (university degree and above) groups of workers, increases in the public sector pay penalty until 2000 were more pronounced at the top of the distribution whereas a decreasing trend in the public sector penalty in the years after 2000 was more pronounced at the bottom of the distribution.

Telegdy (2006) used the WS databases during the post-transition period, between 2000 and 2004, to examine the effects of 2003 public pay reforms in education, health care and public administration in Hungary. This study did not disaggregate male and female employees. Telegdy (2006) estimated by OLS that the 27% public sector average pay penalty in 2000, obtained after controlling for worker's gender, experience, education and occupation, became a premium of 8.4% in 2004.

## 5. REGRESSION ANALYSIS

### 5.1 ANNUAL MEAN AND QUANTILE REGRESSION ESTIMATES

Cross sectional differences in earnings between public and private sector employees for each year of the observed period are first estimated by OLS. Hence, both sectors' data sets are pooled together in an earnings regression with a dummy variable  $P_i$  taking the value one if the  $i$ th employee works in the public sector and zero otherwise. This 'dummy variable' model is given by:

$$\ln w_i = \alpha + \beta' x_i + \gamma P_i + \varepsilon_i \quad \text{for } i = 1, \dots, N \quad (1)$$

where  $\ln w_i$  is the log gross real earnings for the  $i$ th individual. The set of observed worker and job characteristics  $x_i$  with the parameter vector  $\beta$  includes worker's labour force experience and its quadratic form, educational qualification and occupational affiliation and employer's urban type, region and size and  $\varepsilon_i$  is an error term which is assumed to be uncorrelated with  $x_i$ . A public sector dummy variable  $P_i = 1$  if the  $i^{\text{th}}$  individual works in the public sector and zero otherwise. Hence,  $\hat{\gamma}$  is the 'average' estimate of the public sector pay gap equivalent to an intercept shift.

It should be acknowledged that we do not explicitly deal with endogeneity and measurement error problems in this paper. On the one hand, there are no suitable instruments in the employer-provided survey to control for differences in workers' unobserved heterogeneity between sectors. Moreover, the public sector includes only budgetary institutions and hence we are not able to use changes in the proportions of industry branches or occupations within the public sector caused by large-scale privatisations as an instrument for endogeneity. On the other hand, there is less measurement error in this data because it is an employer survey.

The estimation results from monthly and hourly gross earnings annual equations over the period of economic transition in Hungary from 1992 until 2003 are presented in Tables 4 and 5 for men and women separately. Gross hourly earnings are calculated by dividing the gross monthly earnings with monthly hours. Monthly hours are available for the last three years.

The unconditional time trends of  $\hat{\gamma}$  presented in Tables 4 and 5 are the raw differences in mean real gross earnings between public and private sector workers. The conditional time trends of  $\hat{\gamma}$  presented in Tables 4 and 5 are differences in mean real gross earnings between public and private sector workers conditional on worker's labour force experience and its quadratic term, education, occupation (except in 1992) and employer's urban type, region and size. Tables 4 and 5 present only the returns to labour force experience and education.<sup>7</sup>

The fit of the monthly gross earnings equations augmented by additional 'control' variables using the R-squared is relatively high. The explanatory power of the variance of mean log monthly gross pay in the augmented regression increases from 0.45 (0.52) in 1995 to 0.54 (0.60) in 2003 for men (women). The regression standard error increases from 0.45 (0.35) for men (women) in 1995 to 0.46 (0.39) in 1999 and declines to 0.42 (0.34) in 2003 for men (women). The Breusch-Pagan test for heteroskedasticity is performed by regressing the residuals from an OLS regression on the same set of covariates. Although estimated coefficients and R squared statistics are not affected, in all cases the test showed heteroskedastic errors which implies that the variance of log monthly pay varies across variables. For this reason, the estimated heteroskedasticity robust or "White" standard errors of the coefficients reported in parentheses are used to calculate 95% confidence intervals.

The overall F statistic evaluates the null hypothesis that coefficients on all explanatory variables in the model equal zero and leads easily to rejection of this null hypothesis in all equations. Most of the control variables are statistically significant at 1% level of significance for both genders. The overall explanatory power of the variance of mean log hourly gross pay is equal to the monthly and the estimates are not materially different.

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<sup>7</sup> The full specification results from conditional regressions available from the author upon request.

Table 4

### Estimation of real monthly and hourly gross earnings in Hungary for men, 1992-2003

	1992	1995	1996	1997	1998	1999	2001	2002	2003	<i>2001h</i>	<i>2002h</i>	<i>2003h</i>
<i>Unconditional Model</i>												
Public Sector:	0.183*** (0.001)	0.090*** (0.001)	-0.051*** (0.001)	0.016*** (0.001)	0.049*** (0.001)	0.043*** (0.001)	0.106*** (0.002)	0.158*** (0.001)	0.283*** (0.002)	<i>0.126*** (0.002)</i>	<i>0.159*** (0.001)</i>	<i>0.290*** (0.002)</i>
<i>Conditional Model</i>												
Experience:	0.034*** (0.000)	0.024*** (0.000)	0.024*** (0.000)	0.021*** (0.000)	0.021*** (0.000)	0.019*** (0.000)	0.017*** (0.000)	0.017*** (0.000)	0.017*** (0.000)	<i>0.018*** (0.000)</i>	<i>0.017*** (0.000)</i>	<i>0.016*** (0.000)</i>
Experience Sq:	-0.051*** (0.000)	-0.034*** (0.000)	-0.035*** (0.000)	-0.020*** (0.000)	-0.031*** (0.000)	-0.028*** (0.000)	-0.028*** (0.000)	-0.027*** (0.000)	-0.025*** (0.000)	<i>-0.028*** (0.000)</i>	<i>-0.027*** (0.000)</i>	<i>-0.024*** (0.000)</i>
Education:												
Unskilled	<i>f</i>	<i>f</i>	<i>f</i>									
Lowskilled	0.155*** (0.000)	0.080*** (0.001)	0.099*** (0.001)	0.116*** (0.001)	0.120*** (0.001)	0.112*** (0.001)	0.010*** (0.001)	0.072*** (0.001)	0.098*** (0.001)	<i>0.103*** (0.001)</i>	<i>0.073*** (0.001)</i>	<i>0.099*** (0.001)</i>
Middleskilled	0.381*** (0.001)	0.201*** (0.001)	0.222*** (0.001)	0.265*** (0.001)	0.270*** (0.001)	0.266*** (0.001)	0.235*** (0.001)	0.202*** (0.001)	0.210*** (0.001)	<i>0.241*** (0.001)</i>	<i>0.208*** (0.001)</i>	<i>0.214*** (0.001)</i>
Highskilled	0.836*** (0.001)	0.561*** (0.002)	0.609*** (0.003)	0.676*** (0.003)	0.702*** (0.003)	0.737*** (0.003)	0.706*** (0.003)	0.676*** (0.003)	0.691*** (0.003)	<i>0.711*** (0.003)</i>	<i>0.685*** (0.003)</i>	<i>0.700*** (0.003)</i>
Public Sector :	-0.065*** (0.001)	-0.075*** (0.001)	-0.252*** (0.001)	-0.228*** (0.001)	-0.204*** (0.001)	-0.215*** (0.001)	-0.223*** (0.001)	-0.196*** (0.001)	-0.071*** (0.001)	<i>-0.202*** (0.001)</i>	<i>-0.199*** (0.001)</i>	<i>-0.069*** (0.001)</i>
Constant:	10.55*** (0.003)	10.42*** (0.003)	10.22*** (0.003)	10.27*** (0.003)	10.24*** (0.003)	10.32*** (0.003)	10.49*** (0.003)	10.65*** (0.003)	10.77*** (0.003)	<i>5.509*** (0.003)</i>	<i>5.607*** (0.003)</i>	<i>5.686*** (0.003)</i>
R-squared	0.405	0.455	0.468	0.460	0.476	0.473	0.483	0.513	0.538	<i>0.490</i>	<i>0.523</i>	<i>0.548</i>
Root MSE	0.40	0.41	0.42	0.45	0.45	0.46	0.44	0.42	0.42	<i>0.44</i>	<i>0.42</i>	<i>0.42</i>
Observations	64153	73365	64740	64078	64150	62613	60466	66501	65486	<i>60466</i>	<i>66501</i>	<i>65486</i>

*Notes to Table 4:* The samples used relate to full time employees, aged between 15 and 64. The depended variable is the log of real monthly and hourly gross earnings. Monthly gross earnings are defined as monthly gross wage in May plus regular premia and bonuses in May plus one twelfth of the sum of all other payments and irregular incomes connected to the full-time job paid over the previous year, denoted in HUF and converted to 2003 earnings by the annual consumer price index. The gross hourly earnings calculated by dividing the gross monthly earnings with monthly hours and estimates in italics are obtained for 2001, 2002 and 2003 years denoted by the letter *h*. All specifications include worker's occupational affiliation (except 1992) and employer's urban type, region and size. The estimation procedure for the mean robust regressions is OLS and estimated robust standard errors calculated based on White (1980) are reported in parentheses. OLS regression analysis reported used STATA 10.0: \*\*\* denotes the 0.01 significance level. *f* denotes category omitted in estimation.

*Data Source:* The Harmonised Hungarian Wage Survey (WS) from 1992 until 2003

Table 5

**Estimation of real monthly and hourly gross earnings in Hungary for women, 1992-2003**

	1992	1995	1996	1997	1998	1999	2001	2002	2003	2001h	2002h	2003h
<i>Unconditional Model</i>												
Public Sector	0.037*** (0.001)	0.032*** (0.001)	-0.068*** (0.001)	0.009*** (0.001)	0.028*** (0.001)	0.020*** (0.001)	0.047*** (0.001)	0.114*** (0.001)	0.289*** (0.001)	0.078*** (0.001)	0.112*** (0.001)	0.298*** (0.001)
<i>Conditional Model</i>												
Experience	0.028*** (0.000)	0.024*** (0.000)	0.022*** (0.000)	0.019*** (0.000)	0.018*** (0.000)	0.020*** (0.000)	0.017*** (0.000)	0.015*** (0.000)	0.015*** (0.000)	0.018*** (0.000)	0.015*** (0.000)	0.015*** (0.000)
Experience Sq	-0.038*** (0.000)	-0.030*** (0.000)	-0.024*** (0.000)	-0.018*** (0.000)	-0.017*** (0.000)	-0.024*** (0.000)	-0.022*** (0.000)	-0.018*** (0.000)	-0.017*** (0.000)	-0.023*** (0.000)	-0.018*** (0.000)	-0.016*** (0.000)
Education:												
Unskilled	<i>f</i>											
Lowskilled	0.181*** (0.001)	0.063*** (0.001)	0.067*** (0.001)	0.058*** (0.001)	0.062*** (0.001)	0.073*** (0.001)	0.059*** (0.001)	0.044*** (0.001)	0.036*** (0.001)	0.055*** (0.001)	0.043*** (0.001)	0.033*** (0.001)
Middleskilled	0.406*** (0.001)	0.223*** (0.001)	0.231*** (0.001)	0.242*** (0.001)	0.247*** (0.001)	0.249*** (0.001)	0.190*** (0.001)	0.199*** (0.001)	0.179*** (0.001)	0.189*** (0.001)	0.201*** (0.001)	0.180*** (0.001)
Highskilled	0.791*** (0.001)	0.509*** (0.002)	0.529*** (0.002)	0.575*** (0.002)	0.600*** (0.002)	0.686*** (0.003)	0.627*** (0.002)	0.649*** (0.002)	0.653*** (0.002)	0.624*** (0.002)	0.649*** (0.002)	0.654*** (0.002)
Public Sector	-0.077*** (0.001)	-0.052*** (0.001)	-0.184*** (0.001)	-0.156*** (0.001)	-0.150*** (0.001)	-0.183*** (0.001)	-0.191*** (0.001)	-0.130*** (0.001)	0.005*** (0.001)	-0.163*** (0.001)	-0.133*** (0.001)	0.015*** (0.001)
Constant	10.43*** (0.002)	10.29*** (0.002)	10.19*** (0.002)	10.25*** (0.003)	10.27*** (0.003)	10.27*** (0.003)	10.46*** (0.002)	10.68*** (0.002)	10.83*** (0.002)	5.463*** (0.002)	5.588*** (0.002)	5.682*** (0.002)
R-squared	0.440	0.522	0.527	0.504	0.503	0.514	0.508	0.529	0.598	0.510	0.532	0.602
Root MSE	0.35	0.35	0.36	0.37	0.38	0.38	0.36	0.35	0.33	0.36	0.35	0.32
Observations	65893	76785	78259	79440	77079	74327	73673	75407	72943	73673	75407	72943

*Notes to Table 5:* See Notes to Table 4.

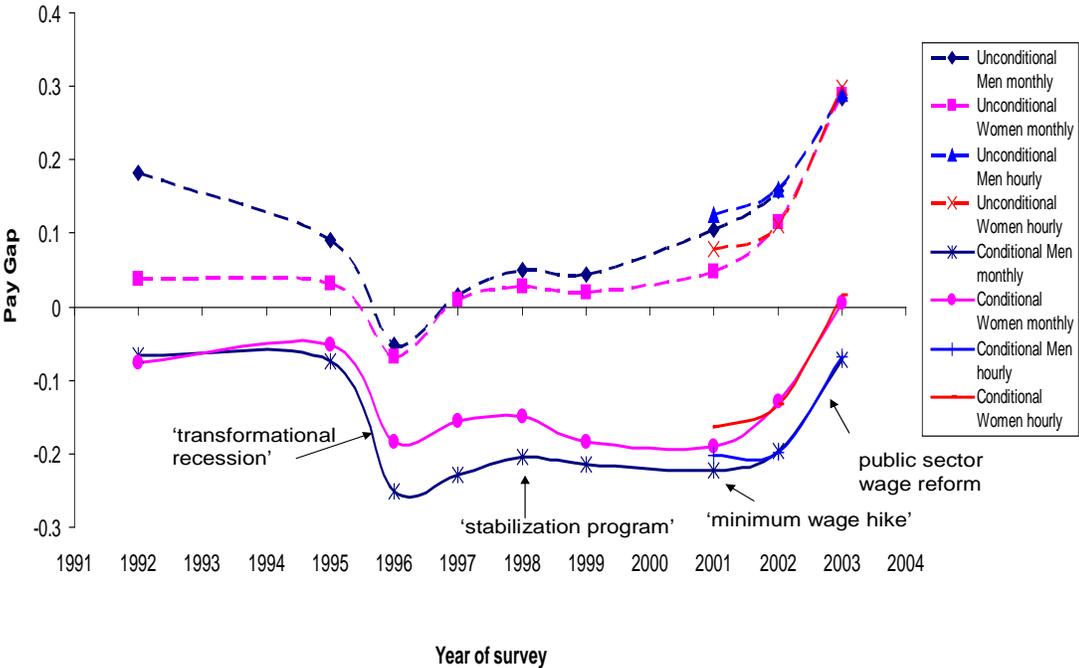
Data Source: The Harmonised Hungarian Wage Survey (WS) from 1992 to 2003

Comparison between unconditional and conditional estimates in Tables 4 and 5 shows that the sectoral pay gap is largely determined by different nature of jobs and skills in public and private sectors. In particular, the statistically significant unconditional public sector premium for the most of the years, turns into statistically significant public sector penalty after controlling for differences in characteristics.

