

## 2.3 Pay level and selection to the public sector

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This chapter is based on a study by Köllő (2013) that examines changes in the *number* and *quality* – as measured by their residual earnings in the private sector – of graduates moving from private sector to public sector jobs as a result of the large pay increases implemented before and after the 2002 general elections.<sup>1</sup>

The analysis is based on a large administrative panel dataset covering a relatively long period (1998–2008) but limited in terms of the number of variables. It explores the development of mobility between the two sectors and then draws conclusions on the quality of inflows from the private to the public sector based on the *mean residual wages* of those shifting from the private to the public sector. (Residual wage is the difference between the actual wage and the expected wage on the basis of gender, age and education). The analysis concludes with a panel estimation that directly quantifies the relationship between the sectoral wage gap and private sector residual wages of workers moving to the public sector.

#### Earlier literature and methodological considerations

Surprisingly few studies examined inter-sector mobility and the selection effects of public sector wages over recent decades. Some studies draw conclusions about selection effects from the between-sector earnings differentials – without actual data on mobility [see e.g. Foguel *et al.* (2012) on Brazil, Tansel (2005) on Turkey or Assad (1997) on Egypt]. Other studies (Bellante and Link, 1981, Blank, 1985) analyse selection directly, without data on wages. Obviously, even “lopsided” studies like these can have valid conclusions on the relationship between wages and selection if they can reliably estimate how much public sector employees would be earning in the private sector and vice versa. For example Stelcner, van der Gaag and Vijverberg (1989), Heitmueller (2006) or Gimpelson and Lukiyanova (2009) use this approach (*switching regression*) to address this problem.

Nickell and Quintini (2002) draw conclusions from comparing time series of the wage gap and various quality indicators. Quality is measured as test results in early teenage years and they show the deterioration of these results alongside the weakening in the wage position of the public sector in Britain. Katz and Krueger (1993) find a strong positive relationship between relative wages in the public sector and changes in educational attainment *within* public service occupations in the United States.

Borjas (2002) captures the quality of people moving to the public sector using *the residual wage they achieved in the private sector*, assuming that to some

<sup>1</sup> In the absence of data on education, “graduate professionals” are defined as employees who worked in occupations that require higher education or in a managerial position for any length of time in the observed period between 1997 and 2008.

extent this reflects their productivity. In this study Borjas basically provides an adaptation of the Roy-model (Roy, 1951, Borjas, 1987) to the issue of selection between the private and public sector. Thus, its main focus is the relationship between the quality of entrants and wage *dispersion* within sectors. If both sectors value more or less the same skills and the dispersion of wages is much smaller in the public sector, more productive workers will select themselves to the private sector, even if mean wages in the two sectors are equal – this is one of the key conclusions of Borjas' version of the Roy-model. The study presented here also follows this approach in measuring quality, however it does not aim to adopt Borjas's (2002) model mechanically because dispersions within sectors did not change at all in Hungary in the period observed; however mean wage differentials between the two sectors fluctuated within a very wide range. Therefore, it is worth concentrating on the effects of the latter and keeping the measurement method of the Borjas study.

The use of residual wage as an indicator of quality needs a qualifying note here. The actual wage of people moving from one sector to the other can differ from the wage that would be expected on the basis of their gender, age and educational attainment due to a variety of unobserved factors. Residual wages that are controlled for only these factors might reflect characteristics associated with quality, such as management position, diligence or talent, but they will also contain items that compensate for non-wage advantages or disadvantages, industry rents, trade union premiums, bonding schemes and other factors that divert the actual wage from actual marginal productivity. Of course, it cannot be posited that in the comparison of two individuals higher residual wage indicates higher productivity.

However *changes over time* in *mean residual wages* of people who move between sectors – especially if these changes are not trend-like – can indicate increases or decreases in mean productivity, particularly if there are no changes or no trend-like changes in the composition of the private sector in terms of sub-sectors, company size, ownership or trade union membership. A large sudden increase or decrease in residual wages among those who move between sectors, in otherwise stable circumstances, is likely to indicate a positive or negative selection effect, which is the focus of this analysis.

