Bičáková, Alena; Slacalek, Jiri; Slavík, Michal

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Labor supply after transition: evidence from the Czech Republic

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In 2008 all ECB publications feature a motif taken from the €10 banknote.

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2 CERGE–EI, Praha, Czech Republic. CERGE–EI is a joint workplace of the Center for Economic Research and Graduate Education, Charles University, and the Economics Institute of Academy of Sciences of the Czech Republic. Address for correspondence: CERGE–EI, P.O. Box 882, Politických vězňů 7, Prague 1, 111 21, Czech Republic; e-mail: alena.bicakova@cerge-ei.cz; web: http://home.cerge-ei.cz/Alena/

3 Directorate General Research, European Central Bank, Kaiserstrasse 29, 60311 Frankfurt am Main, Germany; e-mail: jiri.slacalek@ecb.int; http://www.slacalek.com/

4 Directorate General Economics, European Central Bank, Kaiserstrasse 29, 60311 Frankfurt am Main, Germany; e-mail: michal.slavik@ecb.int

Address
Kaiserstrasse 29
60311 Frankfurt am Main, Germany

Postal address
Postfach 16 03 19
60066 Frankfurt am Main, Germany

Telephone
+49 69 1344 0

Website
http://www.ecb.europa.eu

Fax
+49 69 1344 6000

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Abstract

We extend the scarce evidence on labor supply in post-transition countries by estimating the wage elasticity of labor force participation in the Czech Republic. Using the household income survey data of 2002, we find that a one-percent rise in the gross wage increases the probability of working by 0.16 and 0.02 percentage points for women and men, respectively. Taking into account the tax and benefit system, these semi-elasticities fall to 0.06 for women and 0.01 for men. We interpret the difference between the estimates from the two specifications as a summary measure of the welfare system disincentives. The estimated wage elasticities lie at the lower end of the range of values reported for mature market economies. This finding is consistent with the stylized fact that the labor supply in countries with high labor force participation rates, such as in the Czech Republic, tends to be less sensitive to wages.

Keywords: Labor supply, transition, welfare system

JEL classification: J22, J31, P30

Non-technical Summary

Evidence on the labor supply behavior in transition and post-transition countries is scarce. In many planned economies labor force participation was obligatory and jobs were created by the government to ensure everybody was working. Although there was a gradual withdrawal from labor market during the transition from planned to market economy, labor force participation rates in many European post-Communist countries remain still high, in particular among women, when compared to the mature market economies.

The aim of this paper is twofold. First, we extend the limited knowledge of labor supply behavior in post-transition countries and provide one of the first estimates of the wage elasticity of labor force participation with Czech data. Second, we compare two alternative specifications: In the first one, we use the gross monthly earnings as the wage variable in the labor force participation model, while in the second, we substitute it with the effective net monthly wage that takes into account taxes and benefits. We interpret the difference between the two specifications as a behavior-based measure of the welfare system disincentives, which we consider to be better than the traditional ex ante make-work-pay indicators.

Using the Czech household income survey data of 2002, we find that a one-percent rise in the gross wage increases the probability of working by 0.16 and 0.02 percentage points for women and men, respectively. Replacing gross wage with the effective net wage, these semi-elasticities fall to 0.06 for women and 0.01 for men. Under both specifications, wage responsiveness of the labor force participation is higher among women and among individuals who earn lower wages. The work disincentives of the welfare system are stronger for women than for men.

Our estimates of wage semi-elasticities of labor force participation are at the lower end of the range of values documented for mature market economies. The small size of the estimates is consistent with the recent empirical evidence that the labor supply in countries with high labor force participation rates, such as in the Czech Republic, tends to be less sensitive to wages.

The estimated effects of other determinants of labor force participation, such as marital status or presence of children, are also in line with the results documented in the standard literature, which suggests that labor supply behavior in the post-transition Czech Republic is comparable to the one in the mature market economies.

Our findings show that for most prime-age individuals in the post-transition Czech Republic, labor supply does not respond much to small changes in wages. Lowering income taxes under the current social benefit structure, is therefore unlikely to substantially enhance employment.

1 Introduction

Labor markets in post-Communist countries resemble those in mature market economies. Returns to human capital, gender discrimination, unemployment duration, matching functions or wage curves have been estimated for markets in transition[1] and have been found to be comparable to the ones documented for standard market economies. However, evidence on labor supply behavior during and after transition is scarce[2] and a comparison with standard findings from market economies is lacking.

This paper investigates labor supply behavior in the Czech Republic thirteen years after the change of the political regime. Using the household income survey data of 2002, we estimate the wage elasticity of labor force participation using two different definitions of wage: gross wage, ignoring the tax and benefit system, and the effective net wage, which takes into account the taxes paid and benefits received. A comparison of the two specifications illustrates the impact of taxes and benefits on a labor supply decision. We interpret the difference between the two estimates of the wage elasticity of labor force participation as an indicator of welfare system disincentives. We consider this behavior-based measure, which reflects the actual distortionary effect of government policies on labor supply, to be a more accurate tool for policy evaluation than the (ex ante) make-work-pay indicators, reported by international organizations.[3]

We find that a one-percent rise in the gross wage increases the probability of working by 0.16 and 0.02 percentage point for women and men, respectively. When we substitute the gross wage with the effective net wage, these semi-elasticities[4] fall to 0.06 for women and 0.01 for men. Under both specifications and for both genders, wage sensitivity of the labor force participation decreases with earnings. Gross wage elasticity in the top wage

