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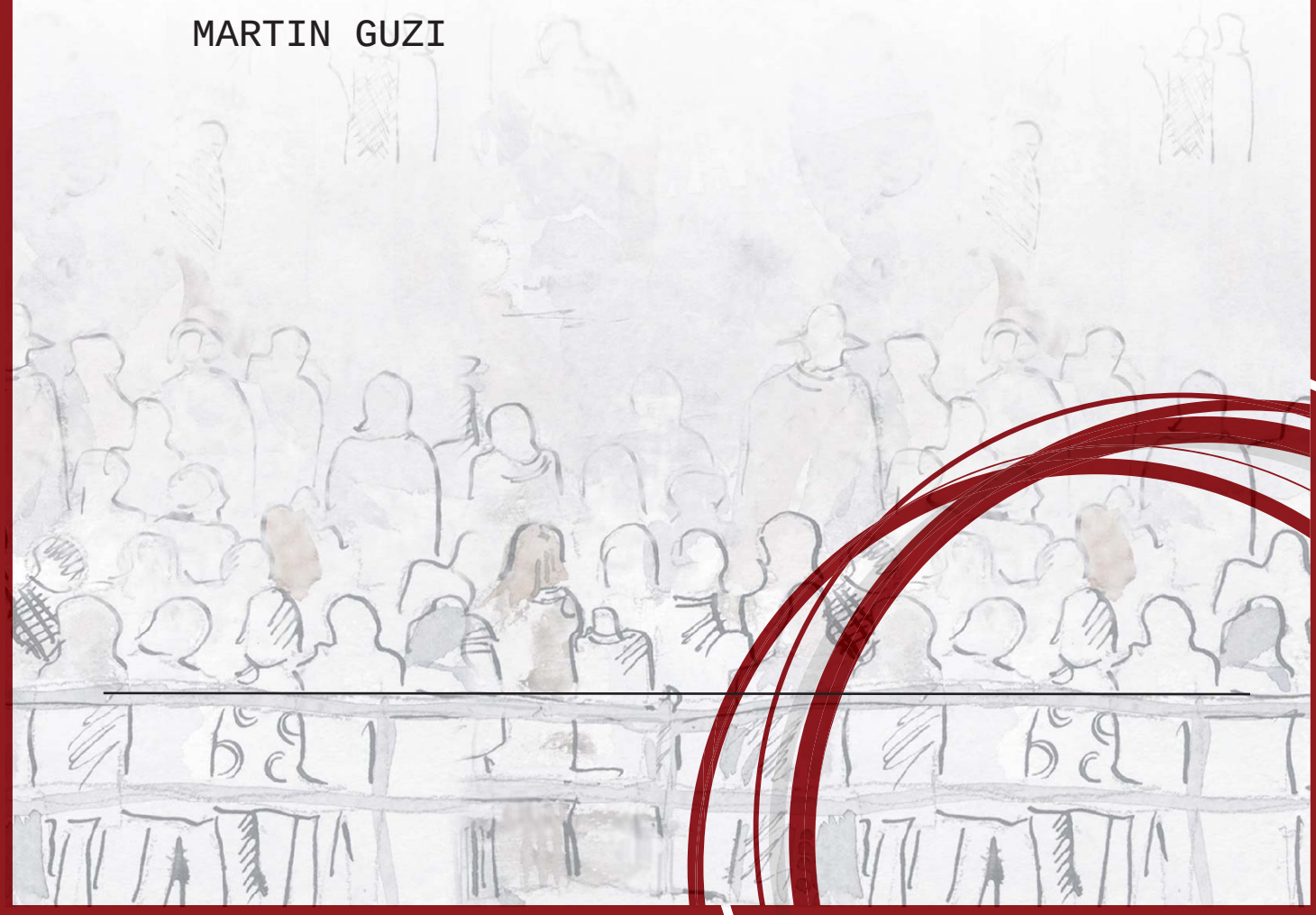
September 2013

MARTIN GUZI



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Martin Guzi
Masaryk University and CELSI

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Central European Labour Studies Institute (CELSI)

Zvolenská 29
821 09 Bratislava
Slovak Republic

Tel/Fax: +421-2-207 357 67
E-mail: info@celsi.sk
Web: www.celsi.sk

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ABSTRACT

An Empirical Analysis of Welfare Dependence in the Czech Republic*

Paper demonstrates the existence of a welfare trap in the Czech Republic, created by the tax and social security systems. Combining individual data from the Czech Labor Force Survey and the Czech Household Income Survey, the analysis exploits the difference between the available social benefits and the net household income when a person is employed. This information allows us to calculate the net replacement rate based on the parameters of the taxation system and rules for means-tested social benefits at the household level. Estimates imply the existence of a welfare trap, which means that individuals who receive relatively higher social bene?ts are also more likely to remain unemployed. It is shown that the most affected groups are those with low education and long unemployment spells. Furthermore, the paper documents the disadvantaged position of women in the Czech labor market. The estimates imply that women outflows to employment are particularly influenced by the high social benefits, and the existence of a welfare trap persists even when the job-search intensity is controlled. This finding contributes to the discussion on the persistent and large unemployment gender gap in the Czech Republic. The results of the analysis support policy improvements towards low-income households. A better harmonization of tax and social security systems is necessary in order to ensure that the incentives to leave unemployment are not hampered by high social benefits.

Keywords: labor supply, welfare trap, net replacement rate

JEL Classification: J22, J31, I38

Corresponding Author:

Martin Guzi
Department of Public Economics, Masaryk University
Lipova 507/41a, 602 00 Brno, Czech Republic
E-mail: Martin.Guzi@econ.muni.cz

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1 Introduction

The combination of tax and social security systems affects labor market dynamics. The scope of this paper is to explore whether the potential disincentive effects created by the Czech tax and social security systems reduced the labor flows from unemployment to employment over the period 1995-2005. The employment and social policies are subject to incentive compatibility constraints given that they have to make work pay. The interaction of tax and social security systems defines the disposable income of individuals and, therefore, influences the decision of the unemployed to accept a job.

In the late 1990s, the amount of social benefits paid to the unemployed was relatively generous; indeed, the Czech social system was ranked the second most generous in the OECD in 1996 (OECD, 1998).[1] Moreover, the incremental benefit attributed to families with children was proportionally larger in the Czech Republic than in any other OECD country (OECD, 1998). OECD studies pointed out that the combination of benefit withdrawal and the tax system in the Czech Republic could lead to a distorted labor supply (OECD, 1998; OECD, 2004). In 1998, OECD representatives issued the recommendation for the Czech Republic to *"re-examine the basis upon which benefits in the social assistance and state social support system are determined. To preserve work incentives, additional benefits awarded to larger families need to be reduced in line with international practice"*.[2] At the same time, the economic transformation in the late 1990s prompted a steep increase in the unemployment rate. The unemployment rate doubled following the recession in 1997, while the long-term unemployment rates more than tripled between 1996 and 2000 (see Figure 1). After 2000, the economy was growing yet the unemployment rate remained high.

The tax and social security systems in the Czech Republic were assessed by several studies as generating a welfare trap for a wide range of households (e.g. Jahoda, 2004; Schneider, 2004; Jurajda and Zubricky, 2005; Galuscak and Pavel, 2007). Results from studies suggest that high net replacement rates are likely to attenuate work incentives for individuals with children, as well as those who have lower chances of getting a better-paid job. For these individuals, the potential income from employment may not be significantly higher relative to the available income from social benefits. Galuscak and Pavel (2007) estimate that around one-third of all employed individuals in the Czech Republic in 2006 had low incentives to avoid short spells of unemployment given that it did not significantly reduce their earnings. These findings are typically based on the theoretical considerations for selected types of households, with the potential income of the unemployed usually approximated with the income of the average production worker in the economy and compared to the amount of available benefits.

