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## **The Returns to Job Mobility during the Transition: Evidence from Czech Retrospective Data**

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## **Abstract**

We analyze how the emerging labor market is functioning in terms of reallocation of labor. We examine the effect of job mobility on individuals' wage changes from 1989 to 1996, considering how workers left the old job and the characteristics of the new job, especially whether or not the new job is in the private sector. We test competing predictions about the relationship between job and wage mobility. We find that the relationship between job mobility and wage changes varies by type of separation and the sector of destination of movers.

## 1. Introduction

The transition from central planning to a market economy provides a unique laboratory for the study of the simultaneous emergence of a private sector and markets and hence the reallocation of production, and factors of production, from the old state sector to the new private sector. In this paper, we analyze how the emerging labor market is functioning in this reallocation process. Specifically, we examine the effect of job mobility on individuals' wage changes from 1989 to 1996, considering how workers left the old job and the characteristics of the new job, especially whether or not the new job is in the private sector.

While the literature on wage determination in transition economies is growing, there is little evidence on the relative wage gains of workers moving from old (declining, state) sector to new (private) sector jobs.<sup>1</sup> The scant literature stems largely from the lack of panel data for most of the transition economies that links individuals' wages and job characteristics to their firms' characteristics.<sup>2</sup> In this paper we report results based on a retrospective survey for the 1989-1996 period that we carried out in the Czech Republic.

Important related studies in this area are by Boeri and Flinn (1997), Burda and Mertens (1998), Hunt (1998), Noorkôiv, et al. (1998) and Sabirianova (2000). Hunt's paper is the most similar to ours in that she uses panel data to investigate the determinants

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<sup>1</sup>This is not to say that the literature on labor markets in transition economies is thin as a number of important areas have been carefully researched. For instance, the literature has examined the evolution of labor demand by firms, wage setting at the firm or industry level, determinants of wages in the context of the human capital model, and the flows of individuals among the three labor market states of employment, unemployment and out-of-the-labor force. (See Svejnar, 1999, for a recent survey of these studies.)

of the tremendous wage growth in former East Germany over the 1990-1996 period. Hunt identifies the demographic characteristics of the biggest gainers and estimates the returns to job mobility. Sabirianova (2000), Boeri and Flinn (1997) use Polish data on the same individuals over six consecutive quarters to estimate a structural econometric model characterizing inter-temporal changes in the probabilities of dismissal, remuneration and offer arrival rates. Their estimates of costs and benefits of job mobility are derived at a point in time when Poland was in a fairly mature stage in its transition. We are able to capture wage changes from the beginning of the transition process. Burda and Mertens (1998) focus only on the wage changes of displaced workers in Germany, while we examine wages changes of both voluntary quits and involuntary layoffs. Finally, Noorkõiv et al. (1998) use a retrospective data set from Estonia that is very similar to our Czech data. However, in this paper they do not make full use of the panel nature of the data. They examine changes in employment by industry and estimate cross-sectional wage regression (similar to our first paper using the Czech retrospective data, Munich, et al. 1999). However, none of these studies examines the interactions between job and wage changes and the new emerging private sector.

In this paper we test competing predictions about the relationship between job and wage mobility, taking into account the decision of workers to quit or stay and to move to firms in the new versus old sector of the economy. The outline of the paper is as follows. The theoretical models driving this literature is briefly surveyed in Section 2. We describe our data set in Section 3 and our methodology in Section 4. We then discuss the

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<sup>2</sup> The Russian Longitudinal Monitoring Survey (RLMS) and the Estonian Retrospective Employment History Survey (EREHS) are two exceptions.

results from the various specifications of the wage change equations in Section 5 and conclude the paper in Section 6.

## **2. Theoretical Background**

The relationship between job mobility and wages has of course been one of the main areas of interest in western labor economics (see e.g., Light and McGarry, 1998, and Farber, 1999, for recent surveys). A number of models have been developed since the early Blumen, Kogan and McCarthy (1955) “stayer-mover” model which emphasized underlying personal characteristics of workers as driving mobility and wage differences associated with job changes. The model predicts that mobility is negatively related to wages because “good” (high-productivity) workers avoid turnover, while “bad” (low-productivity) workers undergo persistent mobility. People are consistently high or low mobility individuals over their entire life cycle.

The human capital models (see e.g., Bartel and Borjas, 1981; Farber, 1994, Mincer, 1981, Neal, 1995 and Topel, 1986, 1991) stress the importance of skills acquired on the job and the firm’s valuation of these skills in explaining job mobility. Whereas the earlier human capital literature focuses on explaining mobility over the life-cycle (i.e., why it is higher earlier in the life-cycle than later), the more recent literature is concerned with explaining why job separation is higher in the early part of a job and it declines as tenure increases. The central idea is that as long as workers are being paid for their accumulated firm specific human capital, they will not quit. Moreover, the more firm specific human capital the worker has obtained, the more costly it is for the worker to quit. Conversely, firms will not layoff a worker if her productivity (including firm

specific human capital) is equal to or above the wage. Unfortunately, much of the recent empirical literature has been mired by the fact that firm specific capital is not observed and tenure is not a good proxy for this. Farber (1999) argues that the theoretical link between wages and marginal product of labor exists for general human capital, as proxied by experienced, but not for specific human capital.