[1] See for example Orazem and Vodopivec (1997), Münich, Svejnar, and Terrell (2005b), and Münich, Svejnar, and Terrell (2005a) on returns to human capital; Hunt (2002), Jolliffe (2002), Adamchik and Bedi (2003), Jurajda (2003), Jurajda (2005), and Jurajda and Harmgart (2007) on gender discrimination; Ham, Svejnar, and Terrell (1998) and Ham, Svejnar, and Terrell (1999) on unemployment duration; Münich and Svejnar (2007) on unemployment flows and the Beveridge curve; Galuščák and Münich (2005) on the wage curve; and Galuščák and Münich (2007) on the matching function.

[2] We found only two papers that estimate wage elasticity of the labor supply in transition countries, Chase (1995) in the Czech and Slovak Republics and Saget (1999) in Hungary. They focus on the early stage of transition and find rather unexpected values (compared to the estimates for mature market economies in the 1990s). While Saget (1999) documents rather high (1.81) wage elasticity of labor force participation of Hungarian married women, Chase (1995) estimates extremely low (zero) elasticity of labor force participation of Czech married women. Blau and Kahn (2007) report that the corresponding values for the US in 1990 lie between 0.41 and 0.44. We discuss the two papers in more detail in the next section.

[3] The average and marginal effective tax rates, net replacement ratios, and welfare traps are the most popular among the make-work-pay indicators. See for example OECD (2004).

[4] While wage elasticity is defined as the percentage change in the probability of supplying work in response to a one-percent rise in wage, wage semi-elasticity describes the absolute change (in percentage points) of the probability of supplying work in response to a one-percent rise in wages.

quintile is lower, by 47 percent for women and by 85 percent for men, than the elasticity in the bottom wage quintile; the corresponding differences for the net effective wage are similar: 83 percent for men and 41 percent for women.

Our estimates of wage semi-elasticities of labor force participation are at the lower end of the range of values documented for mature market economies. The small size of the estimates is consistent with the recent empirical evidence (see Blau and Kahn, 2007 and Alesina and Ichino, 2007) that labor supply in countries with high labor force participation rates, such as the 81.6 percent for women and 94.8 percent for men in the Czech Republic in 2005, tends to be less sensitive to wages. We therefore expect a limited response of labor supply to wages also in other post-transition countries which have retained high labor force participation rates since the Communist period.[5]

The estimated effects of other determinants of labor force participation, such as marital status or presence of children, are also in line with the results documented in the standard literature, which suggests that labor supply behavior in the post-transition Czech Republic is comparable to the one in mature market economies. While other income (defined as the sum of the non-labor income of the individual and other household income, after tax and excluding social benefits); other economic activity in the household (defined as the presence of economically active members other than the analyzed individual and her spouse); and a disability reduce the labor force participation of both genders, being married and having young children has an adverse effect only on women's decision to work.

The paper is organized as follows. The next section summarizes the stylized facts about labor supply in mature market and transition economies. We then present theoretical framework for the labor supply decision, our econometric model of labor force participation, and a brief description of our data. Our main results, their interpretation and policy implications are summarized next, followed by conclusion. Definitions of key variables and further details of our estimation are presented in the Appendix.

2 Labor Supply in Mature Market and Transition Economies

The vast empirical research on labor supply in mature market economies[6] has produced many estimates of wage elasticity that span relatively broad

[5]In many Communist countries, labor force participation was obligatory and encouraged both ideologically and by institutions such as free provision of child care. Although gradual withdrawal from labor market occurred during the transition from planned to market economies, the labor force participation rates in many European post-Communist countries, remain still high, when compared to mature market economies, such as France, Germany and the US; for comparison of the labor force participation rates see Table 7 in section 7, where we interpret our results.

[6]Killingsworth (1983) and Blundell and MaCurdy (1999) provide comprehensive surveys of models, methods and findings.

intervals. The values typically range from 0 to 0.12 for men and from 0.05 to 2 for women (see for example tables 1 and 2 in Blundell and MaCurdy, 1999). Female labor supply—especially of married women and women with children—is almost always found to be more wage sensitive than that of men. While most of these estimates are based on a full labor supply model of supply of hours of work, some studies, such as ours, focus only on labor force participation, a binary decision whether to work. Most papers estimate wage elasticity with gross wages, but there is also extensive literature which takes tax and benefit systems into account.[7,8]

Among the estimates for mature market economies, the most comparable, in terms of the method, time period, and focus, with our gross wage specification are in Blau and Kahn (2007). They find that the wage semi-elasticity of labor force participation of married women in the US fell from roughly 0.43 to 0.29 between 1990 and 2000.[9]

In contrast with the substantial labor supply literature in mature market economies, research on labor supply behavior in countries after the transition from planned to market economies is scarce. To our knowledge, there are only two papers which directly estimate the wage elasticity of labor supply in transition countries: Saget (1999) (for Hungary) and Chase (1995) (for Czech and Slovak Republic).[10] Similar to this work, the two studies focus on labor force participation rather than the supply of hours worked. Their estimates come from the early phases of transition and their scope is limited to labor supply behavior of married women. Both papers specify labor force participation as a function of gross wage, ignoring income taxes and social benefits.

