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Are Transition Economy Workers
Underpaid?

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ABSTRACT

We examine the extent to which workers in transition and developed market economies are able to obtain wages that fully reflect their skills and labor force characteristics. We find that workers in two transition economies, the Czech Republic and Poland, are able to better attain the maximum wage available than are workers in a sample of developed market economies. This greater wage-setting efficiency in the transition economies appears to be more the result of social and demographic characteristics of the labor force than of the mechanisms for setting wages or of labor market policies.

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1 INTRODUCTION

The transition in Central and Eastern Europe has had a major impact on labor markets. Wage setting has changed from centrally established wage rates to market determined ones; there have been large shifts in employment from agriculture and industry into services; and relative wages for different skills and job categories have changed dramatically. Given such major upheavals in the process of allocating labor and rewarding workers for their contributions to production, the numerous changes in employment and the resulting need to search for a new job that workers in these countries faced, and the perceived rigidities in their labor markets, a natural question to ask is how efficiently do transition economy labor markets function in the face of such major changes in employment and wages.¹ In this study, we use stochastic frontier wage functions to analyze the degree of wage inefficiency in the Czech and Polish labor markets in 1996 and 2001 respectively, and we compare this level of inefficiency to that existing in a sample of mainly developed market economies. We find that wage efficiency in the Czech Republic is better than that in most of the more developed market economies, and Poland's wage efficiency is palpably higher than that in all other countries in our sample, suggesting that transition economy labor markets function better in terms of rewarding workers for their labor market attributes than do those of more developed market economies.

Wage inefficiency is defined as the gap between a worker's actual and potential wage, given his or her demographic and socio-economic characteristics.² It is thus a natural measure of the allocative efficiency of the labor market. Wage inefficiency may arise from causes such as incomplete labor market information, discrimination, a decentralized wage setting system, the absence of trade unions, weak employers' coordination, or an unregulated labor market.

Inefficient job matches where workers accept wages below the maximum wage that they could earn given their skills and characteristics result in both lower incomes for individual workers as well as noisier signals for workers and firms regarding the state of the labor market. Thus, such inefficiency results in both a private welfare loss borne by those workers who accept a wage lower than the highest one available to them as well as a social welfare loss borne by all employers and all workers who consequently face greater uncertainty about the wage-skill nexus.

¹ The debate on labor market rigidities in transition economies is unsettled. See Boeri (1997), Boeri and Garibaldi (2006), Feldmann (2004) and Sorm and Terrell (2000).

² The literature often refers to this phenomenon as "underpayment" or "a shortfall in wages." Some researchers use "underemployment"; however, this term may be quite misleading (see Hofler and Murphy, 1992).

2 THEORETICAL BACKGROUND AND ESTIMATION TECHNIQUE

2.1 The Theory of the Underpayment of Labor

In their seminal article on the application of a stochastic frontier wage function to measure the underpayment of workers in the United States, Hofler and Murphy (1992) used job-search theory to explain the systematic deviation between observed and potential wages. This theory suggests a number of reasons why workers may terminate their job search before finding the highest wage that their skills and personal characteristics could obtain. One obvious cause is imperfect information on the part of both workers and employers. While searching for a job, workers do not know the exact market relationship between their skills and the going wage rate, nor do they know which firms will pay the highest wages for their set of skills. Because collecting this information is costly and time consuming, job search theory predicts that workers who face a budget constraint and who discount future income relative to current income will adopt a reservation wage that is below their notion of the maximum wage that they could earn and stop searching when they are offered this wage, which may occur before they discover the highest-paying job. Likewise, employers have imperfect information about potential hires. Employers face the same uncertainties and constraints, although their information, discount rate over future profits and perception of the wage-skill nexus may differ from that of workers. Nevertheless, the literature suggests that the major cause of the underpayment of workers is uncertainty on the part of workers rather than uncertainty on the part of employers. In part this is due to the fact that employers are able to organize searches for workers to be simultaneous by considering a number of job candidates at one time, while the searches of workers tend to be more sequential.³

Second, wage inefficiency could reflect the wage setting process and the bargaining power of workers and employers. Wage efficiency is expected to be higher for more compressed wage distributions and lower for more dispersed wage distributions both because less wage dispersion leads to a better understanding of the wage-skill nexus by both firms and workers and because, with less dispersion, neither firms nor workers can use leverage to move too far from the norm in their offers or reservation wages. The empirical literature supports the view that labor market institutions, most notably collective bargaining, often proxied by trade union density or coverage by collective agreements;

³ Polachek and Yoon (1987, 1996) modeled this worker-employer search under uncertainty for both parties by means of a two-tiered stochastic wage frontier in which both employers and workers faced uncertainty. In such a model each hire effectively splits the difference between the reservation wage and the maximum wage between the firm and the hired worker. However, Polachek and Xiang (2006, p.42) show that “incomplete employee information varies far more than incomplete employer information” and thus the latter may be ignored without a significant loss of accuracy and generality. Polachek and Robst (1998) compared frontier estimates of incomplete information to direct measures of workers’ knowledge and concluded that “stochastic frontier estimates provide a reasonable measure of a worker’s incomplete wage information” (p. 231).

centralized or coordinated wage setting; and laws on minimum wages and progressive taxation, all serve to reduce the dispersion of earnings and compress wage differentials (Freeman, 1998; Blau and Kahn, 1999, 2002; Aidt and Tzannatos, 2002; Cardoso and Portugal, 2003;). OECD (2004) reports high bivariate and multivariate association between union density, bargaining coverage, and centralization/coordination, on the one hand, and overall earnings inequality as measured by the 90-10 percentile ratio on the other. The study concludes that “there is consistent evidence that overall earnings dispersion is lower where union membership is higher and collective bargaining more encompassing and/or more centralized/co-ordinated. This finding accords with a considerable number of earlier studies (...) and can be considered to be quite well established” (pp. 160-161).⁴

Finally, as Hofler and Murphy (1992) show, the degree of underpayment can be influenced by the characteristics of the labor force, including worker wealth and education, labor force attachment, gender, etc. Thus two countries with identical institutions for wage setting and information about the relationship between wages and skills could have different degrees of underpayment if the composition or characteristics of their labor forces differ.

2.2 The Stochastic Frontier Approach to Labor Market Inefficiency

We utilize a stochastic wage frontier approach to measuring underpayment or labor market inefficiency that is similar to that of Hofler and Murphy (1992). The stochastic wage frontier of the maximum wages that workers can achieve is based on a Mincerian (Mincer, 1974) earnings function of the form:

$$\ln w_i = \alpha + \beta' \mathbf{x}_i + \varepsilon_i \quad (1)$$

where $\ln w_i$ is the logarithm of the observed wage of the i -th individual, \mathbf{x}_i is a vector of socio-economic characteristics of that individual, ε_i is an error term, and α and β s are parameters to be estimated.

