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MONOPSONY WITH HETEROGENEOUS LABOUR: EVIDENCE FROM ECONOMIC TRANSITION

by

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Abstract

Recent years have seen revived interest in the role of monopsony power in wage-setting in the public sector. Most evidence focuses on individual occupations rather than considering the implications for wage and employment structure where the state has differential monopsony power across different types of workers. A model of monopsony with heterogeneous workers is constructed here. A large scale 'natural experiment' of the consequences of declining monopsony power is the process of economic transition from communist regimes to market-based economies. The paper shows that many salient features of economic transition, such as increasing wage inequality, rising returns to education, rising public sector pay 'markups' and changing employment composition, are compatible with this 'story'.

Key words: Monopsony Economic transition Wage structure

JEL classification: J42, J31, P31

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1. Introduction

An important feature of the public sector is its potential market power in the labour market, arising from its role as the dominant employer in selected occupations, such as in education, provision of health care, law and order, and certain administrative functions. This power gives public sector enterprises the scope for monopsonistic wage-setting in these labour markets. Of course, in some settings, the public sector faces the countervailing power of well-organised public sector trade unions and in such a situation, alternative models of pay-setting are required.[1]

The analysis of the implications of 'pure' monopsony for wage-setting has therefore tended to focus on settings where, *a priori*, workers have little countervailing power – the classic examples being teachers or coal-miners in a geographically isolated setting facing a single employer (Landon and Baird, 1971; Luizer and Thornton, 1986; Boal, 1997; Boal and Ransom, 1997; Merrifield, 1999). The early literature on this subject did however find evidence of collusive behaviour among public sector enterprises even in large metropolitan areas, such as in the employment of nurses (Fogel and Lewin, 1974, Sullivan, 1989).[2] The recent resurgence of interest in monopsonistic wage-setting has followed from the recognition that search models with imperfect information give employers some degree of market power in wage-setting in many labour market settings and Manning (2003) has explored the implications of this for a variety of standard labour market applications.[3] This renewed interest has in turn has led to a number of recent empirical applications which are strongly suggestive of monopsonistic or oligopsonistic wage-setting behaviour by employers, especially in the public sector (Journal of Labor Economics, 2010).

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[1] There is with a well-established literature on the implications of coordinated and uncoordinated bargaining for economic outcomes stemming from the work of Calmfors and Driffill (1988).

[22] The reluctance of NHS hospital trusts to move away from national pay scale rates despite being given the freedom to do so after the introduction of Foundation Trust status in England in 2002, and the failure to use recruitment premia on a widespread scale despite local shortage of certain skilled health professionals, are also *prima facie* evidence of cartel behaviour. See the discussion of NHS Employers' evidence to the NHS Pay Review Body in NHSPRB (2009).

[3] Although somewhat surprisingly, not in the specific field of public sector labour markets, an unfortuante admission admitted to us in correspondence by the author.

A neglected issue in this literature, however, is the effect of monopsonistic wage-setting behaviour in the public sector on employment structure and on wage *differentials*. Much of the empirical literature on monopsony has focused on individual occupations such as teaching and health care professionals. The nature of the markets for these occupations implies that the public sector is the dominant employer and that the elasticity of labour supply of workers to these occupations or employment sectors is not highly (or infinitely) elastic. Workers with these qualifications can work elsewhere in the economy in other occupations but are unlikely to fully recompense their costs of training for their specific skills. However the public sector also employs workers (e.g. in unskilled ancillary occupations, in general administrative functions, or in specific professions such as accountancy) where the public sector is not the dominant employer or where individuals have skills which are easily transferable and where the elasticity of labour supply to the public sector is therefore much greater.

To the extent that the public sector employer can drive a wedge between the marginal product and the wage only where the elasticity of labour supply is relatively low, then a public sector employing a mix of workers with different elasticities of supply to the occupation or employer is likely to generate a wage distribution and an employment structure that is different from that in a competitive labour market. It is this contention that will be explored in the present paper by establishing a simple theoretical model and then applying it to a large scale 'natural experiment': the process of economic transition in Eastern and Central Europe from economies dominated by largely public sector wage-setting to economies characterised by market-based incentives.

We shall show that many of the 'stylised facts' of labour markets during economic transition, such as growing wage dispersion, increasing returns to education, increasing (not falling) public sector wage premia, changing employment composition and the like, can be explained by the weakening monopsonistic power of the public sector in segments of the labour market over time. The power of the dominant public sector in a pre-transition economy is therefore reflected in the *differential extraction of economic rent* from workers; a process that is increasingly limited as the process of transition occurs.[4]

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[4] It is of course something of an irony that the labour theory of value, underpinning Marxist economics, predicates capialist accumulation on the extraction of surplus value from workers (for a discussion of such theories, see Meek, 1956) whereas our interpretation of the process of transition

The remainder of this paper is structured as follows. The next section provides a model of a public sector enterprise in which output (employment) is maximised subject to a hard budget constraint, employing heterogeneous workers with different elasticities of labour supply. Although the model has general implications, we also show how the process of economic transition from centrally-planned to market economies can be interpreted as a weakening of the monopsony power of the public enterprise, with implications for employment and wage structure. Section 3 calibrates the model on some reasonable parameter values (for the transition in Hungary). The calibration model is reinforced by descriptive labour market data for Central and Eastern Europe (CEE) economies in Section 4 which confirm the 'stylised facts' referred to in the previous discussion. The final section then summarises the findings and considers why such a model provides a superior explanation of employment and wage trends than other models'; these other models being skill-biased technical change (SBTC), solidaristic, and bureaucratic models of wage -setting.

2. A model of monopsony with heterogeneous workers

This section derives a monopsony model with heterogeneous workers. As the model description progresses, we provide some descriptive evidence of its realism in the context of CEE countries.

We assume that the objective function of the public sector enterprise is to hire labour until its available budget is exhausted; this is equivalent to maximising total output where profit (or surplus) is zero. The enterprise therefore faces a hard budget constraint given exogenously by the level of total revenues disbursed to the enterprise from overall public revenues. For simplicity, we abstract from other factors of production; thus, the budget constraint is defined as the total wage bill $\overline{wE}$.[5] This inverse relation between employment and wage rate, representing the effective labour demand function in the public sector, is also used by Leslie (1985) to describe the union wage-employment combination given by the wage bill fixed by the available public budget (i.e. a so-called 'cash limit'). In our model, however, the public sector enterprise is an output maximiser that faces two constraints: first

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from self-styled 'communist' to 'market capitalist' regimes requires the elimination of a process of selective rent extraction from specific groups of workers.

[5] Public sector enterprises are in any event typically highly labour intensive in most economic systems, with wage costs typically accounting for 60-75% of budgetary costs in typical public sectors such as education, health care and law and order.

the budget constraint and second the supply curve for each type of labour. Moreover, we assume that workers have no bargaining power (no right to strike etc.).

These assumptions need little justification in centrally planned CCE economies, in which wages were set centrally and were not directly linked to enterprise performance. Köllő (1998) explains that, in the short run, firms under central planning had an incentive to continuously bargain for cash budgets to increase employment that was compatible with revenues, instead of profit maximisation. Furthermore, the pay equalising mechanism was based upon managers' incentives to increase employment coupled with political constraints and prohibitive taxes on wage increases. Consequently, the likelihood that some firms would set wages high above the industry average or lag behind substantially was rather low.[6] Moreover, faced with administrative wage-setting, quit rates were severely circumscribed by housing shortages. Labour unions in centrally planned economies had no bargaining role and according to Flanagan (1995), their main function was to challenge dismissals. The consequence was increased employment and falling real wages during the pre-transition period, albeit wages were augmented by non-wage benefits such as housing, child care, transport and meal allowances (Nunberg, 1999). Estrin (1994) argues that these social welfare benefits in Czechoslovakia added around 5 percent of the total wage bill.

Continuing the description of our model: assume that the public enterprise can choose any combination of wages, w, and employment, E, of different types of workers to satisfy this budget constraint. There is no presumption that, as a result of the decisions of public sector enterprises, the whole labour force is thereby employed.[7] The model developed here solves

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[6] The pre-reform 'self-management' model in Yugoslavia is sometimes seen as an exceptional case, with greater discretion in wage-setting at the enterprise level (Krstić and Reilly, 2003). Nevertheless, even here, individual wage-setting within the firm was strictly limited because, in order to even out differences in pay among firms, the government fixed the firm's wage bill at a rate which was termed a "socially warranted" wage bill (Haltiwanger and Vodopivec, 2003) and the standard communist mechanism of enterprise bargaining with central government to maximise cash limits in order to increase employment remained. Vodopivec (1993) provides details of how the "socially warranted" personal earnings fund of the firm derived from an index of the firm's relative 'business success'. This index was computed by comparing the firm's actual income with a prescribed norm assessed by a special body representing the Republic's government and other political and economic agents. This index was then converted into the "correction factor". The main purpose of the correction factor was to dampen the index of business success for the above-average firms and to raise the index for the below-average firms. The essence of the policy, embodied in the socially warranted personal earnings fund, was to level earnings across firms of comparable size and occupational structure.