Saget (1999) estimates a labor force participation model with a relatively small sample of 720 prime aged (24 to 54 years old), married women using data from 1992. Women on maternity leave and unemployed women are excluded from the sample, which prevents direct comparison with the existing literature that typically leaves these two groups in the sample. Based on her estimation, Saget finds the wage elasticity of labor force participation of Hungarian married women in 1992 to be 1.81,[11] a value which is much

[7] See for example the Special Issue on Taxation and Labor Supply in Industrial Countries of *the Journal of Human Resources,* 25(3), Summer 1990. A comprehensive overview of the literature that estimates the effect of taxes and benefits on labor supply can be also found in Hausman (1985) and Moffitt (2002).

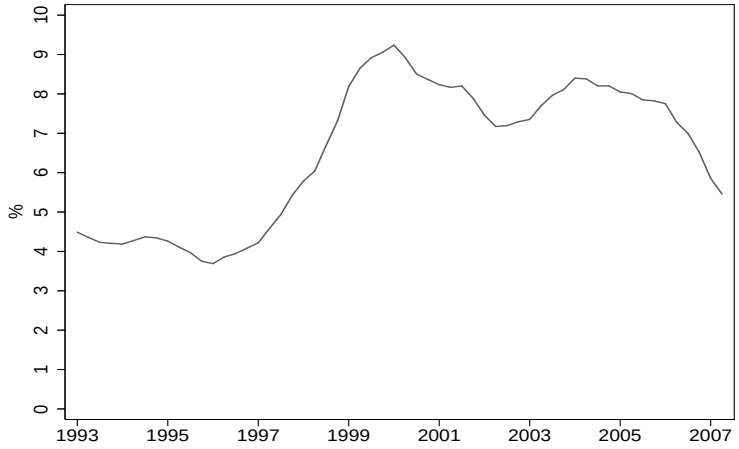
[8] Recent literature estimates wage sensitivity of labor supply using natural experiments such as changes in labor market policies. Although these methods are almost certainly superior to the simple estimation based on cross-sectional variation, neither panel data nor natural experiments isolated from the rest of the changes are available in the Czech Republic or other transition countries.

[9] The wage semi-elasticities reported in Blau and Kahn (2007), table 6 range across the four alternative specifications they estimate between 0.41 and 0.44 in 1990 and between 0.27 and 0.30 in 2000.

[10] Bonin and Euwals (2005) also explore the labor force participation of married women in East and West Germany during the 1990s, after the German reunification, and use earnings as one of its determinants. However, they do not focus on wage elasticity and only mention the significant and positive relationship they find between participation and wages (without presenting the marginal effects or calculating the elasticities).

[11] The value of 1.81 seems also hard to reconcile with another representation of Saget's

Figure 1: The Unemployment Rate in the Czech Republic (Percent)



Source: Aggregate unemployment rate of total population aged 15 years and above. Czech Statistical Office, seasonally adjusted, ILO definition.

higher than for example roughly 0.75 implied by the estimates of Blau and Kahn (2007) for the US in 1990.[12]

Chase (1995) compares labor force participation of Czech and Slovak married women (between 20 and 69 years of age) before (in 1984) and after (in 1993) the change of the political regime and the division of Czechoslovakia. In the specification that uses only the predicted own and husband's earnings in the labor force participation equation, which is the most comparable to our analysis here, Chase finds that the wage semi-elasticity of labor force participation changed from 0.54 to zero[13] for the Czech and from 0.49 to 0.63 for the Slovak married women between the two years.[14]

In 1993, four years after the change of the political regime, both the Czech and Slovak Republics were still undergoing reforms and structural changes as a part of the transition process from planned to market economies. At that time, the phenomenon of unemployment had not yet emerged in the

findings that "a one forint increase in the predicted wage [of a representative woman who earns 80 Ft per hour, i.e., a 1.25 percent increase in wage] ... is estimated to increase the probability of her working by 3.6 per cent," p. 589 (which at the average participation rate of 75 percent corresponds to the elasticity of 3.8). The marginal effect corresponding to the 1.81 elasticity and 75 percent participation rate on the other hand is 1.36.

[12]Blau and Kahn (2007) estimate that the wage semi-elasticity of participation is roughly 0.43, which combined with the participation rate of 57.5 percent implies the elasticity of $0.75 = 0.43/0.575$.

[13]The estimated value (which is actually negative, -0.13) is insignificant at the 10 percent level. Similar to Saget (1999), however, standard errors do not seem to be corrected for the presence of predicted variables in the second-stage probit estimation.

[14]The only exception to the wage inelastic labor supply behavior of Czech married women in 1993 that Chase finds when he repeats his estimation for samples stratified by age is the wage elasticity of more than 50 year olds, which is positive, significant and relatively large (0.7).

Czech Republic as a noticeable labor market problem (the unemployment rate was only 4.3 percent in 1993). Compared to other transition economies, the Czech Republic had one of the lowest unemployment rates during the first phase of its transition. However, in the second half of the 1990s, when the country entered its first recession, which induced further restructuralization, unemployment rose from 4 percent in 1996 to almost 9 percent in 2000, as illustrated in Figure 1.[15] We therefore expect the labor supply behavior and the values of wage elasticity of labor force participation in the Czech Republic in the new steady-state path of the post-transition period to differ substantially from the one during the turbulent years of the early phases of transition, as documented in Chase (1995).