A further insight into time trends of estimated unconditional and conditional public sector pay gap  $\hat{\gamma}$ <sup>8</sup> is given by Figure 3.<sup>9</sup>

Figure 3

**Public sector pay relative to private sector pay: unconditional and conditional differences in real gross earnings by gender in period 1992-2003**



Data Source: The Harmonised Hungarian Wage Survey (WS) from 1992 until 2003

<sup>8</sup> Expressed in log percentage points throughout the paper.  
<sup>9</sup> The 95% confidence intervals spread is about 0.005 or less (i.e. difference between lower and upper bound). Since the 95% confidence intervals are attached closely to the estimates they are not presented on Figure 3.

Figure 3 shows that the conditional results lower the measured public sector pay effect. Moreover, male workers across sectors are more different in observable characteristics than female workers. In general, estimated conditional differentials for a decade of economic transition in Hungary reveal widening of the sector pay gap from 1992 until 2001 and its closure by 2003. Hence, the public sector pay gap was negative during most of the period of economic transition, but grew to zero by the end of the period reviewed in this paper.

The cyclical nature in the public sector pay gap may be related to economic policies. The increasing negative trend in the estimated public sector pay gap during the initial years of economic transition correlates with the period of 'transformational recession' during which the public sector employment increased from 21% of total employment in 1992 to 24.1% in 1995 (Kézdi, 1998). As suggested by theoretical model in paper 3 an increase in public sector employment leads to pay reduction given by the budget constraint. Indeed, the increase in the public sector pay penalty in 1996 resulted from the government income measure to 'freeze' public sector wages (Hámori, 2007). In addition, in 1995 the banks and public utilities were privatised to foreign strategic investors (Kézdi, 2002).

The 'boom' of the Hungarian economy as a result of the implementation 'Bokors Csomag' macroeconomic stabilisation program relates to the 1997-2000 period. Figure 3 shows a modest decline in the public sector pay penalty in 1997 and 1998, but a further increase until 2001. Hence the economic boom led to a generally more rapid increase in private sector pay. Furthermore, the minimum wage increases in 2001 and 2002 mainly affected private sector pay since the majority of minimum wage earners is located in that sector.<sup>10</sup> However, the public sector pay penalty declined from 2002 and closed down in 2003. Increases in the average public sector wage between 2002 and 2003 are associated with wage reforms which aimed to increase the public sector nominal wages by 50% on average.

In addition to the monthly estimates, hourly public sector pay differentials from 2001 until 2003 are also plotted in Figure 3. The difference between the hourly and monthly gross pay gap estimates is rather modest. In particular, the difference is observable in 2001 only, albeit quite small (around 2% for male and 3% for female workers).

The estimated annual conditional public sector pay effects at the mean can be compared to the results reported by Hámori (2007) and Telegdy (2006) that used the same data. Hámori (2007) obtained public sector pay gap estimates from OLS monthly earnings

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<sup>10</sup> Hámori (2007) emphasises that the compliance of minimum wage regulations is very high in Hungary. For example in 2001, less than 2% of the full-time employees were paid less than the minimum wage.

equations for male workers from 1994 until 2003 after controlling for labour force experience, its squared term, education and Hungarian capital Budapest. That study estimated that the gap was -21%, -31% and -38% in 1995, 1996 and 1997 and -36%, -32% and -14% in 2001, 2002 and 2003 respectively. These estimates are a bit larger than those reported in Table 4 mainly due to the fact that they are not conditional on workers' occupation. In particular, the public sector workers are on average more educated and more experienced than the private sector workers but most of the better paying occupations are in the private sector. This tends to decrease the estimated gap. Indeed, our estimates are in line with the results reported by Telegdy (2006). That study obtained the OLS estimates in monthly earnings equations for the 2000-2004 period on the pooled sample of male and female workers after controlling for worker's gender, experience, education and occupation. Similarly to conditional estimates in Tables 4 and 5 Telegdy (2006) reported that the mean public sector pay gap was -25.7%, -20.5% and 7% in 2001, 2002 and 2003 respectively.

Furthermore, Tables 4 and 5 present the returns to labour force experience and education over the period of economic transition in Hungary. The labour force experience effects are statistically significant and increase at a decreasing rate. This is in contrast to the usual finding that labour force experience gained during the pre-transition is not valued by the market in transition (Adamchik and Bedi (2000) for Poland, Jovanović and Lokshin (2004) for Moscow). However, these estimates are consistent with the results reported by Orazem and Vodopivec (1997) for Slovenia and may be explained by early retirement schemes which made experienced labour relatively scarce at the start of economic transition.

The level of educational attainment strongly correlates to pay differentials. As expected, university level education (high-skilled educational qualification) is valued the most in the labour market. The returns to high-skilled educational level are increasing during the whole period i.e. from 56% in 1995 to 69% in 2003 for men and from 51% in 1995 to 65% in 2003 for women.<sup>11</sup>

The estimated returns to educational qualification obtained for Hungary are comparable with the findings reported by related empirical studies for other transitional economies. For the Czech Republic, Munich, Svenjar and Terrell (2002) reported an increase in returns to university educated male workers relative to junior high school from 28% in 1989 to 72% in 1996. For Slovenia, Orazem and Vodopivec (1997) found the returns to university education

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<sup>11</sup> The estimates on returns to education are greater in 1992 than in the following years, but this is because the occupational affiliation is not controlled for 1992 due to significant changes in the Hungarian occupational code.

relative to less than primary school increased from 72% in 1987 to 94% in 1991. For Poland, Keane and Prasad (2001) estimated that returns to college education relative to primary school increased from 37% in 1986 to 53% in 1992 and then further increased to 68% in 1996. Finally, for Hungary, Hámori (2007) finds that relative to primary school or less (unskilled) the average premium to high school (middle-skilled) and university degree (high-skilled) rose dramatically while the average return to vocational education (low-skilled) remained constant during the transition period from 1994 until 2003. Hámori (2007) suggests that this is on the one hand partially due to the inefficient training in vocational institutions and on the other hand due to the increasing demand for high-skilled labour.

Returns to other characteristics from the full regression specifications are summarised as follows. The top paying occupations are professionals and managers. Nevertheless, the managers are rewarded almost two times more on average than professionals. Male managers are better paid than female managers whereas the difference in pay between genders is not particularly pronounced for professionals. Female technicians and clerk employees are more rewarded than male employees with the same occupations, on average, during most of the years considered. The least paid occupations are farmers and labourers, for both genders.

The earnings are highly positively correlated with the firm size. The increase in pay with the firm size is greater for male than for female workers. Working in the Hungarian capital Budapest or county centers provides significant premiums relative to working in the rural areas but more for female than for male workers. All regions relative to Central Hungary are less rewarding.

The same conditional annual equations are now estimated at the selected quantiles of the earnings distribution. The general model of estimation can be formulated as in Koenker and Basset (1978):

$$\ln w_i = \beta'_{\mathcal{G}} x_i + \gamma_{\mathcal{G}} P_i + \varepsilon_{i,\mathcal{G}} \quad \text{for } i = 1, \dots, n \quad (2)$$

with  $Quant_{\mathcal{G}}(\ln w_i | x_i, P_i) = \beta'_{\mathcal{G}} x_i + \gamma_{\mathcal{G}} P_i$  and  $Quant_{\mathcal{G}}(\varepsilon_{i,\mathcal{G}} | x_i, P_i) = 0$  where  $\mathcal{G}^{th}$  is the regression quantile,  $0 < \mathcal{G} < 1$ , computed by:

$$\min_{\beta \in R^k} \left\{ \sum_{i: \ln w_i \geq \beta'_{\mathcal{G}} x_i + \gamma_{\mathcal{G}} P_i} \mathcal{G} |\ln w_i - \beta'_{\mathcal{G}} x_i - \gamma_{\mathcal{G}} P_i| + \sum_{i: \ln w_i < \beta'_{\mathcal{G}} x_i + \gamma_{\mathcal{G}} P_i} (1 - \mathcal{G}) |\ln w_i - \beta'_{\mathcal{G}} x_i - \gamma_{\mathcal{G}} P_i| \right\} \quad (3)$$

If  $\hat{\gamma}_g$  is positive, then public sector workers at  $g^{th}$  conditional quantile of  $\ln w_i$  earn a premium. If  $\hat{\gamma}_g$  is negative, then public sector workers at  $g^{th}$  conditional quantile of  $\ln w_i$  earn a penalty. Therefore, estimating (2) the public sector pay effect can be traced over the entire conditional distribution of  $\ln w$  by increasing  $g$  continuously from 0 to 1.

Each bar on Figure 4 presents the annual conditional public sector pay penalties/premia for each of the selected percentiles of the log real monthly gross earnings distribution, for men and women separately. The estimated standard errors are obtained by the bootstrapping procedure with 200 replications in all cases.<sup>12</sup> The coefficient estimates presented on Figure 4 are summarised in Table A4 in the Appendix.

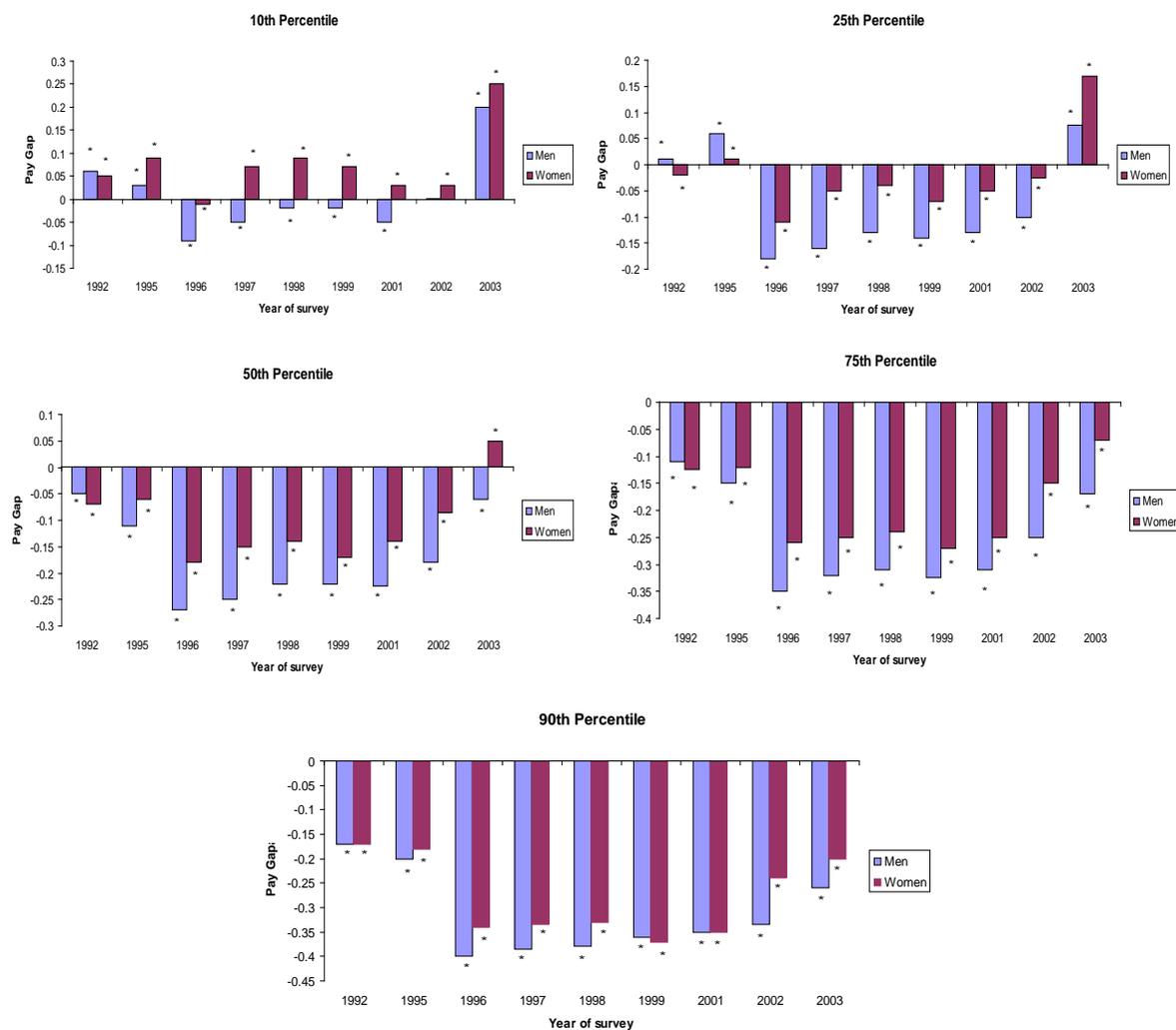
The quantile regression estimates provide a richer insight into the public sector pay gap. In particular, apart from females at the 10<sup>th</sup> percentile that gained from the public sector status over the whole period considered, Figure 4 shows an increasing public sector pay penalty until 1996, modest fluctuations until 1999 and declining trend at all percentiles of the pay distribution for both gender during 2000s. In 2003 the public sector male workers below the median and female workers at and below the median started to collect statistically significant 'mark-up' relative to their private sector counterparts. Although other groups of public sector workers also saw the improvements in their financial position the increases in pay as a result of wage reforms in 2003 appear to had the greatest effects on the lower part of the earnings distribution.

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<sup>12</sup> The number of replications is lower than in the paper 4 given the large dataset. As pointed by Melly (2006) the number of replications must be kept reasonable because of the computation time. The same number of replications is used by Hámori (2007).

Figure 4

**Evolution of conditional public sector pay gap for each of the percentiles of the monthly gross pay distribution by gender in Hungary, 1992-2003**



*Notes to Figure 4:* Quantile regression procedures are used to obtain the coefficient estimates for the selected percentiles. The public sector monthly gross earnings pay gap is estimated abstracting from all variations attributable to worker's labour force experience, its quadratic form, educational qualification and occupational affiliation (except in 1992) and employer's urban type, region and size. Presented estimates are reported in Table A4 in Appendix. Standard errors obtained by the bootstrapping procedure based on 200 replications in all cases. \* denotes that estimates are significantly different from zero at the 0.01 significance level.