[7] This rigid system created over-employment which is usually termed 'hidden' unemployment since open unemployment was not permitted. In pre-transition economies, the public sector was officially the only existing sector of employment, with measured public sector employment varying from 70% of the workforce in Poland to 99% of the workforce in Czechoslovakia in 1988 (Milanović, 1998).

optimal levels of wages and employment for a public sector enterprise with two types of workers, skilled and unskilled. In subscripts, the notation s denotes skilled and u denotes unskilled.

Each worker of a particular type has a constant marginal revenue product Y'. The labour supply curve $E(w)$ for each type of worker is a function of the wage rate, w. In the setting of public sector monopsony, this wage rate can be set below marginal revenue product, Y', depending on the labour supply elasticity, ε_{Ew}. Hence, when ε_{Ew} is some constant number (i.e. $\varepsilon_{Ew} < \infty$), the public sector has some monopsony power such that:

$$\frac{Y' - w}{w} = \frac{1}{\varepsilon_{Ew}} > 0. \tag{1}$$

A key assumption in the following analysis is that $\varepsilon_s < \varepsilon_u$.

The enterprise's objective function is to maximise employment and therefore output as a function of two worker types, such as to exhaust the exogenous budget constraint, i.e.:

$$\max_{E_s E_u} f(E_s, E_u) \tag{2}$$

$$\text{s.t. } \overline{wE} = w_s E_s + w_u E_u = w_s(E)E_s + w_u(E)E_u$$

note that, in the monopsony case, the wage depends on the level of employment, unlike the case of a competitive labour market.

Assume a Cobb-Douglas production function with constant returns to scale of the following form:

$$Y = E_s{}^{\alpha} E_u{}^{1-\alpha}, \ 0 < \alpha < 1 \tag{3}$$

However, such large fractions should be treated with caution, not just because areas of private sector activity often took part in a informal setting, but also because public sector enterprises were sometimes characterised by absentee and notional employees which boosted the notional employment figures. The alternative occupation, or 'reservation price' of workers in such economies, could be characterised as agricultural employment, small-scale enterprises, and informal activity. However the model here is intended to address pay compression, not the general reduction in wages arising from oversupply.

where α is the elasticity of output with respect to skilled labour when unskilled labour is held

constant:[8] $\alpha = \dfrac{\partial Y}{\partial E_s}\dfrac{E_s}{Y}$ and $(1-\alpha)$ is the elasticity of output with respect to unskilled labour

when skilled labour is held constant: $(1-\alpha) = \dfrac{\partial Y}{\partial E_u}\dfrac{E_u}{Y}$.

The competitive solution

As a benchmark, consider first the competitive outcome where the wage of each worker type is independent of the level of employment. Hence, the wage of each worker type is exogenously given and equal to its marginal revenue product:

$$Y'_s = \frac{dY_s}{dE_s} = w_s,\ Y'_u = \frac{dY_u}{dE_u} = w_u \tag{4}$$

If the marginal revenue product of skilled workers relative to unskilled workers in the

competitive case is denoted by $\gamma = \dfrac{Y'_s}{Y'_u}$, we can express the wage differential of skilled to

unskilled workers in the competitive case as:

$$\gamma = \frac{Y'_s}{Y'_u} = \frac{w_s}{w_u} \tag{5}$$

The first-order conditions of the optimisation problem given by (2) with respect to E_s and E_u are:

$$w_s = \alpha E_s^{\alpha-1} E_u^{1-\alpha} = Y'_s \tag{6a}$$

$$w_u = (1-\alpha) E_s^{\alpha} E_u^{-\alpha} = Y'_u \tag{6b}$$

Therefore (5) can be rewritten as:

$$\gamma = \frac{w_s}{w_u} = \frac{\alpha}{1-\alpha}\frac{E_u}{E_s} \tag{7}$$

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[8] α is also the share s of skilled workers in the total cost: $\alpha = \dfrac{w_s E_s}{w_s E_s + w_u E_u} = \dfrac{w_s E_s}{wE}$.

We can also express the employment levels of skilled and unskilled labour as:

$$E_s = \frac{Y\alpha}{w_s} = \frac{Y\alpha}{Y'_s} \text{ and } E_u = \frac{Y(1-\alpha)}{w_u} = \frac{Y(1-\alpha)}{Y'_u}$$

and obtain the relative employment of skilled to unskilled labour, e:

$$e = \frac{E_s}{E_u} = \frac{\alpha}{1-\alpha}\frac{Y'_u}{Y'_s} = \frac{\alpha}{1-\alpha}\frac{1}{\gamma} \tag{8}$$

Finally, after standard transformations we also get expressions for the steady state level of employment for skilled and unskilled labour:

$$E_s = \left[\frac{\alpha}{(1-\alpha)}\frac{Y'_u}{Y'_s}\right]^{1-\alpha} Y \text{ and} \tag{9a}$$

$$E_u = \left[\frac{(1-\alpha)}{\alpha}\frac{Y'_s}{Y'_u}\right]^{\alpha} Y \tag{9b}$$

The monopsony solution

We assume that, for each worker type, the labour supply elasticity, ε_{Ew}, is some constant positive number (i.e. $\varepsilon_{Ew} < \infty$), and differs across skills. Monopsony power allows the employer to drive a wedge between the wage and the marginal product of the worker; that wedge being greater the lower the supply elasticity. Hence public sector monopsony can reduce the wage of each worker type below its marginal revenue product, and the public sector enterprise can thereby hire more workers, given the fixed total wage bill and zero profit condition, than in a competitive labour market.

Consider the skilled worker type, with labour supply elasticity: $0 < \varepsilon_s = \frac{w_s E'_s(w_s)}{E_s(w_s)} < \infty$. Combining this expression with (1), we get the wage of a skilled workers which can be expressed as:

$$w_s = \frac{\varepsilon_s}{1+\varepsilon_s}Y'_s(E_s) \text{ where } 0 < \frac{\varepsilon_s}{1+\varepsilon_s} < 1 \tag{10}$$

The same of course holds for unskilled workers when $0 < \varepsilon_u < \infty$.

The inverse of monopsony power can be expressed by the parameters: $\theta_s = \dfrac{\varepsilon_s}{1+\varepsilon_s}$ and

$\theta_u = \dfrac{\varepsilon_u}{1+\varepsilon_u}$. These parameters ($\theta_s$ and θ_u) indicate the extent to which wage setting departs

from the marginal product rule as showed by (10). When $\theta_{s,u} = 1$ the competitive setting

holds, when $0 < \theta_{s,u} < 1$ the monopsony setting holds. Because $0 < \varepsilon_s < \infty$ it follows that

$0 < \theta_s = \dfrac{\varepsilon_s}{1+\varepsilon_s} < 1$ and hence: $w_s < Y'_s$. Again, we can write a similar expression for

unskilled workers, noting however that the greater supply elasticity of unskilled workers

reduces the 'wedge' between the marginal product and the wage for this group. The wage

differential of skilled to unskilled workers under monopsony, ω, can be written as:

$$\omega = \frac{w_s}{w_u} = = \frac{\alpha}{1-\alpha} \frac{E_u}{E_s} \frac{1/\theta_u}{1/\theta_s} = \frac{\alpha}{1-\alpha} \frac{E_u^m}{E_s^m} \tag{11}$$

where E_s^m and E_u^m denote the levels of employment of skilled and unskilled labour,

respectively, under monopsony.