The job-matching models, started by Jovanovic in his seminal JPE (1979) paper, are also focused on explaining higher separation rates earlier in the job tenure. However, these models focus on the fact that the worker-firm match varies across firms and the quality of this match is not known ex-ante. Hence, the quality of the match is revealed over time as tenure accumulates. In the earlier models, there is no randomness in the wage offer distribution or shocks to productivity or demand, therefore all turnover is generated simply by the revelation of the match. Separations occur when match quality is poor and hence those who stay are better matched and earn higher wages. Search models (e.g., Burdett, 1978), on the other hand, stress the importance of the distribution of wages, and shifts in these distributions in explaining voluntary mobility. And finally, the sectoral shifts models (e.g., Jovanovic and Moffit, 1990) focus on mobility arising from shifts in sectoral demand as the economy is restructuring, which is very important for economies in transition.

Hence, the mover-stayer, human capital and job-matching models have in common the prediction that people who do not change jobs frequently, i.e., who have longer tenure on the job *ceteris paribus*, will have higher wages than individuals who change jobs more often and hence have shorter job tenure. If the transition is a process in which the creation and restructuring of firms generates major matching opportunities, then one should

observe job mobility to be positively correlated with wage gains as workers and employers realize new productive matches.

### **3. Data**

The data we use in this paper are taken from a survey we conducted of 3,157 randomly selected households located throughout the 76 districts of the Czech Republic in December 1996.<sup>3</sup> Any member of the sampled household who had worked for a minimum of two weeks between January 1, 1991 and December 31, 1996 was asked a series of retrospective questions about the characteristics of each employment and non-employment spell during this period as well as the job held in January 1989.<sup>4</sup> We have monthly data on the labor market histories of 4,700 individuals (2,284 men and 2,416 women).

In this paper we analyze how those individuals who had worked under communism fared in the transition to a market economy. Hence, given the structure of our data, we select all individuals who held a job in both 1989 and 1996, as this enabled us to create a panel and compare wages at the same point in time for everyone.<sup>5</sup> This selection yields a sample of 3,072 individuals. After further cleaning the data to exclude individuals who held only part-time jobs, had missing wage data in 1989 or 1996, held

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<sup>3</sup> A comparison of the means and distributions of the major characteristics of the working age population in our survey with those from the last quarter of the 1996 Labor Force Survey reveals they are very similar. Moreover, a comparison of the characteristics of workers and their earnings in the Social Attitudinal Survey taken in 1989 is quite similar to the characteristics of the workers and their earnings in our sample. Hence we believe our sample is representative of the working population in 1996 and 1989. See Munich et al. (1997) for a detailed description of the sample design and characteristics of the data.

<sup>4</sup> January 1989 was selected as a point in the last year of communism with the belief that people were likely to remember their labor market characteristics at the beginning of this year. We then used January 1, 1991 as the starting point for the detailed labor market histories as this is the year when the government effectively began to engineer the transition to a market economy.

more than two full-time jobs simultaneously, or had missing data for the question on how they left their job, we are left with a sample of 2,343 individuals. The characteristics of this sample are described in Section 5 (Table 1) of the paper when we discuss the variables used in the estimation strategy.

#### 4. Methodology

The goal of the paper is to analyze the 1989-1996 wage changes of individuals with labor market experience in the communist regime, assess whether or not these workers benefited from job mobility, and evaluate whether the gain/loss from mobility varied with the type of separation (voluntary and involuntary) and type of firm to which they moved (as characterized by ownership, size, and industry).

##### 4.1 Simple Wage Regression Model

We begin by modeling the logarithm of wages in any given period  $t$  ( $W_t$ ) as a function of time-invariant characteristics  $X$  and time-varying characteristics  $Y_t$ , respectively. Suppressing individual subscripts, we write the relevant wage equation for 1996 as:

$$\ln W_{96} = X'\alpha_{96} + Y'_{96}\beta_{96} + \varepsilon_{96}, \quad (1)$$

where  $\ln$  is the natural logarithm,  $\alpha_{96}$  and  $\beta_{96}$  are coefficients giving the 1996 payoffs to the values of the explanatory variables and  $\varepsilon_{96}$  is the 1996 individual specific error term.

The corresponding wage equation for 1989 may be written as:

$$\ln W_{89} = X'(\alpha_{96} - \Delta\alpha) + Y'_{89}(\beta_{96} - \Delta\beta) + (\varepsilon_{96} - \Delta\varepsilon), \quad (2)$$

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<sup>5</sup> We therefore exclude all individuals who entered the labor market in 1991-1996 as this requires a



where  $\Delta\alpha = \alpha_{96} - \alpha_{89}$  and  $\Delta\beta = \beta_{96} - \beta_{89}$  are the changes in the payoffs to the explanatory variables over the period and  $\Delta\varepsilon = (\varepsilon_{96} - \varepsilon_{89})$  is the difference in the error terms between the transition (1996) and communism (1989). Subtracting equation (2) from (1) yields the equation for the percentage change in wages between 1989 and 1996:

$$\ln W_{96} - \ln W_{89} = X'\Delta\alpha + Y'_{89}\Delta\beta + (Y'_{96} - Y'_{89})\beta_{96} + \Delta\varepsilon. \quad (3)$$

For the time-invariant explanatory variable  $X$  we hence obtain estimates of the changes in payoffs ( $\Delta\alpha$ ) between 1989 and 1996, while for the time-varying characteristics  $Y$  we generate estimates of the coefficients for 1996 ( $\beta_{96}$ ) and of the changes in payoffs ( $\Delta\beta$ ) between 1989 and 1996.