[1] The benefit generosity is compared relative to the average economy wage rather than in absolute terms.
[2] Page 87 in OECD (1998)

Several studies (e.g. Sorm and Terrell, 2000; Lauerova and Terrell, 2005) have examined the behavior of the unemployed in the Czech labor market directly using micro data yet have not considered the role of social benefits. One exception is the study of Commander and Heitmueller (2007), who use micro data and empirically test the impact of social benefits on the labor supply behavior of the unemployed in the Czech Republic, Hungary and Poland. However, the measure of social benefits generosity is simplistic in their analysis with the authors assuming the average level of benefits relative to the national average wage for several household types. The high approximation of social benefits at the household level reflects the main drawback of the paper, and consequently, the authors find only weak evidence for the role of social benefits in the Czech labor market.

This paper adapts the methodology from Commander and Heitmueller (2007) yet significantly improves the computations of household income under working and non-working alternatives. Given that the Czech Labor Force Survey does not include any income information, the Czech Household Income Survey is used to estimate potential income in the local labor market for the unemployed. This information allows us to calculate the Net Replacement Rate (NRR) based on the parameters of the taxation system and rules for means-tested social benefits at the household level. The analysis subsequently proceeds to examine the link between the social benefits generosity and individual labor supply behavior. The purpose of the paper is to test the hypothesis that high social benefits constitute a welfare trap for the unemployed and to identify the existence of a welfare trap among different groups.

The remainder of the paper is organized as follows. The next section discusses the empirical findings of labor market policies on individual labor supply behavior. Section 3 describes the Czech social security system. Section 4 proposes a simple job search model to derive the behavior of the unemployed with available social benefits. Section 5 provides a description of the data set used and presents summary statistics. The calculation of NRR for each household is described in Section 6, while Section 7 presents findings and Section 8 concludes.

2 Literature review

Both active and passive labor market policies were introduced in the transition economies during the 1990s to relieve tensions in the labor market and provide income support for jobless workers. Government interventions through an active labor market policy (ALMP) provide training and guidance to the unemployed. Indeed, it is documented that the increased expenditure on ALMP has a positive impact on employment prospects in EU-15 countries, and it has also been shown that youth measures and public employment services reflect the most efficient allocation of ALMP resources (European Commission, 2004). The level of expenditure on ALMP is substantially lower in Central and Eastern Europe (CEE) countries, and thus it is not surprising that unemployment development does not seem to be affected by ALMP in these countries (Lehmann and Muravyev, 2009). The weak

efficiency of ALMP programmes in the Czech Republic was previously confirmed in Münich, Svejnar and Terrell (1999). Flek and Vecernik (2005) mention that expenditure on ALMP appeared to be insufficient to reverse the rising unemployment rate in the Czech Republic in the late 1990s.

Passive labor market policies ensure that individuals can subsist during periods of unemployment with more resources allocated to these programmes.[3] On the one hand, the availability of income support for the unemployed renders joblessness less painful, thus allowing for a longer job search that leads to a better job match in the labor market. Wulfgramm and Fervers (2013) find that workers in European countries with more generous income support for the unemployed achieve higher employment stability upon re-employment. The authors suggest that this outcome is possibly driven by the intensity of ALMP programmes via skill level increases and information deficit reductions.

On the other hand, generous social benefits can negatively affect the job search intensity of unemployed workers, and conditional on the wage offered, the higher benefits reduce the economic incentives to accept a job offer. Mulligan (2012) explains that recently expanded welfare programs in the USA provide strong disincentives to work. His evidence is compelling as he shows that the labor supply behavior was not affected among groups least affected by the specific safety-net increases (e.g. among the elderly, married, high-income, and among workers residing in regions with more stable housing prices). Literature provides many examples that most of the unemployed want to work and the evidence of negative aspects of welfare participation on transition to work is documented. In Germany, Schneider and Uhlendorff (2006) confirm that exits to work during 1992-2000 were more likely to be observed for unemployed individuals with higher potential wage relative to the level of social benefits. Portugal and Addison (2008) identify disincentive effects of unemployment benefits on the exit rate from unemployment using Portuguese employment surveys between 1992 and 1997. Petrongolo (2009) evaluates the UK reform in 1996 that introduced tighter search requirements for social benefits claimants. She concludes that reform was successful in moving unemployed individuals to the labor market through raising the costs of remaining on social benefits. Van Ours and Vodopivec (2006) find that the job finding rate of the unemployed in Slovenia largely increased after 1998 when the benefit entitlement period was substantially shortened. The exit rate remained unchanged for the unemployed whose entitlement period did not change; therefore; the authors interpret the effect as causal. Boeri (2000) finds a positive relationship between the level of social benefits and the (self-reported) reservation wages of individuals in the transition countries with the generous social benefits increasing the opportunity costs of employment and leading to high reservation wages. Boeri explains that the distribution of reservation wages does not increase uniformly but rather rises predominantly at

[3] The Ministry of Labor and Social Affairs reports that the share of ALMP in GDP was 0.07% during the period 1995-2000. The average spending on passive programmes amounted to 0.23% of GDP.

its lower end. Consequently, high social benefits increase the chances of low-productive workers remaining out of employment.

Both the tax and social security systems contain measures targeted at poorer households and families with children. Prusa (2001) discusses the redistribution and tax policies in the Czech Republic prior to 2000 and Jahoda (2004) in 2003. Both studies conclude that there is a little interaction between these two systems with the welfare trap likely to arise for low-income individuals who transit from unemployment to employment. Similarly higher benefits targeted to families with children may lock individuals in unemployment due to the welfare trap. Schneider (2004) shows that the tax and social security systems in the Czech Republic heavily redistribute income towards low-income groups. Working with aggregate figures from 2001, Schneider finds that taxes rise and social benefits are withdrawn when household income moves up from the bottom decile, creating strong disincentives for labor market participation. Jurajda and Zubricky (2005) discuss the parameters of tax and social security systems, showing that the level of social benefits for individuals from low income and large families remains relatively high in long-term unemployment. Therefore, the guaranteed household income from social benefits suggests very little motivation for individuals to exit unemployment.

Several studies have empirically examined the behavior of the unemployed in the Czech labor market using micro data. The study by Sorm and Terrell (2000) analyses worker mobility across different labor market states during 1994-1998. It considered individual characteristics as determinants of labor mobility and concluded that labor market flows during the studied period were efficient with a low incidence and duration of unemployment. Lauerova and Terrell (2005) explore female-male differences in labor market flows over the period 1993-1996 finding that women have significantly lower probabilities of exiting unemployment than men. Such chances are particularly low for married women. Commander and Heitmueller (2007) study flows in the labor market with respect to the role of social benefits during 1993-2003 finding weak evidence that individual decisions to leave unemployment to employment relate to the amount of social benefits. However, this result can be partly attributed to the fact that the authors use a simple approximation of benefit generosity at the household level.

The findings from literature evaluating the dynamics in the Czech labor market are very inconclusive. The findings based on the income simulation for selected households suggest that the combination of tax and social security systems in the Czech Republic creates a welfare trap, i.e. social benefits are accepted as an alternative to low and insecure earnings. Empirical studies find that the less educated tend to have a higher incidence of unemployment and longer spells although the association between social benefits and high unemployment was not directly confirmed. This paper confirms the existence of a welfare trap finding a negative influence of the high net replacement rate on the probability of transition from unemployment to employment.

3 The Czech social security system

The Czech government implemented extensive reforms to its tax and social security systems in the early 1990s. The social security system described in this paper was introduced in 1995 and had only undergone minor changes until 2005.[4] Workers who become unemployed are eligible to receive unemployment benefits for a period of 6 months with the amount calculated from previous net income. The unemployed who are jobless for more than 6 months are entitled to social benefits of an unlimited duration. Social benefits are not taxable and are subject to means-testing. In practice, they are paid to keep household income above the minimum subsistence level (MSL), which is defined by the Ministry of Labor and Social Affairs and represents the minimum amount of money that a household of a given composition would require for its subsistence. The MSL scheme defines a personal benefit for individuals by age and a household supplement to cover necessary household expenses. The MSL is shown in Table 1 and expressed in percentages relative to the net income of an average productive worker. The MSL for a given household is defined as the sum of personal benefits of all family members and the household supplement. Table 2 demonstrates the MSL computed for several typical households. It is observed that the MSL was initially set at relatively high levels before falling over time. Galuscak and Pavel (2007) calculate that while the average wage in the Czech economy between 1996 and 2006 increased by 106%, the amount of social benefits rose by 66% for single individuals, 57% for a couple without children, and 51% for a couple with two children. The authors explain that this decreasing trend in benefit generosity mainly occurred due to relatively high (wage) inflation and a lack of indexation of social benefits. However, social benefits remained relatively high for some groups throughout this period. It should be noted that it is standard to express social benefits relative to the national average wage despite the income of the majority of workers being lower. Therefore, the presented values are taken as a lower bound, and the relative value of social benefits can be higher for the majority of workers.