Following Aigner *et al.* (1977), we separate the error term in Equation 1 into two parts, a white noise variable $v_i \sim N(0, \sigma_v^2)$ and a non-negative inefficiency term $u_i \geq 0$. Equation 1 can thus be rewritten as:

$$\ln w_i = \ln w_{\max i} + v_i - u_i = \alpha + \beta' \mathbf{x}_i + v_i - u_i \quad (2)$$

where $w_{\max i}$ is the deterministic frontier wage, the maximum wage that worker i can obtain given his or her characteristics. We assume a half-normal distribution for

⁴ Of course this wage dispersion is not necessarily the result of inefficient wage setting. Rather, the causality runs from greater wage dispersion to larger differences in wage offers that searching workers may receive and to a less precise understanding of the wage-skill relationship.

$u_i \sim N^+(0, \sigma_u^2)$ and that u_i and the independent variables are unrelated. Equation 2 is estimated using the log-likelihood function (Aigner *et al.*, 1977; Meeusen and van den Broeck, 1977). The conditional expectation value of u_i given ε_i is calculated as in Jondrow *et al.* (1982). The u_i -values are used to calculate individual efficiency (EFF) and inefficiency (INEFF) ratios measuring the gap between the actual wage and the stochastic wage frontier for the i -th individual as:

$$\text{INEFF}_i = 1 - \text{EFF}_i = 1 - \frac{\exp(\alpha + \boldsymbol{\beta}'\mathbf{x}_i + v_i - u_i)}{\exp(\alpha + \boldsymbol{\beta}'\mathbf{x}_i + v_i)} = 1 - \exp(-u_i). \quad (3)$$

3 DATA

One part of our data consists of estimates by Polachek and Xiang (2006) of wage-setting inefficiency in 10 OECD countries including one transition economy, the Czech Republic, and Israel for years close to 2000. Because this sample includes only one transition economy, we supplement these results with our own estimate of a frontier wage function, using data from the Polish Labor Force Survey conducted by the Polish Central Statistical Office in May 2001. We restricted our attention to full-time hired workers because only this category of employees was required to report their net earnings at their main workplace during the preceding month. After these adjustments, we had a sample of 9,380 full-time hired workers for 2001.

4 ESTIMATION RESULTS

4.1 Estimates of the Stochastic Wage Frontier

A problem that we encounter if we wish to make cross-country comparisons of the inefficiency of the wage-setting process is that the degree of inefficiency measured by the frontier wage function depends in part on which and how many explanatory variables are included in Equation 2. Polachek and Xiang (2006) used the following identical explanatory variables to measure wage-setting inefficiency in their sample of countries: years of schooling, years of potential experience, years of potential experience squared and a dummy variable equal to one if the worker is a woman. Thus, we used the identical specification for the estimate of the Polish wage frontier.

The means for these explanatory variables, the maximum likelihood estimates of the parameters of Equation 2, and the estimate of inefficiency for Poland are presented in Table 1. Also reported in Table 1 are the corresponding means, parameter estimates, and inefficiency estimates obtained by Polachek and Xiang (2006) for the Czech Republic, Israel and a sample of developed market economies. As the first three columns of Table 1 show, the means of the explanatory variables for the Czech Republic and Poland all fall within the range of values reported for the non-transition countries with the exception of the percentage of women, which, in the Polish sample, is somewhat lower than it is for the non-transition economies. Thus, any differences in efficiency between the transition economies and the rest of the sample cannot be attributed to inter-country differences in the labor force characteristics used to estimate the wage frontier.

The estimated frontier coefficients for Poland are all significant at quite robust p -value levels and entirely consistent with those obtained by Polachek and Xiang. Moreover, all the parameter estimates for the Czech Republic and Poland fall within the range of coefficients reported for the non-transition economies.

Despite the similarities in sample characteristics and parameter estimates across the countries in the sample, the efficiencies of the two transition economies are surprisingly

high. That of the Czech Republic is higher than that of any country in the sample save Poland and the UK, while Poland's efficiency is higher than that of the other countries in the sample by a surprisingly wide margin. Given the major changes in the Czech and Polish labor markets that occurred in the 1990s such low labor-market inefficiency is noteworthy, and we now turn to an explanation of this result.⁵

⁵ To test for the robustness of the low estimate of Polish labor market inefficiency, we estimated inefficiency for other years and we also estimated the wage frontier with a richer set of explanatory variables (worker characteristics). The low inefficiency reported in Table 1 was found for other years and for a richer specification.

5 WHY ARE TRANSITION ECONOMIES' LABOR MARKETS SO EFFICIENT?

In Section 2, we discussed the two major determinants of wage inefficiency: incomplete worker information and the wage setting process as the two determinants of labor market efficiency. In this section we examine whether either of these determinants can account for the high efficiency of the wage search process the transition economies. Because both incomplete worker information and the wage setting process have a number of separate dimensions to them while we have a very limited sample of countries, we are not able to study the causes of labor market efficiency by means of regression techniques. However, simple bilateral relationships between elements of labor market information and the wage setting process provide useful insights into why the transition economies' labor markets are so efficient.

5.1 Labor Market Information

Job search theory predicts that better labor market information improves the job-matching process, leads to higher wage offers and lowers underpayment. However, labor market information is imperfect and costly to obtain. Theory predicts that certain demographic groups possess more or better information than others, that some methods for collecting information are more efficient and lead to more and better information than do others, and that the availability of supplementary income lowers search costs, prolongs the period of job search, and allows workers to acquire more information.

Socio-demographic groups and labor market information. Weak labor market attachment, an environment with limited public knowledge about wages, higher costs of job search, *etc.* lead to less complete information and, consequently, to higher wage inefficiency. Search theory suggests that men, married workers, prime age workers, workers with more education, workers in urban areas, union members, industrial workers, public sector workers, and natives experience less underpayment as compared to women, single workers, young workers, less educated workers, workers in rural areas, non-unionized workers, private sector workers, and migrants.⁶ Data on these characteristics of each sample country's labor force are reported in Table 2 and plotted against the estimate of labor market efficiency of each country in Figure 1. Overall, the results presented in Figure 1 are in accord with the predictions of search theory in that a country's wage efficiency is positively correlated with demographic characteristics of the labor force such as the share of male, married, prime-age, higher-educated, industrial,

⁶ Meager et al. (2002) examined workers' awareness and knowledge of five specific groups of employment rights: legislation related to work-life balance; working time legislation; wages, terms and conditions (including the national minimum wage); anti-discrimination legislation; and unfair dismissal rights. Their results conclude that worker characteristics are associated with different levels of awareness/knowledge.

and native workers in the labor force. The exception is urbanization, which appears to be unrelated or negatively related to wage efficiency.