Vectors  $X$  and  $Y_t$  contain variables relating to the individual's human capital (HC), local labor market conditions (D) and job characteristics (J):

$$\begin{aligned} X &= (\text{HC}, D, J) \\ Y_t &= (\text{HC}_t, D_t, J_t). \end{aligned} \quad (4)$$

Specifically, we model the wage change equation as a function of the following human capital characteristics: gender, education (time invariant), potential experience in 1989, the change in experience between 1989 and 1996 (netting out unemployment spells). The coefficients on gender, education and experience in 1989 hence capture the (relative) change in the return to each of these factors (i.e.,  $\Delta\alpha$  or  $\Delta\beta$  in equation 3). The coefficient on the change in experience estimates the 1996 return to experience (i.e.,  $\beta_{96}$ ).

Local demand conditions are captured with a change in the district unemployment rates from 1989 to 1996 and a time invariant dummy for Prague. Since unemployment

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different methodology. We plan to analyze their experience in future research.

rates were zero in 1989, this variable is effectively the district unemployment rate in 1996. However, its coefficient rate indicates the relative effect of changes in local demand conditions on changes in wages (capturing the wage curve hypothesis of Blanchflower and Oswald, 1995). The coefficient on the dummy for Prague ( $\Delta\alpha$ ) indicates whether wages of people residing in the capital city relative to the wages of those living in other areas of the country changed over this 1989-1996 period.

We estimate the wage effect of changes in job characteristics in several ways. We begin by estimating the effect of simply changing a job vs. staying on the same job with a dummy variable. This corresponds to the basic “stayer-mover” model of Blumen, Kogan and McCarthy (1955). We extend this framework by examining whether wage changes differed by the number of job changes over the period. We then ask whether job changes that also involved changing certain attributes of the job make a difference. We first test whether the wage effect depends on whether a person changes her industrial sector when she changes her job (we account for eight sectors). Derek Neal (1995) argues that workers receive compensation for skills that are specific to their industry, i.e., industry-specific human capital. Hence a worker who changes industry may not experience as much of a wage gain as a worker who changes job without changing industry, *ceteris paribus*. However, we also recognize that the industrial wage structure was changing dramatically over this period.<sup>6</sup> In line with the importance of the growth of new private economic activity in transition countries, we next estimate specifications that show the impact on wages of moving from a job in the old sector to a job in the new sector vs. changing jobs but staying in the old sector. Since in pre-tests we did not find major

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<sup>6</sup> See Munich et al. (1999) for an analysis of changes in industrial wage structure using this same data set.

differences in the estimates for state-owned enterprises (SOEs) and privatized SOEs, we present results in which we define the old sector as comprising SOEs, privatized SOEs, SOEs in the process of privatization, coops, and public administration. The new sector includes both entrepreneurial self-employment and jobs in new private firms.

We recognize that patterns of wage change may differ for individuals who changed jobs by voluntarily quitting their job versus being involuntarily laid-off. Herein also lies an econometric problem with estimating equation (3). Job termination is only exogenous to the laid off workers. Those who change jobs by quitting do so on the basis of an evaluation of the net expected gain from quitting vs. staying on the job.

#### 4.2 Correcting for Selectivity Bias: the Decision to Quit

The fact that a person chooses to change jobs creates a problem of selectivity bias in estimating the impact of quitting on the net wage change. Briefly, the problem is one where we want to estimate the net benefit (wage change) of quitting, however we only observe wage changes for those who quit and wage changes for those who stay. The net benefit is the market wage individuals could obtain if they quit and change jobs compared with what they could obtain if they stay in the job. Therefore, among the determinants of the net benefit are factors that also affect the income received in either place. An analysis of income in a sample of quitters must account for the incidental truncation (non-randomness) of the quitter's income on a positive net benefit. Likewise, the income the stayer is incidentally truncated on a non-positive net benefit. The model implies an income after moving for all observations, but we observe it only for those who actually do move.

Formally, abstracting from time varying/non-varying nature of the variables, we observe for those who stay:

$$\ln W_s = \beta_s X_s + \varepsilon_s \quad (5)$$

For those who quit we observe

$$\ln W_q = \beta_q X_q + \varepsilon_q \quad (6)$$

OLS estimates of  $\ln W_s$  and  $\ln W_q$  produce biased estimates since quits are determined simultaneously with wages:

$$\Pr \{q = 1\} = \Pr \{ \pi Z + \upsilon > 0 \} = \Pr \{ \upsilon > -\pi Z \} \quad (7)$$

Therefore, we find:

$$E(\ln W_s | q = 0) = \beta_s X_s + E(\varepsilon_s | \upsilon < -\pi Z) \quad (8)$$

$$E(\ln W_q | q = 1) = \beta_q X_q + E(\varepsilon_q | \upsilon > -\pi Z) \quad (9)$$

Since  $\upsilon$  is correlated with  $\varepsilon_q$  and  $\varepsilon_s$ , the expected value of the error terms is not zero. The quit/stay decision truncates  $\varepsilon_q$  and  $\varepsilon_s$ . If those who stay are well matched and have large  $\varepsilon_s$ 's, the lower tail of the distribution of  $\varepsilon_s$  is truncated and the mean wage of stayers is higher. Assuming that  $\upsilon$ ,  $\varepsilon_q$  and  $\varepsilon_s$  are normally distributed, equations (8) and (9) can be written as:

$$E(\ln W_s | q = 0) = \beta_s X_s + \alpha_s \frac{-f(\mathbf{pZ})}{1 - F(\mathbf{pZ})} \quad (10)$$

$$E(\ln W_q | q = 1) = \beta_q X_q + \alpha_q \frac{f(\mathbf{pZ})}{F(\mathbf{pZ})} \quad (11)$$

Where  $\alpha_s = \text{cov}(\varepsilon_s, \upsilon) / \sigma_\upsilon$  and  $\alpha_q = \text{cov}(\varepsilon_q, \upsilon) / \sigma_\upsilon$  and  $f$  and  $F$  are the standard normal density and cumulative distribution. The estimated values of the  $f/F$  and  $-f/(1-F)$  are

computed from probit estimation of the probability of quitting. These are the "Mill's ratios" which adjust for selectivity bias.