The employment levels of skilled and unskilled labour, under monopsony, are then

given by:

$$E_u{}^m = \frac{Y(1-\alpha)}{w_u} \quad \text{and} \quad E_s{}^m = \frac{Y\alpha}{w_s}$$

The final expression is the steady state conditional demands for skilled and unskilled

labour under monopsony which can be deduced after standard transformations to be:

$$E^m{}_s = \left[\frac{\alpha}{(1-\alpha)} \frac{w_u}{w_s} \right]^{1-\alpha} Y \quad \text{and} \tag{12a}$$

$$E_u{}^m = \left[\frac{(1-\alpha)}{\alpha} \frac{w_s}{w_u} \right]^{\alpha} Y \tag{12b}$$

Comparing these results with the competitive solution, then, keeping α constant, the

relative employment of skilled workers, given by the ratio $\dfrac{E_s^m}{E_u^m}$, will be greater, the lower the

relative labour supply elasticity of skilled workers to unskilled workers, $\varepsilon = \dfrac{\varepsilon_s}{\varepsilon_u}$. At the same time, the wage gap $\dfrac{w_s}{w_u}$ between skilled and unskilled labour will be lower (i.e. there will be greater wage compression), the lower the relative labour supply elasticity of skilled to unskilled workers. These are the key results that underpin or empirical investigation of wage and employment differentials before and after economic transition.

Transition

Consider the process of 'economic transition' as a decline in the degree of monopsony power of the public sector as the private sector increases its share of employment, whether through privatisations and contracting-out of public functions, or from the establishment of new private enterprises. As the labour market moves towards a competitive outcome, relative wages and relative employment of skilled workers change. This change arises from two factors: (i) the declining ability of enterprises to exploit monopsony power in order to drive a wedge between the marginal product and the wage and (ii) increased opportunities for those workers who are most 'exploited' (here, skilled workers) to shift between enterprises, hence increasing their labour supply elasticity to the individual enterprise. This implies an increase in the relative labour supply elasticity of skilled workers i.e. $\dfrac{\theta_s}{\theta_u} \to 1$.

During transition, the changes in relative employment of skilled workers, e^m, keeping the relative marginal revenue product of skilled workers, γ, constant, depends on the changes of two parameters: θ_s , θ_u . Comparative statics shows that:

$$\frac{\partial e^m}{\partial \theta_s} < 0 \text{ and } \frac{\partial e^m}{\partial \theta_u} > 0$$

$$\frac{\partial e^m}{\partial \theta_s} = -\frac{\alpha \theta_u}{(1-\alpha)\,\theta_s^{\,2}\gamma}$$

$$\frac{\partial e^m}{\partial \theta_u} = \frac{\alpha}{(1-\alpha)\,\theta_s\,\gamma}$$

Similarly, the relative wage of skilled workers can be expressed as a function of the relative employment of skilled labour under the monopsony solution, e^m :

$$\omega = \frac{w_s}{w_u} = \frac{\alpha}{1-\alpha} \frac{1}{e^m} = \frac{\alpha}{1-\alpha} \frac{1}{e} \frac{\theta_s}{\theta_u} = \frac{\theta_s}{\theta_u} \frac{Y'_s}{Y'_u} = \frac{\theta_s}{\theta_u} \gamma \qquad (13)$$

Thus, changes in the relative wage of skilled workers depend on the changes of two parameters: θ_s, θ_u . Comparative statics shows that:

$$\frac{\partial \omega}{\partial \theta_s} > 0 \text{ and } \frac{\partial \omega}{\partial \theta_u} < 0$$

$$\frac{\partial \omega}{\partial \theta_s} = \frac{\alpha}{(1-\alpha)\, \theta_u\, e}$$

$$\frac{\partial \omega}{\partial \theta_u} = - \frac{\alpha \theta_s}{(1-\alpha)\, \theta_u^{\,2} e}$$

Finally, we now consider the overall differential between monopsony and competitive relative wages and employments of skilled workers. Write:

$$\frac{\omega}{\gamma} = \frac{e}{e^m} = \frac{\theta_s}{\theta_u} \text{ and } \gamma e = \omega e^m = \frac{\alpha}{1-\alpha} \qquad (14)$$

A strong result now follows given the assumption that the supply elasticity of skilled labour was originally lower than the supply elasticity of unskilled labour. Equation (14) and the preceding analysis confirm that the relative wage of skilled workers obtained under a monopsony solution is lower than under a competitive solution i.e. $\omega < \gamma$, and that the relative employment of skilled workers under monopsony solution is greater than under competitive solution, i.e. $e^m > e$. So a decline in the relative public sector monopsony power over skilled workers may be expressed as $\frac{\theta_s}{\theta_u} \to 1$ implying a decline in the employment share of skilled workers (even in the public sector): e^m towards the competitive share e, and an increase in the wage differential of skilled to unskilled workers (even in the public sector): ω towards competitive, γ .

Evidence from other sources suggests that the structure of wage setting inherited from central planning strongly influenced the pay determination process at the start of the economic transition. Compared with other aspects of economic policy, relatively little changed in terms of control of wages (Köllő, 1998). A link between wages, the state budget

and money supply remained particularly strong. Lane (1992) surveys various wage policies that were utilised at the beginning of the economic transition such as: a specific wage constraint, a ceiling on the enterprise wage bill, a ceiling on the average wage, a wage bill ceiling with adjustment for output, a wage bill ceiling with adjustment for value added and adjustments for profits. These wage controls entailed rigidity in wages in state enterprises but most research studies stress their necessity in the absence of strong profit incentives and the fact that these enterprises were encouraged to emphasise employment over productivity (for example, Corricelli and Revenga, 1992 and Allison and Ringold, 1996).[9] Lane (1992) explains that the main rational for these controls was a weakness in the governance of state enterprises pending privatisation. Ultimately, however, as transition accelerated and privatisation took place on a larger scale, such relaxation on enterprise wage differentials took place.

3. A calibration model

This section illustrates the implications of the theoretical framework with a simple calibration model. The model simulates the impact of the decline in public sector monopsony power on the relative employment and wages of skilled workers. It uses empirical estimates of labour supply elasticities for different types of workers, benchmarked on Hungarian data on wage and employment differentials pre- and post-transition, to assess the validity of the model. It models the decline in monopsony power as a rise in the supply elasticity of skilled workers to the public sector as the private sector grows in importance during transition.

4.1 Estimates of supply elasticities

Surveys of the literature on labour supply elasticities, such as Boal and Ransom (1997) and Bashkar, Manning and To (2002), reveal a degree of variation in the estimates, not least because the literature considers different approaches to measuring the market power of the employer, different time horizons (short and long run) as well as different types of workers.

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[9] Flanagan (1995) discusses the negative consequences of tax-based incomes policies which were adopted in Eastern Europe during the early stages of transition. He explains that policies which targeted the average wage penalised companies that downsized to shed their least efficient workers or those that expanded to hire highly skilled workers, which further compressesed the public sector wage structure. For that reason, he advocated policies that targeted the enterprise wage bill, allowing for downsizing that could be accompanied by an increase in average wage to attract and retain skilled workers.

One group of studies measure supply elasticities in 'dynamic' monopsony settings (Manning, 2003) by noting that the level of employment in steady state is the ratio of the recruitment rate to the separation rate (Bashkar, Manning and To, 2002). Hence, the elasticity of employment with respect to wages is the difference between the elasticity of recruits with respect to wages and the elasticity of separations with respect to wages. Using this approach on United States data, Card and Krueger (1995) calculate that the upper bound for the overall wage elasticity is 5, implying that wages are on average 17 percent below the workers' marginal products. A similar estimate is obtained by Manning (2003) using data for the United Kingdom. Van Der Berg and Ridder (1993) using data from the Netherlands, apply the standard Burdett and Mortensen dynamic search model and measure monopsony power by the ratio of job offers and job destruction rates. They find the average elasticity of labour supply to be around 7. This is fairly elastic but considers workers as a whole. Our model differentiates skilled and unskilled workers.

More pertinent studies have focused on either skilled or unskilled workers. Sullivan (1989) uses panel data to estimate the employer size–wage effect for nurses, after controlling for other factors (individual hospital effect, measures of hospital caseload etc). The wage elasticity of labour supply of nurses in the short run was estimated to be 1.3 and in the long run 3.9. Ransom and Sims (2010) estimate the labour supply elasticity of school teachers in the United States at 3.7, while Falch (2010) obtains the somewhat lower estimate for Norwegian school teachers of 1.4. On the other hand, Staiger, Spetz and Phibbs (2010) estimated a much lower short run wage elasticity of labour supply of between 0 and 0.2 for registered nurses in US hospitals run by the Veterans Administration (VA). Their estimate is based on a 'natural experiment' based on the change in relative employment at individual VA and non-VA hospitals, after VA hospital wages departed from the overall wage-setting machinary. In contrast, focusing on the supply elasticity for unskilled labour, Boal (1995), estimates that long run inverse elasticities of West Virginia coal miners, are at most 0.03, 0.05 or 0.09, using discount rates of 5 percent, 10 percent or 20 percent respectively, implying that the inverse elasticities are essentially zero. This means that the elasticity of the unskilled labour supply approaches infinity which is expected given that workers with general skills might be regarded as more mobile.