Panel *a* of Figure 1 shows a positive relationship between efficiency and the percentage of males in civilian employment. Indeed, if Ireland, a clear outlier, were dropped from the sample, this relationship would be particularly tight, and Poland and the Czech Republic both have relatively high percentages of male workers in civilian employment. In Panel *b* a high share of married people in the adult population 20 to 40 years of age also shows a positive influence on efficiency. In our sample Poland, at 57.7 percent, and the Czech Republic have the highest shares and Sweden the lowest at 28.0 percent.⁷ Considerable research in labor economics suggests that family interests make workers perform better in the labor market along several dimensions. Especially for men, marriage is likely to be a powerful source of pressure to get a good job and settle down. Married workers are believed to have greater motivation from the need to support their families, so they are more apt to search for jobs that pay well and to have a higher reservation wage than unmarried workers. On the other hand, companies search for workers whose need to earn more makes them more productive and committed at the workplace. Thus married workers have both a higher reservation wage and a higher likelihood of being offered a wage close to the frontier.⁸ We conclude that a greater share of married people in the Polish and Czech work forces thus contributes to a higher level of wage efficiency in these countries.

Panel *c* plots the share of prime-age (25-55 years of age) workers in employment against efficiency. Poland has the highest share at 81.5 percent and the Czech Republic scores relatively high as well. The weak labor market attachment of younger and older workers is a well-established fact. EU-OSHA (2007) analyzed youth employment in the EU-25 and concluded that:

“[t]emporary workers (...) are less informed” and that “[i]n 2005, one in four young workers had a part-time job.” (p. 1).

Older workers also have weak labor force attachment. OECD (2006) reviewed 21 OECD countries and found that:

“In 2004, less than 60% of the population aged 50-64 had a job, on average in the OECD, compared with 76% for the age group 24-49” (pp. 9-10) and that older workers who lose their job often face considerable difficulties finding a new job and suffer large potential wage losses. “In most of the review countries, older people appear to face a number of obstacles in obtaining adequate employment services to help them find a job. (...) Moreover, the level and type of support given to older jobseekers is not always the same as is given to younger jobseekers” (pp.76-77), and “[o]lder job seekers are under-represented in active labour market programmes in nearly all of the review countries” (p. 10).⁹

⁷ Poland also has the highest share of married people in the 20-40 age group among the 20 OECD countries.

⁸ Research shows that being married consistently has a statistically significant positive effect on men's earnings. For women, the relationship between marriage and earnings is more complex: the findings range from slightly positive to negative.

⁹ OECD (2006) reports that older workers in several countries are much less likely than the young to be covered by active labor-market policies. Hence, public employment services need to provide tailored help

Weak labor market attachment of younger and older workers leads to their having poor labor market information. According to Meager (2002, p. 32), “levels of informed awareness (...) peak in the 36-45 age group, with those in the youngest and oldest groups the least informed.” The fact that in our sample Poland has the lowest share of younger and older workers while the Czech Republic is also below average for our sample means that they have high shares of prime-age workers who possess more information and hence experience greater wage efficiency.

Panel *d* of figure 1 shows that Poland and the Czech Republic do not differ much from the other countries in the sample, except for Ireland, which is something of an outlier here as well, in terms of the share of workers with secondary and tertiary education in the work force. The literature suggests that better educated workers are also better informed about wages and job opportunities, and, if Ireland is dropped from the picture, there is a strong relationship between educational attainment and wage efficiency in our sample. However, given that the educational attainment of Czech and Polish workers falls in the mid-range of the sample countries, this demographic characteristic does not help explain the greater wage efficiency in the two transition economies.

Finally, a low share of foreign-born population (*i.e.*, immigrants) tends to reduce observed wage efficiency, and this is borne out by Panel *e* of Figure 1, although the cross-country variation is quite large. Poland has the lowest proportion of foreign born and the Czech Republic, too, has a low proportion of the foreign born, in both countries a legacy of their communist past. In many countries, migrants do not integrate well into the labor market, and overqualification for the jobs they are able to get is a big challenge (Gurria, 2008). For instance, in the OECD countries the employment rate was on average 68.1 percent among the native-born population 15-64 years of age and 57.2 percent among immigrants in the same age category. Overall, in the OECD, unemployment among immigrants was higher than that among the native-born: 7.8 vs 11.7 percent, respectively. Furthermore, in almost all OECD countries, immigrants were more likely to be ‘overqualified’, that is, working in jobs or occupations for which their skills were too high, than were persons born in the country. Data in OECD (2008, p. 139, A profile) show that the percentage of employed foreign-born holding a job for which they were overqualified was 9.0 in Poland, 9.6 in the Czech Republic, 17.3 in the United States, 18.4 in the United Kingdom, 18.6 in Sweden, 21.0 in Ireland, 21.6 in Finland, 25.2 in Canada. Unfavorable labor market outcomes of immigrants may be due to poor information about the local labor market, lack of host-country language proficiency, legal and administrative obstacles, and problems with transferability of human and social capital. As a result, immigrants may be more willing to accept unskilled jobs with low pay, even if their qualifications are higher. Hence, we may expect lower wage efficiency in those countries where the share of immigrants is high. Since the Czech Republic’s and Poland’s shares of immigrants are negligible and the labor market out-

to the over 50s. Several pilot initiatives have been launched, such as “Jobwise Workshops for older job-seekers and workers to provide them with information on the changing nature of the labor market (including their own local labor markets), effective job-search strategies and available assistance measures. Jobwise Self-Help Groups for older job seekers, allowing them to exchange experiences, provide mutual support, develop their job-search techniques and improve career decisions.” (p. 129).

comes for them are more favorable than they are in other OECD countries, this, too, suggests a part of the explanation for the two transition economies' high wage efficiency.

Environmental factors and labor market information. The ability of workers to obtain information about wages may also depend on where they live and work, since the dissemination of wage information is, in large part, a social process. In Figure 2 we consider some indicators that relate to social factors that may promote or inhibit the spread of wage information. In Panel *a* of Figure 2 we consider the degree of urbanization. The assumption here is that if workers are located in urban agglomerations, they have more contact with workers employed by other firms and thus more information about wages in the local economy than do workers in a rural area where the majority of them may work for a single firm that dominates the local labor market. Unfortunately, Panel *a* shows that, for our sample of countries, this hypothesis lacks support.