Further questions can be raised. First, are there any factors, in addition to the pay gap, that might cause sudden changes in the composition of people considering a sector change? Moving to a job in the public sector can be motivated by a variety of considerations. These can include changes in risk tolerance or preferences to do with age and family status. (On the role of risk tolerance in selection between sectors see for example Bellante and Link 1981, Pfeifer, 2008, Buurman et al., 2009.) It is also possible that some people who are made redundant accept a job in the private sector, but later, when the opportunity arises they reconsider this decision and move to a more preferred

job in the public sector. And vice versa: somebody who is at risk of unemployment in the private sector, might decide to accept a job in the public sector immediately rather than risk unemployment, even if their preferred option would be a private sector job at the given wage. However, the influence of these factors is unlikely to fluctuate if the age distribution of the work force is stable (or changing steadily) and the labour market is near equilibrium. On the contrary, an abrupt increase in the relative pay position of the public sector makes it suddenly profitable for higher paid, more productive workers to move to a public sector job as well.

Secondly, it is arguable whether changes in *intentions* to move to another sector can be captured through time series on actual mobility. The supply effect can only be demonstrated from data on actual moves if public institutions are intending to select the best applicants at the given pay level. This seems like a reasonable assumption for most jobs; apart from those positions that are filled according to explicitly political criteria.

Based on these considerations this study uses the following methods: we observe, over a long period of time (1997–2007), all cases when a graduate employed in the private sector in year  $t$  moves to the public sector in year  $t + 1$  without any unemployment or other interruptions in between. After this, changes in the residual wage of people who changed sectors are examined. Finally, we estimate how the between-sector pay differential affects the residual wage of switchers. The procedure is presented in Annexe 2.3.

### Data and variables

The Central Administration of National Pension Insurance (CANPI) has a centralised electronic register that holds records of contribution payments (“Kelen”) starting from 1997. This chapter uses a 20-per cent random sample of individuals who were registered in Kelen between 1997 and 2008; it includes a total of 15,464,904 annual records for 1,288,742 individuals. In the database there were 738 thousand individuals employed in “graduate occupations” in 1997 and 852 thousand in 2008.<sup>2</sup> For further information on the sample and the key concepts see the original paper (Köllő, 2013). Here we only summarise how coding in the “Kelen” data base affects the definition of public and private sector employees and switchers.

*Private sector employees* are defined as employees whose income came exclusively from one or several private sector jobs in a given year. Switchers are those who worked as public service employees or civil servants for any length of time in the following year, without any time spent in unemployment, on parental leave, or as self-employed or independent contractors.

For *public sector employees* the only certainty is that they worked in the public sector *for any length of time* in the given year, thus their income might also include earnings from the private sector. Furthermore, direct mobility

<sup>2</sup> The CSO Labour Force Survey found 773 thousand and 900 thousand college or university graduates in these years. Obviously some of those who are considered “graduates” on the basis of their work history do not have a degree, while some graduates would probably not meet the above criteria based on their work history. Nevertheless the figures are reassuringly similar.

from the public to the private sector is only observed if the individual was employed in the private sector for the whole of the following year and had no other earnings. Also, particularly at the beginning of the period, it was common that public sector workers moved to the private sector without a change of jobs through outsourcing or privatisation. On the extent of this and job moves from the public to the private sector see Chapter 2.4 of this *In Focus* and for more detail *Elek and Szabó's* paper (2013). Thus, shifts from the public to the private sector are not examined in this chapter. We focus on direct moves from the private to the public sector.