*Data Source:* The Harmonised Hungarian Wage Survey (WS), 1992-2003

In general, Figure 4 provides evidence of significant public sector pay compression relative to the private sector earnings distribution. Particularly, whereas for workers below the median the public-private sector pay gap is rather small, for workers at and above the median the gap is substantial over the whole period considered. The pattern of the increasing conditional public sector pay penalty as one moves up the earnings distribution is best illustrated by comparing the estimates across the percentiles. For example, the public sector pay penalty for male workers is greater by almost one tenth at the 25<sup>th</sup> percentile, by one fifth at the 50<sup>th</sup> percentile, by one quarter at the 75<sup>th</sup> percentile and by more than a third at the 90<sup>th</sup> percentile relative to the public pay penalty at the 10<sup>th</sup> percentile over a decade considered.

## 5.2 POOLED ESTIMATES

### *(i) Mean and Quantile Regressions*

In the further analysis previous results are pooled across the years. The changes in the public sector pay distribution relative to the private sector pay distribution are investigated comparing the period of economic transition during 1990s with the period during 2000s. The reasons for this time division are the wage reforms that took place after 2000 which might affected the earnings distribution. These reforms related to minimum wage increases in 2001 and 2002 and to public sector wage increases between 2002 and 2003.

Initially a 'dummy variable' approach was used to obtain the pooled estimates across the earnings distribution from 1995 until 1999 and from 2001 until 2003. The covariates included in the pooled regressions are the same as in annual regressions but expanded by year dummies to account for aggregate time effects. The public sector pay differentials at the mean and at the selected percentiles of the earnings distribution for the two time periods by gender are presented in Table 6. The improvements in the financial position of public sector workers between the two periods are given by the last two columns of Table 6. A negative sign of the point change shows decline in the public sector pay penalty.

In general, Table 6 shows that the public sector pay gap is smaller at lower-half and larger in upper-half of the earnings distribution than that obtained using OLS for all workers. In particular, the public sector pay penalty increases monotonically over the earnings distribution for men during 1995-1999. The same public sector inequality reducing pattern is present during 2001-2003 but the male workers at the 10<sup>th</sup> percentile collect the public sector premium. In addition, the public sector penalties for the rest of the percentiles during 2001-2003 are lower than during 1995-1999. For female workers the 10<sup>th</sup> percentile during 1995-

1999 and the 10<sup>th</sup> and 25<sup>th</sup> percentiles of the public sector earnings distribution during 2001-2003 are higher than their counterpart percentile on the private sector earnings distribution. The reverse holds for the other percentiles, but as for men, public sector penalty is lower during 2001-2003 than during 1995-1999. The upward shift in the public sector earnings distribution relative to the private sector earnings distribution between the two periods was the most pronounced for workers at and below the middle of the distribution.

Table 6

**Public sector pay penalty and premium across monthly gross earnings distribution for men and women in Hungary in 1995-1999 and 2001-2003**

	1995-1999		2001-2003		Change	
	Men	Women	Men	Women	Men	Women
<b>Mean</b>	-0.195*** (0.001)	-0.144*** (0.000)	-0.164*** (0.001)	-0.106*** (0.001)	-0.031	-0.038
R-sq; Adj R-sq.	0.46	0.51	0.51	0.55		
Root MSE	0.44	0.38	0.43	0.36		
<b>10th Percentile</b>	-0.037*** (0.001)	0.059*** (0.000)	0.020*** (0.001)	0.091*** (0.000)	-0.057	-0.031
Pseudo Rsq	0.22	0.27	0.20	0.26		
<b>25th Percentile</b>	-0.137*** (0.001)	-0.048*** (0.000)	-0.062*** (0.001)	0.030*** (0.000)	-0.075	-0.078
Pseudo Rsq	0.25	0.30	0.26	0.31		
<b>50th Percentile</b>	-0.214*** (0.000)	-0.139*** (0.000)	-0.152*** (0.001)	-0.060*** (0.000)	-0.062	-0.079
Pseudo Rsq	0.27	0.32	0.30	0.35		
<b>75th Percentile</b>	-0.289*** (0.000)	-0.226*** (0.000)	-0.231*** (0.000)	-0.158*** (0.000)	-0.058	-0.068
Pseudo Rsq	0.30	0.38	0.35	0.37		
<b>90th Percentile</b>	-0.340*** (0.001)	-0.305*** (0.001)	-0.305*** (0.001)	-0.252*** (0.001)	-0.035	-0.053
Pseudo Rsq	0.34	0.40	0.39	0.39		
Observations	328946	385890	192453	222023		

*Notes to Table 6:* The public sector monthly gross earnings pay gap is estimated conditional on the following set of regressors: labour force experience, its quadratic form, educational qualification, occupational affiliation, employer urban type, employer region, employer size and year dummies. The estimation procedure for the mean robust regressions is OLS and estimated standard errors calculated based on White (1980) are reported in parentheses. Quantile regression procedures are used to obtain the coefficient estimates for the selected percentiles. Standard errors obtained by the bootstrapping procedure with 200 replications in all cases and reported in parentheses. \*\*\* denotes the 0.01 significance level.

*Data Source:* Pooled Harmonised Hungarian Wage Survey (WS), 1995-1999 and 2001-2003

Three main conclusion can be drawn from these results: firstly, the public-private sector pay differential is greater for workers at higher percentiles for both men and women during both periods of economic transition; secondly, the gap is higher for men than for women during both periods of economic transition; thirdly, the gap declined from earlier to later period of economic transition. These conclusions are based on the assumption that the returns to characteristics are the same across sectors.

In order to test whether the returns to characteristics differ between sectors earnings equations are now estimated using the same set of covariates but in the following ‘double equation’ model:

$$\text{Private sector:} \quad \ln w_i^{NP} = \alpha^{NP} + \beta' \text{ }^{NP} x_i + \varepsilon_i^{NP} \quad (4)$$

$$\text{Public sector:} \quad \ln w_i^P = \alpha^P + \beta' \text{ }^P x_i + \varepsilon_i^P \quad (5)$$

where  $NP$  and  $P$  denote non-public (i.e. private) and public sectors respectively. The estimates are obtained by gender for two sub-periods, 1995-1999 and 2001-2003 at the conditional mean and at conditional selected percentiles using monthly gross earnings whereas hourly gross earnings equations have been estimated for the later period only. The results are presented in Tables A5-A8 in the Appendix<sup>13</sup>. Most of the control variables included in both earnings equations are statistically significant at 0.01 level of significance. However, the sizes of the estimated coefficients differ between sectors implying different structure of the returns to characteristics.

In particular, returns to all skill levels for both male and female workers are greater in the private than in the public sector, except for low skilled women. The inter-sectoral differences in returns to education increase with the level of education. For example, during 1995-1999 the average returns to vocational (low skilled), high school (middle skilled) and university (high skilled) education for full-time male employees are estimated to be 11%, 25% and 69% higher than the reference primary (unskilled) level of education in the private sector and 8%, 18% and 39% in the public sector, respectively. The results obtained for the private sector are comparable with the estimates reported by other studies for Hungary. For example, Kertesi and Köllő (2002) estimated that between 1986 and 1999 the average relative returns to vocational education remained approximately constant (around 12%) but average relative returns to high school and college education increased, from 14% to 21% and from 36% to 63% respectively, relative to the primary education base.

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<sup>13</sup> Tables A5-A8 present only the returns to labour force experience and education and year dummies. The full specification results from conditional regressions available from the author upon request.

Furthermore, the quantile regressions reveal the effects of the rigid pay scales in the public sector. As explained at the beginning of the paper the public sector wage scale in Hungary assured equal wages for employees for a given job with the same qualification and seniority. Indeed, the quantile regressions show that the inter-sectoral differences in returns to education increase with higher percentiles of the earnings distribution for each level of education.

A divergent earnings determination pattern between sectors is the most pronounced for university graduates. For example, the inter-sectoral difference in returns to education was 10 percentage points at the 10<sup>th</sup> percentile and 50 percentage points at the 90<sup>th</sup> percentile for male graduates during 1995-1999. This was caused by an equal 'mark-up' to university level of education relative to the primary education base at each percentile of the earnings distribution paid by the public sector as given by coefficient estimates presented in Table A5 in the Appendix. As opposed to the rigid pay scales in the public sector the earnings determination in the private sector was more flexible allowing workers at a higher percentiles an accumulation of returns.

Focusing attention on returns to education in each sector during the 2001-2003 period Tables A6 and A7 in the Appendix provide evidence of the convergence in public and private sectors earnings determination processes. In particular, a decline in inter-sectoral differences in returns to education between two sub-periods was the most pronounced for workers below the median who had university level of education. Hence, the results indicated that the inter-sectoral differences and their changes over time varied between workers with different levels of educational qualifications as well as across the earnings distribution within each educational level. This will be further investigated in the next section.

Additional inspection of other estimates from earnings regressions suggests that the earnings structure between the two sectors was different with respect to returns to other characteristics as well. For example, relative to the base group the majority of occupations were paid less in the public than in the private sector for both genders and contrary to returns to education these sectoral differences increased over the period. In addition, public sector pay was more equally distributed across employers in different regions and of different sizes than private sector pay. Finally, Tables A5-A8 in the Appendix show that the annual average public sector pay in years during 1996-1998 was lower than the reference pay in year 1995, whereas the average private sector pay increased during the same period. A decline in the public sector pay was proportional across the earnings distribution whereas the increase in private sector earnings was greater at the top-end of the earnings distribution.

On the other hand, average public sector earnings increased twice as fast as average private sector wages in 2002 and about three times faster in 2003 relative to the reference 2001 wage level. The pay increases during the 2001-2003 period may reflect both minimum wage increases and public sector wage reforms. The effects of minimum wage increases are likely to be captured by the 2002 year dummies as showed by greater increases in pay at the lower end of the earnings distribution in both sectors. If the 2003 year dummy estimates in public sector earnings equation reflect the increases in pay as a result of public sector wage reform then it can be observed that these effects declined as one moves up the earnings distribution. The differences in returns to characteristics between sectors are not explained by the number of working hours since the estimates obtained using the log of real hourly gross earnings during 2001-2003 are analogous to monthly estimates.

*(ii) Decomposition of Differences in Distribution*

We now re-estimate the pooled quantile regression models by using a decomposition method. This method is based on aggregating the differences in the distribution into a part explained by differences in returns to characteristics and into a part explained by differences in characteristics.

A decomposition is obtained by following a version of the approach developed by Melly (2006). In Melly (2006) the consistent and asymptotically normally distributed estimators are obtained in two steps. In the first step the conditional distribution is estimated by traditional quantile regressions in each sector for each selected quantile. In the second step the conditional distribution is integrated over the range of the covariates to estimate the unconditional distribution. This approach is semiparametric since the conditional quantiles are assumed to satisfy a parametric restriction but distributional assumption is not required and the covariates can influence the whole conditional distribution.

The counterfactual distributions are estimated by replacing either the estimated coefficients or the distribution of characteristics in one sector by the other sector's estimated coefficients or the distribution of characteristics (Melly (2006), p. 111). A decomposition of differences in unconditional distribution at each quantile into a part explained by coefficients and a part explained by characteristics can be written as:

$$\mathcal{G}(x^P, \hat{\beta}^P) - \mathcal{G}(x^{NP}, \beta^{NP}) = \left[ \mathcal{G}(x^P, \beta^P) - \mathcal{G}(x^P, \beta^{NP}) \right] + \left[ \mathcal{G}(x^P, \beta^{NP}) - \mathcal{G}(x^{NP}, \beta^{NP}) \right] \quad (6)$$

where the first bracket in (6) represents the effect of differences in coefficients (could be interpreted as public sector earnings premium or penalty) and the second bracket represents the effect of differences in the distribution of characteristics;  $\mathcal{Q}$  is the estimated quantile of the earnings distribution and the  $x$  includes the same set of covariates as in the previous models.

The full decomposition estimation results are plotted in Figures A1 and A2 in the Appendix. The part of the total (i.e. unconditional) differential explained by differences in returns to (observed) characteristics (interpreted as the sector pay gap) for the periods 1995-1999 and 2001-2003 by gender are presented in Table 7.

For each period Table 7 shows that the estimates are the same in sign and similar in size to the results obtained using the 'dummy variable' approach in Table 6. In particular, during the 1995-1999 period apart from the 10th percentile the public sector pay penalty was statistically significant and increased from the bottom-end to the high-end for both men and women. The same holds for the 2001-2003 period but workers at the 10th percentile collected statistically significant public sector premia whereas the public sector pay penalty at the other percentiles was lower than during the 1995-1999 period.

Table 7

**Decomposition of public-private sector earnings differential at different percentiles: differences in returns to characteristics**

Percentile:	1995-1999		2001-2003		Change	
	Men	Women	Men	Women	Men	Women
<b>10<sup>th</sup></b>	-0.001 (0.001)	0.034*** (0.001)	-0.002** (0.001)	0.046*** (0.000)	0.001	-0.012
<b>30<sup>th</sup></b>	-0.136*** (0.000)	-0.069*** (0.001)	-0.054*** (0.001)	-0.012*** (0.002)	0.082	-0.057
<b>50<sup>th</sup></b>	-0.204*** (0.000)	-0.143*** (0.001)	-0.160*** (0.000)	-0.122*** (0.004)	0.044	-0.021
<b>70<sup>th</sup></b>	-0.289*** (0.000)	-0.261*** (0.002)	-0.273*** (0.001)	-0.256*** (0.003)	-0.016	-0.005
<b>90<sup>th</sup></b>	-0.472*** (0.001)	-0.443*** (0.002)	-0.406*** (0.003)	-0.439*** (0.003)	-0.065	-0.004

*Notes to Table 7:* Decomposition of differences in distribution estimation procedure implemented by estimating 100 quantile regressions in each sector accounting for worker's labour force experience, its quadratic form, educational qualification, occupational affiliation and employer's

urban type, region and size and year. The variance has been estimated by bootstrapping the results 100 times. Coefficients component contribution to the log difference in real monthly gross earnings between the public and private sectors are presented. The standard errors reported in parentheses. \*\*\* denotes the 0.01 significance level. Full decomposition results presented in Figures A1 and A2 in the Appendix.

*Data Source:* Pooled Harmonised Hungarian Wage Survey (WS), 1995-1999 and 2001-2003

Therefore, removing differences in characteristics, decomposition results reinforce the previous finding that the earnings distribution is more compressed in the public than in the private sector and that the gap declined over period reviewed.