The decision to quit can be modeled several ways. Following the human capital and job search models (e.g., Jovanovic, 1979 and Burdett, 1978) a simple model of the worker's decision to quit is developed by Farber (1999) follows: Let  $W_a$  represent the best alternative wage available to the worker in the market. This is the value of the general skills that the worker brings to the labor market. The work is also rewarded for specific capital inherent in the match between the worker and the firm ( $Y$ ). Hence the wage paid to the worker by the current firm is:

$$W = W_a + \lambda Y, \tag{6}$$

where  $\lambda$  is the worker's share of the value of specific capital. In the simplest world, where there is complete information about worker productivity and no costs of mobility, the worker will not quit as long as the firm pays the worker even a small amount more than her alternative wage ( $W > W_a$ ), which implies  $\lambda > 0$ .

In order to generate quits in this model, some randomness in the alternative wage needs to be introduced. Burdett's (1978) model of quits relies on job search of employed workers. A simplified version of this model has a wage offer  $W_o$  arriving each period drawn from some wage offer distribution with mean  $W_a$ , dependent on worker's general ability, and with dispersion that reflects cross-job variation in the worker's job-specific ability. Hence, the wage offer can be expressed as  $W_o = W_a + \Phi$ , where  $\Phi$  is a random variable with mean zero. A worker quits if the wage offer exceeds the current wage, which implies the condition for quitting of  $W_a + \Phi > W_a + \lambda Y$ , or  $\Phi > \lambda Y$ . Clearly, the probability that the wage offer exceeds the current wage is greater the lower the person's

wage is in the distribution of wage offers and hence, the more likely a worker will quit. Search theory also predicts that the arrival rate of wage offers is higher in tighter labor markets, so workers are more likely to quit in economic upswings. As a corollary, workers might be more likely to quit if they are working in a job that is in a rapidly declining industry – the value of quitting and taking a job offer would exceed the value of staying, with a high probability of being laid-off in the next period. Moreover, it could be argued that the arrival rate of wage offers would be higher in large urban centers, where the structure of the labor market is more diversified and there are more different types of jobs to choose from.

Yet, since mobility is not costless and information about jobs is not perfect, a model of quitting behavior should incorporate these costs/risks that the individual is considering in the decision to quit. One way to incorporate uncertainty in the decision making is to consider the individual's decision as part of a household maximization decision, assuming the household members have common preferences and pool all sources of income. Just as individuals can reduce their exposure to various investment risks by holding a diversified portfolio of assets, a household that shares earnings can ex-ante reduce its exposure to labor market uncertainty by holding a diversified portfolio of jobs (Stillman, 2000). Because of data limitations, we are not able to incorporate the jobs of other household members in the estimation strategy. However, we incorporate variables reflecting whether a person is married or not, the number of children in the household and the level of per-capita household income (to proxy the wealth of the household). The assumption is that married people, especially those with more children, may be less likely to take risk given their family responsibilities. We also assume that

wealthier households are in a position to take bigger risks and hence a worker in such a household might be more likely to quit for a new (uncertain) job.

Hence, the  $Z_i$  vector contains the following variables to capture risk: dummy variables for, marital status, one child, and two or more children; the log of per capita household income (in 1996). The vector includes the following variables to capture human capital and search characteristics: gender education, age, the log of the individual's wage relative to the mean wage of all individuals with the same level of schooling (in 1996)<sup>7</sup> and dummy variables for Prague and for the three sectors where employment declined dramatically (agriculture, mining and utilities, and heavy manufacturing).

We estimate a probit model with these variables and obtain the Mill's ratio to correct for selectivity bias in the wage regressions for quitters and stayers. For satisfactory identification, it is important that  $Z_i$  excludes at least one element that is in the wage regressions, or else the identification of the model hinges completely on functional form assumptions. Given we have several variables that affect the value of quitting but do not determine wage levels (marital status, number of children and household per capita income), we are confident that we have satisfactory identification.

#### 4.3. The Decision to take a Job in the Old vs. New Sector

Workers who leave their job to take another one (either by quitting or being laid-off) also choose how/where to search and which job offer to accept as part of their optimization decision. In modeling the individual's decision, we assume that employed individuals are simultaneously deciding on whether to stay in the current job, quit and

take a job offer in the new sector, or quit and take a job offer in the old sector.<sup>8</sup> On the other hand, those who are laid-off receive an exogenous shock and we assume that they only decide on which job to take after receiving the shock. Hence, we use the following two models: a) a standard multinomial probit (rather than an ordered probit) for stay vs. i) quit and take a job in the new sector or ii) quit and take a job in the old sector; b) a standard probit, conditional on lay-off, for the decision to take a job in the new vs. the old sector.

Using the same  $Z_i$  vector for both of these probit models, we derive the Mill's ratios to estimate selection corrected regressions of changes in log wages for these five groups of people.

## **4. Empirical Results**

### **4.1. Summary Statistics**

We start with a discussion of the means and standard deviations of the main variables. As may be seen from the values in row 2 of Table 1, the 1989-96 change in real full-time wages was negative for all the principal groups of individuals.<sup>9</sup> (This variable is defined as nominal monthly salaries of full-time workers, net of tax, deflated by the consumer price index.) For the entire sample, the real wages fell by 16.5 percent between January 1989 and December 1996. The decline was deeper (22.8 percent) for those who stayed in their original jobs - “stayers.” Those who quit their job experienced a smaller decline of about 8.5 percent, while those that were laid off lost 20.3 percent. Therefore,

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<sup>7</sup> The relative wage variable is  $\ln(w_i/\text{average wage of the individual's education group})$ , where education groups are defined as: apprentice, high school education without the CGE exam, high school education with the CGE exam and university and higher.