The *earnings data* relate to total annual earnings subject to social insurance contributions while the number of qualifying days is also known. The wage level is measured as *earnings per day* and is expressed as a percentage of the total sample's mean.<sup>3</sup>

### Development of wages in the private and public sector

*Figure 2.3.1* shows the development of the wage differential between the two sectors, controlled for gender, age and educational attainment, based on data from the Wage Tariff Survey and Kelen. In the latter case, the wages of those who worked for the whole year were taken into account. Based on administrative data the wage level of the public sector seems higher, but this is not unexpected as, unlike the Wage Tariff Survey, the Kelen data base includes the low-paid workers of companies with fewer than five employees. However, the development of the wage gap over time is similar, apart from 2004. This might be explained by the differences in recording earnings data: the Wage Tariff Survey of May 2004 recorded regular earnings in May plus 1/12 of the bonuses and premiums received in 2003, while Kelen records earnings in the year they are actually paid.<sup>4</sup>

### Mobility

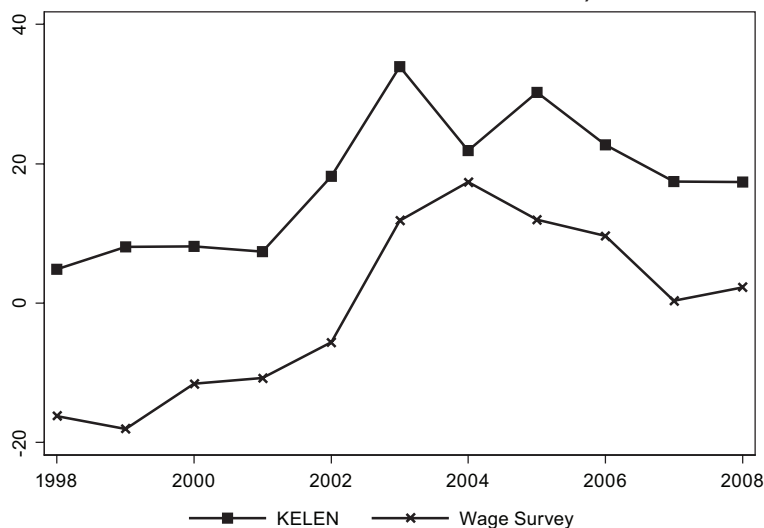
Public institutions can use their increased resources in a variety of ways that has implications for our expectations about the development of job mobility. Pay rises can – even without any additional action – slow down the exodus of high-quality workforce and thus reduce entry mobility. At the same time public institutions could also take advantage of higher wages and recruit more and better workers from the private sector. (They could have done this all the more as the number of public sector workers – including employees in graduate occupations – was rising until 2005.) This latter strategy increases the rate of entry to the public sector and may also increase the exit rate if the number of jobs is held constant.

The data clearly show that wage rises during the Medgyessy and Orbán governments increased the number of direct moves from private to public sector jobs only in 2003 (*Table 2.3.1*). (Note that the rows indicate the last year

<sup>3</sup> Information on wages for 1997 had considerable amounts of missing data and seemed unreliable – the mean and dispersion are much smaller than in subsequent years – therefore wage data for only 1998–2008 was used. The time-scale of employment statistics is 1997–2008, for mobility it is 1997–2007, and the analysis of the relationship between wages and mobility is for the period between 1998 and 2007.

<sup>4</sup> The Wage Survey records regular earnings for the month of May minus irregular bonuses in May plus the monthly average of irregular bonuses from the previous year.

Figure 2.3.1: The earnings advantage/disadvantage of public sector employees, 1998–2008 (percentage points, private sector employees with similar observable characteristics = 0)



Note: The curve represents  $e^{\beta}$  values calculated from  $\beta$  parameters. For public sector employees some of the qualifying days might be from the private sector.

*Wage Tariff Survey.* Wage: Gross wage in May excluding irregular bonuses but including 1/12 part of the total bonuses in the previous year. Sample: employees of companies with five or more (in 1998–1999 10 or more) employees, and public service employees and civil servants in the public sector. Dependent variable: the logarithm of wage. Control variables: gender, age, age square, educational attainment, number of paid working hours.