### *(iii) Mean and Quantile Regressions by Educational Qualification*

The previous analysis suggested a compressed structure of the public sector earnings distribution. If a worker's earnings are interpreted as a measure of skill the compression of public sector pay indicates that the public sector pay penalty increases with skill. Furthermore, public sector pay compression may differ within each skill group. For example, the sectoral differences in earnings for unskilled workers are expected to be more uniform across the earnings distribution than for university graduates. As argued by Disney and Gosling (1998), if public sector workers with university degrees are more equal in terms of ability and 'drive' than their private sector counterparts, or if private sector workplaces are more likely to pay a premium for these attributes, then there will be a difference between the estimated effects of the public sector at for example the median or upper percentiles of the earnings distribution.

In order to test both between and within group public-private sector pay differentials as well as their changes over a decade of economic transition the sector pay gap in this subsection is estimated across the pay distribution for each skill level separately.

The public sector pay effects across groups of workers differentiated by educational qualifications attained are estimated using a 'dummy variable' method given by equation (1) at the conditional mean and at the conditional selected percentiles of the earnings distribution given by equation (2). The public-private sector pay gap estimates are obtained by pooling the data during 1990s and 2000s separately for each educational group by gender.

The unskilled group includes workers with primary educational qualification or less. The skilled group includes workers with both vocational (low skilled) and high school degree (middle skilled). The high-skilled group includes workers with a university degree.

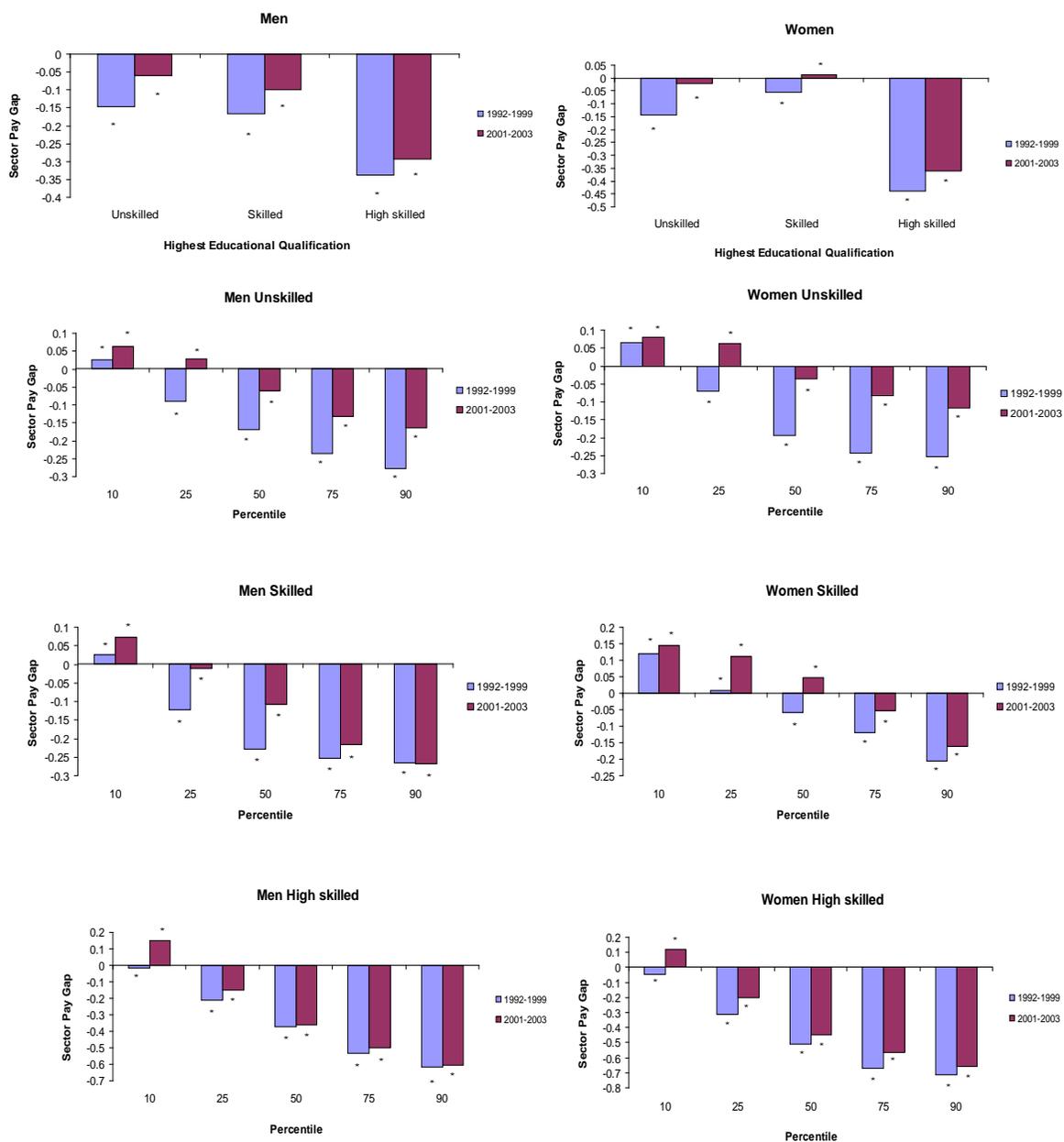
Since some of the occupations are not present for some educational groups we do not control for occupations and hence are able to pool data from 1992 until 1999 for the 1990s period. Each pooled regression is therefore estimated conditional on labour force experience, its quadratic form, employer urban type, employer region and a set of year dummies. We can compare our results to Hámori (2007) who estimated the annual sectoral pay gap from 1994 until 2003 WS data for different educational groups of full-time male employees conditional on the similar set of covariates.

The public sector pay differentials estimated for three groups of workers according to educational qualification by gender are plotted in the Figure 5. The first two charts present the results from mean regressions estimated by OLS. The rest of the charts illustrate quantile regression estimates. All estimated conditional public sector pay premia/penalties are statistically significant at the 0.01 level of significance and summarised in Table A9 in the Appendix. In addition to the monthly estimates Table A9 reports the hourly estimates for the 2001-2003 period. The difference between the monthly and hourly public-private sector differentials is insignificant.

The impact of the public sector pay status across groups differentiated by skill qualifications attained is evident from Figure 5. The between-group reduction in inequality for male workers arising from public sector earnings determination is observable in both periods by the increase in the negative average returns to public sector with higher skill level. For female workers the between-group reduction in inequality is observable in the higher negative average returns to public sector graduates relative to their private sector counterparts in both periods. In addition, the between-group reduction in inequality is also observable by a greater average public sector pay gap for men than for women. Finally, the between-group public sector pay compression is illustrated by a higher penalty to public sector status at the upper end of the earnings distribution which is almost double for high skilled workers than for other skill groups and by the higher premia for unskilled and skilled women at the lower end of the earnings distribution relative to men.

Figure 5

**Public sector monthly gross pay premium/penalty by highest educational qualification on average and across the pay distribution by gender in Hungary during 1992-1999 and 2001-2003**



*Notes to Figure 5:* The public sector monthly gross earnings gap is estimated conditional on labour force experience, its quadratic form, employer urban type, employer region and year. \* denotes that all coefficients are significant at 0.01 level. Estimates are summarised in Table A9 in the Appendix.

*Data Source:* Pooled Harmonised Hungarian Wage Survey, 1992-1999 and 2001-2003

In addition to between-group pay compression Figure 5 suggests that there is an equalising effect within skill groups attached to public sector status. In particular, working in the public sector clearly reduces the pay inequality among graduates relative to the private sector for both men and women. For example, the public sector pay penalty increased from 1.5% (4.6%) at the 10<sup>th</sup> percentile to 61.5% (71.5%) for men (women) at the 90<sup>th</sup> percentile during 1992-1999.

The same inequality-reducing effect is apparent for public sector graduates from 2001 until 2003, but the public sector penalty is lower than during the 1992-1999 period. During 2001-2003 both public sector male and female graduates at the 10<sup>th</sup> percentile obtained premia relative to their private sector counterparts but the penalty for having a public sector job remained at the rest of the percentiles. For example, the 15% public sector premium for male workers at the 10<sup>th</sup> percentile converts into 60% public sector penalty at the 90<sup>th</sup> percentile.

Our estimates are consistent with Hámori (2007). In particular, controlling for labour force experience, its quadratic form and Hungarian capital Budapest in a log monthly gross earnings equation, Hámori (2007) estimated that in 1994, the public sector pay penalty for male graduates increased from around 21% at the 10<sup>th</sup> percentile to 69% at the 90<sup>th</sup> percentile. Similar to our results, Hámori (2007) found for 2003 a 27% public sector premium for graduates at the 10<sup>th</sup> percentile, but around 62% public sector penalty at the 90<sup>th</sup> percentile.

A substantial public sector within-group earnings equalising effect for graduates in Hungary may be best depicted if the results are compared to some of the developed OECD countries. For example, Disney and Gosling (1998) estimated for UK public sector male graduates in 1983 a 25% premium over their private sector counterparts at the 10<sup>th</sup> percentile which drops to zero as one moves up the income distribution. During 1991-1995 although the whole distribution has shifted downwards (with workers at 25<sup>th</sup> percentile and above obtaining public sector pay penalties) Disney and Gosling (1998) find the same inequality reducing effect. Hence, relative to the UK the estimated public sector pay compression for male graduates in Hungary was three times greater.

Differences between the estimated coefficients during the 1990s and 2000s plotted on the Figure 5 are presented in columns titled as 'change' in Table A9 in the Appendix by gender. A negative sign presents the improvements in the financial position of public sector workers between the 1992-1999 and 2001-2003 periods. In general, Table A9 suggests the following conclusions. First, during 2001-2003 relative to 1992-1999 all public sector educational

groups improved their financial position. On average the improvements were the highest for the unskilled group of male and female workers. However, quantile regressions reveal that high-skilled workers at the 10<sup>th</sup> percentile saw the greatest improvement relative to their private sector counterparts between the two sub-periods. Second, on average and at most of the conditional percentiles, improvements in the financial position of public sector workers were greater for women than for men for every educational group. Third, within the unskilled group except at the 10<sup>th</sup> percentile the improvements in financial position of public sector workers were uniform across the earnings distribution. Within the skilled group the public sector pay penalty declined the most for workers at the middle of the earnings distribution. Within the high-skilled group workers at the top-end saw the smallest change in their financial position between the two sub-periods relative to their private sector counterparts.

Again, these conclusions are consistent with Hámori (2007) who found uniform changes in the public sector pay gap across the earnings distribution during economic transition for male workers with lower skills but not with higher skills. As has been shown in this section, Hámori (2007) also suggested that high skilled male workers were more affected at the top end until 2000 (increasing trend in public sector penalty) and at the bottom end of pay distribution after 2000 (decreasing trend in public sector penalty) due to public sector wage reforms.

## **6. CONCLUSION**

This paper has aimed to provide a comprehensive picture of the evolution of the earnings distribution in public and private sectors by gender during the economic transition in Hungary. The analysis was performed during the twelve-year long period, from 1992 until 2003, using an employer-provided microdata.

The empirical analysis in this paper had four goals. First, we tested whether there was a public-private sector earnings differential and how it changed during the period of economic transition. The OLS annual estimates showed that the conditional mean public sector pay differentials were negative during most of the period of economic transition in Hungary, but grew to zero by the end of the period reviewed in this paper. In particular, there was a widening of the mean sector pay gap from 1992 until 2001 and its closure by 2003. The change in the sign of the public sector pay gap is argued to be due to public sector wage reforms that took place in the early 2000s and aimed to increase public sector nominal wages by 50% on average.

In addition, we tested personal and job characteristics of workers. In contrast to the usual finding that labour force experience gained during the pre-transition is not valued by the market in transition (Adamchik and Bedi (2000) for Poland, Jovanović and Lokshin (2004) for Moscow and Laušev (2010) for Serbia) we found statistically significant returns to experience in Hungary. These results are similar to returns to experience reported by Orazem and Vodopivec (1997) for Slovenia and explained as an outcome of early retirement schemes which made experienced labour relatively scarce at the start of the economic transition.

Furthermore, we found that returns to university level education were increasing during the whole period observed. The estimated returns to educational qualification obtained for Hungary are comparable with the findings reported by related empirical studies for other transitional economies (such as Keane and Prasad (2001) for Poland; Munich, Svenjar and Terrell (2002) for Czech Republic; Orazem and Vodopivec (1997) for Slovenia).

Our second goal was to test whether the public sector pay effect for workers with similar characteristics varied across the earnings distribution. Indeed, quantile regressions indicated significant public sector pay compression. In particular we found: firstly, that the public-private sector pay differential was greater for workers at higher percentiles, i.e. the gap was smaller at lower-half and larger in upper-half of the earnings distribution than that obtained using OLS; secondly, that the gap was higher for men than for women; and thirdly, that the gap declined from earlier to later period of economic transition (i.e. before and after 2000).

Our third goal was to test the robustness of the quantile regression estimates obtained from a 'dummy variable' approach. So, the public sector pay effects across the conditional earnings distribution are re-estimated by a decomposition method. Removing the differences in characteristics the results from the decompositions reinforced the previous finding that the earnings distribution was more compressed in the public than in the private sector and that the difference in distributions declined over a period reviewed.

Our fourth goal was to test whether the public sector compressed pay both within and between groups of workers with different educational qualifications. Between groups the public sector pay equalising effect is confirmed by a higher penalty to public sector status at the upper end of the earnings distribution which is almost double for high skilled workers than for other skill groups, and by the higher premia for unskilled and skilled women at the lower end of the earnings distribution relative to men. The public sector compressed the pay the most amongs graduates for both men and women. For example, the public sector within-group earnings equalising effect for male graduates in Hungary is found to be three times

greater than the similar estimate reported by Disney and Gosling (1998) for the UK during 1990s.

Moreover, the paper showed that all public sector educational groups improved their financial position during 2000s relative to the 1990s, although women more than men. This is not surprising given the public sector wage reforms in early 2000s and the fact that the public sector is more female dominated. Finally, the improvements were highest for the unskilled groups of male and female workers on average. However, quantile regressions revealed that actually high-skilled workers at the 10<sup>th</sup> percentile saw the greatest improvement, whereas those at the top-end saw the smallest change in their financial position relative to their private sector counterparts. Within the skilled group the public sector pay penalty declined the most for workers at the middle of the earnings distribution. Within the unskilled group the improvements in financial position of public sector workers were uniform across the earnings distribution.