3 Model of Labor Supply Decision

The theoretical framework of our analysis is the standard static model of labor supply.[16] An individual maximizes her utility

$$\max_{\{c,h\}} \quad u(c,h)$$

subject to

$$c = w\,h + T(w\,h, y, X) + y, \quad 0 \leq h \leq H,$$

where u is a utility function which depends positively on consumption c and negatively on the number of hours h of work.

The individual consumes the sum of her total earnings $w \times h$, her non-labor income and other household income y (pre-tax and without social transfers), and the transfers she gets minus the taxes she pays, as determined by function $T(\cdot)$. The parametrization of T is given by the tax and benefit system, where the amount of taxes and transfers depends on the level of various types of individual and household income, as well as on the demographic characteristics (X) of the household. Working hours are restricted to range from zero to the maximum amount H, so that $H - h$ is the number of hours of leisure.

The maximization problem can be solved in two stages: First is the choice of the optimal number of hours conditional on working, and second , for the optimal decision whether to work. The solution to the first stage is given by the first order condition in which the optimal number of hours of work h^* (subject to $0 < h \leq H$) solves the equation

$$(1 - \tau^h)w = -\frac{\frac{\partial\, u(c,h)}{\partial\, h}}{\frac{\partial\, u(c,h)}{\partial\, c}},$$

[15] See for example Svejnar (2002) for development of the Czech labor market in the context of other transition countries.

[16] The notation is based on a modified version of the model in Eissa, Kleven, and Kreiner (2004), extended to capture the household structure and to include the individual's non-labor and other household income. Fixed costs of working are omitted as they are not fundamental to the basic idea of the model. The flexible form of our econometric model, however, allows for the presence of the fixed costs of working.

where $\tau^h = \frac{\partial T(w\,h,y,X)}{\partial\, w\,h}$ is the *effective marginal tax rate of working an additional hour*, which includes both the direct marginal tax rate and the reduction in benefits due to the increased earnings. The solution to the second stage is determined by comparing the utility of working and that of not working. An individual will work if the former exceeds the latter:

$$u(h^*, c^*) \geq u(0, c_0).$$

Optimal consumption if the individual does not work (c_0), equals the benefits she receives if not working plus her non-labor and other household income,

$$c_0 = T(0, y, X) + y.$$

Optimal consumption if working is the total individual's labor, non-labor, and other household income plus net transfers (benefits received minus taxes paid). It may be expressed as

$$c^* = w\,h^* + T(w\,h^*, y, X) + y = c_0 + (1 - \tau) w\,h^*,$$

where

$$\tau = \frac{T(0, y, X) - T(w\,h^*, y, X)}{w\,h^*}$$

is the *effective marginal tax rate of transition from not working to working.* The optimal number of hours of work h^{**} is therefore given by

$$\begin{aligned} h^{**} &= h^* && \text{if } u(h^*, c^*) \geq u(0, c_0), \\ h^{**} &= 0 && \text{otherwise.} \end{aligned}$$

h^{**}, which is a function of all the parameters of the model, fully describes the individual's labor supply.

As described above, the labor supply decision consists of two parts. The first is the labor force participation decision or the decision at the *extensive margin*, which is the decision to supply labor at all. The second is the choice of the number of hours of work (conditional on the decision to work), also referred to as the decision at the *intensive margin.* A change in the parameters may induce individuals to move along the intensive margin (adjust the number of hours of work supplied) or to cross the extensive margin (stop or start working).

As we estimate a model of labor force participation decision, we limit our focus to the extensive margin only. We do so for the following reasons: First, in most occupations, people cannot choose the number of hours of work freely, but rather have them specified as part of their contract. People have therefore mostly control over the supplied hours of work only in the long run, when they choose the type of job. Second, different occupations are often characterized by different hours and wage combinations.[17] If individuals choose their hours of work and their pay jointly, when choosing their jobs,

[17]For example, consulting jobs typically pay a high per hour wage but require long working hours while the opposite is true of some jobs in the public sector.

a consistent estimation of labor supply of hours worked requires that two separate equations for hours and wage are estimated simultaneously (such as in Moffitt, 1984). Third, previous research suggests that hours of work are typically over-reported and suffer from substantial measurement error.[18] Fourth, wage elasticity of labor supply seems to be much higher at the extensive rather than at the intensive margin (see Heckman, 1993), so that the largest impact of any changes in wages are expected to be on the entry to or exit from the labor market. We therefore choose labor force participation decision as our specification of labor supply, as the one that is less affected by the listed estimation problems and also the one that is more relevant from a policy perspective.

4 Econometric Model

4.1 Labor Force Participation Decision

Denote LFP_i as the indicator that equals one if individual i decides to supply her labor on the market and zero otherwise. The theory suggests that LFP_i depends on the *effective net wage* (gross wage net of the explicit and implicit taxes implied by the effective marginal tax rate of transition from not working to working); individual's non-labor income and other household income;[19] household characteristics (X_i) and other factors that reflect individual preferences; and cost of working among others:

$$LFP_i = f\big((1-\tau_i)w_i, y_i, X_i, \dots\big).$$

In order to estimate the effect of wage on labor force participation decision, we approximate the optimal number of hours of work h_i^{**}, by the following equation:

$$h_i^{**} = \alpha \ln\big((1-\tau_i)w_i\big) + X_i'\beta + \varepsilon_i,$$

where $(1-\tau_i)w_i$ is the effective net wage, X_i is a vector of all other variables that affect her decision to work, and ε_i is an error term assumed to be independent and normally distributed across individuals, $\varepsilon_i \sim N(0, \sigma_\varepsilon^2)$.