*Kelen.* Wage: monthly breakdown of annual earnings from employment or public service/civil service status. Sample: everyone who paid contributions on labour income for the whole year. Dependent variable: the logarithm of wage. Control variables: gender, dummies for single years of age, proxy for educational attainment (see main text).

spent in the private sector, therefore moves that happened in 2003 are shown in the row of 2002!) The block on the left side of the table displays the unadjusted transfer rates for everyone and also separately for people aged under and over 40 years. The block on the right shows year fixed effects from probit models that estimate the probability of transition between sectors controlled for gender and single years of age. Both the raw data and the estimates suggest that the transfer rate was slowly declining in 1998–2002, slightly increased in 2003, and then dropped sharply to well below any previous levels and remained there, fluctuating within narrow ranges.<sup>5</sup>

It might be argued that the transfer *rate* could have decreased without a decline in the absolute number of job movers as a result of the steady increase in

<sup>5</sup> The statistical tests also confirm that the transfer rate fell significantly both in the older and younger group in 2003. In earlier or later periods fluctuations were not statistically significant.

the number of graduates employed in the private rather than the public sector. The data disprove this: the fall in the transfer rate was sudden and much greater than would have been justified by a steady decline in the relative weight of the public sector (that was even interrupted by a slight increase in 2002–2003). The question might also be raised of whether the remarkable decline in flows from the private sector was caused by an (implicit) hiring freeze introduced alongside the wage increases. This is clearly not the case because the number of graduates working in the public sector steadily increased from 290 thousand in 2001 to 306 thousand in 2004 and only started to decrease as a result of austerity measures taken in 2006.

**Table 2.3.1: Job moves from the private to the public sector – transfer rates and year fixed effects, 1997–2007 (probability that a private sector worker moves to a public sector job in the subsequent year)**

Last year in the private sector	Unadjusted transfer rates <sup>a</sup>			Year fixed effects controlled for gender and age		
	All	25–40 years	41–61 years	All	25–40 years	41–61 years
1997	1.95	2.14	1.68	2.24	2.13	2.13
1998	2.08	2.21	1.89	2.40	2.19	2.45
1999	1.69	1.92	1.35	1.75	1.73	1.58
2000	1.83	2.07	1.48	1.95	1.90	1.80
2001	1.79	2.12	1.28	1.85	2.00	1.48
2002	1.97	2.35	1.41	2.13	2.34	1.69
2003	1.43	1.72	0.99	1.30	1.46	0.99
2004	1.48	1.72	1.10	1.39	1.50	1.19
2005	1.41	1.69	0.96	1.28	1.47	0.94
2006	1.34	1.57	0.97	1.18	1.32	0.96
2007	1.25	1.45	0.93		reference	

<sup>a</sup> Transfers to public sector as a percentage of private sector workers.

<sup>b</sup> Probit marginal effects at the sample mean, percentage.

Dependent variable: worked in the public sector for any length of time in the subsequent year.

Independent variables: gender, age, age square, dummies for single years of age. All year effects are significant at 0.01 level.

*Table 2.3.2* presents time series data on mobility from the public to the private sector in a similar structure to *Table 2.3.1*; however it must be emphasised that these data differ from data on moves in the opposite direction. The slump in 2002 is clearly noticeable in the total sample as well as in the older and younger groups. Job moves from the public to the private sector – and any vacancies as a result – decreased considerably: in the four years when the public sector paid high wages, moves to the private sector were over 30 per cent lower than either before or after. The increase later, in 2006–2007 could already be related to the redundancies that had begun to commence in the public sector.

**Table 2.3.2: Job mobility from the public to the private sector, 1997–2007  
(the probability that somebody who [also] worked in the public sector  
in year  $t$  would have earnings only from the private sector in year  $t + 1$ )**

Last year in the public sector	Unadjusted transfer rates (percentage)			Year fixed effects controlling for gender and age <sup>a</sup>		
	All	25–40 years	41–61 years	All	25–40 years	41–61 years
1997	4.63	5.90	3.05	3.29	4.34	2.31
1998	3.92	5.38	2.19	2.45	3.62	1.32
1999	3.96	5.35	2.42	2.59	3.57	1.64
2000	4.17	5.81	2.41	2.90	4.18	1.68
2001	3.59	5.05	2.10	2.24	3.20	1.33
2002	2.64	3.83	1.46	1.04	1.57	0.51
2003	3.00	4.40	1.62	1.54	2.36	0.80
2004	3.03	4.32	1.79	1.64	2.30	1.06
2005	2.90	4.21	1.66	1.50	2.22	0.88
2006	3.55	5.12	2.08	2.41	3.52	1.46
2007	3.39	4.85	2.05		benchmark year	

<sup>a</sup> Probit marginal effects at the sample mean, percentage.