Panel *b* of Figure 2 considers internal inter-regional migration. Like international migrants, internal migrants usually possess limited and incomplete information about local labor market conditions. As Table 2 shows, in Poland only 0.3 percent of population 15 to 64 years of age moved to another region within a year, the lowest level in our sample, and the Czech Republic has the second lowest level.¹⁰ Not only were transition economies' internal migration rates low, but they decreased over the 1990s (Fidrmuc, 2004). Feldmann (2004) attributes the low rates of inter-regional migration in the transition countries to the legacy of central planning and its pervasive job security, to scarce housing and undeveloped housing markets, a higher share of the labor force in agriculture, low regional wage dispersion, and to the attitudes and habits of people. He suggests that "the reason for this attitude is the traditionally very close system of family ties. In fact, surveys in Poland have shown that people move, if at all, for family reasons in most cases and not because of jobs" (p. 284). Since permanent residents are usually better informed about the local labor market than new residents, low internal regional mobility supports higher wage, and this is borne out by Panel *b*.

Panel *c* considers the share of the labor force engaged in industry on the assumption that industrial jobs are relatively homogeneous and that wage information spreads more easily in large industrial plants. An examination of Panel *c* lends some support to this hypothesis, but the relationship seems largely driven by outlier countries, and the dispersion around the trend line is quite large, suggesting that this is not an important factor in the transition economies' good wage efficiency performance

Finally, in Panel *d* we consider the size of the public sector. A high degree of public ownership is a defining feature of the transition economies. Public sector workers are often assumed to be better informed than their private sector counterparts about labor laws, wages, incentives, work requirements and conditions. In many countries, what a public employee makes is, by law, a matter of public record. On the other hand, a private company is typically able to keep that information within the company, and could require employees not to reveal it to outsiders.¹¹ Hence, we expect that countries with a

¹⁰ We were unable to find comparable data for Finland, Ireland, Norway, and Sweden.

¹¹ For instance, Groot and Oosterbeek (1994, p. 388) conclude that "employees in the public sector possess more market information than workers in the private sector. This is probably due to the fact that

greater share of public sector employment will exhibit a greater degree of wage efficiency, and the data presented in Panel *d* of Figure 2 confirm these expectations.¹² As is to be expected, the transition economies have a larger public sector despite the extensive privatization that took place in the 1990s, and this appears to play a role in wage efficiency

Job search channels and search costs. The job search of individuals in the labor market involves a number ways of obtaining information about available jobs. These are usually divided into three categories: institutional intermediaries such as employment agencies, market methods such as direct applications and responding to job advertizing, and social networks including family, social and professional links. The former two ways of searching for a job are considered as formal, and the latter one, informal. Job search methods vary in their costs, effectiveness, and access to different wage distributions. The time and money costs associated with informal job search are low in comparison to the costs associated with formal methods. Montgomery (1991), Mortensen and Vishwanath (1993, 1994) developed theoretical models of job search and argued that informal search methods generate job offers with higher wages; that is, even if applicants have the same productivity, individuals who have access to informal search channels will earn a higher wage. Studies have consistently found that informal methods may be as, or more, productive in generating job offers as formal methods. However, empirical studies addressing the extent to which different channels result in jobs with different wages yield conflicting results.¹³

Figure 3 plots the percentage of people obtaining information about jobs from informal sources such as family and friends in eight OECD countries in our sample. There is a positive relationship between reliance on informal search and the wage efficiency.¹⁴ In Poland, those who rely on informal networks amounted to 46 percent¹⁵, which is similar

wage policies in the private sector are in general less public knowledge and more individually based.” Furthermore, Groot and Oosterbeek find that “public sector employers are more informed than private sector employers. By its size the public sector often exercises some sort of monopsony power on the labor market, leading to information advantages over employers in the private sector. When we view the public sector as one large employer, one may expect public employer ignorance to be lower than private employer ignorance, as a large employer probably has more information about the reservation wages of employees than a small-scale employer does” (p. 388).

¹² To assess the size of the public sector in our sample of countries, we used an internationally comparable set of the OECD Product Market Regulation indicators (see Nicoletti *et al.*, 1999; Conway *et al.*, 2005). The “public ownership” indicator is made up of: (a) the scope of the public enterprise sector, (b) the size of public enterprise sector, and (c) the extent direct government control over business enterprises. The methodology and results are available from the authors upon request.

¹³ For example, Granovetter (1974), Corcoran *et al.* (1980), Simon and Warner (1992), Addison and Portugal (2002), Boheim and Taylor (2002), Sabatier (2002), and Kugler (2003) found positive (albeit sometimes insignificant) wage premia for jobs found through referrals from relatives and friends. In contrast, Koning *et al.* (1997) conclude that formal and informal search methods do not generate wage offers that are significantly different. Bentolila *et al.* (2004) find that the use of social contacts helps find jobs one to two months sooner but leads to individual wage discounts of 5 to 7 percent.

¹⁴ Data on Germany, the Netherlands and Sweden are not available.

¹⁵ Our own calculations for 38,954 Polish individuals who were unemployed in 1994-2001 also show that 42 percent used social networks, which is consistent with the data in Paci *et al.* (2007). Further, 77 percent were looking for a job through institutional intermediaries (74 percent through regional labor offices

to the United States and slightly below the Czech Republic, which had the greatest share at 49 percent.

Unemployment benefits and search costs. Job search theory predicts that unemployment benefits decrease search costs, allow people to search for a job longer and, hence, to acquire more information, and lead to higher post-unemployment wages by increasing workers' reservation wages.¹⁶ Figure 4 shows three measures of the unemployment compensation system generosity in OECD countries in our sample: (1) expenditure on unemployment benefits in US PPP\$ per one unemployed¹⁷, (2) the unemployment benefits replacement ratio, and (3) the share of unemployment compensation in a country's GDP. The two post-communist transition countries in the sample, the Czech Republic and Poland, had the lowest unemployment benefits per unemployed person, but this is in part due to their lower *per capita* incomes, but their replacement ratios were relatively low compared to other countries, a fact that should lead to inefficient wage setting. The ratio of unemployment assistance to GDP measures, in part, the coverage and generosity of unemployment benefits, but obviously also depends on the level of unemployment.¹⁸ Figure 4 depicts an inverse relationship between all three measures of unemployment compensation and wage efficiency. Thus, there seems to be no evidence that unemployment benefits in OECD countries or in the transition economies significantly reduce the costs of acquiring information, extend the length of the job search longer, and result in better job matches with higher earnings.¹⁹ We conclude that unemployment compensation does not help us shed any light on high wage efficiency in the transition economies.

and 3 percent through private employment agencies), 55 percent used other market search methods (39 percent contacted employers and 16 percent answered and placed announcements in newspapers), and 0.8 percent tried to start their own business. The total is greater than 100 percent because each respondent in the Polish Labor Force Survey could report up to three job search methods. On average, each person reported 1.77 search methods.