While these results suggest a range of estimates of labour supply elasticities, the following broad conclusions emerge: (1) results depend on the methods used such that inferences from recruitment and separation rates provide greater elasticities than individual

case studies (2) short run elasticities are smaller then long run estimates and (3) skilled workers have a lower elasticity of labour supply than unskilled workers or the workforce as a whole.

4.2 A calibration on Hungarian data

The calibration model presented here applies elasticities which are within the bands of these estimates of labour supply to actual data obtained for Hungary during economic transition. The public sector employment shares and average wages of skilled and unskilled full-time male workers during the economic transition from 1994 until 2003 for Hungary are obtained from Hámori (2007) and presented in Table 1. The unskilled group of workers is created by summing up unskilled (primary school or less) and low-skilled (vocational degree) groups. The skilled group of workers is created from middle-skilled (high school degree) and high-skilled (tertiary degree) groups. Note, among the salient features of Table 1, that the ratio of skilled to unskilled wages is higher in the private sector than the public sector and that both the skill differentials increase slightly over the period. In addition, the ratio of skilled to unskilled workers employed in the private sector remains unchanged but falls in the public sector.

Table 1: Skill composition and wages by ownership type in Hungary, 1994 and 2003

	Private sector		Public sector	
	1994	2003	1994	2003
Educational composition (%)				
Unskilled (U)	21.7	15.8	15.4	11.5
Low-skilled (L)	39.4	45.1	12.7	18.3
U+L	61.0	60.8	28.1	29.8
Middle-skilled (M)	25.4	26.0	28.1	21.4
High-skilled (H)	13.6	13.2	43.8	48.7
M+H	39.0	39.2	71.9	70.2
Ratio: Skilled to Unskilled employment	0.64	0.64	2.56	2.35
Monthly gross earnings for education group U	85,000	95,000	73,000	100,000
Monthly gross earnings for education group L	94,000	109,000	78,000	102,000
Mean monthly gross earnings Unskilled (U+L)	89,500	102,000	76,000	101,000
Monthly gross earnings for education group M	134,000	155,000	110,000	128,000
Monthly gross earnings for education group H	242,000	360,000	132,000	228,000
Mean monthly gross earnings Skilled (M+H)	188,000	258,000	121,000	178,000
Ratio: Skilled to Unskilled earnings	2.10	2.53	1.60	1.76

Notes to Table 1: Monthly gross earnings for full-time male employees are denoted in Hungarian currency HUF and converted to 2003 earnings by the annual CPI. The employer-provided data from the Hungarian National Labour Center's Wage Survey. *Source*: Hámori (2007)

The ratios calculated from the actual transition data in Table 1 are presented in Table 2 in the column titled headed 'Real data'. The relative employment e^m and wage ratios ω in the public sector distinguish between two groups of workers only: unskilled and skilled. The relative employment of skilled workers in the public sector, e^m, is the ratio of skilled to unskilled workers in the public sector in 1994 and 2003. The relative wage of skilled workers in the public sector, ω, is the ratio of the average wage of skilled workers to the average wage of unskilled workers in the public sector in 1994 and 2003. The ratio of the share of skilled workers in the total cost (wage bill), parameter α, to the share of unskilled workers in the total cost (wage bill), parameter $(1-\alpha)$ is calculated using the information on employment and average wages of skilled and unskilled workers in the public sector in 1994 and 2003.

For the purpose of assessing the compression of public sector wages at the outset of the transition, we consider the wages paid by the private sector in 1994 as a benchmark. Hence, we assume that the relative wage of skilled private sector workers in the early years of the economic transition is close to the relative marginal revenue product of skilled workers γ. Hence, knowing the relative wage ω and relative marginal revenue product of skilled workers γ we can calculate the inverse of public sector relative monopsony power over skilled workers in 1994 and 2003: $\theta = \dfrac{\omega}{\gamma}$. Then we can calculate the relative employment of skilled workers under a competitive solution: $e = \theta e^m$.

Table 2: Public sector monopsony: real data and model calibration

Public sector	Real data		Model I calibrated values		Model II calibrated values	
Ratios:	1994	2003	$\varepsilon_s = 3; \varepsilon_u = 100$ 1994	$\varepsilon_s = 5; \varepsilon_u = 100$ 2003	$\varepsilon_s = 3; \varepsilon_u = 75$ 1994	$\varepsilon_s = 5; \varepsilon_u = 75$ 2003
e^m	**2.56**	**2.35**	**2.52**	**2.26**	**2.51**	**2.26**
θ	0.76	0.84	0.76	0.84	0.76	0.84
e	1.95	1.97	1.91	1.91	1.91	1.91
ω	**1.60**	**1.76**	**1.59**	**1.77**	**1.59**	**1.77**
γ	2.10	2.10	2.10	2.10	2.10	2.10
$\alpha/(1-\alpha)$	4.09	4.13	4.00	4.00	4.00	4.00

Notes to Table 2: See Table 1 for 'Real data'. Derivation of all other values are described in the text.

The next two columns of Table 2 present the calibration models for years 1994 and 2003. The calibration of the models is based on the equalities derived from the theoretical

model and given in equation (14): $\dfrac{\omega}{\gamma} = \dfrac{e}{e^m} = \theta$ and $\gamma e = \omega e^m = \dfrac{\alpha}{1-\alpha}$ by fitting the estimates

of the elasticity of labour supply for skilled and unskilled workers from the literature. We interpret the process of transition as a weakening of monopsony power, embodied in a rise in the labour supply elasticity of skilled workers, constraining the derived elasticities to be within the 'reasonable' values derived from the literature described previously.

The only parameters taken from the 'real data' column and used in columns titled as 'model I' and 'model II' are the relative marginal revenue product of skilled workers, γ, and the relative share of skilled workers in the total cost (wage bill), $\alpha /(1-\alpha)$. All other parameters are generated by the model. The 'free' parameters are the labour supply elasticities of skilled and unskilled workers, ε_s and ε_u chosen to calibrate the inverse of the relative public sector monopsony power θ given in the 'real data' column. Therefore, the calibration is carried out by fitting the values for skilled and unskilled labour supply elasticities to the corresponding ratio values from the 'real data' column. The estimates for the skilled labour supply elasticity should lie within the range described in the empirical literature; the elasticity for unskilled labour is 'large' and we choose two alternative values. The resulting values for these parameters, chosen to maximise the fit of the model, are the following: for Model I, $\varepsilon_s^{1994} = 3$ and $\varepsilon_s^{2003} = 5$ and $\varepsilon_u = 100$ in both years, 1994 and 2003; for Model II, $\varepsilon_s^{1994} = 3$ and $\varepsilon_s^{2003} = 5$ and $\varepsilon_u = 75$ in both years, 1994 and 2003. After fitting $\theta = \varepsilon_s /(1+\varepsilon_s)/\varepsilon_u /(1+\varepsilon_u)$ and knowing γ and α we calculate ω, e and e^m using equation (14): $\dfrac{\omega}{\gamma} = \dfrac{e}{e^m} = \theta$ and $\gamma e = \omega e^m = \dfrac{\alpha}{1-\alpha}$.

An inspection of Table 2 shows that if we take 'transition' as meaning that the elasticity of skilled labour supply ε_s increases from 3 to 5 (both within the range of empirical estimates described previously) and benchmark on actual 1994 values for Hungary, we can predict 2003 rather well.

4. Empirical evidence

This section provides some descriptive data on labour market trends during transition in a number of East and Central European countries. We argue that these trends are consistent with the model of declining and differential monopsony power outlined in the previous sections.

4.1 Wage inequality

A basic implication of our model, whereby transition implies an erosion in the differential monopsony power of the state across worker types, is that wage inequality should increase faster in transition economies than in other OECD economies. This is demonstrated in Table 3, where changes in wage inequality (using the log 90/10 wage differential) are documented for four pre-1990 OECD economies and four transition economies. Although the OECD economies show differential trends (a faster growth in inequality in the UK and the US, and for women than men in 3 of the 4 countries), all the measures of growing inequality are less than those for all four transition economies for which data are provided. The Czech Republic and Romania provide particularly sharp evidence of rising inequality.