<sup>8</sup> Given that 90% of those individuals in our sample who quit did not experience a spell of non-employment, the assumption of simultaneity of the decision to accept an offer from one of the sectors and quit is consistent with the data. (We define a spell of non-employment as not working for more than one month. We assume non-employment spells of one month or less are being used for leisure.)



on average laid off workers fared similarly as those who stayed in their original jobs. When one considers the 1996 destination of the movers, irrespective of whether they quit or were laid off since 1989, one observes that those who moved to the “old state sector” (public administration, state-owned enterprises and privatized enterprises) lost 21.6 percent, as compared to a smaller loss of 5.1 percent for those who moved to the newly formed private firms (including self-employed). Hence, individuals who quit and those who moved to the new private firms gained more in wages than those who stayed, were laid off, or moved into the old state sector.

In terms of other variables, we see that those who quit and those who move into new private firms are on average 2-4 years younger (and have 2-4 years less work experience) than those who stay in their original jobs, are laid off or move to the old sector. Women constitute 43.7 percent of the sample and they are found disproportionately among laid off workers (47.3 percent) and those moving into the old state sector (46.4 percent). They are under-represented among those moving to the sector of new private firms (37.1 percent). The mean of the variable ‘change in experience between January 1989 and December 1996’ (constructed as eight years minus the duration of unemployment spells during that time) is 7.9 years. This reflects the fact that only 7.6 percent of the sample experienced spells of unemployment and that on average these spells were rather short. Note that by construction, individuals who did not change jobs accumulated eight years of new (post-communist) work experience. Indeed, the extent of non-employment is greatest among individuals who suffered from layoffs, as their change in experience averages 7.7 years.

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<sup>9</sup> Overall, real consumer wages did not reach their 1989 level until 1998.

In view of the size and vigorous growth of the economy in the capital city of Prague, it is not surprising to find that individuals living in Prague suffer less from layoffs and move more frequently to the new private sector. Married individuals tend to be stayers and suffer less from layoffs, while individuals with children tend to be disproportionately located among those who quit and those who move to the new sector. Interestingly, individuals with two or more children suffer less from layoffs than individuals with fewer or no children, a finding that may signal the presence of social consideration in the allocation of layoffs. As might be expected, layoffs are observed in the declining industries (defined as losing more than 10% of their workforce over the 1989-1996 period).

#### 4.1. A Simple Model of the Determinants of the 1989-96 Wage Change

We start our analytical discussion by providing a simple overall perspective on the determinants of the change in full-time wages between December 1989 (the end of communism) and December 1996 (mature transition). We do so by presenting in Table 2 the estimates of several ordinary least squares (OLS) regression equations that relate the 1989-1996 logarithmic change in wage to five sets of explanatory variables.

In line with the model presented in Section 4.1, the five specifications overlap in that they all include as common explanatory variables education, experience in 1989, change in experience between 1989 and 1996, a gender dummy variable coded 0 if the individual is a man and 1 if woman, a dummy variable for Prague, 1996 district unemployment rate, and eight dummy variables to capture (together with a constant term)

any effects on wage changes from a job change that involves a change from one sector to another in the nine principal sectors of economic activity.<sup>10</sup>

Beginning with the human capital variables, education is positively related to wage changes, with each year of education yielding about a 3 percent wage gain over the 1989-1996 period. As may be seen from Table 2, this result is robust to differences in specification. Experience in 1989 captures the effect of work experience gained under communism on wage changes during the 1989-96 period. This effect is found to be negative and highly significant, although the absolute size of the coefficient is small. It suggests that each year of work experience obtained under communism lowers the wage change during the 1989-96 transition period by 0.4 to 0.5 percent. The coefficient on '1989-96 change in experience' captures the returns to new experience gained in the post-communist period. We would a priori expect the significance of this coefficient to be low since the variable has small variance (see Table 1). Interestingly, the coefficient is positive, ranging from 2.4 to 4.3 percent, and in some specifications it is or comes close to being statistically significant at the 10 percent test level. These estimates suggest that post-communist work experience is more valuable during the transition than experience obtained under communism. Finally, we note that the difference between men and women's 1989-1996 wage change is not statistically significant *ceteris paribus*.

The variables capturing the effect of local demand conditions had the expected signs. Prague residence yields a 10-13 percent wage gain over those living outside Prague in all specifications. People living in a district with higher unemployment rate have lower wage gains than people living in districts with lower unemployment,

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<sup>10</sup> The "change in industrial sector" variable was constructed as -1 if the person left the sector, 1 if the person moved into the sector, and 0 otherwise.

providing an indirect support for the wage curve hypothesis (Blanchflower and Oswald, 1995). Finally, the net change of sector dummy variables indicate that individuals leaving (entering) mining and utilities lost (gained), while those leaving (entering) heavy manufacturing gained (lost). Other inter-sectoral moves are not associated with significant wage gains or losses during the 1989-96 period.