The paper did not explicitly deal with endogeneity and measurement error problems. Employer survey has less measurement error than self-reported data but has no suitable instruments to control for differences in workers' unobserved heterogeneity between sectors. Finally, changes in the public sector earnings inequality relative to the private sector during the post-transition period are left for future research.

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## 8. APPENDIX

Table A1

### Description of Variables Used in the Analysis

Variable name	Variable description
	<b>Wages and Hours Variables</b>
Monthly Gross Earnings and natural log of Monthly Gross Earnings	Monthly gross earnings are defined as monthly gross wage in May plus regular premia and bonuses in May plus one twelfth of the sum of all additional payments and irregular incomes connected to the full-time job paid over the previous year denoted in Hungarian currency (forint) and converted to 2003 earnings by the annual consumer price index
Hourly Gross Earnings and natural log of Hourly Gross Earnings	Hourly gross earnings are obtained by dividing monthly gross earnings with monthly hours
Monthly Hours	The monthly hours are reported paid hours in May
	<b>Employer Location and Region Variables</b>
Budapest	=1 if the individual works in capital Budapest; otherwise 0.
County center	=1 if the individual works in county center; otherwise 0.
City	=1 if the individual works in city; otherwise 0.
Village <sup>1</sup>	=1 if the individual works in the village; otherwise 0.
Central Hungary <sup>1</sup>	=1 if the individual works in the Central Hungary; otherwise 0.
Central Transdanubia	=1 if the individual works in the Central Transdanubia; otherwise 0.
Western Transdanubia	=1 if the individual works in the Western Transdanubia; otherwise 0.
Southern Transdanubia	=1 if the individual works in the Southern Transdanubia; otherwise 0.
Northern Hungary	=1 if the individual works in the Northern Hungary; otherwise 0.
Northern Great Plain	=1 if the individual works in the Northern Great Plain; otherwise 0.
Southern Great Plain	=1 if the individual works in the Southern Great Plain; otherwise 0.
	<b>Worker Education Level and Labour Force Experience Variables</b>
Unskilled <sup>1</sup>	=1 if the individual has primary education and less; otherwise 0.
Low skilled	=1 if the individual has vocational education; otherwise 0.
Middle skilled	=1 if the individual has high school education; otherwise 0.
High skilled	=1 if the individual has tertiary education; otherwise 0.
Labour Force Experience <=5 years <sup>1</sup>	=1 if the individual has less or five years of working experience; otherwise 0.
5<Labour Force Experience<=10 years	=1 if the individual has more than five and less or ten years of working experience; otherwise 0.
10<Labour Force Experience<=20 years	=1 if the individual has more than ten and less or twenty years of working experience; otherwise 0.
20<Labour Force Experience<=30 years	=1 if the individual has more than twenty and less or thirty years of working experience; otherwise 0.
Labour Force Experience>30 years	=1 if the individual has more than thirty years of working experience; otherwise 0.
Labour Force Experience <sup>2</sup> (Years/100)	Labour Force Experience squared of individual in years (divided by 100)

### Worker Occupation Variables

Manager	=1 if the individual is a manager; otherwise 0.
Professional	=1 if the individual is a professional; otherwise 0.
Technician	=1 if the individual is a technician; otherwise 0.
Clerk	=1 if the individual is a clerk; otherwise 0.
Worker in Services <sup>1</sup>	=1 if the individual is a worker in the services; otherwise 0.
Farmer	=1 if the individual is a farmer; otherwise 0.
Miner Industrial	=1 if the individual is a miner or industrial; otherwise 0.
Operator	=1 if the individual is an operator; otherwise 0.
Labourer	=1 if the individual is a labourer; otherwise 0.

### Employer Industry Branch Variables

Agriculture <sup>1</sup>	=1 if the individual works in agriculture and forestry; otherwise 0.
Mining & Manufacturing	=1 if the individual works in industry sector; otherwise 0.
Electricity Gas Water	=1 if the individual works in electricity, gas and water; otherwise 0.
Construction	=1 if the individual works in construction; otherwise 0.
Trade	=1 if the individual works in trade; otherwise 0.
Tourism and Catering	=1 if the individual works in catering and tourism; otherwise 0.
Transport Post	=1 if the individual works in transport and communication; otherwise 0.
Telecommunications	
Financial Intermediation & Real Estate & Renting Machinery	=1 if the individual works in financial and other services such as real estate and renting machinery; otherwise 0.
IT & Research & Development	=1 if the individual works in computer sciences and research and development; otherwise 0.
Other Business Activities	=1 if the individual works in other business activities; otherwise 0.
Public Administration & Defense & Compulsory Social Security	=1 if the individual works in public administration and compulsory social security; otherwise 0.
Education & Health & Social Work	=1 if the individual works in education, health and social work; otherwise 0.
Sewage & Refuse Disposal & Sanitation	=1 if the individual works in sewage and refuse disposal, sanitation and similar; otherwise 0.
Sports & Cultural & Recreative	=1 if the individual works in sports and culture and similar; otherwise 0.
Other & Private households with employed	=1 if the individual works either in non listed industry or for the private households; otherwise 0.
Extra territorial organisations and bodies	=1 if the individual works for extra territorial organisations and bodies; otherwise 0.

### Employer Size

21<=Employer Size<=50 <sup>1</sup>	=1 if individual works for employer with over 20 employees but less than 51 employees
51<=Employer Size<=300	=1 if individual works for employer with over 50 employees but less than 301 employees
301<=Employer Size<=1000	=1 if individual works for employer with over 300 employees but less than 1001 employees
1001<=Employer Size<=3000	=1 if individual works for employer with over 1000 employees but less than 3001 employees
Employer Size>=3001	=1 if individual works for employer with over 3000 employees

### Ownership Sector Variable

Public <sup>1</sup>	=1 if the individual works in the 'budgetary sector' (1992) or the individual is civil servant, judge, prosecutor or public servant (1995-2003); otherwise 0.
Private	=1 if the individual works in the enterprise in the competitive sector; otherwise 0.

*Notes to TableA 1:* <sup>1</sup> - denotes variable omitted in estimation.

*Data Source:* The Harmonised Hungarian Wage Survey (WS), 1992-2003

Table A2

**Proportions and Means of Variables used in Analysis from Harmonised  
Hungarian Wage Survey - Men**

Period Sector	1992				1995-1999				2001-2003			
	Public		Private		Public		Private		Public		Private	
	Mean	St. Dev.	Mean	St. Dev.	Mean	St. Dev.	Mean	St. Dev.	Mean	St. Dev.	Mean	St. Dev.
Log Monthly Gross Earnings (HUF)	11.63	0.48	11.45	0.52	11.43	0.56	11.40	0.61	11.79	0.60	11.60	0.62
Monthly Hours									180.83	14.90	182.57	13.10
Log Hourly Gross Earnings (HUF)									6.59	0.60	6.40	0.62
Age (years)	40.98	10.4	38.79	10.5	42.01	10.7	38.68	10.7	43.94	11.1	39.58	11.0
Labour Force Experience <=5	0.06	0.24	0.07	0.25	0.06	0.24	0.08	0.27	0.06	0.23	0.07	0.25
5<Lfe<=10 years	0.12	0.33	0.12	0.32	0.11	0.31	0.13	0.34	0.10	0.30	0.14	0.35
10<Lfe<=20 years	0.27	0.45	0.27	0.44	0.24	0.43	0.25	0.43	0.22	0.41	0.26	0.44
20<Lfe<=30 years	0.32	0.47	0.31	0.46	0.32	0.46	0.31	0.46	0.28	0.45	0.27	0.44
Labour Force Experience>30	0.20	0.4	0.20	0.4	0.24	0.43	0.20	0.4	0.29	0.45	0.22	0.42
Unskilled (Primary School or less)	0.18	0.3	0.28	0.45	0.17	0.37	0.21	0.41	0.12	0.33	0.17	0.38
Low skilled (Vocational Degree)	0.14	0.34	0.41	0.49	0.18	0.39	0.43	0.5	0.18	0.3	0.45	0.5
Middle skilled (High School Degree)	0.18	0.39	0.21	0.41	0.21	0.41	0.24	0.43	0.20	0.4	0.25	0.44
High skilled (Tertiary Degree)	0.51	0.5	0.10	0.29	0.43	0.5	0.11	0.31	0.50	0.5	0.12	0.33
Budapest	0.23	0.42	0.22	0.42	0.34	0.47	0.23	0.42	0.34	0.47	0.23	0.42
County center	0.31	0.46	0.25	0.43	0.29	0.45	0.27	0.44	0.30	0.46	0.27	0.44
City	0.31	0.46	0.34	0.48	0.26	0.44	0.35	0.48	0.26	0.44	0.37	0.48
Village	0.15	0.36	0.18	0.38	0.11	0.32	0.14	0.35	0.11	0.31	0.13	0.34
Central Hungary	0.29	0.45	0.28	0.45	0.39	0.49	0.29	0.45	0.38	0.49	0.30	0.46
Central Transdanubia	0.07	0.26	0.12	0.33	0.07	0.26	0.12	0.33	0.07	0.26	0.13	0.34
Western Transdanubia	0.10	0.3	0.13	0.34	0.08	0.2	0.13	0.34	0.08	0.27	0.13	0.34
Southern Transdanubia	0.12	0.32	0.09	0.29	0.09	0.2	0.09	0.29	0.09	0.2	0.09	0.2
Northern Hungary	0.13	0.34	0.11	0.31	0.11	0.31	0.11	0.31	0.11	0.31	0.11	0.31
Northern Great Plain	0.16	0.37	0.14	0.34	0.14	0.35	0.13	0.34	0.14	0.35	0.13	0.33
Southern Great Plain	0.12	0.33	0.13	0.34	0.12	0.33	0.12	0.33	0.12	0.33	0.12	0.32
21<=Employer Size<=50	0.08	0.26	0.07	0.25	0.12	0.32	0.14	0.34	0.12	0.33	0.19	0.39
51<=Employer Size<=300	0.46	0.5	0.29	0.45	0.44	0.5	0.33	0.47	0.46	0.5	0.36	0.48
301<=Employer Size<=1000	0.22	0.42	0.24	0.42	0.20	0.4	0.21	0.41	0.21	0.41	0.23	0.42
1001<=Employer Size<=3000	0.16	0.36	0.19	0.39	0.13	0.34	0.15	0.36	0.11	0.31	0.12	0.32
Employer Size>=3000	0.08	0.2	0.22	0.41	0.11	0.31	0.17	0.38	0.09	0.29	0.11	0.31
Agriculture					0.00	0.0	0.11	0.32	0.00	0.0	0.08	0.2
Mining & Manufacturing					0.00	0.0	0.40	0.49	0.00	0.0	0.43	0.49
Electricity Gas Water					0.00	0.0	0.07	0.25	0.00	0.0	0.05	0.23
Construction					0.00	0.0	0.07	0.26	0.00	0.01	0.07	0.26
Trade					0.00	0.0	0.08	0.27	0.00	0.0	0.11	0.31

Tourism & Catering				0.01	0.08	0.02	0.13	0.00	0.03	0.02	0.14
Transport Post											
Telecommunications				0.02	0.14	0.15	0.36	0.00	0.07	0.11	0.32
Financial											
Intermediation & Real Estate & Renting Machinery				0.00	0.05	0.03	0.17	0.01	0.08	0.04	0.18
Computer Activities & Research & Development				0.01	0.12	0.01	0.09	0.01	0.11	0.01	0.11
Other Business Activities				0.00	0.05	0.04	0.19	0.00	0.07	0.05	0.21
Public Administration & Defence & Compulsory Social Security				0.37	0.48	0.00	0.00	0.43	0.00	0.00	0.00
Education & Health & Social Work				0.53	0.50	0.00	0.06	0.50	0.00	0.00	0.06
Sewage & Refuse Disposal & Sanitation				0.00	0.04	0.01	0.10	0.00	0.03	0.01	0.11
Sport & Culture				0.05	0.22	0.00	0.06	0.04	0.19	0.01	0.08
Other & Private households with employed				0.00	0.02	0.00	0.06	0.00	0.02	0.00	0.05
Extra territorial organisations				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Manager				0.11	0.31	0.10	0.31	0.13	0.33	0.09	0.29
Professional				0.32	0.47	0.04	0.19	0.35	0.08	0.05	0.22
Technician				0.17	0.37	0.08	0.08	0.17	0.08	0.09	0.29
Clerk				0.01	0.09	0.01	0.08	0.01	0.09	0.01	0.08
Service				0.08	0.27	0.09	0.29	0.07	0.26	0.09	0.28
Farmer				0.01	0.09	0.03	0.17	0.01	0.08	0.03	0.16
Miner Industrial				0.11	0.31	0.36	0.08	0.09	0.29	0.35	0.08
Operator				0.09	0.29	0.20	0.00	0.08	0.27	0.21	0.41
Labourer				0.10	0.30	0.08	0.27	0.09	0.29	0.08	0.27
1992	1.00	0.00	1.00	0.00							
1995				0.21	0.41	0.20	0.00				
1996				0.21	0.40	0.20	0.00				
1997				0.19	0.40	0.20	0.00				
1998				0.20	0.40	0.20	0.00				
1999				0.18	0.39	0.20	0.00				
2001								0.34	0.47	0.37	0.48
2002								0.34	0.47	0.32	0.47
2003								0.33	0.47	0.31	0.46
Observations	9751		54402		56379		27256 7		30337		162116

*Notes to Table A2:* The samples used relate to full time male employees, aged between 15 and 64. Means, Proportions and Standard Deviations obtained for 1992 sample, pooled 1995-1999 samples and pooled 2001-2003 samples.