Table 3: Change in wage inequality in the advanced OECD countries, 1979–1990 and in the CEE countries, 1988-1995: Log 90/10 wage differential

OECD	1979	1984	1987	1990	(1990)-(1979) change	Five year change [a]
			Males			
United States	1.23	1.36	1.38	1.40	0.17	0.077
United Kingdom	0.88	1.04	1.10	1.16	0.28	0.121
France	1.19	1.18	1.22	1.23	0.04	0.018
Japan	0.95	1.02	1.01	1.04	0.09	0.041
			Females			
United States	0.96	1.16	1.23	1.27	0.31	0.141
United Kingdom	0.84	0.98	1.02	1.11	0.27	0.123
France	0.96	0.93	1.00	1.02	0.06	0.027
Japan	0.78	0.79	0.84	0.83	0.05	0.023
CEE	1988	1989	1993	1994	1995	Five year change [a]
			All			
Czech Republic	…	0.88	1.16	…	1.31	0.358
Hungary	1.14	…	1.30	1.33	…	0.158
Poland	0.96	…	1.11	…	1.22	0.186
Romania	…	0.67	1.02	…	1.12	0.375

Notes to Table 3: Wage inequalities for selected OECD countries by *Katz, Loveman and Blanchflower (1995)* and for CEE countries from *Rutkowski* (1996a) for 1988–1993 and *Rutkowski* (1997) for 1994/1995. [a] The difference between the last year and the first year value expressed on a five year basis. *Source*: Kertesi and Köllő (2000)

A similar pattern of increasing income inequality during the first years of transition (i.e. the early 1990s) relative to the pre-transition period (i.e. late 1980s) can be presented by looking at other inequality measures. Table 4 presents Gini coefficients for income inequality

in a number of transitional countries using different sources. A similar pattern emerges to that in Table 3.

Table 4: Gini coefficients for income inequality

Year	1987 – 1988		1989		1993		1994	1993 –1994	
Author	*C*	*H*	*AM*	*AC*	*P*	*W*	*P*	*C*	*H*
Bulgaria	0.25	0.23	0.3					0.34	0.34
Czech Republic	0.19	0.19	0.20	0.20				0.19	0.26
Hungary	0.21	0.21	0.25	0.25		0.27		0.23	0.24
Poland			0.27	0.27					0.31
Romania	0.23	0.23				0.255		0.29	0.29
Slovakia	0.20	0.20	0.20					0.20	0.20
Estonia	0.23	0.30				0.39			0.39
Latvia	0.23	0.27				0.27			0.27
Lithuania	0.23	0.28				0.34			0.36
Russia	0.24	0.28		0.28	0.40	0.50	0.41		0.48

Notes to Table 4: The Ginis are identified in columns by year and by different sources, indicated by letters: *AC Aghion and Commander* (1999), *AM Atkinson and Micklewright* (1992), *C Corricelli* (1997), *H Honkkila* (1997), *P Popov* (1996) and *World Bank* (1997). *Source*: Rosser, Rosser and Ahmed (2000)

Finally, Table 5 presents Gini coefficients for income inequality in public and private sectors in two transitional countries. Table 5 shows that the increase in income inequality was driven partly by the emerging private sector but also by rising wage differentials in the public sector.

Table 5: Gini coefficients for income inequality by ownership type

Country		1987	1992	1995
	All	0.23	0.25	0.29
Poland	Public	0.23	0.24	0.27
	Private		0.29	0.33
	All	0.27 [a]	0.30	0.32 [b]
	Public Men		0.27	0.32
Hungary	Private Men		0.31	0.33
	Public Women		0.26	0.28
	Private Women		0.30	0.31

Notes to Table 5: [a] 1988 [b] 1994. *Source*: Rutkowski (1997) for Poland and Laušev (2010) for Hungary

4.2 Returns to education

Another important dimension of rising inequality lies in the behaviour over time of returns to further and higher education, relative to the incomes of those with high school or uncompleted education. The model of differential monopsony power implies that returns to education in CEE (Central and Eastern Europe) countries should be less than those in high income OECD countries, but that these returns should rise during the economic transition.

Data for selected OECD and CEE countries are presented in Table 6. Various ratios are given, and these broadly confirm our 'story': returns to education are generally higher in OECD countries than CEE countries at the start of the transition for most comparisons, with more rapidly rising ratios of highly education to less education earnings in CEE countries during transition.

Table 6: Changes in educational differentials in the advanced OECD countries and in the CEE countries

OECD	Educational group ratio	Initial year	Ratio value	Second year	Ratio value	Five years change [a]
United States	College/ High school	1979	1.37	1987	1.52	0.11
United Kingdom	College/No qualification	1980	1.53	1988	1.65	0.08
France	Males: Nonmanual/Manual [b]	1976	1.58	1987	1.53	-0.03
	Females: Nonmanual/Manual [b]	1976	1.38	1987	1.35	-0.01
Japan	College/Upper high school	1979	1.26	1987	1.26	0.00
Canada	University/High school	1980	1.4	1985	1.43	0.03
West Germany	(14-18)/(11-13) years	1981	1.36	1983	1.42	0.10
Sweden	University/Post Secondary	1981	1.16	1986	1.19	0.03
Netherlands	University/Secondary	1983	1.43	1987	1.23	-0.25
CEE						
Czech Republic	Higher education/Secondary	1988	1.29	1992	1.41	0.15
Hungary	Higher education/Secondary	1989	1.44	1994	1.47	0.03
	Higher education/Vocat.training sch.	1989	1.56	1994	1.86	0.30
Poland	Higher education/Vocational secondary	1988	1.23	1993	1.39	0.16

Notes to Table 6: For OECD countries: the calculations by *Davis* (1992), except France. [b] Educational differentials for males and females nonmanual/manual workers in France by *Katz, Loveman and Blanchflower (1995).* For CEE countries: calculations for Hungary by *Kertesi and Köllő* (2000) and for Czech Republic and Poland by *Rutkowski* (1996a). [a] The difference between the second year and the initial year value expressed on a five year basis. *Source*: Kertesi and Köllő (2000)

Public-private wage differentials by educational attainment from a study of Poland are presented in the Table 7, drawn from Rutkowski (1996b). The table shows that all workers, regardless of educational attainment, earned a premium in the private sector early in the process of economic transition. But whereas the private sector rewarded high qualifications (tertiary education) by 30 percent higher wages, workers with lower skills earned between 3 and 11 percent more than in the public sector. In addition, the age-earnings profile in the private sector was found to be significantly steeper than in the public sector and earnings peaked about four years earlier in the private sector than in the public sector.

**Table 7: Earnings in the private sector relative to earnings in the public sector
by level of educational attainment in Poland, 1993**

Educational Level	All	Men	Women
All levels	105.7	102.0	106.5
Tertiary, university level	127.3	112.3	141.4
Tertiary, below university	132.8	105.0	140.8
Secondary vocational	111.1	107.3	112.3
Secondary general	105.8	102.2	103.4
Vocational training	103.3	103.0	105.9
Primary	110.9	108.6	107.7

Notes to Table 7: Public sector = 100.
Source: Rutkowski (1996b)

As the process of economic transition proceeds, however, public sector wage increases began to accelerate, especially among groups of workers with attractive options in the private sector i.e. the higher skilled.[10] This is compatible with the weakening role of monopsonistic power in the public sector towards high skilled workers. Table 8 shows two phenomena for Hungary during the transition. First, pay in the most senior roles in private enterprise accelerate rapidly as the market-based share of economic activity increases. This should not be too surprising because 'top pay' in the private sector (e.g. CEOs) far exceeds top pay in the public sector in most market-oriented economies. Second, however, pay among public sector administrative groups increases more rapidly among the higher skilled and higher paid occupations within the public sector.

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

Occupation	1986		1996		1986-1996 % change	
	Public administration	Private sector	Public administration	Private sector	Public administration	Private sector
Chief executives [a]	191	208	243	379	27	82
Business administration [a]	148	148	180	234	22	58
Higher educated bureaucrats [a]	138	147	173	221	25	50
Lower educated bureaucrats [b]	82	105	108	121	32	15
Administrative occupations [b]	78	83	89	93	14	12

Notes to Table 8: [a] With higher education level. [b] With secondary school education level. *Source:* Kézdi (1998)

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[10] There are many case studies of this for transition economies: see, for example, Orazem and Vodopivec (1997) for Slovenia, and Flanagan (1998) for the Czech Republic.