¹⁶ However, the link between job search theory and empirical work is rather frail. The most recent empirical research on reservation wages often produces negative coefficients on the unemployment benefits variable (Heath and Swann, 1999; Rööm, 2003; Prasad, 2003).

¹⁷ Data for Finland, Germany, and Ireland are not available.

¹⁸ In Poland, the level of unemployment benefits was uniform for all eligible jobseekers irrespective of their previous earnings. Unemployment benefits were reduced from 50 percent of the average national wage in 1991 to 36 percent in 1994 and to 21 percent in 2002. In addition, an open-ended unemployment benefit system was replaced by a maximum duration of 12 months. Finally, the eligibility rules for access to unemployment benefits were tightened, that caused a drastic drop in the proportion of the unemployed receiving benefits from 80 percent in 1991 to 50 percent in 1994 to less than 20 percent in 2002 (UNECE, 2003).

¹⁹ Our own calculations for the extensive data set of 38,954 Polish individuals who were unemployed in 1994-2001 show that unemployment benefits increased the reservation wage by about 0.8 percent; however, the coefficient is significant (t-statistic=2.035) but small in economic terms. In the sample, 32 percent of the unemployed claimed unemployment benefits as their main source of personal income.

5.2 The wage setting system

The literature suggests the institutions of wage setting also tend to influence the ability of workers to obtain a wage that is close to their maximum wage. Among the institutional factors are lower unionization and collective bargaining coverage, less centralized bargaining, and the absence of statutory minimum wages all of which tend to increase wage dispersion (see the literature review in Card *et al.*, 2007, as well as Koenig *et al.*, 2007 and Baccaro, 2008). Highly dispersed wage distributions are likely to produce opaque wage signals to job seekers who will have to acquire and process a greater amount of information than under a more compressed wage distribution.

Trade unions. As Figure 5 shows, in our sample the highest levels of unionization were observed in the Scandinavian countries and the lowest level was recorded for the United States. Paradoxically, Poland, where trade unions initiated the market reforms in the 1980s, now has among the lowest levels of trade union density in Europe but the Czech Republic is solidly in the center of the distribution. Thus the relationship between efficiency and union density does help explain Poland's good wage efficiency, though it does not do so for the Czech Republic

Employers' coordination. Employers in Poland are not well organized. According to EIRO (2006, pp. 2, 4-5), employers' organization density in Poland was 20 percent versus 58 percent in the EU. The most notable associations were the Confederation of Polish Employers, the Business Center Club, the Polish Confederation of Private Employers, and the Association of Polish Crafts. The Confederation of Polish Employers was the biggest, with about 2 million members; however, it was more interested in acquiring political power than in negotiating collective agreements at the sectoral or multi-establishment level.

Collective bargaining. Collective bargaining coverage shows the real extent to which salaried workers are subject to union-negotiated terms and conditions. The bargaining coverage data presented in Table 2 show that Poland is in the middle of our sample and the Czech Republic is at the low end, so this seems not to be a factor that explains wage efficiency in the transition economies.

There are two dimensions to collective bargaining: centralization and coordination. Centralization reflects the level where collective contracts are negotiated and formally set. In Poland, collective agreements covering a single employer entity continue to be the main form of collective bargaining; and sectoral, inter-sectoral or multi-level agreements remain rare. In 1995-2002, the authorities registered 12,094 single-establishment agreements and only 157 multi-establishment agreements (EIRO, 2006, p. 5). Table 2 shows the centralization indicators for our sample for the 1995-2000 interval. According to OECD (2004, p.150), Canada and the United States have historically bargained at the company and plant level, the United Kingdom and some Central and Eastern European countries, including Poland and the Czech Republic have joined this group more recently. At the other extreme, inter-industry bargaining at national level is a feature historically characteristic of the Scandinavian countries. Most continental European countries traditionally favor "intermediate" forms of wage negotiation, mainly at the branch or sectoral level. Coordination of bargaining reflects the extent to which pay

negotiations are coordinated across the economy. In Table 2, the Czech Republic and Poland are characterized by the lowest level of coordination, that is, company/plant bargaining with little or no coordination by upper-level associations.

Minimum wage. The ratio of the minimum wage relative to the median wage of full-time employees for the Czech Republic and Poland did not differ from those of the other countries in our sample (see Table 2). Moreover, there does not seem to be a strong relationship between this ratio and wage efficiency.

Overall, wage setting institutions do not seem to provide an explanation for the greater wage efficiency of the two transition economies. In part this is because the two transition economies do not differ systematically from the other countries in the sample and in part because the relationships between indicators of wage setting mechanisms and wage efficiency are not very robust or opposite to what theory predicts.

6 CONCLUSIONS

In this paper we have used our own and others' estimates of wage setting efficiency in a sample of developed market and transition economies. We find that wage setting efficiency in the transition economies, the Czech Republic and Poland, is higher. We also find that this is largely due to socio-economic and environmental factors. In these two countries, the labor force is dominated by married males in their prime working years. There are few foreign workers, and there is little in-country labor mobility. Moreover, strong social bonds lead workers to use informal means of searching for new or higher paying jobs. Labor market institutions and policy instruments such as the minimum wage or unemployment benefits do not seem to play a major role in wage efficiency.

While these results seem to suggest that there are some important efficiency benefits to the sort of traditional male-dominated and family-oriented societies that the Czech Republic and, especially, Poland represent, two important points should be kept in mind. The first is that, if our findings are correct, then wage efficiency in the Czech Republic and Poland comes at some cost, such as the exclusion of old and young workers and women from the labor force, at least to some extent, as well as the relative absence of part-time and other flexible working arrangements. The second point is that the socio-economic features that appear to bestow such high efficiency in wage setting on the Czech Republic and Poland are unlikely to last. Their populations are ageing, which means that immigrants will account for a larger share of the labor force, and flexible arrangements for young and old workers and women will have to be provided. Moreover, as production shifts from industry to services, women can also be expected to play a larger role. Last, but not least, rising incomes and influences from the more advanced countries are likely to produce social changes in the Czech Republic and Poland that will move society away from sort of traditional nuclear families, lack of mobility, and strong local social ties that characterize the two post-communist countries now and that seem to contribute so strongly to their wage efficiency.