Dependent variable: only has earnings from the private sector in the subsequent year. Independent variables: gender, age, age squared, dummies for single year of age. All year effects are significant at the level of 0.01.

### Wages of job movers in the public sector

The wages of job movers are first examined using repeated cross-sectional regressions. *Table 2.3.3* indicates that the daily wage of graduate job movers controlled for gender, age and working time (“residual” hereafter) was 2.5–8 per cent lower, than the daily wage of stayers in 1998–2001, and the difference was significant at 0.05 in three out of the four years.<sup>6</sup>

The number of observations increased at a steady rate over time: ranging from 91,439 to 116,682 in the full sample, from 49,480 to 69,944 in the younger group and between 44,756 and 50,139 in the older group.

In the years of large pay rises (2002–2004) the wage of movers – as expected – exceeded the wage of stayers by 4.4–5.6 per cent. However, alongside the decline in the relative wage level of the public sector this advantage first disappeared and then in 2007 turned into a significant and rather large 6.6 per cent disadvantage. It would be difficult to attribute the sudden changes to anything else than the temporarily high public sector pay, which made it profitable for high earner private sector employees to move to the public sector. Public institutions used positive selection and chose applicants that appeared to be more productive.

The development of residual wages over time in the younger and the older age groups was similar, however according to estimations by age group the selection patterns were different. Earnings of young movers (aged 25–40) were below the earnings of stayers in each year. Their disadvantage was statistically significant and substantial (10–16 per cent) in 1998–2001. During

<sup>6</sup> The coefficients show the wage advantage or disadvantage of employees moving between sectors in logarithm points. For example, the value in the upper left corner indicates that the wage of people moving between sectors is 0.0512 logarithm points – or approximately 5.1 per cent – higher than the wage of stayers all other things being equal.

the pay rises of the Orbán and Medgyessy governments, this gap disappeared and the group of movers was comprised of average earners. However, the gap re-appeared with the decline in public sector pay in 2005–2007 and movers – increasingly – came from the lower tail of the wage distribution.

**Table 2.3.3: Wage premium/disadvantage of graduate job movers from the private to the public sector compared to stayers in the private sector, controlled for gender, age and number of years worked (logarithmic point, linear regression coefficients estimated with the method of ordinary least squares)**

Last year in the private sector	Full sample	Younger people (25–40 years)	Older people (41 years and over)
1998	-0.0512** (2.33)	-0.1082*** (3.65)	0.0233 (0.74)
1999	-0.0824*** (3.36)	-0.1609*** (5.10)	0.0478 (1.28)
2000	-0.0239 (1.04)	-0.1095*** (3.70)	0.1149*** (3.22)
2001	-0.0696*** (3.30)	-0.1427*** (5.65)	0.0811** (2.31)
2002	0.0448** (2.35)	-0.0360 (1.55)	0.2066*** (6.48)
2003	0.0442* (1.94)	-0.0119 (0.43)	0.1685*** (4.32)
2004	0.0550*** (2.49)	-0.0159 (0.59)	0.2016*** (5.35)
2005	-0.0104 (0.46)	-0.0782*** (2.93)	0.1580*** (3.93)
2006	-0.0285 (1.27)	-0.1058*** (3.90)	0.1427*** (3.74)
2007	-0.0655*** (2.95)	-0.1334*** (4.93)	0.0757* (1.99)

Note: *t-values* in parentheses.

Dependent variable: the logarithm of daily earnings.