Similar changes are confirmed by Rutkowski (1996b) for Poland. In particular, Gini coefficient presented in Table 9 shows that wage decompression in the public sector mainly occured among white-collar workers. Moreover, earnings at the bottom and at the top decile relative to the median show that wage inequalities among white-collar workers rose at the beginnig of economic transition not because wages of the low-paid workers declined but mainly because wages of the top-paid workers rose.

Table 9: Changes in earnings distribution by broad occupational groups, Poland 1987-1993

		1987	1993		
		Socialised	National	Public	Private
All	Gini	0.23	0.26	0.24	0.30
	P10	61.3	60.1	62.3	56.3
	P90	168.8	181.9	178.1	196.3
Blue Collar	Gini	0.23	0.24	0.23	0.25
	P10	59.5	60.4	62.1	58.0
	P90	172.7	179.3	178.4	179.7
White Collar	Gini	0.21	0.27	0.25	0.37
	P10	64.5	62.8	64.9	54.2
	P90	162.5	188.3	180.1	221.6

Notes to Table 9: 1987 Net earnings; 1993 Gross earnings; Socialised sector includes state and cooperative sectors; National sector includes public and private sectors. P10 denotes the earnings of the bottom decile relative to the median, expressed as a percentage. *Source*: Rutkowski (1996b)

Nunberg (2000) provides some further evidence of public sector pay restructuring in civil service in Hungary. This is illustrated by the increases in civil servants' salaries in Table 10. The attempt to decompress public sector pay is shown by pay increases that are disproportionally concentrated among the top skilled occupations.

Table 10: Civil Servants with Increased Salaries in Hungary, 1997

	Percent of staff in class with salaries increased
Senior Managers	74.2
Non-Managers with Higher Level Qualifications	47.5
Civil Servants with Secondary Level Qualifications	36.5
Administrative Grades	30.1
Blue Collar Workers	19.3

Source: Nunberg (2000)

4.3 *Public sector wage premia*

The argument that wage inequality and returns to education increased during economic transition should not be too surprising and, whilst compatible with the 'story' of declining monopsonistic power in public sector wage-setting, is also consistent with other narratives of the process of transition. However the next two facets of the transition labour

market are less obvious and harder to explain in theoretical settings other than the monopsony setting.

The first argument concerns the public-private sector pay differential. Most studies of this phenomenon across a variety of economic systems find a small positive average pay premium for public sector workers in a variety of institutional setting, though differing across the wage distribution and by certain important characteristics, such as gender (Disney, 2011). This general finding has to be qualified where the public sector employer has a degree of market power and can reduce the wage below that of a competitive market. A specific prediction of the monopsony model in the context of CEE transition economies therefore is that the *average* public sector premium is negative in the early stages of transition when the state has greater monopsoney power, with this negative premium disappearing during the process of transition. Since major reallocations of employment and rising wages outside the public sector during the transition process may provide countervailing tendencies in the 'raw' differential between public and private pay, the effect on the public sector pay penalty or premium has to be measured as a *conditional* effect – controlling for other characteristics such as education, age and experience. Care must also be taken in the fact that public sector workers tended to receive payments in kind (e.g. access to housing or subsidised travel) during the pre-transition years, and the gradual monetisation of these benefits during transition tend to induce an upward bias to the path of measured public sector wages.

Laušev (2011) examines the trend in public-private sector wage differentials during the transition from the Yugoslavian federation to its subsequent states, such as Serbia. Early studies by Kristić and Reilly (2003), Reilly (2003) and Jovanović and Lokshin (2003) for these states do indeed suggest substantial negative premia (i.e. penalties) to public sector workers in the period before large-scale privatisations, although it is not clear that some of these estimates allow for all the non-wage benefits available to public sector workers. Using Labour Force Survey data for the period 1995-2003, 2004-08 and Living Standards Measurement Study data for 2002-03, Laušev shows evidence of negative public sector pay differentials in Serbia, conditioned on human capital and other individual characteristics, and controlling for non-pay benefits, for much of the late 1990s and the early part of the 2000s decade. This negative differential is eliminated after 2004, and indeed male in 2005 and 2006 and female public sector workers in 2007 in Serbia earn a premium of around 8% over private sector workers, also conditioned on personal characteristics. This transition from penalties to premia for public sector workers is most noticeable among those with primary

and high school education, rather than tertitary education. This finding at first sight contrasts with our model in which the most educated workers are most affected by monopsony pay-setting. But it should be borne in mind that employment opportunities in the private sector increase most sharply for highly educated workers in transition (as in the previous sub-section) and that those the with most ability likely leave the public sector for employment in the private sector (or indeed abroad) at the earliest opportunity, so induing a degree of self-selection.

Other studies confirm that public sector premia are low or even negative in pre-transition economies: see, for example, Adamchik and Bedi (2000) for Poland and Jovanović and Lokshin (2004) for Russia. Both these studies showed that the disparity between higher private sector wages and lower public sector wages were especially large for the highly educated, such as graduates, leading to well-known phenomena such as moonlighting and absenteeism in the public sector. Jurajda and Terell (2003) investigated the evolution of wage levels across sectors in the Czech Republic and also find a *private* sector wage premium during the early transition period. However, this significant difference disappears during transition. They argue that this result is probably caused by a self selection process because the first movers from the public to the private sector early in transition are the most able; this first mover advantage shrinks over time with the increase of private employment. In similar vein, Leping (2006) utilizes quantile regressions for estimation of public-private sector wage differentials using Estonian Labor Force Surveys from 1989 to 2004. This study again finds negative public sector wage gaps during early transition (ranging from 23% to 76% depending on the percentile) that steadily decrease over time as transition occurs. Analogous results are reported by Hámori (2007) and Laušev (2011) for Hungary using employer-provided data. Laušev (2011) reports that the public sector pay penalty correlates with worker's position at the earnings distribution (increases from 9% at the bottom to 40% at the top percentile in 1996 for male workers) but that workers at all percentiles saw improvements in financial position from 1996 to 2003 when the average gap approached zero. Finally, Newell and Socha (1998), using the Labour Force Survey for Poland, estimate an average conditional public sector wage gap of −5.2% for men in 1992 and +7.9% in 1996.

5.4 *Employment structure*

A further implication of the monopsonistic interpretation of labour markets in pre-transition economies is that, other things being equal, the application of monopsonistic power to pay implies a greater proportion of skilled workers in employment than would otherwise

be the case, assuming skilled workers have a lower supply elasticity. Consequently the process of transition and the erosion of monopsonistic power would imply a rise in the ratio of unskilled to skilled workers in the public sector, rather than the reverse.

This is harder to test, for the simple reason that pre-transition regimes were characterised by disguised employment, absenteeism and data measurement issues that make accurate calibration of employment trends difficult. Moreover, there are issues as to the average quality of 'skilled' workers produced in pre-transition regimes. Nevertheless there is some evidence that the ratios of skilled to unskilled workers in public sector employment change in the predicted direction during transition – see, for example, the trends in the ratios in Table 2 above for Hungary for actual data.

One argument which implicitly backs the argument that monopsony power increased the employment of skilled workers in pre-transition economies is in the recognition that communism provided more opportunities for training skilled workers, although paying them less than in a market economy. Table 11 shows that the fraction of more skilled workers – as measured by educational attainment – is higher in economies in the early stages of economic transition than in developed OECD economies.

Table 11: Level of education of the labour force as a percent of the total labour force

	Bulgaria	Czecho-slovakia	Hungary	Poland	Romania	Austria	Greece	Italy	Spain
	1990	1989	1990	1988	1990	1990	1989	1990	1990
Basic or less	44.6	26	38.4	34.2	35.8	28.6	52.6	26.6	48.4
Vocational	15.8	21	23.1	29.5	31.4	57.8			
Secondary	30	43.8	26.9	27.9	24	6.3	35.3	66.2	46.1
Higher	9.6	9.2	11.6	8.4	8.8	7.1	11.4	7.2	5.5

Notes to Table 11: National statistical yearbooks for Czechoslovakia and Poland; data supplied directly by Hungarian Central Statistical Office for Hungary and) for Romania; and ILO data base LABEDUC for OECD countries. *Source:* Boeri and Keese (1992)

Flanagan (1998) details the implications of this process for the Czech Republic, showing that the post-1989 transition saw a sharp increase in returns to education. This 'investment in human capital' has sometimes been seen as a beneficial aspect of pre-transition economies (as in the implict argument of the title of Flanagan's paper); however, it is only the transition to a market economy that allowed skilled workers to earn a return on their contributions comparable to that in market economies.