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Appendix

Figure 1: Wage efficiency and demographic characteristics of the labor force

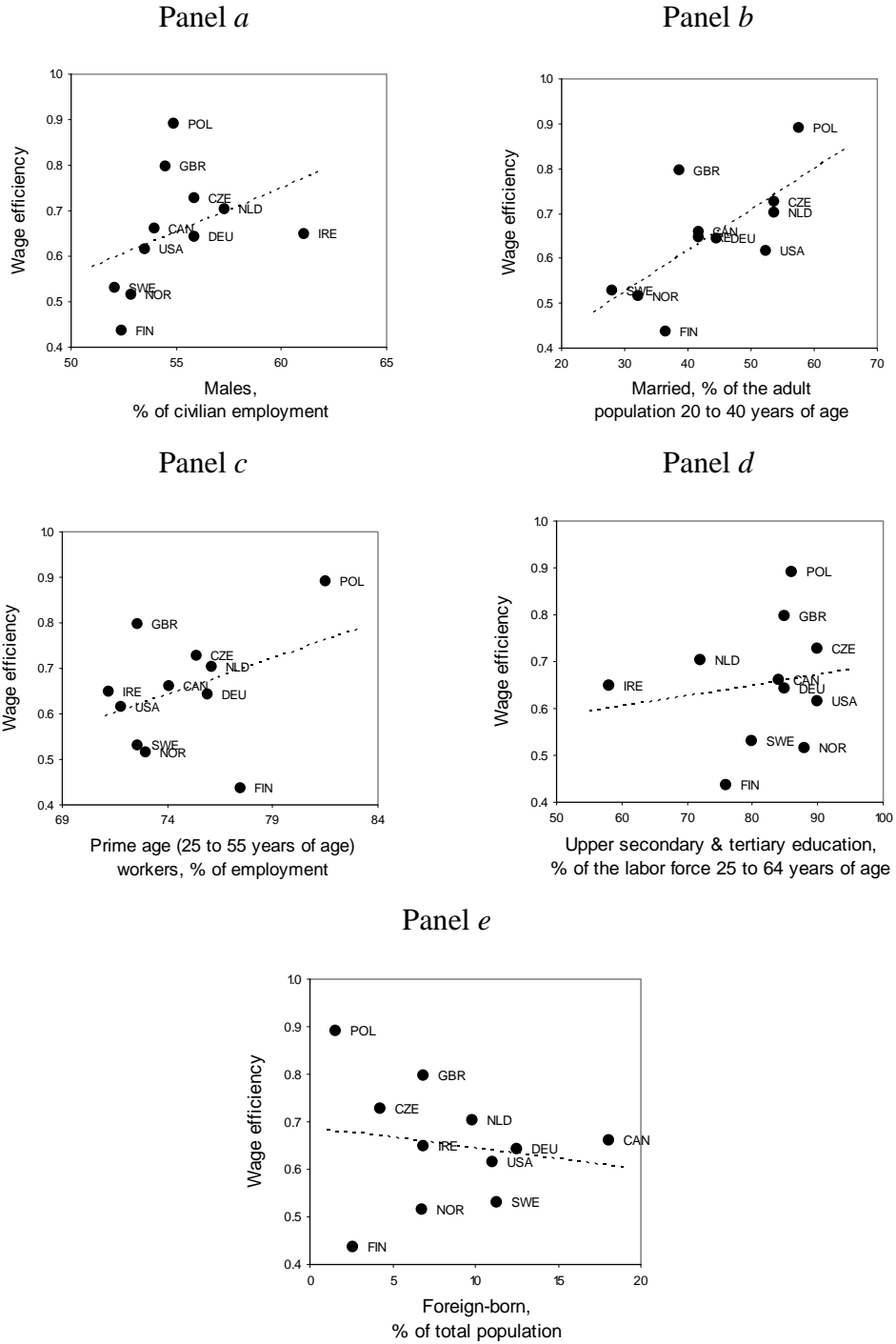


Figure 2:

Wage efficiency and environmental factors

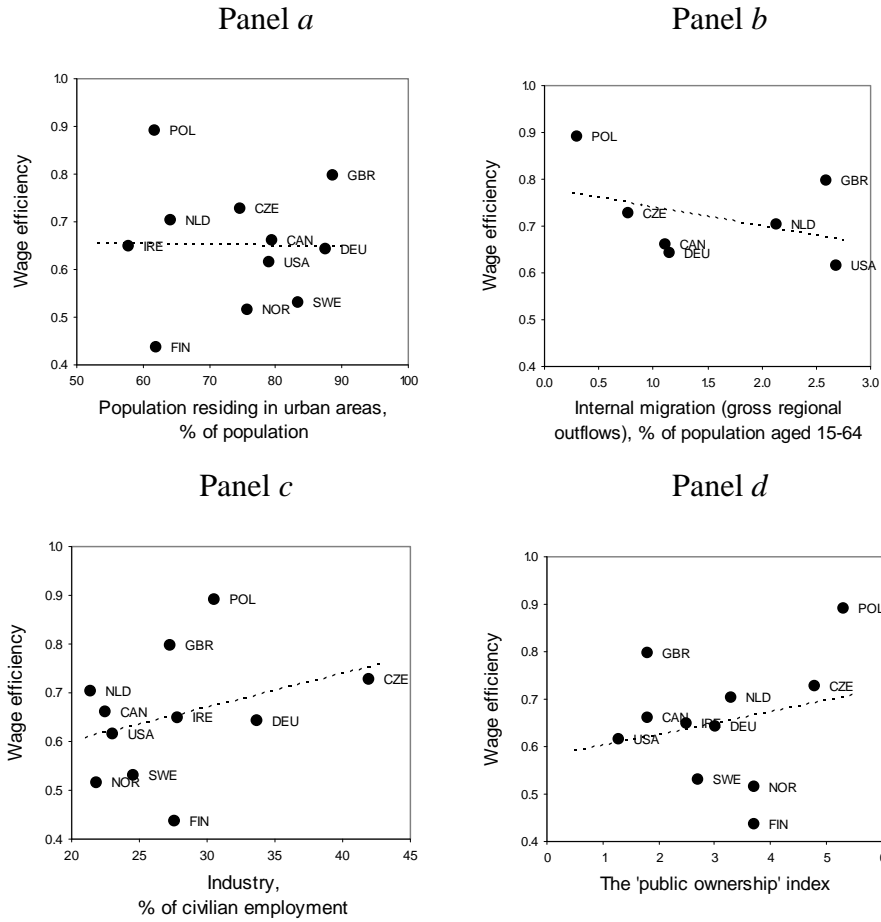


Figure 3:

Wage efficiency and ways of searching for jobs

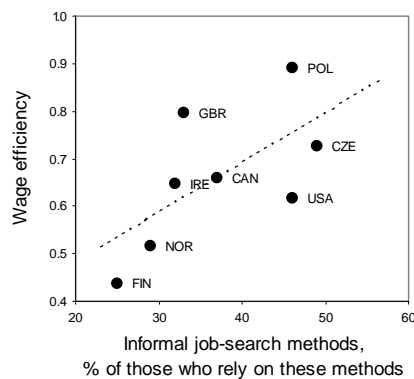


Figure 4:

Wage efficiency and unemployment benefits

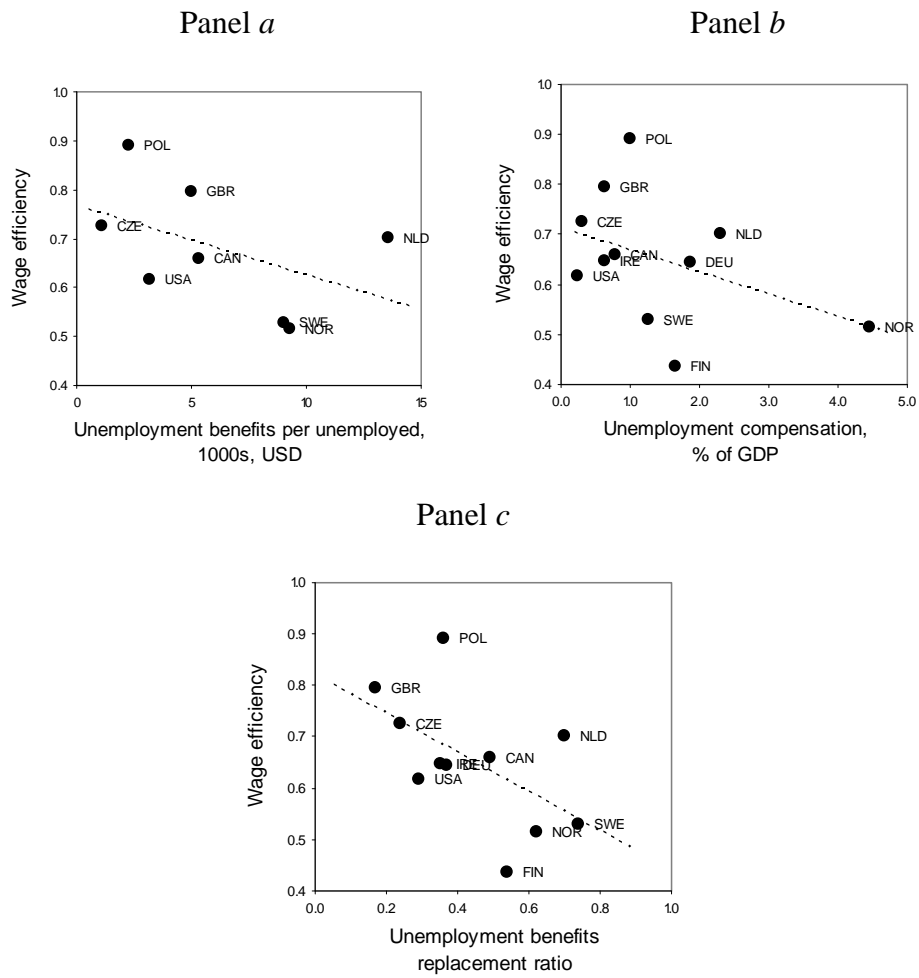


Figure 5:

Wage efficiency and labor union density

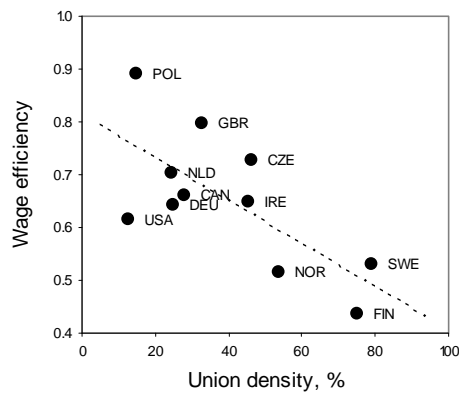


Table 1: **Variable means and maximum likelihood estimates of the wage frontier coefficients: International comparison, Polachek and Xiang (2006) specification**

Country	Year	Variable means			Regression estimates				
		Years of schooling	Potential experience, years	Woman	Years of schooling	Potential experience, years	Potential experience squared	Woman	Wage inefficiency ratio
Canada	2000	13.288	18.450	0.487	0.098	-0.006	0.0002	-0.314	0.340
Czech R.	1996	10.413	23.784	0.466	0.093	0.020	-0.0003	-0.321	0.274
Finland	2000	11.693	22.208	0.491	0.065	0.043	-0.0005	-0.421	0.563
Germany	2000	12.607	27.399	0.516	0.105	0.020	-0.0002	-0.187	0.357
Ireland	1996	9.492	29.905	0.495	0.091	0.038	-0.0004	-0.110	0.353
Israel	1997	12.019	22.691	0.514	0.128	0.042	-0.0005	-0.514	0.341
Netherlands	1999	12.693	19.441	0.463	0.065	0.026	-0.0003	-0.058	0.297
Norway	2000	12.734	20.755	0.486	0.073	0.046	-0.0008	-0.460	0.484
Sweden	2000	12.207	22.140	0.491	0.092	0.036	-0.0005	-0.392	0.471
UK	1995	11.094	22.043	0.504	0.161	0.018	-0.0001	-0.368	0.204
US	2000	12.818	25.219	0.521	0.116	0.027	-0.0003	-0.307	0.384
Poland:	2001	11.985	20.750	0.445					
coefficient					0.085	0.018	-0.0002	-0.231	0.109
std. error					(0.002)	(0.001)	(0.0000)	(0.007)	

$$\lambda = 0.464 \text{ (std.err. 0.080)}$$

$$\sigma = 0.345 \text{ (std.err. 0.005)}$$

$$\sigma_v^2 = 0.098$$

$$\sigma_u^2 = 0.021$$

N obs.= 9380

Source: Authors' computations for Poland. For other countries - Polachek and Xiang (2006), Tables 1 and 2. Polachek and Xiang estimated wage frontier equations for 11 OECD countries over a number of years. We are using the most recent year for each country from their study and 2001 for Poland.