The probability that individual i supplies her labor is given by

$$\Pr(LFP_i = 1) = \Pr(h_i^{**} > 0) = \Pr\big(\alpha \ln\big((1-\tau_i)w_i\big) + X_i'\beta + \varepsilon_i > 0\big).$$

Given our assumptions about the error term ε_i, the labor force participation decision, as described by LFP_i, can be estimated by a standard probit model:

$$\Pr\big(LFP_i = 1 \big| (1-\tau_i)w_i, X\big) = \Phi\big(\alpha \ln\big((1-\tau_i)w_i\big) + X_i'\beta\big),$$

[18] See Bound, Brown, Duncan, and Rodgers (1989) and Juster and Stafford (1991) for the evidence on misreporting.

[19] If utility is linear in c, the individual's non-labor and other household income (y), which does not depend on working, cancels out.

where $\Phi(\cdot)$ is the standard normal cumulative distribution function. As the model is non-linear, the impact of the right-hand side variables has to be expressed in terms of the marginal effects evaluated at different values of the independent variables.[20]

We follow the standard approach in the literature and define $LFP = 1$ for individuals who are working, and for those who do not have a job but seek employment, and $LFP = 0$ for those who neither work, nor wish to work, the so-called inactive. This corresponds to the standard definition of labor force as the sum of employed and unemployed.[21] The assumption is, in contrast with the inactive, the unemployed do not work only due to the demand constraints, as no jobs are available.[22]

Although standard, this assumption somewhat limits the relevance of our findings for policy: It is both the supply and demand side of the labor market that need to be in focus for employment enhancing policies. There is no guarantee that any policy-induced increase in labor supply will be met by a corresponding increase in labor demand (that additional individuals interested in working will find a job).[23]

Even if we limit our focus to labor supply defined as desired employment, we have to bare in mind that labor force participation may be affected by the demand side conditions not only through the market wage but also through the shortage of jobs. The discouraged workers desire to work but (because of an unsuccessful job search) stopped seeking employment, and therefore are not classified as supplying their work. In our estimation, we proxy the differences between the constraints on the demand side by regional indicators and local unemployment.

The key variable in the model is the individual's wage; the main parameter of interest is α. As wage enters the equation in logarithm, the marginal effect corresponding to the coefficient α, of wage on the probability of supplying labor is the *wage semi-elasticity of labor force participation.* The wage elasticity can be calculated by dividing the semi-elasticity by the probability of labor force participation or by the labor force participation rate.

We estimate two specifications of this model: In the first, we use the gross

[20] See for example Baltagi (2002), p. 339.

[21] The standard ILO definition of unemployment requires two other conditions to be met besides the expressed desire to work: availability to start working and active job search.

[22] The labor supply decision of the unemployed is not straightforward. The job search literature tends to regard the unemployed and the inactive as one group of non-employed, with the inactive characterized by a very high reservation wage. Moreover, in particular in most of Europe, where unemployment benefits and their duration are high and the eligibility criteria for receiving them are not as strict, it is often believed that many (in particular the long-term) the unemployed do not in effect supply their work but instead only rely on government support.

[23] In a related paper (Bičáková, Slačálek, and Slavík, 2006) which evaluates the fiscal effects of personal income tax reforms in the Czech Republic in 2006, we estimate the probability of working, where the employed are contrasted with the non-employed, who include both the unemployed and the inactive. The reason for this specification there is we are mostly interested in the probability of employment, i.e., in both the labor supply reaction to the changes in taxes as well as to what extent it is constrained by the labor demand.

monthly earnings as the wage variable, and in the second, we replace it with the effective net monthly wage, which takes into account taxes and benefits. We interpret the difference between the results from the two specifications as an indicator of the welfare system disincentives.

The construction of the wage variable is described in detail in the next section. Other right-hand side variables include other income, other economic activity in the household and binary indicators of marital status, presence of children of different ages, education, and disability.[24]

Previous findings suggest that the effects of wage as well as other right-hand side variables on the decision to work are often very distinct for women and men.[25] Following the literature surveyed above, we estimate the model separately by gender.

4.2 Prediction of Gross Wages

The econometric specification presented above uses information on wages, whether actual or potential, for all individuals. However, potential wages for those who do not work, are not observed. We use the standard Heckman (1979) model to estimate the wage equation on the sample of workers, taking into account the selection to employment. We specify a system of wage and selection equations, allowing for the correlation between the two error terms. The system is estimated jointly by maximum likelihood as a bivariate probit model.[26] Again, the estimation is done separately by gender. The bias-corrected estimated wage equation is used to predict the gross hourly wage for everybody in our sample.

We then transform the predicted gross hourly wage into full-time equivalent gross monthly wages,[27] assuming 40 hours of work per week and 4.3 weeks per month.[28] In the estimation of the labor force participation model, we use the two specifications mentioned above: the first with the predicted full-time equivalent gross monthly wage, and the second with the effective net wage, which is the predicted full-time equivalent gross monthly wage net

[24] The definition variables can be found in section A.1 of the Appendix.