Table 12: Relative employment of skilled to unskilled male full-time employees by ownership type in the CEE countries during economic transition

		Ratio: Skilled to Unskilled employment	
Country	Year	Private sector	Public sector
Croatia	1996	0.96	1.38
	2006	0.59	1.17
Hungary	1994	0.64	2.56
	2003	0.64	2.35
Poland	1994	0.50	0.73
	1999	0.47	0.68
Serbia	2004	0.98	2.28
	2008	0.86	2.15

Notes to Table 12: Skilled: High school degree and higher for Hungary and Poland and 4-years secondary school and higher for Croatia and Serbia; Unskilled: Vocational degree and lower for Hungary and Poland and 3-years secondary school and lower for Croatia and Serbia. *Source*: Croatian Labor Force Survey from Tomić and Domadenik, (2012); Hungarian National Labour Center's Wage Survey from Hámori (2007); Labour Force Survey of the Republic of Serbia and CHER Polish Household Budget Survey

Table 12 confirms an important part of our 'story': a greater proportion of skilled relative to unskilled full-time male employees in the public sector relative to the private sector, but also the relative employment of skilled workers in the public sector declines over the course of economic transition in all countries. With the exeption of Croatia changes in relative employment of skilled workers are more pronounced in public than in the private sector.[11]

5. Discussion of alternative explanations and concluding comments

This paper considers the role of monopsony in public sector wage-setting. Unlike a number of recent papers on this issue which consider a single public sector occupation in isolation, it considers the implications for both pay differentials and employment structure of a setting with heterogeneous labour where the public sector employer exerts differential market power across different types of labour. Empirical estimates of labour supply elasticities suggest that the supply elasticities for skilled workers are lower than those for unskilled workers. A formal model is derived in which monopsony power is thereby applied primarily to skilled workers and it is shown that the application of this market power results in lower skill differentials but a greater employment of skilled to unskilled labour than would

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[11] An important qualification in using employment figures, however, is that definitions of the 'public sector' differ across countries and across data sets: for example for Hungary the 'public sector' includes only the centralised budgetary sector; for Serbia, the 'public sector' includes this sector and state and socially-owned enterprises; and for Croatia the data separately identify public and private sectors and socially-owned enterprises that are in the process of privatisation.

otherwise be the case. A calibration model based on Hungarian data, using actual employment and wage rates and plausible estimates of supply elasticities from outside studies, suggests that the change in Hungarian wage differentials and employment structure in the public sector during economic transition can be explained by a weakening of monopsony power.

Transition in Central and Eastern Europe would seem to be a plausible large scale experiment with which to 'test' the model of the heterogeneous application of monopsony power by public enterprises in pre-transition economies, with the clear implication that the process of economic transition implies a weakening of the capacity of the state to extract surplus from more skilled workers. Specific predictions of the model are that in economic transition: skill differentials widen in both public and private sectors, returns to education increase, the average public sector 'penalty' relative to private sector wages disappears, and that the growth of unskilled to skilled employment is faster in the public sector than in the private sector. All these predictions are borne out to a greater or lesser extent, given various *caveats* (for example, the absence of official unemployment measures in communist economies) and data limitations.

In one sense, this interpretation of the process of economic transition in the labour market is an obvious one, though it has never (to our knowledge) been spelt out explicitly in the context of a formal model. Nor has the theoretical treatment of the standard monopsony model been extended to consider the case of skill heterogeneity (with the possibility of differing supply elasticities – at least in the short run). It is therefore worth considering whether our 'narratives' of pre-transition and transition labour markets are able to capture the same essential features of the process.

The first alternative narrative is implicit in many papers, for example in some of the contributions to Commander (1998). Communist economies are characterised by bargaining between workers, the public sector and enterprises in order to generate a 'given' degree of inequality in wage structure. This need not reflect exploitation of differential market power by public enterprises, but merely the joint desire for a more equal, or solidaristic wage distribution. This, of course, also underpins the rationalisation that would be put forward by governments and political parties in communist countries, contrasting such polices with the inegalitarian policies of western market-oriented countries. However, whilst such a 'story' is certainly consistent with the evidence of lower returns to skilled workers and lower economic inequality in pre-transition economies, an egalitarianism which unravels with the transition

strategy of privatisation and the development of a market-oriented economy, it does not square with some of the other facts adduced here. In particular, an egalitarian story fails to explain why the public sector worker is typically paid less than a private sector worker in the earliest stages of transition, and why workers in the public sector tend only to obtain a premium in the later stages of transition and in market-oriented countries more generally.

A second alternative 'narrative' focuses on the 'bureaucratic imperative' and the role of large-scale bureaucracies to generate alternative pays structures, typically involving a series of points and increments related to 'performance' within the bureaucracy and having little relation to spot market equilibria (e.g. performance pay). Furthermore, bureaucracies have an incentive to maximise employment within the budget constraint (Niskanen, 1975).

This model does indeed provide some insight into wage-setting behaviour in parts of the pre-transition CEE bureaucracy (and indeed to some government departments in market economies). In the so called 'non-productive' spheres of employment such as education, health and public administration, remuneration levels in centrally planned CEE economies were traditionally based on the average wage in the 'productive' enterprise sector (Jovanović and Lokshin, 2003). The wage setting mechanism in sectors under direct supervision of the government (primarily public administration) was founded on a fixed base wage with wage scales, obtained by a multiplication of the base with appropriate coefficients, varied by educational attainment, seniority, working conditions and level of responsibility (Haltiwanger and Vodopivec, 2003). Consequently, centrally determined wage grids with minimum and maximum wages (with the latter being a pre-determined multiple of the latter) were used to create egalitarian wage distributions (Rutkowski, 1996a). But as a generalized description of the phenomena under review, such models generally substitute one form of inequality for another (e.g. 'backloaded' wage profiles benefiting older workers rather than inequality derived from 'spot' market pay determination). They do not explain the particular structure of inequality across skill groups, the behaviour of the public sector pay penalty/premium during transition, or the implications for the relative employment of different types.

A final alternative explanation is skill-biased technical change (SBTC). SBTC is likely to be pervasive across all economies, reflected in the short run by growing wage inequality between skilled and unskilled workers and in the long run by differential employment trends. It is, however, harder to argue that SBTC explains the *differential* trends in wage and employment inequality between CEE transition economies and other developed market economies. If we are prepared to believe that SBTC also involves 'skill upgrading'

amongst existing skilled workers in CEE labour markets, it might also explain the differential change in skilled pay between the private and public sectors in those economies. However the essence of the monopsony model is that a pre-transition economy *overuses* skilled workers, since the pay of that group is held down relative to unskilled workers. Consequently, a SBTC explanation suggests a faster growth in employment of skilled workers relative to unskilled workers than would otherwise be the case, whereas the monopsony model predicts a slower growth in that ratio *ceteris paribus.* Peter (2003) also concludes, in the context of transition in Russia, that 'institutional factors' rather than SBTC are the main drivers of wage inequality in that country during transition.

We conclude, therefore, that insofar as an all-encompassing model can explain the varieties and vagaries of transition in CEE labour markets, a model of monopsony with heterogeneous workers is a plausible candidate. Moreover, by doing so, we provide further evidence in support of the resuscitation of the monopsony model of wage-setting in the literature, with a new application of the model to a different field.

References

Adamchik, V. and Bedi, A. (2000) 'Wage differentials between the public and private sectors: Evidence from an economy in transition', *Labour Economics,* 7, pp.203-224.

Aghion, P. and Commander, S. (1999) 'On the dynamics of inequality in the transition', *Economic Transition*, 7, 2, pp.275-298.

Allison, C. And Ringold, D. (1996) 'Labour markets in transition in Central and Eastern Europe 1989-95', Social Challenges of Transition *Technical Paper,* No*. 352,* Washington, D.C.: The World Bank.

Atkinson, A. and Micklewright, J. (1995) *Economic Transformation in Eastern Europe and the Distribution of Income*, Cambridge: Cambridge University Press.

Bashkar, V., Manning, A. and To, T. (2002) 'Oligopsony and monopsonistic competition in labor markets', *Journal of Economic Perspectives*, 16, 2, pp.155-174.

Boal, W. (1997) 'Testing for employer monopsony in turn-of-the-century coal-mining', *RAND Journal of Economics,* 26, Autumn, pp.519-536.

Boal, W. and Ransom, M. (1997) 'Monopsony in the labor market', *Journal of Economic Literature* 35 (1): pp. 86–112.

Boeri, T. And Keese, M. (1992) 'Labour markets and the transition in Central and Eastern Europe', *OECD Economic Studies*, Paris: OECD.