*Data Source:* The Harmonised Hungarian Wage Survey (WS), 1992-2003

Table A3

**Proportions and Means of Variables used in Analysis from Harmonised  
Hungarian Wage Survey - Women**

Period	1992				1995-1999				2001-2003			
	Public		Private		Public		Private		Public		Private	
Sector	Mean	St. Dev.	Mean	St. Dev.	Mean	St. Dev.	Mean	St. Dev.	Mean	St. Dev.	Mean	St. Dev.
Log Monthly Gross Earnings (HUF)	11.31	0.44	11.27	0.50	11.23	0.48	11.23	0.58	11.59	0.49	11.43	0.56
Monthly Hours									178.65	11.4	181.04	10.1
Log Hourly Gross Earnings (HUF)									6.40	0.49	6.24	0.56
Age (years)	38.89	9.51	38.47	9.72	40.28	9.44	38.31	10.0	42.59	9.94	39.64	10.5
Labour Force Experience <=5	0.10	0.29	0.09	0.29	0.08	0.27	0.10	0.3	0.06	0.24	0.08	0.27
5<Lfe<=10 years	0.10	0	0.08	0.27	0.09	0.29	0.11	0.31	0.09	0.8	0.13	0.33
10<Lfe<=20 years	0.29	0.45	0.24	0.43	0.26	0.44	0.22	0.41	0.23	0.42	0.22	0.42
20<Lfe<=30 years	0.33	0.47	0.37	0.8	0.35	0.8	0.36	0.8	0.32	0.47	0.29	0.45
Labour Force Experience>30	0.17	0.3	0.21	0.41	0.21	0.41	0.21	0.4	0.27	0.44	0.26	0.44
Unskilled (Primary School or less)	0.25	0.43	0.36	0.4	0.22	0.42	0.29	0.45	0.16	0.37	0.25	0.44
Low skilled (Vocational Degree)	0.08	0.27	0.20	0	0.08	0.27	0.23	0.42	0.09	0.8	0.25	0.43
Middle skilled (High School Degree)	0.33	0.47	0.38	0.49	0.36	0.8	0.41	0.49	0.36	0.8	0.40	0.49
High skilled (Tertiary Degree)	0.35	0.4	0.06	0.24	0.34	0.47	0.08	0.27	0.39	0.49	0.10	0.3
Budapest	0.18	0.3	0.27	0.45	0.25	0.43	0.27	0.45	0.27	0.44	0.26	0.44
County center	0.28	0.45	0.25	0.43	0.28	0.45	0.26	0.44	0.28	0.45	0.26	0.44
City	0.34	0.47	0.35	0.8	0.30	0.46	0.36	0.8	0.30	0.46	0.36	0.8
Village	0.20	0	0.12	0.33	0.17	0.37	0.11	0.31	0.15	0.36	0.11	0.31
Central Hungary	0.25	0.43	0.33	0.47	0.32	0.47	0.33	0.47	0.34	0.47	0.34	0.47
Central Transdanubia	0.08	0.2	0.11	0.32	0.10	0.29	0.11	0.32	0.09	0.8	0.12	0.33
Western Transdanubia	0.09	0.29	0.11	0.32	0.09	0.29	0.13	0.34	0.08	0.27	0.13	0.34
Southern Transdanubia	0.12	0.33	0.09	0.8	0.10	0.3	0.09	0.2	0.09	0.8	0.08	0.2
Northern Hungary	0.15	0.36	0.11	0.31	0.12	0.33	0.10	0.3	0.12	0.33	0.09	0.29
Northern Great Plain	0.18	0.3	0.13	0.33	0.15	0.35	0.12	0.32	0.15	0.36	0.12	0.32
Southern Great Plain	0.12	0.32	0.12	0.33	0.13	0.33	0.12	0.33	0.12	0.33	0.11	0.31
21<=Employer Size<=50	0.08	0.27	0.06	0.25	0.16	0.37	0.12	0.32	0.19	0.39	0.15	0.36
51<=Employer Size<=300	0.46	0.5	0.28	0.45	0.46	0.5	0.32	0.47	0.46	0.5	0.35	0.4
301<=Employer Size<=1000	0.21	0.4	0.27	0.44	0.19	0.39	0.24	0.43	0.18	0.39	0.24	0.43
1001<=Employer Size<=3000	0.18	0.3	0.18	0.3	0.15	0.35	0.15	0.35	0.12	0.32	0.12	0.33
Employer Size>=3000	0.08	0.27	0.20	0.4	0.04	0.21	0.17	0.3	0.05	0.22	0.13	0.34
Agriculture					0.00	0.0	0.05	0.23	0.00	0.0	0.03	0.18
Mining & Manufacturing					0.00	0.0	0.44	0.5	0.00	0.01	0.44	0.5
Electricity Gas Water					0.00	0.01	0.03	0.18	0.00	0.01	0.03	0.16
Construction					0.00	0.0	0.02	0.12	0.00	0.01	0.01	0.12

					2							
Trade					0.0	0.16	0.37	0.00	0.0	0.18	0.3	
					0				0		8	
					0.0				0.0		0.2	
Tourism & Catering					9	0.03	0.17	0.00	4	0.04	0	
Transport Post					0.0				0.0			
Telecommunications					5	0.11	0.31	0.00	3	0.08	0.27	
Financial Intermediation & Real Estate & Renting Machinery					0.0		0.2					
Computer Activities					5	0.09	8	0.01	0.07	0.07	0.26	
& Research & Development					0.0		0.0		0.0			
Other Business					6	0.01	9	0.00	6	0.01	0.11	
Activities					0.0				0.0			
Public Administration & Defence & Compulsory Social Security					4	0.04	0.19	0.00	6	0.06	0.24	
Education & Health & Social Work					0.34	0.47	0.00	0.0	0.4	0.00	0.0	
Sewage & Refuse Disposal & Sanitation					0.4		0.0	0.36	8			
					0.62	8	0.01	8	0.61	0.49	0.01	0.12
					0.00	0.01	0.01	0.07	0.00	0.0	0.01	0.0
					0.00	0.01	0.01	0.07	0.02	0.13	0.01	0.0
Sport & Culture					0.02	0.14	0.01	0.07	0.02	0.13	0.01	0.09
Other & Private households with employed					0.00	0.01	0.01	9	0.00	0.0	0.01	0.07
Extra territorial organisations					0.00	0.0	0.00	0	0.00	0.0	0.00	0.0
Manager					0.06	0.24	0.07	0.26	0.07	0.25	0.07	0.25
Professional					0.29	0.45	0.03	0.17	0.31	0.46	0.04	0.19
												0.4
Technician					0.33	0.47	0.21	0.41	0.33	0.47	0.20	0
										0.2		
Clerk					0.08	0.27	0.16	0.37	0.09	8	0.14	0.34
Service					0.06	0.24	0.11	0.31	0.05	0.22	0.12	0.33
						0.0				0.0		
Farmer					0.00	4	0.02	0.13	0.00	4	0.01	0.12
						0.0						
Miner Industrial					0.01	8	0.19	0.39	0.00	0.07	0.18	0.39
						0.0				0.0		
Operator					0.00	3	0.11	0.32	0.00	3	0.14	0.34
								0.2				0.3
Labourer					0.16	0.37	0.09	8	0.14	0.34	0.10	0
1992	1.00	0.0	1.00	0.0								
1995					0.21	0.4	0.21	0.41				
						0.4		0.4				
1996					0.21	0	0.20	0				
						0.4		0.4				
1997					0.20	0	0.20	0				
						0.4		0.4				
1998					0.20	0	0.20	0				
								0.4				
1999					0.19	0.39	0.20	0				
												0.4
2001									0.33	0.47	0.36	8
2002									0.33	0.47	0.32	0.47
2003									0.33	0.47	0.32	0.47
Observations	25879		40014		192128		19376		10608		115939	
							2		4			

*Notes to Table A3:* The samples used relate to full time female employees, aged between 15 and 64. Means, Proportions and Standard Deviations obtained for 1992 sample, pooled 1995-1999 samples and pooled 2001-2003 samples. *Data Source:* The Harmonised Hungarian Wage Survey (WS), 1992-2003

Table A4

**Annual Conditional Public Sector Pay premiums'/penalties in Hungary,  
1992-2003**

	<i>Mean</i>		<i>10<sup>th</sup> Percentile</i>		<i>25<sup>th</sup> Percentile</i>		<i>50<sup>th</sup> Percentile</i>		<i>75<sup>th</sup> Percentile</i>		<i>90<sup>th</sup> Percentile</i>	
	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women
1992	-0.07*** (0.000)	-0.08*** (0.001)	0.06*** (0.001)	0.05*** (0.001)	0.01** (0.001)	-0.02*** (0.001)	-0.05*** (0.001)	-0.07*** (0.001)	-0.11*** (0.001)	-0.12*** (0.001)	-0.17*** (0.002)	-0.17*** (0.001)
1995	-0.08*** (0.001)	-0.05*** (0.001)	0.03*** (0.001)	0.09*** (0.001)	0.06*** (0.001)	0.01*** (0.000)	-0.11*** (0.001)	-0.06*** (0.001)	-0.15*** (0.001)	-0.12*** (0.001)	-0.20*** (0.001)	-0.18*** (0.001)
1996	-0.25*** (0.001)	-0.18*** (0.001)	-0.09*** (0.001)	-0.01*** (0.001)	-0.18*** (0.001)	-0.11*** (0.001)	-0.27*** (0.001)	-0.18*** (0.000)	-0.35*** (0.000)	-0.26*** (0.001)	-0.40*** (0.001)	-0.34*** (0.001)
1997	-0.23*** (0.001)	-0.16*** (0.001)	-0.05*** (0.001)	0.07*** (0.001)	-0.16*** (0.001)	-0.05*** (0.001)	-0.25*** (0.001)	-0.15*** (0.001)	-0.32*** (0.001)	-0.25*** (0.001)	-0.38*** (0.001)	-0.33*** (0.001)
1998	-0.20*** (0.001)	-0.15*** (0.001)	-0.02*** (0.001)	0.09*** (0.001)	-0.13*** (0.001)	-0.04*** (0.001)	-0.22*** (0.001)	-0.14*** (0.001)	-0.31*** (0.001)	-0.24*** (0.001)	-0.38*** (0.001)	-0.33*** (0.001)
1999	-0.22*** (0.001)	-0.18*** (0.001)	-0.02*** (0.001)	0.07*** (0.001)	-0.14*** (0.001)	-0.07*** (0.001)	-0.22*** (0.001)	-0.17*** (0.001)	-0.32*** (0.001)	-0.27*** (0.001)	-0.36*** (0.001)	-0.37*** (0.001)
2001	-0.22*** (0.001)	-0.19*** (0.001)	-0.05*** (0.001)	0.03*** (0.001)	-0.13*** (0.001)	-0.05*** (0.001)	-0.22*** (0.001)	-0.14*** (0.001)	-0.31*** (0.001)	-0.25*** (0.001)	-0.35*** (0.001)	-0.35*** (0.001)
2001 <sub>h</sub>	-0.20*** (0.001)	-0.16*** (0.001)	-0.05*** (0.001)	0.06*** (0.001)	-0.115*** (0.001)	-0.02*** (0.001)	-0.20*** (0.001)	-0.11*** (0.000)	-0.28*** (0.001)	-0.23*** (0.000)	-0.33*** (0.001)	-0.33*** (0.001)
2002	-0.20*** (0.001)	-0.13*** (0.001)	0.00 (0.001)	0.03*** (0.001)	-0.10*** (0.000)	-0.02*** (0.001)	-0.18*** (0.001)	-0.08*** (0.001)	-0.25*** (0.001)	-0.15*** (0.001)	-0.33*** (0.001)	-0.24*** (0.001)
2002 <sub>h</sub>	-0.20*** (0.001)	-0.13*** (0.001)	-0.00*** (0.001)	0.03*** (0.000)	-0.10*** (0.001)	-0.02*** (0.001)	-0.19*** (0.001)	-0.09*** (0.001)	-0.25*** (0.001)	-0.15*** (0.001)	-0.32*** (0.001)	-0.23*** (0.000)
2003	-0.07*** (0.001)	0.01*** (0.001)	0.20*** (0.001)	0.25*** (0.001)	0.08*** (0.001)	0.17*** (0.001)	-0.06*** (0.001)	0.05*** (0.001)	-0.17*** (0.001)	-0.07*** (0.001)	-0.26*** (0.001)	-0.20*** (0.001)
2003 <sub>h</sub>	-0.07*** (0.001)	0.015*** (0.001)	0.20*** (0.001)	0.26*** (0.001)	0.08*** (0.001)	0.18*** (0.001)	-0.06*** (0.001)	0.07*** (0.001)	-0.17*** (0.001)	-0.05*** (0.001)	-0.25*** (0.001)	-0.19*** (0.001)

*Notes to Table A4:* The samples used relate to full time employees, aged between 15 and 64. The dependent variable is the log of real monthly and hourly gross earnings. *h* indicates that the dependant variable is log of hourly gross earnings and is used for 2001, 2002 and 2003 years when the information on monthly paid hours is available. Monthly gross earnings are defined as monthly gross wage in May plus regular payments and bonuses in May one twelfth of the sum of all other payments and irregular incomes connected to the full-time job paid over the previous year, denoted in HUF and converted to 2003 earnings by the annual consumer price index. The hourly gross earnings are obtained by dividing the monthly gross earnings with monthly hours. The public sector dummy estimates are obtained conditional on worker's labour force experience and its squared term, educational qualification and occupational affiliation (except in 1992) dummies and employer's urban type, region and size dummies. The estimation procedure for the mean regression is OLS. Heteroskedasticity robust standard errors are computed on the basis of White (1980) and reported in the parentheses. Quantile regression procedures are used to obtain the coefficient estimates for the selected percentiles. The estimated standard errors reported in parentheses for the quantile regressions are based on the bootstrapping procedure with 200 replications in all cases. OLS and quantile regression analysis reported used STATA 10.0. \*\*\*, \*\*, \* denote significance at the 0.01, 0.05 and 0.1 level.