[25] In particular, the presence of children typically has a positive (but often insignificant) effect on the labor supply of men, while it has a highly significant and negative effect on the labor supply of women. See for example Bičáková et al. (2006).

[26] The specification of the two equations of the Heckman model is described in detail in section A.2.1 of the Appendix.

[27] The predicted gross monthly earnings that fell below the Czech statutory minimum wage in 2002 (36 individuals or 0.5 percent of the predicted wages) were set to the level of the minimum wage of 5,700 CZK. (Using the exchange rate of August 20, 2007: 1 USD = 20.56 CZK, this is about 280 dollars.)

[28] To construct the net monthly earnings of non-workers, we need to assume how many hours they would work. We also need this information to be able to determine into which tax bracket they would fall. Given that the part-time employment opportunities in the Czech Republic are still rather limited and most of the employed in the sample work full-time (forty hours per week), we simply assume that should non-workers start working, they would work full-time. (The share of individuals working part-time, i.e., less than 35 hours a week, among the individuals with valid weekly hours information is 6.72 percent for women and 1.45 percent for men in our sample.)

of any taxes and transfers. We describe the method for the construction of the effective net wages in the next section.

Our econometric model requires at least one exclusion restriction for identification of the wage equation and one exclusion restriction for the identification of labor force participation.[29] We use standard demographic characteristics such as marital status, children, household composition, and other income (excluding social transfers) as the variables affecting the probability of working but exclude them from the wage equation, as they are unlikely to have an impact on an individual's current wage. Dummy variables for regions and the degree of urbanization of the residence[30] are assumed to affect the wage levels but not the probability of supplying labor.[31]

Finally, the standard errors (of the coefficients and of the marginal effects) from the model of the labor force participation are bootstrapped to account for the fact that we are using a predicted wage variable in the estimation.

4.3 Construction of Effective Net Wages

The effective net wage is then constructed from the gross wage as

$$ENW_i = (1 - \tau_i) \times GW_i,$$

where GW_i denotes the predicted gross monthly wage of the individual i. τ_i is the individual-specific effective marginal tax rate of the transition from not-working to working, defined as[32]

$$\tau = 1 - \frac{NW + (SB_{work} - SB_{nonwork})}{GW},$$

where NW is the predicted gross monthly wage net of any taxes or social contributions such as mandatory health and social insurance, SB_{work} are social benefits if working, and $SB_{nonwork}$ are social benefits if not working. As the social benefits often depend on household composition and typically target entire households rather than individuals, we include the total social transfers at the household level in SB_{work} and $SB_{nonwork}$. The structure of the benefit system implies that an individual's decision to work will affect the social transfers received by the entire household. The model implies that this reduction will be one of the factors considered in the individual's labor supply decision.

[29] The exclusion restrictions require that at least one right-hand side variable is unique to each of the two equations, i.e., is present in one equation and not in the other.

[30] In addition, when we control for the wage in the labor force participation equation, we find that age is no longer significant. We therefore exclude age from the final model and use it as an additional exclusion restriction.

[31] Both sets of exclusion restrictions have been tested by the simple procedure of including them one at a time in the equation from which they are excluded and checking their significance with t statistics.

[32] Constructing effective net wage may be problematic in highly de-motivating benefit systems, where the effective marginal tax rate may be greater than one for some individuals. There are 126 such cases in our sample. We retain them in the estimation but topcode the value of τ_i for these observations at 0.99.

4.4 Tax and Benefit System

This subsection briefly describes the Czech system of personal income taxes and social benefits in effect in 2002. The personal tax scheme was stepwise with four tax brackets. Tax rates for the four subsequent income brackets were 15%, 20%, 25%, and 32%. The part of income that falls into the lower bracket(s) was taxed at the corresponding lower tax rate(s); only the part that exceeds the lower bracket(s) was taxed at the higher tax rate(s). Tax rates are applied to a tax base, defined as the sum of various income categories (e.g., wages, rental and entrepreneurial incomes) minus allowances for non-taxable items and deductibles. The main social benefits consisted of five components: parental allowance, child benefits, housing benefits, social supplements, and social assistance.

The detailed scheme of taxes and social benefits, that we use for the construction of the effective marginal tax rate and effective net wages, is summarized in Table 1.[33]

Taxes were computed using the parameters of the tax system displayed in the top panel of the table. Net labor income was calculated by subtracting taxes and employee contributions to health and social insurance from gross income. For each individual, we construct two alternative values of the total household-level social benefits conditional on whether she works. The middle panel shows how the five components of social benefits were calculated depending on the level of net income; the definition of which varies across the benefits, and on the various minimum living standards (which are defined in the bottom panel and determined by the composition of the household).

5 Data

The data come from the Czech Household Income Survey (Mikrocensus) for the year 2002 collected by the Czech Statistical Office. The survey was conducted between February 28 and March 25, 2003 and covers 19,003 individuals in 7,973 households. For our estimation, we select only the individuals who are 25–54 years old. Students, the self-employed, and fully disabled individuals are excluded. In all these cases, as well as for the very young and the very old, the labor supply decision is more complex than the theoretical and econometric models which are used here can capture. Given these restrictions, the estimation sample consists of 6,767 individuals; 3,094 men; and 3,673 women living in 3,518 households. As the estimation is done separately for women and men, we split and describe our sample by gender.