Calmfors, L. and Driffill, J. (1988) 'Bargaining structure, corporatism and macroeconomic performance', *Economic Policy*, 6, April, pp.13-61.

Card, D. and Krueger, A. (1995) *Myth and Measurement: The New Economics of the Minimum Wage,* Princeton: Princeton University Press.

Commander, S. (1998) (ed) *Enterprise Restructuring and Employment in Models of Transition,* Washington, D.C.: The World Bank.

Corricelli, F. (1997) 'Income distribution and the dynamics of reforms', *Economic Transition*, 5, 2, pp.510-514.

Corricelli, F. and Revenga, A. (1992) 'Wages and unemployment in Poland: recent developments and policy issues', in F. Corricelli and A. Revenga (eds) Wage Policy during the Transition to a Market Economy: Poland 1990-91, *Discussion Paper* No. 158. Washington, D.C.: The World Bank.

Davis, S. (1992) 'Cross-country patternbs of changes in relative wages', *Macroeconomics Annual*, National Bureau of Economic Research, Cambridge: Mass

Disney, R. (2011) 'The future of public sector pay in Britain', in D. Marsden (ed) Labour Market Policy for the Twenty-First Century, Oxford University Press, forthcoming.

Estrin, S. (1994) 'The inheritance', in B. Nicholas (ed) *Labour Markets and Social Policy in Central and Eastern Europe: The Transitions and Beyond*: Oxord, Oxford University Press.

Falch, T. (2010) 'The elasticity of labour supply at the establishment level', *Journal of Labor Economics*, 28. 2, pp.237-266.

Flanagan, R. (1995) 'Labor market responses to a change in economic system', *Proceedings of the World Bank Annual Conference on Development Economics, 1994*, Washington, D.C.: The World Bank.

Flanagan, R. (1998) 'Were communists good human capitalists? The case of the Czech Republic', *Labour Economics*, 5, September, pp.295-312.

Fogel, W. and Lewin, D. (1974) 'Wage determination in the public sector', *Industrial and Labor Relations Review*, 27, April, 410-431.

Haltiwanger, J. And Vodopivec, M. (2003) 'Worker flows, job flows and firm wage policies: An analysis of Slovenia', *Economics of Transition*, 11, 2, pp.253-290.

Hámori, S. (2007) *Essays in Labour Economics and Economics of Education*, PhD thesis: University of Mannheim.

Honkilla, J. (1997) 'Privatisation, asset distribution and equity in transitional economies', UN World Institute for Development Economics Research (WIDER) *Working Paper* No. 125, Helsinki.

Jovanović, B. and Lokshin, M. (2003) 'Wage differentials and state-private sector employment choices in the Federal Republic of Yugoslavia', *Policy Research Working Paper*, No. 2959, Washington, D.C.: The World Bank.

Jovanović, B. and Lokshin, M. (2004) 'Wage differentials between the state and private sectors in Moscow', *Review of Income and Wealth*, 50, 1, pp.107-123.

Jurajda, S. and Terrell, K. (2003) 'Job Growth in Early Transition: Comparing two paths', *Economics of Transition*, 11, 2, pp.291-320.

Katz, L., Loveman, G. and Blanchflower, D. (1995) 'Comparison of changes in the structure of wages in four OECD countries', in R.B. Freeman and L.F. Katz (eds) *Differences and Changes in Wage Structure*, Chicago: Chicago University Press, for National Bureau of Economic Research.

Kertesi, G. and Köllő, J (2000) 'Wage inequality in East Central Europe', Institute of Economics, Hungarian Academy of Sciences, *Working Paper* No: 2000-7: Budapest.

Köllő, J. (1998) 'Transformation before the 'transition' (Employment and wage setting in Hungarian firms 1986-89)', Institute of Economics, Hungarian Academy of Sciences, *Working Paper* No: 1998-3: Budapest.

Kristić, G. And Reilly, B. (2003) 'Employees and second job-holding in the Federal Republic of Yugoslavia: An empirical analysis', *Economics of Transition*, 11, 1, pp.93-122.

Landon, J. and Baird, R. (1971) 'Monopsony in the market for public school teachers', *American Economic Review,* 61, December, pp. 966-971.

Lane, D. (1992) 'Wage controls in reforming socialist economies: Design, coverage and enforcement', in F. Corricelli and A. Revenga (eds) Wage Policy during the Transition to a Market Economy: Poland 1990-91, *Discussion Paper* No. 158. Washington, D.C.: The World Bank.

Laušev, J. (2011) *Public-private sector earnings differentials in a transition economy*; PhD thesis: University of Nottingham

Leping, O. (2006) 'Evolution of the public-rpivate sector wage differential during transition in Estonia', *Post-Communist Economies*, 18, 4, pp.419-436.

Leslie, D. (1985) 'The economics of Cash Limits as a method of pay determination', *Economic Journal*, 95, September, pp.662-678.

Luizer. J. and Thornton, R. (1986) 'Concentration in the labor market for public school teachers', *Industrial and Labor Relations Review*, 39, July, pp. 573-584.

Manning, A. (2003) *Monopsony in Motion: Imperfect Competition in Labour Markets* Princeton: Princeton University Press.

Meek, R. (1956) *Studies in the Labour Theory of Value*, Lawrence and Wishart: London.

Merrifield, J. (1999) 'Monopsony power in the market for teachers: Why teachers should support market-based reform', *Journal of Labor Research*, 20, 3, pp. 377-391.

Milanović, B. (1998) *Income, Inequality, and Poverty during the Transition*, Washington, D.C.: The World Bank.

Newell, M. And Socha, M. (1998) 'Wage distribution in Poland: The role of privatization and international trade 1992-96', *Economics of Transition*, 6, 1, pp.47-65.

NHSPRB (2009) NHS Pay Review Body: *Twenty-Fourth Report,* Cm 7646,The Stationery Office: London.

Niskanen, W. (1975) 'Bureaucrats and politicians', *Journal of Law and Economics*, 18, pp.617-643.

Nunberg, B. (1999) *The State after Communism: Administrative transitions in Central and Eastern Europe*, Washington, D.C.: The World Bank.

Orazem, P. And Vodopevic, M. (1997) 'Value of human capital in transition to market: Evidence from Slovenia', *European Economic Review*, 41, April, pp. 893-903.

Peter, K. (2003) 'Skill-based transition: the role of markets, institutions and technological change', IZA *Discussion Paper* No. 893, Bonn.

Popov, V. (1996) 'A Russian puzzle: what makes the Russian economic transformation a special case', World Institute for Development Economics Research (WIDER) *Research for Action* No. 29, Helsinki.

Ransom, M. and Sims, D. (2010) 'Estimating the firm's labor supply curve in a 'New Monopsony' framework', *Journal of Labor Economics*, 28, 2, pp.331-355.

Reilly, B. (2003) 'The private sector wage premium in Serbia (1995-2000): A quantile regression approach', University of Sussex *Working Paper*, No. 98.

Rutkowski, J. (1996a) 'Changes in the wage structure during economic transition in Central and Eastern Europe', *Technical Paper* No. 340, Washington, D.C.: The World Bank.

Rutkowski, J. (1996b) 'High skills pay off: the changing wage structure during economic transition in Poland', *Economics of Transition*, Vol. 4.

Rutkowski, J. (1997) 'Low wage employment in transitional economies of Central and Eastern Europe', *Most-Moct: Economic Policy in Transitional Economies,* No 7.

Sullivan, D. (1989) 'Monopsony power in the market for nurses', *Journal of Law and Economics*, 32, 1, S135-S178.

Staiger, Spetz and Phibbs (2010) 'Is there monopsony in the labor market: evidence from a natural experiment', *Journal of Labor Economics*, Special issue on labour market monopsony, (eds: Ashenfelter, O., Farber, H. and Ransom, M.), 28, 2, pp.203-472.

Tomić, I. and Domadenik, P. (2012) 'Matching, adverse selection and labour market flows in a (post)transition setting: The case of Croatia', *Post-communist Economies*, 24, 1, March, *forthcoming*.

Van den Berg, G. and Ridder, G. (1993), 'Estimating an equilibrium search model from wage data', in: H. Bunzel et al., eds. *Panel Data and Labour Market Dynamics*: North-Holland, Amsterdam.

Vodopivec, M. (1993) 'Determination of earnings in Yugoslav firms: Can it be squared with labor management?' *Economic Development and Cultural Change*, 41, April, pp.623-632.

World Bank (1997) *World Development Report: The State in a Changing World*, Oxford: Oxford University Press.