To capture the wage effects of job mobility, we include in column 1 of Table 2 as a regressor a dummy variable that is coded 1 if the individual changed jobs and 0 otherwise. The estimated coefficient on this variable is 0.09 and it is highly significant, indicating that individuals who moved to a new job over this period gained 9 percent relative to those who did not move, *ceteris paribus*.<sup>11</sup> In column 2 we present the effects of moving into a new private firms and moving into an old sector firm, relative to staying in one's 1989 old sector job. The wage effect of moving into the new sector is 9.4 percent and it is statistically significant at the one percent confidence level. In contrast, the effect of moving into the old sector is not significantly different from staying in the old job. In column 3 we assess the wage effect of moving across several jobs during this period while controlling whether the individual ended in a new sector job. We find that holding two and four or more (but not three) jobs results in a 7 percent wage gain, while the effect of moving into the new sector remains positive and significant at 7.3 percent. Multiple job holding is hence associated with wage gains but the effect is not uniform or monotonic.<sup>12</sup> The estimates in column 4 indicate that quits have a positive 6 percent wage effect, while layoffs have no significant effect on wages, when one controls for the effects of the basic set of variables and for whether the movers go into the new sector.

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<sup>11</sup> These findings are consistent with those from Hunt's (1998) study of former East Germany and both counter the predictions of Blumen et al. (1955) "mover-stayer" model.

Finally, in column 5 we separate the wage effects of different job separations (quits and layoffs) and destinations (new vs. old sector jobs). The results indicate that the workers who quit or were laid off and moved into a new sector job obtain on average a similar wage gain (13.4 and 11.2 percent, respectively) relative to stayers. The wage change of workers who quit and move to the old sector is not statistically different from the wage change of stayers (in the old sector). However, workers who are laid off and end up in the old public sector suffer an 11.2 percent wage decline compared to the stayers. Overall, the findings in Table 2 demonstrate that movers on average gain relative to stayers and that the positive wage effect is associated with quitting and also with moving into the new sector. In contrast, the wage effect of being laid off is neutral, while the effect of moving into the old sector is negative.

### 5.3. Determinants of Quits

In the analysis of the preceding section, we have implicitly assumed that individuals are exogenously assigned to the categories of stayers, quitters and laid-off individuals, as well as to the destination of their move (new vs. old sector firms). While the decision to lay-off a worker is arguably a decision of the firm and as such is exogenous to the worker, the decision to quit or stay is probably not. Similarly, once the worker is laid off, one can argue that rather than being randomly assigned to a firm, she makes a decision on whether to join a firm in the new sector or get a job in the traditional state owned sector. In this section, we present estimates that take this decision-making process into account.

We have estimated three probit models. The marginal (slope) coefficients of the explanatory variables and the associated standard errors are presented in Table3. The

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<sup>12</sup> This finding is similar to that of Keith and McWilliams (1995) using US data.

estimated (raw) probit coefficients and standard errors are presented in Appendix Table A1.

The first set of coefficients in Table 3 gives the estimated effects of marginal changes in the explanatory variables on the probability that a person quits his/her job rather than staying. As may be seen from the binary probit estimates in panel (a) of Table 3, the probability of quitting is negatively related to being married or older and having a relatively high wage in the original job. It is positively related to total household per capita income and the vacancy (job opening) rate in the district. Moreover, we also detect a positive and almost significant effect on quits of having children, being more educated and being in a declining sector. Finally, gender and Prague residence have no systematic effect. With the possible exception of the children effect, these findings are intuitively plausible. Considering the negative effects first, married individuals tend to be more risk averse and incur higher transaction costs in moving. Older individuals may also be more risk averse and incur higher transaction costs and they may have accumulated more job specific capital for which they will lose a return.<sup>13</sup> Moreover, older people have a shorter remaining working life in which to recoup the return on investment in moving. Relatively high income in the original job makes it less likely that a higher paying job will be found elsewhere. In contrast, higher household income relaxes the budget constraint and makes investment in moving more feasible, while a high number of vacancies signals high demand for labor and increases the expected rate of return on moving.

#### 5.4. Determinants of Quitting and Selecting a Job in the New or Old Sector

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<sup>13</sup> We would have preferred to use a tenure variable in the probit, but we did not obtain this information from the 1989 job.

In panel (b) of Table 3 we present estimates of a probit model that postulates that an individual makes the following decisions simultaneously: a) to quit and take a new sector job vs. stay and b) quit and take an old sector job vs. stay. This multinomial model may be interpreted as assuming that an individual considers job offers from firms in the two sectors and then decides whether to stay or whether to accept one of the offers and quit his old job. The fact that only 10 percent of the quitters in our sample experienced an unemployment spell of more than one month is consistent with this conceptual framework.

As may be seen from Table 3, row 1 of panel (b), women are less likely than men to quit and move into a new sector job but are more likely than men to quit and move into an old sector job. Married individuals are indifferent between quitting for a new sector job and staying but are less likely to quit for an old sector job. Neither the presence of children in the household nor the worker's level of education seem to affect the decision making process. As expected, the probability of quitting for a new sector job is positively related to higher per capita household income, whereas this variable does not affect the probability of quitting for an old sector job. Older people are less likely than younger workers to quit for either sector. It is very interesting to see that individuals on the high end of the wage distribution are less likely to quit for an old sector job but are not deterred from quitting for a new sector job. Hence, this last finding combined with the findings on gender, per capita income, education and age, seems to point to that men, younger and more able individuals, living in households with relatively high income are those who are taking the decision/challenge of quitting for a new sector job. Finally, the results in panel (b) indicate that among the variables capturing demand conditions, only

the coefficient on the district vacancy rate is significant, indicating that people who live in districts with tighter labor markets are more likely to quit for a job in either sector. Neither living in Prague nor having a job in a declining sector affect these probabilities.