Table 2:

Labor market characteristics in OECD countries

Country	Year (i)	Males, % of civilian employment (ii)	Married, % of the adult population 20 to 40 years of age (iii)	Prime age (25 to 55 years of age) workers, % of employment (ii)	Upper secondary & tertiary education, % of the labor force 25 to 64 years of age (iv)	Population residing in urban areas, % of population (v)	Union density, % (vi)	Industry, % of civilian employment (ii)	Foreign- born, % of total population (vii)
(A)	(B)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Canada (CAN)	2000	54.0	41.8 (2001)	74.1	84 (1999)	79.4	28.1	22.5	18.1
Czech R. (CZE)	1996	55.9	53.6 (2002)	75.4	90 (1998)	74.7 (1995)	46.3 (1995)	42.0	4.3 (1998)
Finland (FIN)	2000	52.4	36.5 (2002)	77.5	76 (1999)	61.6	75.0	27.6	2.6
Germany (DEU)	2000	55.9	44.6 (2002)	75.9	85 (1999)	87.5	25.0	33.7	12.5
Ireland (IRE)	1996	61.1	41.7 (2002)	71.2	58 (1998)	57.9 (1995)	45.5	27.8	6.9
Netherlands (NLD)	1999	57.3	53.7 (2002)	76.1	72	64.3 (2000)	24.6	21.4	9.8
Norway (NOR)	2000	52.9	32.1 (2002)	73.0	88	75.8	53.7	21.9	6.8
Poland (POL)	2001	54.9	57.7 (2002)	81.5	86	61.7 (2000)	14.7	30.5	1.6 (2002)
Sweden (SWE)	2000	52.1	28.0 (2002)	72.6	80 (1999)	83.3	79.1	24.6	11.3
UK (GBR)	1995	54.5	38.8 (2002)	72.6	85 (1998)	88.7	32.6	27.3	6.9
US (USA)	2000	53.5	52.3	71.8	90 (1999)	79.1	12.8	23.0	11.0

Table 2 (cont.):

Labor market characteristics in OECD countries

Country	Year (i)	Internal regional migration (gross outflows), % of population 15 to 64 years of age (viii)	Informal job-search methods, % of those who rely on these methods (ix)	Unemployment benefits per unemployed, 1000s, USD (x)	Unemployment benefits replacement ratio (xi)	Unemployment compensation, % of GDP (xii)	Ratio of minimum wages to median earnings of full-time workers (xiii)
(A)	(B)	(9)	(10)	(11)	(13)	(12)	(14)
Canada (CAN)	2000	1.11 (1998)	37 (2001)	5.3 (1997)	0.49 (1999)	0.78	0.41 (2003)
Czech R. (CZE)	1996	0.77 (2003)	49 (2001)	1.1 (1997)	0.24 (1998)	0.30 (1999)	0.37 (2003)
Finland (FIN)	2000	..	25 (2001)	..	0.54 (1999)	1.65	..
Germany (DEU)	2000	1.15 (1998)	0.37 (1999)	1.88	..
Ireland (IRE)	1996	..	32 (2001)	..	0.35 (1999)	0.63 (2001)	0.38 (2003)
Netherlands (NLD)	1999	2.15	..	13.6 (1997)	0.70	2.30	0.51 (2003)
Norway (NOR)	2000	..	29 (2001)	9.3 (1997)	0.62 (1999)	4.46	..
Poland (POL)	2001	0.30 (2003)	46	2.3 (1997)	0.36 (1998)	1.01	0.40 (2003)
Sweden (SWE)	2000	9.0 (1997)	0.74 (1999)	1.27	..
UK (GBR)	1995	2.60 (1999)	33 (2001)	5.0 (1997)	0.17 (1999)	0.63 (1998)	0.44 (2003)
US (USA)	2000	2.69 (1998)	46 (2001)	3.2 (1997)	0.29 (1999)	0.23	0.32 (2003)

Notes: Data not available.

(xiii) Source: Figure EQ2.2 on p. 71 in the Society at a Glance: OECD Social Indicators 2006 Edition, OECD, 2007. There is no national minimum wage in Finland, Germany, Norway and Sweden.

Table 2 (cont.):

Labor market characteristics in OECD countries

Country	Year (i)	Collective bargaining coverage, % (xiv)	Bargaining centralization, index (xv)	Bargaining coordination, index (xv)	Bargaining governability, index (xvi)	Annual average earnings dispersion, 90-10 percentile ratios for the gross earnings of full-time employees (xvii)
(A)	(B)	(15)	(16)	(17)	(18)	(19)
Canada (CAN)	2000	32.0	1 (1995-00)	1 (1995-00)	4	3.65 (1995-99)
Czech R. (CZE)	1996	25.0+ (2000)	1 (1995-00)	1 (1995-00)	..	2.86 (1995-99)
Finland (FIN)	2000	90.0+	5 (1995-00)	5 (1995-00)	4	2.36 (1995-99)
Germany (DEU)	2000	68.0	3 (1995-00)	4 (1995-00)	4	2.87 (1995-99)
Ireland (IRE)	1996	..	4 (1995-00)	4 (1995-00)	1 (2000)	3.97 (1995-99)
Netherlands (NLD)	1999	80.0+ (2000)	3 (1995-00)	4 (1995-00)	3 (2000)	2.85 (1995-99)
Norway (NOR)	2000	70.0+	4.5 (1995-00)	4.5 (1995-00)	4	1.96 (1995-99)
Poland (POL)	2001	40.0+ (2000)	1 (1995-00)	1 (1995-00)	..	3.50 (1995-99)
Sweden (SWE)	2000	90.0+	3 (1995-00)	3 (1995-00)	4	2.23 (1995-99)
UK (GBR)	1995	30.0+ (2000)	1 (1995-00)	1 (1995-00)	1 (2000)	3.45 (1995-99)
US (USA)	2000	14.0	1 (1995-00)	1 (1995-00)	3	4.59 (1995-99)

Notes: Data not available.

(xiv) Source: Table 3.3 on p. 145 in the OECD Employment Outlook 2004. Figures with a + sign represent lower-bound estimates. For the purpose of calculating different estimates, OECD increased the indicated value by 2.5 percentage points.

(xv) Source: Table 3.5 on p. 151 in the OECD Employment Outlook 2004. The centralization indicator has a 1-4 (lowest to highest) scale; and the coordination indicator has a 1-5 (lowest to highest) scale.

(xvi) Source: Box 3.3 on p. 152 in the OECD Employment Outlook 2004. The governability indicator has a 1-4 (lowest to highest) scale reflecting the ability of the employer and trade union associations to control the behavior of their constituency or "rank and file."

(xvii) Source: Table 3.2 on p. 141 in the OECD Employment Outlook 2004.