Independent variables: male, dummies for single year of age variables, days in work during the year, dummy for movers set to 1 if the individual worked in the public sector in the subsequent year and 0 otherwise).

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

In the older group, movers’ earnings *exceeded* that of stayers in each year, although the difference was not yet significant in 1998–1999. During the time of large pay rises the average residual wage of older switchers jumped to 20 per cent. It then started to fall and drop below 8 per cent in 2007.

So far the argument that fluctuations in the residual wage of movers were related to variations in the sectoral pay gap was based on *the similarity in their time series*. The following sections will attempt to show – using the panel equation presented in *Annexe 2.3 (A2.3.1)* – that there is a direct relationship between them. First, we form  $K = 640$  groups of private sector workers on the basis of their gender, single year of age and calendar years. Second, we regress the wages of private sector workers on a set of controls, a *MOVER* dummy and its interaction with the deviation of the  $k^{\text{th}}$  group’s annual average public sector pay ( $w_{kt}$ ) from its intertemporal average ( $w_k$ ). The coefficient of the *MOVER* dummy measures the average difference between movers and stayers. The coefficient for the interaction term [ $MOVER \cdot (w_{kt} - w_k)$ ] measures how fluctuations in the public sector pay of a given group affect the residual wages of movers (relative to stayers) in that group.



The estimated wage equation is controlled for gender, age, age square, the number of days in work during the year and calendar year fixed effects – the coefficients of these variables are not presented here. Younger and older age groups are distinguished on the basis of their year of birth rather than their age – to make sure that categories are stable. The two age groups are: people younger than 40 years in 2003 and anyone older than this.<sup>7</sup>

As for the results presented in *Table 2.3.4*: according to estimations for the full sample, the difference between the wages of movers and stayers *entirely* depended on variations in earnings potential in the public sector. The wage of stayers is only 0.85 per cent higher if the level of public sector pay is at its intertemporal mean. By contrast, if the public sector wage is 10 per cent higher in a group than its intertemporal mean, the residual wage of movers is increased by approximately 6 per cent compared to stayers.

**Table 2.3.4: The effect of public sector pay level on the wages of people moving from the private to the public sector, 1998–2007 (panel estimation assuming individual random effects and using the method of least squares)**

	Full sample	Younger people <sup>a</sup>	Older people <sup>b</sup>
$\beta_1$ : <i>MOVER</i>	0.0085** (2.00)	-0.0213*** (3.76)	0.0364*** (5.86)
$\beta_2$ : <i>MOVER</i> × (ln $w_{kt}^k$ - ln $\bar{w}_k^k$ ) <sup>c</sup>	0.5780*** (8.14)	0.6280*** (7.55)	0.3975*** (2.71)
Internal $R^2$	0.0422	0.0613	0.0052
External $R^2$	0.0727	0.0611	0.0452
Total $R^2$	0.0622	0.0663	0.0292
Mean number of years observed	6.7	6.5	7.0
Number of observations	1,313,629	783,390	530,239
Number of individuals	207,597	126,222	81,375

Dependent variable: logarithm of relative wage.

Sample: private sector employees.

<sup>a</sup> Born before 1963.

<sup>b</sup> Born after 1963.

<sup>c</sup> :  $(w_{kt}^k - \bar{w}_k^k)$  deviation of the mean wage in group  $k$  (based on gender and age) in year  $t$  from the intertemporal (between 1998 and 2007) mean wage in the public sector.

$Z$  values in parentheses.

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

The effect of public sector wages is much stronger in the group of younger people born after 1963 than in the older group: elasticity is above 0.6 in the first group while it is below 0.4 in the second. This is most probably related to the fact that people who move to a public sector job at an older age are more likely to be at a senior level. Some of the moves might be part of politically motivated reshuffles of senior government officials or people might move to the public sector as elected officials.

<sup>7</sup> The estimation was carried out using GLS panel regression assuming random effects for the reasons presented in the discussion of equation (A2.3.1). Due to the presence of predicted variables in the equation, standard errors were estimated with a 500-step *bootstrap* method also taking into account that there are multiple, possibly correlated observations for each individual. Therefore we adjust the standard errors for “clustering by individuals”.