*Data Source:* The Harmonised Hungarian Wage Survey (WS), 1992-2003

Table A5

### Estimation of real monthly gross earnings in Hungary for men, 1995-1999

Sector	Mean		10th		25th		50th		75th		90th	
	Public	Private										
<b>Experience</b>	0.031*** (0.000)	0.021*** (0.000)	0.030*** (0.000)	0.017*** (0.000)	0.031*** (0.000)	0.021*** (0.000)	0.032*** (0.000)	0.022*** (0.000)	0.031*** (0.000)	0.021*** (0.000)	0.027*** (0.000)	0.025*** (0.000)
<b>ExperienSq</b>	-0.040*** (0.000)	-0.031*** (0.000)	-0.037*** (0.000)	-0.022*** (0.000)	-0.040*** (0.000)	-0.030*** (0.000)	-0.040*** (0.000)	-0.035*** (0.000)	-0.039*** (0.000)	-0.037*** (0.000)	-0.032*** (0.000)	-0.042*** (0.000)
<b>Education</b>												
Unskilled	<i>f</i>											
Lowskilled	0.079*** (0.001)	0.109*** (0.001)	0.104*** (0.000)	0.108*** (0.001)	0.082*** (0.001)	0.106*** (0.001)	0.075*** (0.000)	0.105*** (0.001)	0.063*** (0.001)	0.114*** (0.001)	0.066*** (0.000)	0.122*** (0.001)
Middleskill	0.180*** (0.001)	0.252*** (0.001)	0.154*** (0.001)	0.200*** (0.001)	0.167*** (0.001)	0.227*** (0.001)	0.180*** (0.000)	0.249*** (0.001)	0.178*** (0.001)	0.277*** (0.001)	0.192*** (0.000)	0.308*** (0.001)
Highskilled	0.391*** (0.002)	0.689*** (0.001)	0.371*** (0.001)	0.464*** (0.002)	0.389*** (0.001)	0.572*** (0.001)	0.385*** (0.000)	0.688*** (0.001)	0.383*** (0.001)	0.808*** (0.001)	0.400*** (0.000)	0.925*** (0.002)
<b>Year</b>												
1995	<i>f</i>											
1996	-0.111*** (0.001)	0.034*** (0.001)	-0.103*** (0.000)	0.007*** (0.001)	-0.106*** (0.001)	0.009*** (0.001)	-0.106*** (0.000)	0.020*** (0.001)	-0.114*** (0.000)	0.039*** (0.001)	-0.125*** (0.000)	0.041*** (0.001)
1997	-0.082*** (0.001)	0.031*** (0.001)	-0.072*** (0.000)	-0.026*** (0.001)	-0.077*** (0.001)	-0.013*** (0.001)	-0.074*** (0.000)	0.015*** (0.001)	-0.077*** (0.000)	0.047*** (0.001)	-0.098*** (0.000)	0.062*** (0.001)
1998	-0.020*** (0.001)	0.062*** (0.001)	-0.018*** (0.000)	0.004*** (0.001)	-0.028*** (0.001)	0.016*** (0.001)	-0.014*** (0.000)	0.044*** (0.001)	-0.025*** (0.000)	0.080*** (0.001)	-0.027*** (0.000)	0.100*** (0.001)
1999	0.013*** (0.001)	0.110*** (0.001)	0.012*** (0.000)	0.042*** (0.001)	0.008*** (0.001)	0.065*** (0.001)	0.022*** (0.000)	0.094*** (0.001)	0.010*** (0.000)	0.136*** (0.001)	-0.007*** (0.000)	0.149*** (0.001)
<b>Constant</b>	10.40*** (0.002)	10.42*** (0.001)	10.14*** (0.001)	9.850*** (0.002)	10.27*** (0.002)	10.08*** (0.001)	10.40*** (0.000)	10.42*** (0.001)	10.55*** (0.001)	10.74*** (0.002)	10.73*** (0.000)	11.03*** (0.003)
<b>Observation</b>	56379	272567	56379	272567	56379	272567	56379	272567	56379	272567	56379	272567
<b>Rsq;</b>												
<b>Pseudo Rsq</b>	0.669	0.445	0.42	0.21	0.44	0.23	0.46	0.26	0.45	0.29	0.42	0.33
<b>Root MSE</b>	0.32	0.45										

*Notes to Table A5:* a) The samples used relate to full time employees, aged between 15 and 64. The dependent variable is the log of real monthly gross earnings. This is defined as monthly gross wage in May plus regular payments and bonuses in May one twelfth of the sum of all other payments and irregular incomes connected to the full-time job paid over the previous year, denoted in HUF and converted to 2003 earnings by the annual consumer price index. The public sector includes budgetary sector and civil servants, judge, prosecutor and public servants. The private sector includes all non-public workers. Each earnings equation includes a full set of occupational affiliation dummies and employer's urban type, region and size dummies.

b) The estimation procedure for the mean regression is OLS. The estimated standard errors reported in parentheses are heteroskedasticity robust computed on the basis of White (1980). Quantile regression procedures are used to obtain the coefficient estimates for the selected percentiles (10<sup>th</sup>, 25<sup>th</sup>, 50<sup>th</sup>, 75<sup>th</sup> and 90<sup>th</sup>). The estimated standard errors reported in parentheses for the quantile regressions are based on the bootstrapping procedure with 200 replications in all cases. OLS and quantile regression analysis reported used STATA 10.0. \*\*\*, \*\*, \* denote significance at the 0.01, 0.05 and 0.1 level. *f* denotes category omitted in estimation. *Data Source:* The Harmonised Hungarian Wage Survey (WS), 1995-1999

Table A6

### Estimation of real monthly gross earnings in Hungary for men, 2001-2003

Sector	Mean		10th		25th		50th		75th		90th	
	Public	Private										
<b>Experience</b>	0.028*** (0.000)	0.016*** (0.000)	0.028*** (0.000)	0.008*** (0.000)	0.027*** (0.000)	0.012*** (0.000)	0.026*** (0.000)	0.016*** (0.000)	0.026*** (0.000)	0.020*** (0.000)	0.025*** (0.000)	0.023*** (0.000)
<b>ExperiencS</b>	-0.037*** (0.000)	-0.027*** (0.000)	-0.036*** (0.000)	-0.010*** (0.000)	-0.034*** (0.000)	-0.017*** (0.000)	-0.033*** (0.000)	-0.027*** (0.000)	-0.033*** (0.000)	-0.035*** (0.000)	-0.032*** (0.000)	-0.043*** (0.000)
<b>Education</b>												
Unskilled	<i>f</i>											
Lowskilled	0.081*** (0.001)	0.096*** (0.001)	0.066*** (0.001)	0.073*** (0.001)	0.066*** (0.000)	0.076*** (0.001)	0.089*** (0.001)	0.087*** (0.001)	0.088*** (0.000)	0.104*** (0.001)	0.081*** (0.000)	0.123*** (0.001)
Middleskill	0.135*** (0.002)	0.228*** (0.001)	0.088*** (0.001)	0.135*** (0.001)	0.092*** (0.000)	0.176*** (0.001)	0.126*** (0.001)	0.218*** (0.001)	0.158*** (0.000)	0.271*** (0.001)	0.185*** (0.000)	0.320*** (0.001)
Highskilled	0.503*** (0.003)	0.704*** (0.002)	0.432*** (0.001)	0.420*** (0.002)	0.495*** (0.000)	0.566*** (0.002)	0.542*** (0.001)	0.707*** (0.001)	0.521*** (0.000)	0.829*** (0.002)	0.530*** (0.000)	0.937*** (0.002)
<b>Year</b>												
2002	0.123*** (0.001)	0.067*** (0.001)	0.144*** (0.001)	0.106*** (0.001)	0.135*** (0.000)	0.076*** (0.001)	0.134*** (0.001)	0.061*** (0.001)	0.141*** (0.000)	0.048*** (0.001)	0.100*** (0.000)	0.038*** (0.001)
2003	0.312*** (0.001)	0.122*** (0.001)	0.427*** (0.001)	0.126*** (0.001)	0.382*** (0.000)	0.125*** (0.00)	0.342*** (0.001)	0.125*** (0.001)	0.274*** (0.000)	0.107*** (0.001)	0.198*** (0.000)	0.089*** (0.001)
<b>Constant</b>	10.54*** (0.003)	10.71*** (0.002)	10.28*** (0.002)	10.40*** (0.002)	10.40*** (0.001)	10.48*** (0.002)	10.53*** (0.002)	10.67*** (0.002)	10.74*** (0.000)	10.95*** (0.002)	10.93*** (0.000)	11.23*** (0.003)
<b>Observation</b>	30337	162116	30337	162116	30337	162116	30337	162116	30337	162116	30337	162116
<b>Rsqr;</b>												
<b>Pseudo Rsqr</b>	0.689	0.49	0.43	0.17	0.47	0.23	0.48	0.28	0.48	0.33	0.45	0.39
<b>Root MSE</b>	0.33	0.44										

*Notes to Table A6:* See Notes to Table A5

*Data Source:* The Harmonised Hungarian Wage Survey (WS), 2001-2003

Table A7

**Estimation of real monthly gross earnings in Hungary for women, 1995-1999**

Sector	Mean		10th		25th		50th		75th		90th	
	Public	Private	Public	Private	Public	Private	Public	Private	Public	Private	Public	Private
<b>Experience</b>	0.030*	0.015***	0.028***	0.015**	0.030*	0.015***	0.031***	0.016***	0.031***	0.016***	0.030*	0.017**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
<b>ExperiencS</b>	-0.034**	-0.018**	-0.039**	-0.016***	-0.034**	-0.017***	-0.037***	-0.020*	-0.037**	-0.020*	-0.033**	-0.022**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
<b>Education</b>												
Unskilled	<i>f</i>	<i>f</i>	<i>f</i>	<i>f</i>	<i>f</i>	<i>f</i>	<i>f</i>	<i>f</i>	<i>f</i>	<i>f</i>	<i>f</i>	<i>f</i>
Lowskilled	0.115***	0.055***	0.121***	0.067***	0.116***	0.053***	0.111***	0.046***	0.102***	0.053***	0.104***	0.064***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Middleskill	0.215***	0.252***	0.173***	0.195***	0.183***	0.215***	0.202***	0.234***	0.232***	0.261***	0.238***	0.290***
	(0.001)	(0.001)	(0.01)	(0.00)	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)	(0.001)
Highskilled	0.451***	0.720***	0.372***	0.504***	0.389***	0.619***	0.422***	0.739***	0.476***	0.817***	0.513***	0.858***
	(0.001)	(0.002)	(0.001)	(0.002)	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.001)
<b>Year</b>												
1995	<i>f</i>	<i>f</i>	<i>f</i>	<i>f</i>	<i>f</i>	<i>f</i>	<i>f</i>	<i>f</i>	<i>f</i>	<i>f</i>	<i>f</i>	<i>f</i>
1996	-0.100***	0.023***	-0.105***	-0.002**	-0.103***	0.009***	-0.098***	0.020***	-0.101***	0.027***	-0.089***	0.038***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)	(0.001)
1997	-0.061***	0.018***	-0.044***	-0.026***	-0.046***	-0.010***	-0.052***	0.008***	-0.066***	0.028***	-0.060***	0.055***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)	(0.001)
1998	-0.012***	0.056***	-0.007***	-0.002**	-0.011***	0.017***	-0.013***	0.044***	-0.014***	0.072***	0.011***	0.105***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)	(0.001)
1999	0.007***	0.105***	0.013***	0.045***	0.018***	0.069***	0.012***	0.094***	-0.002***	0.116***	0.010***	0.142***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)	(0.001)
<b>Constant</b>	10.22***	10.37***	10.04***	9.889***	10.14***	10.08***	10.22***	10.34***	10.34***	10.66***	10.46***	10.94***
	(0.001)	(0.002)	(0.001)	(0.002)	(0.001)	(0.002)	(0.001)	(0.002)	(0.001)	(0.002)	(0.002)	(0.003)
<b>Observation</b>	192128	193762	192128	193762	192128	193762	192128	193762	192128	193762	192128	193762
<b>Rsqr</b>												
<b>Pseudo Rsqr</b>	0.629	0.49	0.42	0.23	0.43	0.26	0.42	0.29	0.4	0.32	0.38	0.36
<b>Root MSE</b>	0.29	0.41										

*Notes to Table A7:* See Notes to Table A5

*Data Source:* The Harmonised Hungarian Wage Survey (WS), 1995-1999

Table A8

**Estimation of real monthly gross earnings in Hungary for women, 2001-2003**

Percentile	Mean		10		25		50		75		90	
	Public	Private	Public	Private	Public	Private	Public	Private	Public	Private	Public	Private
<b>Experience</b>	0.024*** (0.000)	0.012*** (0.000)	0.027*** (0.000)	0.027*** (0.000)	0.025*** (0.000)	0.022*** (0.000)	0.021*** (0.000)	0.007*** (0.000)	0.008*** (0.000)	0.010*** (0.000)	0.012*** (0.000)	0.014*** (0.000)
<b>ExperiencS</b>	-0.027*** (0.000)	-0.020*** (0.000)	-0.033*** (0.000)	-0.033*** (0.000)	-0.030*** (0.000)	0.023*** (0.000)	-0.019*** (0.000)	0.010*** (0.000)	-0.012*** (0.000)	-0.015*** (0.000)	0.019*** (0.000)	-0.022*** (0.000)
<b>Education</b>												
Unskilled	<i>f</i>	<i>f</i>	<i>f</i>	<i>f</i>	<i>f</i>	<i>f</i>	<i>f</i>	<i>f</i>	<i>f</i>	<i>f</i>	<i>f</i>	<i>f</i>
Lowskilled	0.087*** (0.001)	0.040*** (0.001)	0.076*** (0.001)	0.079*** (0.001)	0.085*** (0.001)	0.087*** (0.001)	0.091*** (0.000)	0.022*** (0.001)	0.034*** (0.001)	0.034*** (0.001)	0.051*** (0.001)	0.080*** (0.002)
Middleskill	0.167*** (0.001)	0.204*** (0.001)	0.121*** (0.001)	0.132*** (0.001)	0.147*** (0.001)	0.179*** (0.001)	0.197*** (0.000)	0.085*** (0.000)	0.136*** (0.001)	0.190*** (0.001)	0.247*** (0.001)	0.284*** (0.002)
Highskilled	0.526*** (0.002)	0.699*** (0.002)	0.453*** (0.001)	0.486*** (0.001)	0.508*** (0.001)	0.574*** (0.001)	0.607*** (0.000)	0.370*** (0.002)	0.563*** (0.001)	0.722*** (0.001)	0.814*** (0.002)	0.864*** (0.003)
<b>Year</b>												
2001	<i>f</i>	<i>f</i>	<i>f</i>	<i>f</i>	<i>f</i>	<i>f</i>	<i>f</i>	<i>f</i>	<i>f</i>	<i>f</i>	<i>f</i>	<i>f</i>
2002	0.150*** (0.001)	0.073*** (0.001)	0.150*** (0.001)	0.146*** (0.000)	0.144*** (0.000)	0.161*** (0.000)	0.169*** (0.000)	0.132*** (0.001)	0.090*** (0.001)	0.068*** (0.001)	0.049*** (0.001)	0.039*** (0.001)
2003	0.348*** (0.001)	0.106*** (0.001)	0.426*** (0.001)	0.406*** (0.000)	0.368*** (0.000)	0.328*** (0.000)	0.273*** (0.000)	0.143*** (0.001)	0.111*** (0.001)	0.101*** (0.001)	0.088*** (0.001)	0.072*** (0.001)
<b>Constant</b>	10.40*** (0.001)	10.73*** (0.002)	10.21*** (0.002)	10.29*** (0.001)	10.41*** (0.001)	10.55*** (0.001)	10.69*** (0.000)	10.49*** (0.002)	10.59*** (0.002)	10.74*** (0.002)	10.93*** (0.002)	11.16*** (0.003)
<b>Observations</b>	106084	115939	106084	115939	106084	115939	106084	115939	106084	115939	106084	115939
<b>Rsquared</b>	0.655	0.518	0.43	0.17	0.45	0.24	0.45	0.31	0.44	0.37	0.43	0.36
<b>Root MSE</b>	0.29	0.39										

*Notes to Table A8:* See Notes to Table A5.