#### 5.5. Selection of Job in Old vs. New Sector for those who were Laid-Off

In panel (c) of Table 3 we present the estimated effects of marginal changes in the explanatory variables on the probability that a laid off person enters the sector of new private firms rather than the sector of the old state owned and privatized firms and government agencies. The interpretation of these binomial probit coefficients is analogous to that in panel (a). As may be seen from panel (c), the only coefficient that is statistically significant is the positive coefficient on per capita household income, indicating that laid off individuals from households with greater income tend to go to the new rather than the old sector. This is consistent with the finding in panel (b) and intuitively acceptable, since working in the new sector is riskier, especially for the self-employed. The fact that the probability a laid off person enters the new vs. old sector is unrelated to his/her other demographic characteristics, local demand conditions and growth/decline in sector of previous job is interesting. It suggests that the allocation of laid off individuals to firms in the two sectors may be related more to firm than individual characteristics. Of course, the statistically insignificant estimates could in part be also brought about by the fact that they are based on only 218 observations.

#### 5.6. The Determinants of the 1989-96 Wage Change with Adjustment for Selectivity Bias

We next present estimates of the determinants of the 1989-96 wage changes when we take into account the selectivity issues analyzed in the preceding section. In line with our conceptual framework, we first examine in Table 4 the wage changes of the



following three groups: those who stayed in their 1989 job, those who quit and those who were laid off. We then present in Table 5 our analysis of the wage changes of four groups: those who quit for jobs in the new sector, quit for jobs in the old sector, were laid off and found a job in the new sector, and were laid off and found a job in the old sector. The coefficients on Heckman's  $\lambda$  (the Mill's ratio) are significant in all equations, indicating that there is a correlation between the unobserved factors that determine the choices (of staying and not staying, etc) and the individual's wage changes in 1989-1996.

#### 5.4.1. *Stayers, Quitters, Laid-off*

We begin with the determinants of wages changes for stayers and quitters. As may be seen from Table 4, several of the coefficients on the wage change regressions for stayers and quitters are affected by the correction for selectivity bias. The most notable change is on the coefficient for experience in 1989. In the uncorrected regressions, it would appear that people with more labor market experience in 1989 who quit have a lower wage change than those with less experience who quit. However, after correcting for selectivity bias, the coefficient is positive and significant. Similarly, for stayers, the coefficient on this experience variable is not significantly different from zero in the uncorrected wage equation and it becomes positive and significant in the corrected equation. Hence, once we take into account the fact that older people are less likely to move, we find that the wage gain is in fact positive for people with more experience at the start of the period. For quitters, the gain from finding a job in the new sector is reduced in the corrected equation (falling from 8.4% to 7.7%). Finally, the other noteworthy coefficient that is affected by the selection correction is the district unemployment rate in 1996. It is estimated at  $-5.7\%$  ( $-5.8\%$ ) for quitters (stayers) in the

uncorrected equation and it becomes not significantly different from zero for both in the corrected equation. Hence demand conditions affect the decision to quit vs. stay but not the wages of quitters and stayers.

In general, the coefficients from Table 4 indicate that the more educated individuals experienced a faster growth of wages than the less educated, irrespective of whether they stayed, quit or were laid off. This finding is consistent with Munich, Svejnar and Terrell (1999) finding on the rising rate of return to education during the transition.

Whereas work experience accumulated as of 1989 has a positive effect on wages of stayers and quitters, its effect is negative and almost significant for the laid off individuals. Hence, workers who succeed in keeping their existing jobs or voluntarily move to new jobs are able to secure a positive rate of return on their communist era work experience. Those who are laid off tend to find that the effect of this experience is nil or negative. (It is worth noting again that these results lead to different conclusions than those obtained when one does not correct for selectivity.)

The effect of a change in experience between 1989 and 1996 can only be measured for those who quit or were laid off since stayers by definition all accumulated eight years of new experience. The effect of a change in experience for quitters and laid off individuals is positive but it is statistically insignificant. The gender effect is also not significant for all three categories of workers, as it was in the more aggregated regressions of Table 2.

The results for the demand variables were mixed. Prague location has an insignificant effect for stayers and quitters, but the effect is large (32.4 percent) and

statistically significant for the laid off individuals. We noted above that changes in the local demand conditions (proxied by the 1996 district unemployment rates) did not affect wage changes for individuals in all three groups (if using the wage equations corrected for selectivity bias). The wage effects of changing of industry of the job are generally not significant except for the following: Being laid off from mining and utilities is associated with a major decline in earnings, while quitting from heavy manufacturing is found to have a significant positive effect on earnings.

Finally, both quitters and laid off workers who move into the new sector jobs experience wage gains compared to those who moved to the old sector jobs. The wage effect is estimated at about 8 percent for quitters and 21 percent for individuals who were laid off.

#### 5.4.2. *Quit for New vs. Old Sector and Laid-off for New vs. Old Sector*

The estimates in Table 5a give the selectivity corrected effects of our explanatory variables on the 1989-96 wage change of four groups: those who quit for jobs in the new sector, quit for jobs in the old sector, were laid off and moved to the new sector, and were laid off and moved to the old sector. Table 5b presents the coefficients for the same variables without correcting for selectivity bias.

As may be seen from Table 5a, education has a positive effect on the wage change of the first three groups, but negative and insignificant effect for those who were laid off and moved to the old sector. The increase in the rate of return to human capital is hence related to job and sectoral mobility, being insignificant for those who suffer involuntary separation and move to the old sector. The coefficient is not affected by correction for selectivity bias.