Previous studies emphasized that higher social benefits targeting families with children may constitute a potential welfare trap. As an example, Table 2 illustrates that the guaranteed income from social support for a couple (if both spouses are unemployed) with two children in 2000 was at 102 per cent of the national net monthly wage of an average production worker. The amount of benefits at that level may constitute a sufficient income for a family residing in a depressed region, whilst rendering an employment alternative as a less attractive option.

[4] For a detailed description of the Czech tax and benefit systems, see Galuščák and Pavel (2007). An update to the tax-benefit policy is published annually at www.oecd.org/els/social/workincentives.

4 Theoretical framework

A simple job search model represents a useful framework to illustrate the likely impact of social benefits and job search intensity on the transition from unemployment to employment. This model is familiar within the existing literature on job search theory formalized by Mortensen (1986). In the model, individuals can be either employed or unemployed and maximize the lifetime utility in continuous time. Unemployed individuals receive benefits b and invest search time (or intensity) $s = [0,1]$ to find a job. Search effort cost $c(s)$ generates job offers at rate $\lambda(s)$ from a known wage distribution F(w). The standard assumption follows that search costs are convex in effort while returns are concave; thus, $c'(s) > 0, c''(s) > 0, \lambda'(s) > 0, \lambda''(s) < 0$. Employed individuals are paid a wage w and face an exogenous risk of job loss δ. An individual who has a job does not search to find another one. The unemployed choose an optimal level of job search effort s and determine the optimal reservation wage w_R. The flow value of unemployment and employment can be written as follows, respectively:

$$rU = \max_{s,w_R} \left\{ b - c(s) + \lambda(s) \int_{w_R} \left[W(w) - U \right] dF(w) \right\}, \tag{1}$$

and

$$rW(w) = w + \delta \left[U - W(w) \right], \tag{2}$$

where r represents the intertemporal discount rate. In theory, the reservation wage is defined at the level that makes a job-seeker indifferent between accepting a job and remaining unemployed. From $rW(w_R) = rU$ it follows that the flow value of unemployment is equal to the reservation wage $rU = w_R$, which is derived from (1) as a function of the parameters of the model:

$$w_R = rU = \max_{s} \left\{ b - c(s) + \frac{\lambda(s)}{r + \delta} \int_{w_R} \left[1 - F(w) \right] dw \right\}. \tag{3}$$

The optimal reservation wage is an implicit function of benefits and search intensity. The optimal search effort s^* is set at the level that maximizes the intertemporal utility of a job-seeker. The first order condition for the choice of search intensity is obtained by differentiating formula (3):

$$c'(s^*) = \frac{\lambda'(s^*)}{r + \delta} \int_{w_R} \left[1 - F(w) \right] dw. \tag{4}$$

Equations (3) and (4) form a system that implicitly determines the reservation wage and search effort. From equation (3), it follows that a higher b increases the reservation wage while rendering unemployment more attractive relative to employment. Formally:

$$\frac{dw_R}{db} = 1 - \frac{\lambda(s)}{r+\delta}\left[1-F(w_R)\right]\frac{dw_R}{db} = \frac{r+\delta}{r+\delta+\lambda(s)\left[1-F(w_R)\right]} > 0. \tag{5}$$

The dependence of the reservation wage on search effort is ambiguous in sign given that differentiation leads to:

$$\frac{dw_R}{ds} = \frac{r+\delta}{r+\delta+\lambda(s)\left[1-F(w_R)\right]}\left\{\frac{\lambda'(s)}{r+\delta}\int_{w_R}\left[1-F(w)\right]dw - c'(s)\right\}. \tag{6}$$

A search effort below the optimal level implies a positive effect, while a search effort above the optimal search level implies a negative effect on utility. In the basic model, a rise in benefit increases the reservation wage, but it is assumed that search effort is unconditional on a benefit that is unsatisfactory. The next step is to define the search effort as an implicit function of benefit. Differentiating equation (4) with respect to b implies:

$$c''(s^*)\frac{ds^*}{db} - \frac{\lambda''(s^*)}{r+\delta}\int_{w_R}\left[1-F(w)\right]dw\frac{ds^*}{db} + \frac{\lambda'(s^*)}{r+\delta}\left[1-F(w_R)\right]\frac{dw}{db} = 0. \tag{7}$$

With the help of (5), the result is:

$$\frac{ds^*}{db} = \frac{\lambda'(s^*)\left[1-F(w_R)\right]}{r+\delta+\lambda(s^*)\left[1-F(w_R)\right]}\left[\frac{\lambda''(s^*)}{r+\delta}\int_{w_R}\left[1-F(w)\right]dw - c''(s^*)\right]^{-1} < 0. \tag{8}$$

An unemployed person finds a job at rate $\lambda(s^*)\left[1-F(w_R)\right]$; therefore, higher benefits effectively decrease the job finding rate via both a decrease in the job search effort and an increase in the reservation wage. This result implies that the higher benefits increase the spell of unemployment.

5 Data

5.1 Data and sample selection

The empirical analysis relies on the quarterly Labor Force Survey (LFS) data from 1995 to 2005.[5] It is a rotating sample, and each quarter 20 per cent of individuals in the sample are replaced. The survey design allows the tracing of individuals over two consecutive periods (quarters) in order to identify the change of individual labor market status in the second period. The LFS follows the ILO definition of unemployment, i.e. an unemployed person has no employment, actively searches for a job, and is able to accept a job offer. In the Czech Republic, registration with the labor office is necessary to collect social benefits although labor offices have limited tools to screen the willingness of the unemployed to

[5] Labor Force Survey data for the Czech Republic are collected quarterly since 1993 by the Czech Statistical Office (CSU). Sample sizes cover more than 250,000 individuals per year. The number of respondents is proportional to the size of the district. Households are chosen randomly, and all members of the household are surveyed.

work (Galuscak and Münich, 2007). The final sample includes individuals who are jobless for longer than six months; therefore, they can collect social benefits, and their income never falls below MSL. The final sample includes the unemployed who are the heads of households or spouses. Other persons living in the household, such as the parents of spouses or other relatives, do not enter the analysis (around 2% of the sample). Due to different retirement schemes, the sample is limited to individuals of the working age 18-54 years.[6] Individuals who report full health disability are dropped from the sample. LFS contains information about personal characteristics such as age, gender, the highest level of education, unemployment duration and the type of activity prior to unemployment. Family composition and information about the age and number of children in the household are used to determine the MSL. Unfortunately, the LFS survey contains no income information, which is thus obtained from the Czech Household Income Survey collected by the Czech Statistical Office in 2002.[7] The standard Heckman (1979) model is applied to estimate the wage equation on the sample of workers taking into account the selection to employment.[8] The income is estimated for the sample of individuals 18-54 years old who are full-time employees, excluding the self-employed, students, and persons working less than 30 hours per week. The family characteristics such as the presence of children, other household income and the presence of employed persons other than the spouse are used to estimate participation in the labor market. The estimated parameters of the log-wage equation are used to calculate a potential monthly full-time gross wage of every individual in the LFS sample, while an estimation is performed separately by gender (see Appendix 2 for details).