## Conclusions

The substantial increase of public sector pay – first for civil servants, then for public service workers – in 2002–2003 made the sector more attractive even for higher paid private sector workers. At the same time thanks to the large pay rises, which were not accompanied by redundancies, the number of employees leaving the public sector for a job in the private sector fell and so did the number of vacancies. Public institutions could hire fewer people from a pool of better quality applicants and this led to an improvement in the quality – as measured by the residual wage – of new entrants.

With the erosion of the wage advantage from 2002 and the “slimming down” of the public sector that started in 2006, the number of people coming from the private sector continued to decline as well as their overall quality. The large pay rise temporarily – for three years strongly and for a further two years moderately – improved the *composition* of workers moving to the public sector, however any positive effect on the public sector workforce was limited by a large fall in the entry rate – to two thirds of its previous level. The public sector could have benefited more from the higher wage level if at the same time it would have “sifted through” its existing workforce.

Measures introduced during the economic crisis – especially the abolition of the additional 13<sup>th</sup> month salary and an unofficial but effective pay freeze – pushed the relative pay level of the public sector into a low not seen since the early 1990s. Considering Hungary’s current growth and fiscal prospects it is unlikely that this will change in the foreseeable future. At the time of writing this chapter, in 2013, the wage level of the public sector was 20 per cent below the private sector for people of the same gender, age and educational attainment – this has been unprecedented since 1996, the second year of the Bokros package.

Based on the estimations presented in this study it is expected that the public sector will become even less attractive for workers, and it is likely that much of this deterioration has already happened. (Of course there is no way to verify this prediction until micro data covering 2013 is available.) At the same time it is unclear whether a general pay rise similar to 2002 would lead to the desired outcome: improvement in the quality of the public sector workforce. In addition to pay rises, this also requires selection based on performance and skills.

## Annexe 2.3

The effect of the fluctuation of public sector wage on the residual wage of movers was estimated with the following panel regression:

$$\ln w_{ikt}^M = \alpha X_{ikt} + \beta_1 MOVER_{ikt} + \beta_2 MOVER_{ikt} \times (\ln \bar{w}_{kt}^K - \ln \bar{w}_k^K) + \gamma t + u_{ikt} \quad (\text{A2.3.1})$$

The left side of the equation represents the annual income from year  $t$  for  $t^{\text{th}}$  private sector worker in group  $k$ ,  $X_{ikt}$  includes the indicators of gender, age and working time, and  $t$  is a set of dummy variables for calendar years. The upper case  $K$  (public sector) and  $M$  (private sector) indicate the two sectors. We distinguish those who are known to have worked in the public sector in year  $t + 1$  (*MOVER*). The expression  $w_{kt} - w_k$  measures to what extent the mean public sector wage of a given group differs from its own intertemporal mean. For the estimation we calculate mean public sector pay for 640 age years  $\times$  gender  $\times$  year interactions. Separate estimations are carried out for younger and older workers.

The estimation was carried out using the method of generalised least squares (GLS), assuming *random effects*. A fixed effects model would not answer the question that we are interested in – are higher paid people selected if public sector wages are temporarily high – but would answer the question of whether the wage of movers increases in the year of move compared to their own personal average if the pay advantage (disadvantage) of the public sector is growing (falling) compared to its mean advantage (disadvantage). In other words: our aim is not to filter out but to measure the selection bias arising from the non-random selection of movers.

The reason why the wage component in the interactive term is defined in the way it has been is that we only want to capture the variance of group-level average wages over time. (In an equation that uses the *public sector pay* variable without removing the mean, parameter  $\beta_2$  would simply measure that the wage of movers is likely to be higher in groups where wages are high in both sectors. In the equation (A2.3.1)  $\beta_1$  measures the mean residual wage of movers, while  $\beta_2$  measures the effect of fluctuations in public sector pay on the selection of movers.

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