The effect of 1989 experience is positive for quitters and not significantly different from zero for laid off individuals, irrespective of whether they moved to the new or old sector. Consistent with the findings in Table 4, the sign of this coefficient for each type of quitter changes from negative to positive when it is corrected for selectivity bias. We also learn, that the return to experience cumulated in 1989 is higher for quitters who moved into the new sector than for quitters who took a job in the old sector. Clearly the new sector with its market determined wage is rewarding experienced people (who quit) more than the old sector. On the other hand, the effect of a change in experience between 1989 and 1996 is not statistically significant in all cases except for laid off individuals who moved to the old sector. These individuals register a positive and marginally significant coefficient of 14.5 percent. As mentioned earlier, there is very little variation in this wage for quitters so this result is not surprising.

New information revealed by this set of regressions is that there are significant differences between men and women's wage changes during 1989-1996, in certain categories. Moreover, this effect is not revealed until the regression is corrected for selectivity bias. Women who quit and accept a job in the new sector experience a sizable positive wage gain (40.8 percent) relative to men. On the other hand, women who quit and accept a job in the old sector experience a 21.7 percent lower wage gain than comparable men. We find hence that once we control for the fact that women are less likely to enter the new sector, those who do obtain a considerable wage premium over the men who quit and enter the new sector.

The interesting finding with respect to the "Prague effect" in Table 4 is magnified in Table 5a. We learned earlier that among those laid off and finding a job in the old

sector, being laid-off in Prague had its advantages over being laid off in the rest of the country. In Table 5, we find that those who gain the most are those who are laid-off and find a job in the old sector. Given that Prague is the seat of the government, this is not surprising.

Finally, the coefficients on the dummy variables denoting net sector change continue to be mostly insignificant, perhaps due to sample size. The only one that is significant is the coefficient for those who quit jobs in heavy manufacturing and found a new one in the public sector. They experienced a substantial wage gain.

## **6. Conclusions**

Our analysis of job and wage changes of individuals working in the Czech Republic between 1989 (the last year of communism) and 1996 indicates that the relationship between job mobility and wage changes varies by type of separation and the sector of destination of movers. We find that workers are optimizing (movers are doing their best by moving and stayers are doing their best by staying). In particular, we draw the following conclusions:

1. The Czech workers experienced a significant fall in real wages between 1989 and 1993. Wage growth occurred after 1993 but even by the end of 1996 the real wage of our entire sample was 16.5 percent below that of January 1989. Basic sample statistics and OLS regressions indicate that the decline was deeper (22.8 percent) for those who stayed in their original jobs and those who were laid off (20.3 percent). It was less pronounced for those who quit (8.5 percent). Movers to the “old state sector” (public administration, state-owned enterprises and privatized firms) lost 21.6

percent, as compared to a smaller loss of 5.1 percent for those who moved to the newly formed private firms. Hence, individuals who quit and those who moved to the new private firms gained more in wages than those who stayed, were laid off, or moved into the old state sector.

2. We asked to what extent these findings were biased by selectivity and proceeded estimate wage equations which included Heckman's selectivity bias parameter based on estimated probits of the probability of quitting as well as the probabilities of quitting and taking an old sector job vs. a new sector job. We learned from the probit estimates that quitting behavior is found to be higher in tight local labor markets and among people who are younger, more able, in a better position to take risk (single, higher per capita household income) and who would gain the most from a move (lowest relative earnings in original job). Since layoff decisions are exogenous to the worker, we did not estimate a probability of layoff. On the other hand, both quitters and those who are laid off must decide what type of job to take. The estimates from modeling the choice of sector (new vs. old) indicates that individuals who quit and take a new sector job are more likely to be men, younger, single, with higher education and family income, and working in tight local labor markets. Those with higher relative earnings are not deterred from taking a new sector job. On the other hand those who quit and take a job in the old sector are more likely to be women, older, married and with lower relative wages. The finding that a relatively high income at the original job reduces the probability that a person quits for an old sector job is plausible since old sector jobs do not offer higher average incomes.

The probability that a laid off person enters the new rather than the old sector is affected positively by per capita household income, but no other variable has a significant effect. The finding that laid off individuals from households with greater income tend to go to the new rather than the old sector is an intuitively acceptable since working in the new sector is more risky. The fact that the probability a laid off person enters the new vs. old sector is unrelated to his/her other demographic characteristics, local demand conditions and growth/decline in sector of previous job suggests that the allocation of laid off individuals to firms in the two sectors may be related more to firm than individual characteristics. If so, it suggests that the re-employment process is more a hiring process of the firm than a search process of the individual. The statistically insignificant estimates could in part be also brought about by the fact that they are based on only 218 observations.

3. When we adjust the 1989-96 wage change equations for selectivity of individuals in terms of quitting vs. staying, we find that individuals are optimizing. The positive sign on the selection coefficients in both the stayer and quitter equations suggests that stayers are doing better than they would had they quit, and the same for quitters. I.e., those who are well matched are also better at seeking outside offers.
4. We find that correction for selectivity bias strongly affects the coefficients on general human capital (i.e., experience) accumulated under communism. These coefficients become positive and significant when the OLS estimates were negative but not significant.
5. For quitters, laid off and stayers, wage changes were greater for the more educated, with more experience (except those who were laid-off who did worse) who took a job

in the new sector. Relative changes in local demand conditions (district unemployment rate) do not matter. Prague location has an insignificant effect for stayers and quitters, but the effect is large (32.4 percent) and statistically significant for the laid off individuals. As for changing industry when they found a new job: Being laid off from mining and utilities is associated with a major decline in earnings, while quitting from heavy manufacturing is found to have a significant positive effect on earnings.



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