5.2 Summary statistics

The final sample includes 28,338 unemployed individuals, of whom around two-thirds are comprised of women. Table 3 presents the descriptive statistics of the variables used in the analysis, reported separately for men and women. On average, the transition from unemployment to employment is observed for 9 per cent of individuals and does not differ between genders. The individuals who transit from unemployment to inactivity are treated as unemployed and their inclusion does not have an effect on the final results (around 2.6% of flows from unemployment). In terms of educational attainment, women are more educated relative to men in the sample. Overall, the majority of unemployed (77%) attained lower secondary or primary education. Men in the sample are slightly older than women, while the share of married women is higher than the share of married men. In terms of the activity

[6] In 1995, the statutory retirement age was 60 for men and 57 for women with no children, 56 for women who raised one child, 55 for women who raised two children, and 54 for women with three or four children.

[7] The Czech household income surveys were collected in 1996 and 2002. The choice of 2002 data hinges on the assumption that important wage determinants are stable throughout the study period. The stability of returns to education between 1996 and 2002 is confirmed by Münich, Svejnar and Terrell (2005) who estimate wage regressions using both 1996 and 2002 surveys.

[8] Similarly, Arellano and Meghir (1992) use the British Family Expenditure Survey to estimate the income for individuals in the British LFS. Schneider and Uhlendorff (2006) use the Heckman selection model to estimate a potential gross market wage of the unemployed receiving social assistance in Germany.

prior to unemployment, a quarter of unemployed women worked in the household or provided childcare. By contrast, most unemployed men were employed prior to becoming unemployed, and about 12% engaged in other activities (such as military service or education). Longer detachment from the labor market can negatively affect future prospects in the labor market. Interestingly, the share of unemployed by the length of spell is almost identical by gender. Since 2002, the Czech LFS has included information on job-search channels used by the unemployed to seek work in the last period.[9] The job-search intensity is constructed as the number of search channels used. On average, unemployed individuals report using three channels to seek employment, with higher search intensity likely to speed up the transition to employment. Given that the gender differences in personal characteristics and incentives to exit unemployment are expected to lead to different results, an analysis is also performed separately by gender.

5.3 The labor participation of women

Bicakova (2010) observes that a high percentage of women with young children in the Czech Republic withdraw from the labor force for a considerable period of time to raise their children. Consequently, these women experience a lower ability to find appropriate employment and to keep a job after the end of their parental leave. The amount of social benefits increases with the household size; therefore, individuals from large families tend to be more prone to welfare dependency. This finding emerges in Table 4 when the distribution of households by the number of children in the census data is compared to the distribution of households with unemployed individuals in the LFS sample. The information taken from the census data reveals that 65 per cent of households in the Czech Republic are childless (Column 1 in Table 4). Based on the LFS sample, 38 per cent of the unemployed live in households without children, with this figure significantly differing by gender. Almost half of unemployed men live in childless households, whereas only a third of unemployed women live in a household without children. A tentative pattern observed in Table 4 demonstrates that the incidence of unemployment increases with the number of children in the household, and the risk is higher for women.

5.4 Regional patterns

One of the key sources of variation for the analysis lies in the spatial heterogeneity in the economic conditions and in the nationally determined policy because differences in employment opportunities between districts are not reflected in the social security system, i.e. MSL is based solely on household composition. However, wages are set in the local labor market, and thus the actual generosity of social benefits varies geographically. Tables 5 documents the wage differentials and the widening unemployment rate between districts over time. In every year, 77 districts are divided into quintiles by

[9] The following seven search channels are considered: looking for a job through a public employment office, through a private employment agency, through friends or relatives, contacting employers directly, inserting or answering advertisements in newspapers or journals, studying advertisements in newspapers and journals, or through other methods.

the level of average wage in the district relative to the national wage and by the district unemployment rate. Average values for districts in the first and fifth quintiles are reported in Table 5. In particular, the districts in the first wage quintile record between 79-86 per cent of the national gross wage, while districts in the fifth wage quintile record between 102-107 per cent of the national gross wage. The variation in the unemployment rate between districts is even more pronounced, increasing from 6% to 15% in districts in the fifth quintile, while remaining below 5% in districts in the first quintile over the period 1995-2005. This result implies that territorial differences in earnings opportunities determine the working prospects of the unemployed. In this paper, regional variation in earnings opportunities is accounted for in the net replacement rate calculations. The district unemployment rate is included in the main analysis to control for labor demand in the labor market (the same result is obtained if the vacancy-unemployment ratio is used rather than the unemployment rate).

6 Household welfare participation

6.1 Income estimation

The household net income is obtained under two alternatives in order to test the impact of welfare participation on an individual's labor supply decision. First, the individual potential gross income under the working alternative is obtained from the complementary data set for every person and their spouses in the sample (see Appendix 2 for details). Subsequently, the household net income is computed based on parameters of the tax and social security systems and accounts for family composition. Calculations account for personal income tax, with social contributions and rules for means-tested social benefits applied.[10] In contrast to previous studies, the estimation of household income is significantly improved in this paper. Commander and Heitmueller (2007) assume NRR computed for ten household types relative to the national average wage, while Galuscak and Pavel (2007) undertake the estimation assuming that the potential entry wage for the unemployed equals 50 or 67 per cent of the national average wage.

Second, personal income under the non-working alternative is approximated by the MSL of the household, under the assumption that the household collects the available social benefits. Mares (2001) is the only study to estimate the non-take-up of social security benefits in the Czech Republic, roughly estimating non-take-up rates to vary between 10 and 30 per cent depending on the type of social benefit. If an unemployed person lives with a working spouse, the household income is equal to the sum of the net income of the working spouse and means-tested social benefits.

[10] I thank Stepan Jurajda and Jozef Zubricky who collected the parameters of tax and social benefit systems in the Czech Republic for the period 1995-2005. I adapted their calculations of net income and social benefits from excel tables to STATA (do-files are available upon request).

6.2 Net replacement rates

Having the household income under both working and non-working alternatives enables us to calculate the NRR for every individual, which is expressed as the ratio of net household income when a person is unemployed to the net household income under the alternative situation when the individual is employed. NRR represents a useful measure to assess the link between generous social benefits and unemployment persistence (e.g. Commander and Heitmueller, 2007; Jurajda and Zubricky, 2005). The ratio takes values from 0 to 1, with higher NRR increasing the reservation wage of the unemployed, thereby reducing incentives to enter employment. For example, NRR close to 1 means there are no monetary incentives to look for a job given that the household receives the same level of income regardless of the employment status. However, if accounting for other costs associated with the job search and the costs of participation in the labor market (i.e. transportation costs), even an NRR lower than 1 provides little incentive to search for a job. Table 6 details the average NRR computed for the total LFS sample, as well as separately for men, women, and groups of different characteristics. The decreasing trend of NRR reflects the declining generosity of the social security system. Rates are significantly higher for women relative to men, which is attributed to their lower earnings opportunities in the labor market. The lowest rates are recorded for men and high-educated individuals who have better prospects in the labor market in terms of high potential earnings. Conversely, the highest rates are observed for individuals with children and those who are low-educated. A clear pattern emerges that NRR increases with the length of unemployment spell, which points to the negative selection of individuals with a low ability for long-term unemployment. The share of individuals with an NRR above 0.8 is calculated at the bottom of Table 6. The pattern shows that the incidence of high social benefits is prevalent among the unemployed with children, the low-educated, and the long-term unemployed. Therefore, the existence of a welfare trap is likely to be present among these groups.

7 Results

In this section, we test for the effect of NRR on the transition probabilities of the unemployed to employment, controlling for the individual socio-demographic characteristics, local labor market attributes, and regional and time-fixed effects.

7.1 Estimation strategy

The model is estimated as the reduced form equation defined as the probability of transition from unemployment to employment. The indicator function E is defined. The individual makes the decision to remain unemployed $(E_i = 0)$ rather than enter employment for which they are qualified $(E_i = 1)$ because earnings or other working conditions are less attractive than the option of not working. In the

estimation, constraints on the demand side are approximated by local labor market characteristics (i.e. the district unemployment rate and regional fixed effects). The key variable in the model is the incentive to enter employment in the presence of social benefits. The probability of transition from unemployment to employment is expressed as:

$$P(E_i=1|X_i)=\Phi(\alpha NRR_i + X_i\beta), \quad (9)$$

where NRR is the ratio of household income under the non-working and working alternative, X_i includes individual characteristics. $\Phi(.)$ is the logistic cumulative distribution function, and equation (9) is estimated by the standard Logit model. The estimated coefficient on NRR tests for the existence of the welfare trap. In order to explore the hypothesis, the sensitivity of the estimated parameter is explored among different groups of unemployed but also to the inclusion of job-search intensity.