*Data Source:* The Harmonised Hungarian Wage Survey (WS), 2001-2003

Table A9

**OLS and Quantile Regression Estimates of Public Sector Pay premia and penalties, by Highest Educational Qualification and Gender**

	Men				Women			
	Monthly Gross Earnings			Hourly	Monthly Gross Earnings			Hourly
	1992-1999 (1)	2001- 2003 (2)	Change (3)=(1)- (2)	2001- 2003 (4)	1992-1999 (5)	2001- 2003 (6)	Change (7)=(5)- (6)	2001- 2003 (8)
<i>Unskilled</i>								
Mean	-0.146*** (0.001)	-0.059*** (0.001)	-0.087	-0.047*** (0.001)	-0.145*** (0.001)	-0.022*** (0.001)	-0.123	0.002** (0.001)
10 <sup>th</sup>	0.025*** (0.001)	0.064*** (0.001)	-0.039	0.071*** (0.001)	0.066*** (0.001)	0.081*** (0.000)	-0.015	0.100*** (0.00)
25 <sup>th</sup>	-0.089*** (0.001)	0.028*** (0.002)	-0.061	0.034*** (0.001)	-0.071*** (0.001)	0.062*** (0.001)	-0.134	0.078*** (0.001)
50 <sup>th</sup>	-0.169*** (0.001)	-0.061*** (0.001)	-0.108	-0.041*** (0.002)	-0.195*** (0.001)	-0.035*** (0.001)	-0.160	-0.013*** (0.001)
75 <sup>th</sup>	-0.235*** (0.001)	-0.132*** (0.002)	-0.103	-0.114*** (0.002)	-0.244*** (0.001)	-0.084*** (0.001)	-0.160	-0.060*** (0.001)
90 <sup>th</sup>	-0.277*** (0.001)	-0.165*** (0.003)	-0.112	-0.144*** (0.002)	-0.252*** (0.001)	-0.118*** (0.001)	-0.134	-0.090*** (0.001)
<i>Skilled</i>								
Mean	-0.167*** (0.001)	-0.100*** (0.001)	-0.067	-0.086*** (0.001)	-0.057*** (0.000)	0.013*** (0.001)	-0.070	0.0290*** (0.001)
10 <sup>th</sup>	0.025*** (0.001)	0.073*** (0.001)	-0.048	0.087*** (0.001)	0.120*** (0.001)	0.145*** (0.001)	-0.025	0.158*** (0.000)
25 <sup>th</sup>	-0.123*** (0.001)	-0.012*** (0.001)	-0.111	0.003*** (0.001)	0.007*** (0.001)	0.111*** (0.001)	-0.104	0.132*** (0.001)
50 <sup>th</sup>	-0.228*** (0.001)	-0.107*** (0.001)	-0.121	-0.093*** (0.001)	-0.057*** (0.001)	0.047*** (0.001)	-0.104	0.064*** (0.001)
75 <sup>th</sup>	-0.254*** (0.001)	-0.215*** (0.002)	-0.039	-0.200*** (0.002)	-0.120*** (0.000)	-0.052*** (0.001)	-0.068	-0.037*** (0.001)
90 <sup>th</sup>	-0.265*** (0.001)	-0.269*** (0.002)	0.004	-0.255*** (0.002)	-0.206*** (0.001)	-0.160*** (0.001)	-0.046	-0.151*** (0.001)
<i>High-skilled</i>								
Mean	-0.338*** (0.001)	-0.293*** (0.002)	-0.045	-0.299*** (0.002)	-0.439*** (0.001)	-0.362*** (0.002)	-0.077	-0.362*** (0.002)
10 <sup>th</sup>	-0.014*** (0.001)	0.152*** (0.002)	-0.166	0.152*** (0.002)	-0.046*** (0.001)	0.119*** (0.001)	-0.165	0.126*** (0.001)
25 <sup>th</sup>	-0.209*** (0.001)	-0.149*** (0.001)	-0.060	-0.157*** (0.001)	-0.311*** (0.001)	-0.204*** (0.001)	-0.107	-0.197*** (0.001)
50 <sup>th</sup>	-0.372*** (0.001)	-0.362*** (0.002)	-0.010	-0.377*** (0.001)	-0.512*** (0.001)	-0.449*** (0.001)	-0.063	-0.462*** (0.001)
75 <sup>th</sup>	-0.533*** (0.001)	-0.500*** (0.001)	-0.033	-0.506*** (0.001)	-0.669*** (0.001)	-0.566*** (0.001)	-0.103	-0.575*** (0.001)
90 <sup>th</sup>	-0.614*** (0.001)	-0.605*** (0.001)	-0.009	-0.597*** (0.001)	-0.715*** (0.001)	-0.655*** (0.001)	-0.060	-0.649*** (0.002)

*Notes to Table A9:*

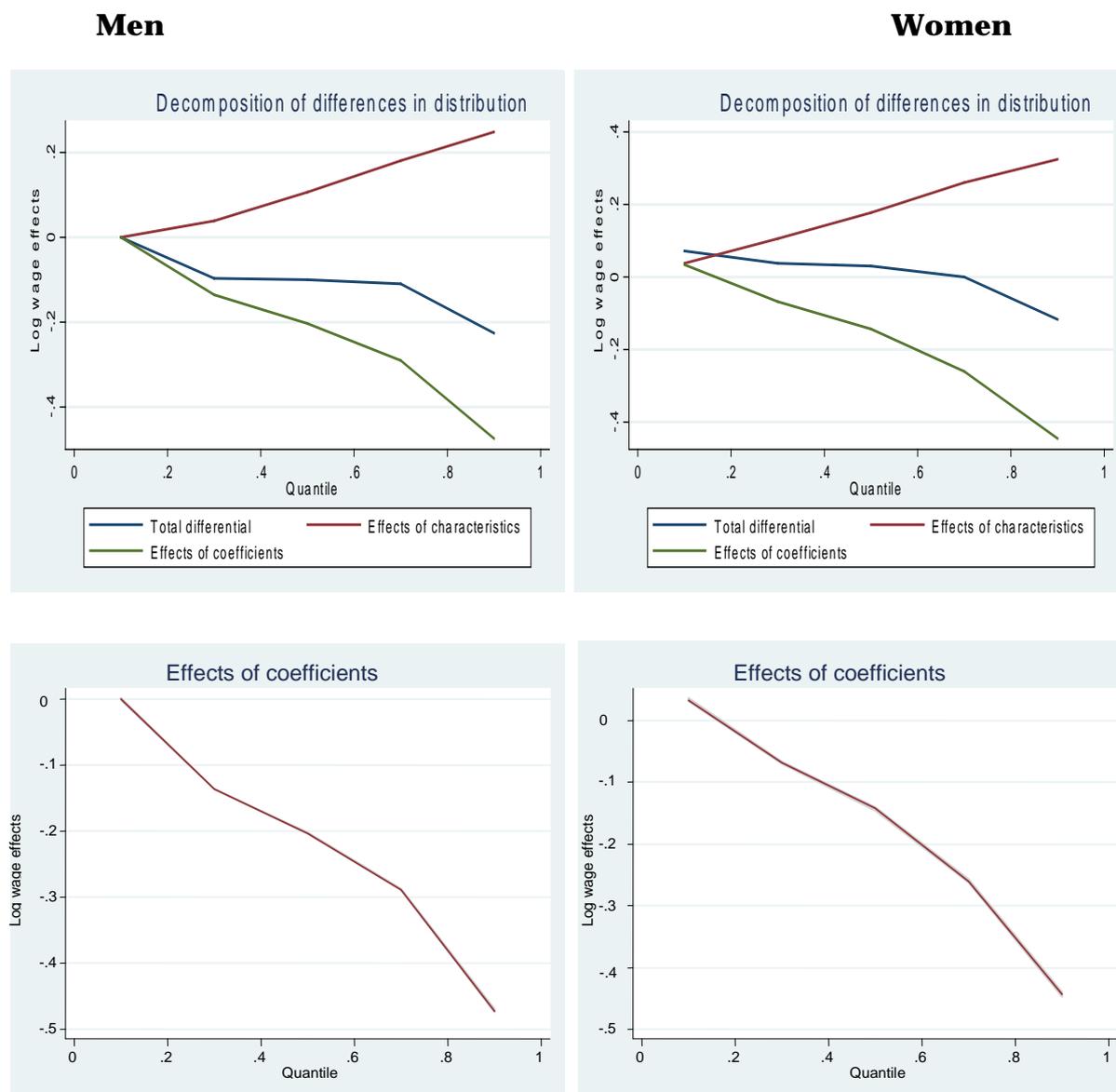
a) The samples used relate to full time employees, aged between 15 and 64. The dependent variable is the log of real monthly and hourly gross earnings. The unskilled group includes workers with primary educational qualification or less. The skilled group includes workers with both vocational (low skilled) and high school degree (middle skilled). The high-skilled group includes workers with university degree.

b) Public sector pay gap estimates obtained conditional on labour force experience and its quadratic form and a set of employer's urban type, region and year dummies. The estimation procedure for the mean regression is OLS and robust standard errors reported in the parentheses are computed on the basis of White (1980). \*\*\* denotes significance at the 0.01 level. Quantile regression procedures are used to obtain the coefficient estimates for the selected percentiles: 10<sup>th</sup>, 25<sup>th</sup>, 50<sup>th</sup>, 75<sup>th</sup> and 90<sup>th</sup> percentiles of the log earnings distribution. The estimated standard errors reported in parentheses for the quantile regressions are based on the bootstrapping procedure with 200 replications in all cases. OLS and quantile regression analysis reported used STATA 10.0.

*Data Source:* The Harmonised Hungarian Wage Survey (WS), 1992-1999 and 2001-2003

Figure A1

**Decomposition of public-private sector earnings differential at different quantiles for men and women in Hungary, 1995-1999**



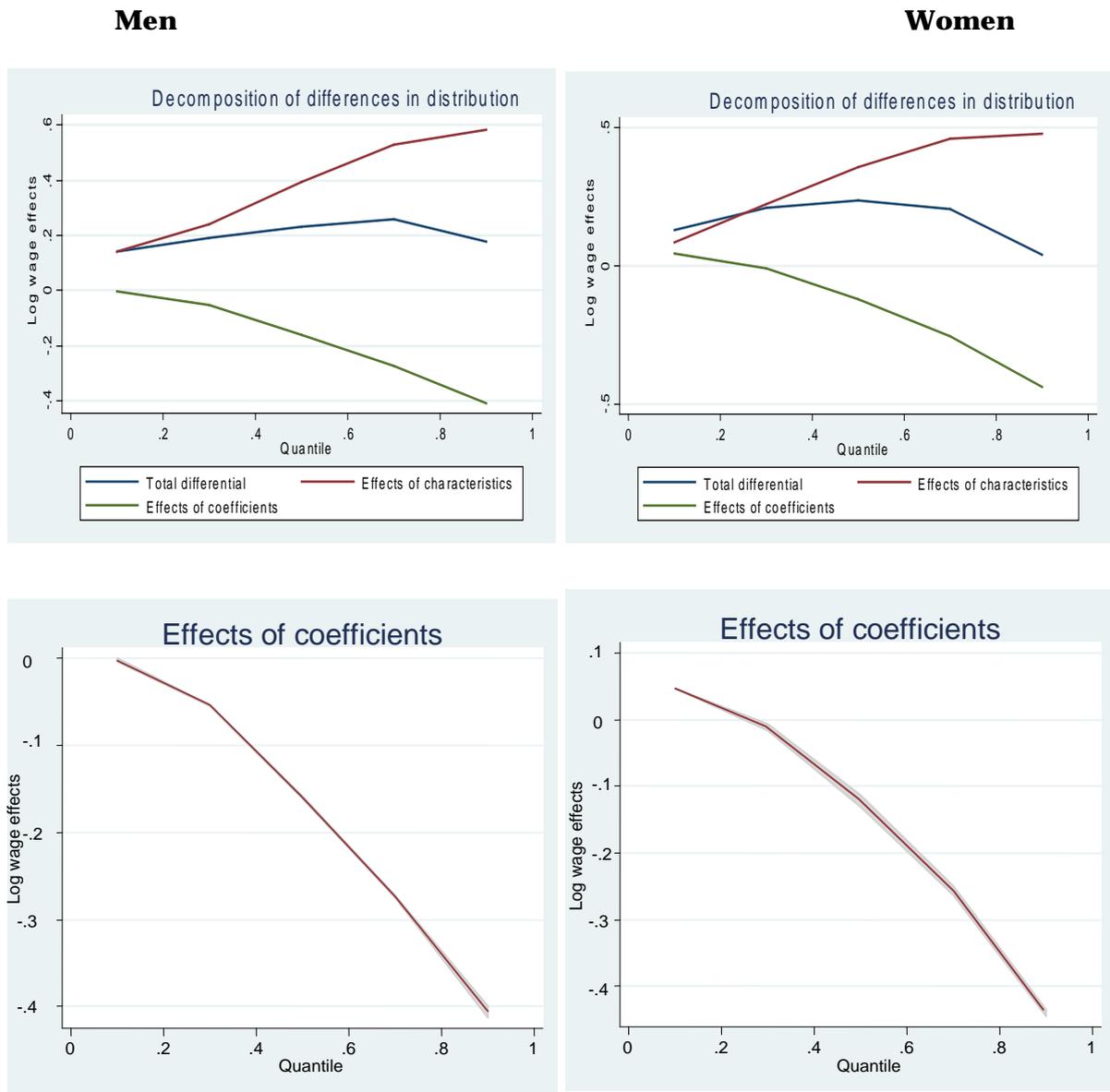
*Notes to Figure A1:* a) The samples used relate to full time male and female employees, aged between 15 and 64. The depended variable is the log of real monthly gross earnings. Monthly gross earnings are defined as monthly gross wage in May plus bonuses and plus regular premia and bonuses in May plus one twelfth of the sum of all other payments and irregular incomes connected to the full-time job paid over the previous year, denoted in HUF and converted to 2003 earnings by the annual consumer price index.

b) Decomposition estimation procedure implemented by estimating 100 traditional quantile regressions in each sector accounting for worker's labour force experience, its quadratic form, educational qualification, occupational affiliation and employer's urban type, region and size and year. The variance has been estimated by bootstrapping the results 100 times. Effects of coefficients presented with 95% confidence interval.

*Data Source:* The Harmonised Hungarian Wage Survey (WS), 1995-1999

Figure A2

**Decomposition of public-private sector earnings differential at different quantiles for men and women in Hungary, 2001-2003**



*Notes to Figure A2:* See Notes to Figure A1.

*Data Source:* The Harmonised Hungarian Wage Survey (WS), 2001-2003

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