Table 2 summarizes the basic characteristics of the most relevant variables. The definitions of all the variables are presented in section A.1 in the Appendix. Female and male labor force participation rates in our sample are 84 and 98 percent, respectively. The proportion of the unemployed is

[33] Table 1 is adapted from table 1 of Galuščák and Pavel (2005). For details of the Czech tax and benefit system, see also Jurajda and Zubrický (2005).

Table 1: Summary of the Czech System of Taxes and Social Benefits, 2002

Item	Amount (%/CZK per Month)
Social Security Contributions	%
	12.5
Tax Allowances	CZK per Month
Person	3170
Spouse*	1810
Dependent Child	1960
Income Tax (CZK per Month)	%
0–9100	15
9101–18200	20
18201–27600	25
27601 and more	32
Parental Allowance**	CZK per Month
Child below 4 Years	$1.1\times\text{MLS}_i$
Child Benefits (CZK per Month)	
$I_1 < 1.1 \times \text{MLS}_{tot}$	$0.32\times\text{MLS}_{ch}$
$1.1 \times \text{MLS}_{tot} < I_1 < 1.8 \times \text{MLS}_{tot}$	$0.28\times\text{MLS}_{ch}$
$1.8 \times \text{MLS}_{tot} < I_1 < 3 \times \text{MLS}_{tot}$	$0.14\times\text{MLS}_{ch}$
Housing Benefit (CZK per Month)	
$I_2 < \text{MLS}_{tot}$	$\text{MLS}_{hh} - \text{MLS}_{hh}/1.6$
$\text{MLS}_{tot} < I_2 < 1.6 \times \text{MLS}_{tot}$	$\text{MLS}_{hh} - (\text{MLS}_{hh} \times I_2)/(1.6 \times \text{MLS}_f)$
Social Supplement (CZK per Month)	
$I_2 < \text{MLS}_{tot}$	$\text{MLS}_{ch} - \text{MLS}_{ch}/1.6$
$\text{MLS}_{tot} < I_2 < 1.6 \times \text{MLS}_{tot}$	$\text{MLS}_{ch} - (\text{MLS}_{ch} \times I_2)/(1.6 \times \text{MLS}_f)$
Social Assistance (CZK per Month)	
$I_3 < \text{MLS}_{tot}$	$\text{MLS}_{tot} - I_3$
Minimum Living Standard (MLS)	CZK per Month
Adults (MLS_i)	2320
Dependent Children (MLS_{ch})	
Below 6 Years	1690
6–10 Years	1890
10–15 Years	2230
15–26 Years	2450
Household (MLS_{hh})	
1 Member	1780
2 Members	2320
3 or 4 Members	2880
5 and More Members	3230

Notes: Adapted from table 1 of Galuščák and Pavel (2005). The CZK/USD exchange rate on August 20, 2007: 1 USD = 20.56 CZK. The mean and median gross wage in our estimation sample are 16001 CZK and 14697 CZK, respectively, for men and 12599 CZK and 11076, respectively, for women. MLS_{tot}: total minimum living standard of the household—the sum of the individual parts of each member (MLS_i/MLS_{ch}) and the household part (MLS_{hh}). *: spouse is inactive or earning less than the basic tax allowance per person; **: the allowance is provided if the individual earns less than MLS_i. Benefits are not subject to taxes. I_1: net earnings of both spouses + unemployment benefits + parental allowance. $I_2 = I_1$+child benefits. $I_3 = I_2$+housing benefit+social supplement.

Table 2: Estimation Sample Summary Statistics

	Men		Women	
Variable	Mean	Std. Dev.	Mean	Std. Dev.
Labor Force Participation	0.98	0.14	0.84	0.37
Unemployed	0.04	0.20	0.04	0.20
Other Income*	482	2,784	543	2,267
Age	39.5	8.9	39.3	8.9
Higher Education	0.48	0.50	0.56	0.50
Married	0.66	0.47	0.69	0.46
Children < 2 Years	0.10	0.30	0.11	0.31
Children 3–5 Years	0.11	0.31	0.11	0.32
Children 6–9 Years	0.15	0.36	0.17	0.38
Children 10–15 Years	0.25	0.43	0.30	0.46
No. Hh Members	3.11	1.22	3.18	1.13
Other Ec Act in Hh	0.31	0.63	0.40	0.64
Partly Disabled	0.02	0.15	0.02	0.15
Sample Size	3,094		3,673	

Notes: *: Other income is the sum of the non-labor income of the individual and other household income (after tax and excluding social benefits) in 2002 CZK. Other economically active members in the household ("Other Ec Act in Hh") are all the household members (excluding the head and, if present, the spouse) who currently work.

comparable for the two genders: 4.3 percent for women and 4.4 percent for men.[34]

Other income, defined as the sum of the non-labor income of the individual and other household income (after tax and excluding social benefits), varies substantially and is 543 Czech korunas (CZK) per month for households in which women live, and 482 CZK for households in which men live, on average.[35]

The mean age is slightly less than 40 years for both genders. About half of the respondents, 56 percent of women and 48 percent of men, have higher education, defined as having completed secondary education. Almost 70 percent of men and women in our sample are married. The children variables are binary indicators of the presence of children of a particular age in the household.[36] The distribution of the presence of children of different ages is fairly similar for women and men. A typical household has about

[34]The aggregate unemployment rate for the whole population older than 25 years was 6.1 percent overall, 9.0 percent for women and 4.7 percent for men in 2002. The rates for the two genders are much more similar in our sample than usually documented by aggregate statistics because of the exclusion of the self-employed, who are more likely to be men, which reduces the measured unemployment rate of men relative to women.