7.2 The effect of social benefits on the transition from unemployment to employment

Equation (9) is estimated for different groups with the results reported in Table 7. Column 1 shows the baseline model estimates from total sample. The coefficient on NRR is significant and negative, in line with the hypothesis, which means that individuals who receive relatively higher social benefits are also more likely to remain unemployed. Estimates imply that, *ceteris paribus*, if NRR were to decrease from a value of 0.8 to 0.68 (a decrease by one standard deviation to the mean value), there would subsequently be an associated change in the transition probability from 8.7% to 9.2%. The existence of the welfare trap and its prevalence among different groups is discussed further below. The estimated effects of demographic characteristics on transition probabilities are consistent with the previous literature. Labor supply is often a joint decision within couples, as observed by Galuscak and Pavel (2007). Moreover, married persons are more likely to leave unemployment for a job, as empirically confirmed by Sorm and Terrell (2000). Estimates further imply that unemployed persons who live with an employed spouse exhibit a higher propensity to enter employment. Coefficients on a female dummy in Table 7 are negative; thus, suggesting that women are disadvantaged in the transition to employment with at least two reasons discussed within the existing literature. Women are placed in a disadvantaged position, first, by the responsibility for childcare (Bicakova, 2010) and second, the lower earnings opportunities in the labor market (Jurajda, 2003). The presence of young children in the family implies a negative impact although variables are not significant at the conventional levels.[11] In general, people with less education have a lower propensity to enter employment relative to those

[11] Low significance possibly arises because the presence of children delivers the reverse impact on labor supply behaviour by gender. When the equation is estimated separately by gender, the presence of a 3-5 year old child in the family translates to the lower probability of transitioning to work for women by 1.2 percentage points, and the coefficient is significant at the 5 per cent level. For men, the estimate implies a significant positive effect of 1.4 percentage points. The presence of older children in the family has no association with the dependent variable.

with more education. Furthermore, workers who were not employed prior to unemployment display a lower ability to exit unemployment. This predominantly concerns women who worked in the household or provided childcare. The longer duration of unemployment has a rather strong negative effect on the outflow from unemployment. All individuals in the sample have been unemployed for at least 6 months. Estimates imply that the chances of exiting unemployment decrease by around 3 percentage points for those unemployed with a spell longer than 12 months and by 7 percentage points if the spell lasts for more than 2 years. Individuals with partial health disability have a lower propensity to leave unemployment for a job by 3 percentage points. A higher unemployment rate in the local labor market indicates fewer employment opportunities and consequently lower chances of finding a job. Estimates from the baseline model in Column1 imply that, *ceteris paribus*, an increase in one standard deviation in the unemployment rate is associated with a decline by 0.25 percentage points in the propensity to leave unemployment for employment.

Finally to confirm that results are not driven by the number of children, the equation is estimated including the interactions of NRR with the number of children in the household.[12] The estimates confirm the robustness of the benchmark regression, while the effect of NRR is negative and significant (the size of the coefficient is larger in magnitude -4.2 and significant at the 5% level), and the interaction terms are not significant.

7.3 Which groups are affected?

The transition from unemployment to employment varies with economic incentives. Previous studies indicate that motivation may be particularly low for those unemployed with children as well as individuals who have lower chances of getting a better paid job. To test this hypothesis, equation (9) is estimated separately for the unemployed living in families with and without children (see Table 7 in Columns 2 and 3). The effect of social benefits (represented by NRR) is negative and significant at the 5 per cent level for childless individuals, while it is not significant for those with children. This result points to the existence of a welfare trap within the former group yet not within the latter group. An alternative explanation consistent with the estimates is that social benefits attached to families with children are high (as shown in Table 6) although the variation in NRR is insufficient to explain the outflow from unemployment. Accordingly, this means that the transition probability for this group is determined by factors other than the level of social benefits. Estimates suggest that it is rather the childless unemployed with low-earnings opportunities who are vulnerable to the welfare trap. To further support this argument, equation (9) is estimated separately for individuals with low (primary or lower secondary) and high (upper secondary or tertiary) educational attainment. Given that education is a strong predictor of labor income, the withdrawal of means-tested benefits associated with entering low-paid work can lead to a no significant increase in total income in the case of low-educated

[12] I thank Mikolaj Herbst who suggested the robustness check. Results are available on request.

individuals. Results in Columns 4 and 5 reveal that the effect appears to be concentrated in the groups with low education; indeed, for the group with high education, the effect is close to zero and statistically insignificant. Overall, the results reveal that relatively high social benefits constitute a welfare trap for potentially low-income workers, and the existence of a welfare trap was not confirmed for those unemployed with children.

7.4 Unemployment duration dependence

The last three columns of Table 7 present results from the specification containing individuals by the length of unemployment spell. The negative duration dependence was confirmed by Sorm and Terrell (2000), implying that the longer an individual is unemployed, the less likely they are to leave that state. Negative dependency arises due to the unobserved heterogeneity that those who are unemployed for longer spells are less motivated or have other characteristics that render them less favourable to employers. According to that hypothesis, the welfare trap is more likely to be present among long-term unemployed who have the lowest chances of improving their economic conditions in the labor market. The estimate on NRR is negative and significant for those unemployed for a spell longer than two years, while coefficients are not significant for those unemployed for shorter spells. Estimates indicate that the negative dependency observed in the Czech labor market is accompanied by the existence of a welfare trap.

7.5 Gender differences

As discussed above, women are disadvantaged in the transition from unemployment to employment. Relative to men, women face lower earnings possibilities, and consequently, the relative level of social benefits is higher for women. For this reason, the amount of social benefits can have an impact that varies on the economic incentives of men and women to find a job. Equation (9) is estimated separately for men and women and for groups along different dimensions in Table 8 in order to examine whether there is a heterogeneous effect of social benefits on the labor supply behavior of men and women. The dimensions considered are the presence of children, education, and unemployment duration. In general, the results reveal that women are more vulnerable to the welfare trap than men. The existence of a welfare trap is confirmed for women without children, the low-educated and the long-term unemployed, while the estimate on NRR for women living in families with children is proven not to be significant. This also means that the transition probability for this group is determined by other factors (such as education, the economic status of spouse, the age of children, etc.) rather than the level of social benefits. For men, the average estimated coefficient on NRR is negative and significant yet is imprecisely estimated for the sub-groups of the male sample. Finally, the estimates of models that include observations before and after 2000 are presented.[13] These estimates are consistent with the findings of Sorm and Terrell (2000), who document that the labor market was characterized

[13] The results are robust to the choice of split around 2000.

by a high mobility of workers with short unemployment spells prior to 2000. The existence of a welfare trap is confirmed in the period after 2000. The estimate on NRR is significant for women at the 1 per cent level, while it is not significant at the conventional level for men.

7.6 Job-search intensity

The theoretical framework derived in section 4 demonstrates that higher job-search intensity increases transitions to employment. The relationship is tested empirically for the sub-sample in the period 2002-2005, given that the information on search channels is not provided for the whole period. Table 9 shows the estimates of the baseline model for the sub-sample together with the estimates separately by gender. Next to it, the equations are estimated with the additional control of job-search intensity. Estimates on search intensity provide evidence that those unemployed who use multiple channels of job searching are more successful in finding a job and exiting unemployment. Importantly, the inclusion of the search intensity variable only slightly affects the estimates on NRR. The existence of a welfare trap is documented for women; however, it is not significant for the total sub-sample (t statistics are 1.54) and men (t statistics are 0.86).

8 Conclusions

The social security system in the Czech Republic has been assessed by several studies as generating potential disincentive effects (welfare trap) for some unemployed individuals. This paper combines the information from Czech Labor Force Surveys and the Czech Household Income Survey to demonstrate the effect of the tax and social security systems on individual flows from unemployment to employment. The analysis presents empirical evidence that relatively high social benefits reduce the incentives to exit unemployment for individuals with low-earnings opportunities in the labor market. The analysis documents the disadvantaged position of women in the Czech labor market. Due to lower earnings in employment, women face high replacement rates relative to men. The estimates imply that women outflows to employment are particularly influenced by the high social benefits, and the existence of a welfare trap persists even when the job-search intensity is controlled. This finding contributes to the discussion on the persistent and large unemployment gender gap in the Czech Republic initiated by Lauerova and Terrell (2005).

Finally, the analytical results advocate for policy improvements towards low-income households. A better harmonization of the tax and social security systems is necessary in order to ensure that the incentives to leave unemployment are not hampered by high social benefits. The suggested solution that would help the unemployed return to work is to allow individuals to receive full social benefits for some period while they are earning an income. To further strengthen the incentives, the measure should be accompanied by improvements to monitoring and to the enforcement of job search.

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Appendix 1

Table 1: Minimum subsistence level (% average of monthly net income)

Year	Personal benefit depends on age				Household supplement depends on household size				
	0-5	6-9	10-15	above 16	1	2	3	4	5
1995	27	20	22	26	12	16	20	20	22
1996	24	18	20	23	13	17	21	21	24
1997	24	18	20	23	12	16	20	20	22
1998	23	17	19	22	14	19	23	23	26
1999	22	16	18	21	16	21	26	26	29
2000	21	15	17	20	15	20	25	25	28
2001	20	15	17	20	16	20	25	25	28
2002	19	14	15	19	15	19	24	24	26
2003	18	13	15	18	14	18	22	22	25
2004	17	12	14	17	13	17	21	21	24
2005	16	12	13	16	13	18	22	22	24

Source: Ministry of Labor and Social Affairs of the Czech Republic

Note: Amounts are computed relative to the nominal monthly net income of an average production worker living in a single household (see Column 2 in Table 5).

Table 2: Minimum subsistence income computed for typical households (% average of monthly net income)

Year	Single	Single+children	Couple	Couple+children
1995	38	92	67	117
1996	36	86	63	109
1997	35	85	62	108
1998	37	86	64	108
1999	37	86	64	107
2000	36	81	60	102
2001	36	81	61	101
2002	33	75	57	94
2003	32	71	54	89
2004	30	67	50	84
2005	29	66	49	82

Source: Ministry of Labor and Social Affairs of the Czech Republic

Note: Subsistence is computed from Table 1 as the sum of personal benefits for all family members based on their age and the household supplement based on the family size. A family with two children aged 3 and 8 is assumed.

Table 3: Summary statistics – individual characteristics

	Total		Men		Women	
	mean	s.dev	mean	s.dev	mean	s.dev
N	28338		9384		18954	
Transition to employment	0.09	0.29	0.09	0.29	0.09	0.29
Female	0.67	0.47				
Married	0.61	0.49	0.56	0.50	0.63	0.48
Spouse is employed	0.48	0.50	0.31	0.46	0.57	0.50
No children	0.38	0.49	0.48	0.50	0.33	0.47
Child 0-2y	0.04	0.20	0.11	0.32	0.01	0.08
Child 3-5y	0.15	0.36	0.13	0.33	0.17	0.37
Child 6-9y	0.25	0.43	0.18	0.38	0.28	0.45
Child 10-15y	0.30	0.46	0.23	0.42	0.33	0.47
Edu: primary	0.33	0.47	0.35	0.48	0.32	0.47
Edu: lower sec	0.45	0.50	0.50	0.50	0.42	0.49
Edu: upper sec	0.20	0.40	0.12	0.33	0.24	0.43
Edu: tertiary	0.03	0.16	0.03	0.18	0.02	0.14
Age	39.81	9.10	40.91	9.25	39.26	8.98
Spell 0.5-1 years	0.32	0.47	0.31	0.46	0.32	0.47
Spell 1-2 years	0.28	0.45	0.27	0.44	0.28	0.45
Spell >2 years	0.41	0.49	0.42	0.49	0.40	0.49
Before: employment	0.76	0.43	0.88	0.33	0.70	0.46
Before: household	0.08	0.27	0.01	0.08	0.11	0.32
Before: childcare	0.09	0.28	0.00	0.04	0.13	0.33
Before: other	0.08	0.27	0.12	0.32	0.06	0.24
Partial disability	0.13	0.34	0.15	0.36	0.12	0.33
Search intensity	3.74	1.24	3.71	1.24	3.75	1.23
Unemployment rate	10.84	4.91	11.16	4.95	10.68	4.88

Source: Labor Force Survey 1995-2005, the Czech Republic

Note: Information on search intensity is only available for the 2002-2005 period.

Table 4: Household typology (in %)

Household type	Census 2001	Estimation sample		
		Men	Women	Total
without children	65	48	33	38
one child	17	20	28	26
two children	15	19	28	25
three or more children	3	13	11	12
unknown	1	0	0	0

Source: Census information is taken from Jahoda (2004), Labor Force Survey 1995-2005

Table 5: Wage level and unemployment rate statistics at national and district level

Year	National avg gross wage (CZK) (1)	National avg net wage (CZK) (2)	Avg wage in districts as % of (1) lower quintile (3)	upper quintile (4)	Unemployment rate in districts lower quintile (5)	upper quintile (6)
1995	8170	6291	86	107	1.15	5.83
1996	9684	7457	86	106	1.47	6.73
1997	10698	8344	85	106	2.53	9.50
1998	11709	9133	84	107	4.06	12.53
1999	12651	9868	84	107	5.20	15.48
2000	13484	10383	83	106	4.35	15.60
2001	14793	11391	80	103	4.49	15.42
2002	15857	12210	79	102	5.14	16.62
2003	16917	12857	80	102	5.61	17.38
2004	18035	13707	80	102	5.83	17.08
2005	18937	14392	80	102	4.88	15.24

Source: Czech Statistical Office

Note: The average nominal gross monthly wage (in CZK) and registered unemployment rate were collected in 77 districts. Average nominal net wage (in CZK) assumes the effective tax rate of a single person without children. In every year, districts are divided into quintiles by the level of average gross wage and unemployment rate. Average values for districts in lower and upper quintiles are reported.

Table 6: Net Replacement Rate of different groups in the sample

Year	**Total**	**Men**	**Women**	**Childless**	**Has children**	**Low edu**	**High edu**	**Spell 0.5-1y**	**Spell 1-2y**	**Spell >2y**
1995	0.74	0.67	0.77	0.61	0.79	0.76	0.63	0.72	0.73	0.80
1996	0.72	0.63	0.76	0.59	0.78	0.74	0.62	0.71	0.72	0.77
1997	0.70	0.63	0.74	0.59	0.77	0.73	0.62	0.70	0.68	0.76
1998	0.71	0.64	0.74	0.60	0.77	0.74	0.62	0.68	0.71	0.76
1999	0.71	0.65	0.75	0.61	0.77	0.75	0.61	0.68	0.71	0.76
2000	0.70	0.62	0.73	0.58	0.76	0.73	0.59	0.68	0.69	0.73
2001	0.69	0.61	0.73	0.59	0.75	0.71	0.61	0.66	0.69	0.71
2002	0.68	0.60	0.73	0.57	0.76	0.71	0.59	0.66	0.67	0.70
2003	0.67	0.58	0.71	0.55	0.74	0.69	0.57	0.64	0.66	0.69
2004	0.65	0.56	0.70	0.55	0.73	0.68	0.54	0.61	0.64	0.68
2005	0.64	0.54	0.69	0.54	0.71	0.67	0.54	0.63	0.62	0.66
average NRR	0.69	0.60	0.73	0.57	0.75	0.71	0.59	0.67	0.68	0.71
% NNR>0.8	0.21	0.17	0.23	0.10	0.28	0.26	0.03	0.15	0.19	0.28

Source: Author's computations.

Note: Individuals with a low level of education are defined as those who have primary and lower secondary. Individuals with upper secondary and tertiary education are defined as a high level of education.

Table 7: Transition probability from unemployment to employment and NRR

	Total		Childless		Has children		Low edu		High edu		Spell 0.5-1y		Spell 1-2y		Spell >2y	
	(1)		(2)		(3)		(4)		(5)		(6)		(7)		(8)	
NRR	-0.034	**	-0.053	**	-0.03		-0.035	**	0.016		-0.049		-0.02		-0.043	**
	(0.017)		(0.023)		(0.035)		(0.018)		(0.051)		(0.044)		(0.035)		(0.019)	
Married	0.019	***	0.02	***	0.018	***	0.022	***	0.002		0.043	***	0.027	***	0.004	
	(0.004)		(0.006)		(0.006)		(0.004)		(0.013)		(0.011)		(0.009)		(0.005)	
Spouse is employed	0.012	***	0.004		0.016	**	0.01	**	0.017		0.012		0.015	*	0.009	*
	(0.004)		(0.006)		(0.007)		(0.005)		(0.012)		(0.011)		(0.009)		(0.005)	
Child dummy 0-2y	0.005				0.005		0.004		0.017		-0.004		0.003		0.013	
	(0.007)				(0.009)		(0.008)		(0.023)		(0.019)		(0.016)		(0.009)	
Child dummy 3-5y	-0.004				-0.003		-0.002		-0.009		-0.005		-0.011		0.006	
	(0.004)				(0.005)		(0.005)		(0.012)		(0.011)		(0.010)		(0.006)	
Child dummy 6-9y	-0.004				-0.004		-0.004		-0.003		-0.011		-0.005		-0.001	
	(0.004)				(0.004)		(0.004)		(0.010)		(0.010)		(0.008)		(0.004)	
Child dummy 10-15y	0.003				0.002		-0.001		0.018	*	0.004		-0.01		0.01	**
	(0.004)				(0.005)		(0.004)		(0.010)		(0.010)		(0.008)		(0.004)	
Female	-0.009	**	0.003		-0.017	***	-0.004		-0.037	***	-0.021	**	-0.019	**	0.008	
	(0.004)		(0.006)		(0.006)		(0.004)		(0.011)		(0.010)		(0.009)		(0.005)	
Edu: lower sec	0.029	***	0.011	**	0.043	***	0.025	***			0.064	***	0.035	***	0.008	**
	(0.004)		(0.005)		(0.006)		(0.003)				(0.011)		(0.008)		(0.004)	
Edu: upper sec	0.04	***	0.016	**	0.056	***					0.089	***	0.038	***	0.016	***
	(0.005)		(0.007)		(0.007)						(0.012)		(0.010)		(0.005)	
Edu: tertiary	0.027	***	-0.001		0.043	***			-0.016		0.066	***	0.029		-0.001	
	(0.009)		(0.013)		(0.013)				(0.013)		(0.022)		(0.019)		(0.013)	
Age /100	0.384	**	0.25		0.416		0.361	**	0.521		0.647	*	0.423		0.21	
	(0.156)		(0.184)		(0.256)		(0.163)		(0.441)		(0.386)		(0.329)		(0.199)	
Age sq /10000	-0.706	***	-0.517	**	-0.731	**	-0.64	***	-1.016	*	-1.153	**	-0.82	*	-0.4	
	(0.204)		(0.239)		(0.339)		(0.213)		(0.577)		(0.508)		(0.430)		(0.253)	
Spell 1-2 years	-0.032	***	-0.03	***	-0.033	***	-0.025	***	-0.062	***						
	(0.003)		(0.005)		(0.005)		(0.004)		(0.009)							
Spell >2 years	-0.072	***	-0.074	***	-0.069	***	-0.063	***	-0.108	***						
	(0.004)		(0.005)		(0.005)		(0.004)		(0.011)							
Before: household	-0.023	***	-0.028		-0.024	***	-0.024	***	-0.022		-0.052	***	-0.028	**	-0.005	
	(0.006)		(0.019)		(0.007)		(0.007)		(0.015)		(0.016)		(0.013)		(0.006)	
Before: childcare	-0.018	***			-0.019	***	-0.017	**	-0.021		-0.056	***	-0.005		-0.008	
	(0.006)				(0.007)		(0.007)		(0.015)		(0.017)		(0.012)		(0.006)	
Before: other	-0.012	*	-0.002		-0.025	**	-0.016	**	0		-0.017		-0.012		-0.008	
	(0.006)		(0.007)		(0.010)		(0.007)		(0.017)		(0.018)		(0.013)		(0.006)	
Partial disability	-0.03	***	-0.026	***	-0.029	***	-0.026	***	-0.047	**	-0.053	***	-0.038	***	-0.009	*
	(0.006)		(0.007)		(0.008)		(0.006)		(0.020)		(0.016)		(0.012)		(0.005)	
Unemployment rate	-0.005	***	-0.003	***	-0.007	***	-0.004	***	-0.011	***	-0.011	***	-0.005	***	-0.002	***
	(0.001)		(0.001)		(0.001)		(0.001)		(0.002)		(0.002)		(0.001)		(0.001)	
Constant	-0.152	***	-0.077	*	-0.189	***	-0.148	***	-0.143	*	-0.299	***	-0.191	***	-0.105	**
	(0.031)		(0.040)		(0.053)		(0.034)		(0.085)		(0.077)		(0.066)		(0.041)	
N	28338		10726		17612		22001		6337		8990		7798		11550	

Source: Labor Force Survey 1995-2005, the Czech Republic

Note: Logit model estimates and marginal effects are reported. Year dummies and 14 region fixed effects are included. The following are base groups: male, primary education, single, no children, unemployment spell 0.5-1 year, employed before unemployment, no disability and Prague region. Standard errors in parenthesis, *** significance level 1%, ** significance level 5%, * significance level 10%.

Table 8: Estimates of NRR for different groups by gender

	Total		Men		Women	
All	-0.034	**	-0.043	*	-0.059	**
	(0.017)		(0.026)		(0.023)	
Childless	-0.053	**	-0.040		-0.077	**
	(0.023)		(0.036)		(0.030)	
Has children	-0.030		-0.073		-0.015	
	(0.035)		(0.070)		(0.043)	
Low edu	-0.035	**	-0.028		-0.078	***
	(0.018)		(0.026)		(0.027)	
High edu	0.016		-0.174		0.039	
	(0.051)		(0.112)		(0.062)	
Spell 0.5-1 years	-0.049		-0.116		-0.047	
	(0.044)		(0.074)		(0.062)	
Spell 1-2 years	-0.020		0.032		-0.106	**
	(0.035)		(0.057)		(0.049)	
Spell >2 years	-0.043	**	-0.040		-0.057	**
	(0.019)		(0.025)		(0.027)	
Year 1995-2000	-0.018		-0.031		-0.023	
	(0.027)		(0.041)		(0.039)	
Year 2001-2005	-0.044	**	-0.043		-0.088	***
	(0.022)		(0.034)		(0.031)	

Source: Labor Force Survey 1995-2005, the Czech Republic

Note: Figures in the table are the estimates of NRR from separate regressions. All models have the same specification as in Table 7. Standard errors in parenthesis, *** significance level 1%, ** significance level 5%, * significance level 10%.

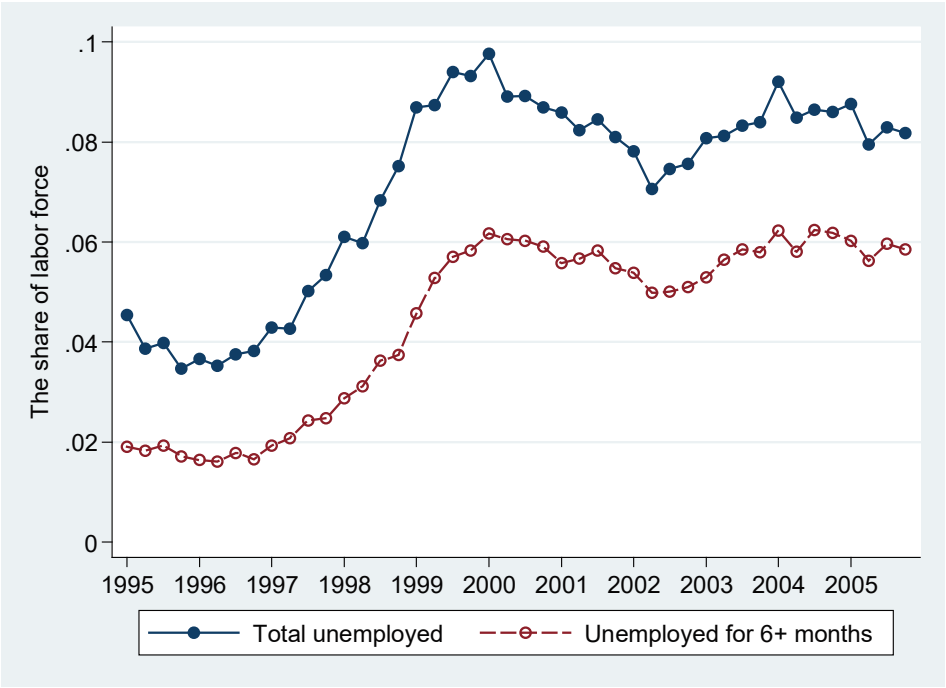
Table 9: Estimates of NRR and search intensity

	Total	Men	Women		Total		Men		Women	
	(1)	(2)	(3)		(4)		(5)		(6)	
NRR	-0.038	-0.033	-0.067	**	-0.037		-0.033		-0.064	*
	(0.024)	(0.039)	(0.034)		(0.024)		(0.039)		(0.034)	
Search intensity					0.005	***	0.006	**	0.004	**
					(0.002)		(0.003)		(0.002)	
N	12699	4242	8457		12699		4242		8457	

Source: Labor Force Survey 2002-2005, the Czech Republic

Note: All models have the same specification as in Table 7. Standard errors in parenthesis, *** significance level 1%, ** significance level 5%, * significance level 10%.

Figure 1: The unemployment rate



Source: Labor Force Survey 1995-2005, the Czech Republic

Appendix 2

The Heckman's sample selection model is applied to estimate a wage equation controlling for the selection into employment. In the first step, the probit selection equation describing the propensity to work is formulated. The predicted values from the probit regression are used to calculate the Inverse Mills Ratio (IMR) for each observation in the sample. In the second step, the wage regression is estimated with IMR as an additional regressor that will account for the bias due to the non-random nature of the sample of wage earners. The first equation is specified as follows:

$$P(E_i=1|Z_i)=\Phi(Z_i\gamma),$$

where Z includes different explanatory variables that affect the likelihood of participation of individuals in waged work $(E_i = 1)$. The IMR is calculated by the following relation:

$$IMR_i=\frac{\phi(Z_i\gamma)}{1-\Phi(Z_i\gamma)},$$

where $\phi(.)$ and $\Phi(.)$ are the density function and distribution function of the standard normal distribution, respectively. In the second step, IMR is added as an additional explanatory variable in the Mincerian wage model:

$$W_i^* = X_i\beta + \beta_{IMR} IMR_i + \varepsilon_i,$$

where W_i^* is the wage, and vector X_i includes observed variables relating to the i'th person's productivity, and ε_i is an error term. β_{IMR} is the covariance between the error terms from the wage and selection equations. Error terms in both equations are assumed to be jointly normally distributed. The system is estimated separately for men and women. The participation equation contains potential working experience and its square, education, family characteristics such as the presence of children of different ages, marital status, the presence of an economic active person in the household other than a spouse, the logarithm of other household income, the district unemployment rate, city size, and region fixed effects. The results are presented in Table 10. As expected, the presence of young children in the household is associated with the lower participation rate of women and less so of men. Higher education has a strong positive effect on participation for both genders. As expected, the availability of other household income has negative associations with employment participation. Similarly, the presence of an other employed person in the household implies the lower participation of women. In the second step, the Mincerian log-wage regression is estimated with controls including the worker's experience, education, a indicator of partial disability, and region fixed effects. The significant estimate on IMR in the wage regression points to the negative selection into employment.[14] Estimating the potential entry income of unemployed workers in the local labor market, the choice of variables in the wage regression is limited due to the fact that the prediction of income for the sample of unemployed workers does not allow us to consider work characteristics (the same approach is used in Schneider and Uhlendorff, 2006). The wage regression explains about 35% of the variation in wages. The estimated parameters of the log-wage equation are used to calculate a potential monthly full-time gross wage of every individual in the LFS. The wages for years other than 2002 are subsequently adjusted for the regional wage growth. Predicted gross monthly earnings that fell below the Czech statutory minimum gross wage (180 cases) were set to the respective level of the minimum wage.

[14] Based on the findings, the interpretation is that a woman with sample average characteristics who selects into waged employment receives around 3.2% lower wages than a woman drawn at random from the population with the average set of characteristics. The respective figure for men is 5%. These effects are computed at the average IMR values of 0.446 and 0.198 for women and men, respectively.

Table 10: Wage estimation (Heckman's sample selection model)

Equation 1: selection to employment

	Women		Men	
Work experience	-0.001		0.057	***
	(0.013)		(0.016)	
Work experience sq. /100	0.018		-0.132	***
	(0.032)		(0.039)	
Edu: lower sec	0.606	***	0.95	***
	(0.092)		(0.110)	
Edu: upper sec	0.789	***	1.264	***
	(0.095)		(0.127)	
Edu: tertiary	1	***	1.405	***
	(0.132)		(0.181)	
Partial disability	-1.73	***	-1.417	***
	(0.167)		(0.171)	
Married	0.043		0.683	***
	(0.065)		(0.094)	
Child dummy 0-2y	-1.984	***	-0.077	
	(0.086)		(0.133)	
Child dummy 3-5y	-1.347	***	-0.271	**
	(0.082)		(0.137)	
Child dummy 6-9y	-0.391	***	-0.05	
	(0.075)		(0.124)	
Child dummy 10-15y	-0.083		-0.11	
	(0.070)		(0.098)	
Other household income	-0.04	*	-0.156	***
	(0.024)		(0.030)	
Other econ. active person	-0.41	***	-0.045	
	(0.038)		(0.050)	
City size 5,000-50,000	0.132	*	0.156	*
	(0.069)		(0.090)	
City size 50,000-100,000	0.188	*	0.309	**
	(0.109)		(0.144)	
City size above 100,000	-0.124		-0.15	
	(0.113)		(0.141)	
Unemployment rate	-0.036	***	-0.041	**
	(0.012)		(0.016)	
Constant	1.495	***	0.779	***
	(0.204)		(0.266)	
N	4019		3473	
Pseudo R2	0.378		0.2448	

Equation 2: logarithm of gross monthly wage

	Women		Men	
Work experience	0.008	***	0.02	***
	(0.003)		(0.003)	
Work experience sq. /100	-0.011	*	-0.043	***
	(0.006)		(0.007)	
Edu: lower sec	0.109	***	0.064	*
	(0.026)		(0.038)	
Edu: upper sec	0.424	***	0.293	***
	(0.027)		(0.042)	
Edu: tertiary	0.714	***	0.6	***
	(0.032)		(0.045)	
Partial disability	-0.363	***	-0.389	***
	(0.078)		(0.072)	
The inverse Mills ratio	-0.076	***	-0.265	***
	(0.026)		(0.074)	
Constant	9.163	***	9.446	***
	(0.038)		(0.058)	
N	3121		3202	
R2	0.354		0.328	

Source: Czech Household Income Survey, 2002

Note: Estimation method: probit model for the selection equation and OLS regression for the wage equation The sample includes individuals aged 18-54 years old who are unemployed or full-time employees (excluding self-employed, students and persons working less than 30 hours per week). Work experience equals age minus 6 minus imputed years of schooling. Fourteen region fixed effects are included in both equations. Standard errors in parenthesis, significance level: *** 1%, ** 5%, * 10%.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