[35]The distribution of other income is highly skewed: 2038 individuals (30 percent) have no other income and 75% have less than 135 CZK per month.

[36]Children can be linked to their parents only for household heads and their spouse. As we are using all individuals in the household to increase our sample size, we are limited to the use of the information about the presence of children in the household. This may be adequate information as child care may be provided by other members of the household and therefore affects their labor supply as well.

three members. Other economic activity in the household is defined as the presence of economically active members other than the analyzed individual and her spouse.

Women are somewhat more likely to live in households with other economically active members (30 percent of households) than men (40 percent of households). About 2 percent of individuals of both genders are partly disabled.

6 Results

The results from the first stage of our estimation, the Heckman model of the system of wage and selection equations, used for the prediction of the gross hourly wages, are in line with our prior expectations and with the evidence from the literature for standard market economies.[37] Wages increase with age and education. The degree of urbanization of the residence also leads to a higher wage, as does living in Prague (the Czech capital). On the contrary, disability significantly reduces the wage level. While the results for the wage equation are fairly similar by gender, the selection equation shows more substantial differences between men and women. In particular, the effect of the presence of children is negative and large for women, while it is not significant for men. The effect of being married is negative for women but positive for men. Otherwise, the probability of the selection into employment increases for both genders with age and education, and decreases with other income, other economic activity in the household, and for the partly disabled.

The marginal effects from the estimated probit model of the labor force participation are presented in Tables 3 and 4. Although mean marginal effects would be preferable, the effects presented in these two tables are calculated at the means of the variables.[38] We use this convention here in order to simplify the calculation of the bootstrapped standard errors. For a subset of results, we later show the mean marginal effects, i.e., the means of the marginal effects evaluated for each individual for comparison. The results do not seem to differ substantially with the method employed.

The two tables show the results for men and women respectively and compare the specification with the gross wage and with the effective net wage. Exploring the fit of the model based on two standard measures, pseudo-R^2 and χ^2 statistics of the Wald test of all coefficients (except for the constant) being equal to zero, suggests that for both the male and female sample, the specification with an effective net wage performs better than the one with the gross wage.

The wage semi-elasticity of probability of supplying labor—the key parameter of interest—is given in the first rows of the two tables.[39]

[37] The full sets of estimates from the Heckman model are available in section A.2.1 of the Appendix.

[38] Marginal effects of binary right-hand-side variables are computed as a discrete change in the predicted probability, induced by the value of the variable changing from 0 to 1.

[39] Wage semi-elasticity of labor force participation η is defined as $\eta = \frac{\partial \Pr(LFP=1)}{\partial W} \times W$

Wage semi-elasticity of labor supply is substantially larger for women than for men (in both specifications). While gross wage has no significant effect on male labor force participation decision (even at the 10 percent level), its effect is highly significant for women and implies that a one percent increase in gross monthly wage increases the probability of supplying labor by 0.16 percentage point for a woman with the average characteristics in the sample. The corresponding elasticites,[40] calculated by dividing these numbers with the predicted probability of labor force participation at means of variables, are 0.0221 and 0.1766 for men and women, respectively.[41]

Focusing on the second specification, the semi-elasticities of labor force participation to effective net wage are about one-third as large as to gross wage: A one percent rise in effective net wage increases the probability of supplying labor by about a 0.06 percentage point for women and by less than 0.01 percentage point for men, but both effects are significant at the 1 percent level. The corresponding wage elasticities are 0.0086 and 0.0595 for men and women, respectively.

We conjecture that the gross wage elasticities are greater than the effective net wage elasticities mainly because the effective net wage is distributed among individuals more unevenly.[42] This result follows because the marginal effective tax rate that we use to construct the effective net wage, takes into account both the actual income taxes and social contribution and the implicit taxation (reduction in social transfers associated with wage increases).[43]

As we have so far evaluated the marginal effects at the means of the variables, they only represent the response of an individual with average characteristics. We next explore in Tables 5 and 6 how the estimated wage semi-elasticities vary across the different wage levels. The marginal effects in these two tables are computed as within-quintile and overall averages of the marginal effects evaluated for each individual. Comparing the overall

and is therefore equal to the marginal effect of wage on the probability of supplying labor, i.e., MFX $= \frac{\partial \Pr(LFP=1)}{\partial \ln(W)} = \alpha \times \phi(\alpha \ln(W) + X\beta)$, where $\phi(\cdot)$ is the standard normal probability density function. The estimated effect can be interpreted as follows: A one percent rise in wage increases the probability of supplying labor by 0.01 × MFX (or the labor force participation rate from $LFP\,\%$ to $[LFP + \text{MFX}]\%$).

[40] Wage elasticity is given by $\epsilon = \frac{\partial \Pr(LFP=1)}{\partial W} \times \frac{W}{\Pr(LFP=1)}$ and can be therefore calculated as $\epsilon = \frac{\eta}{\Pr(LFP=1)}$, using the estimated value of η and the predicted value of $\Pr(LFP = 1)$ evaluated at the means of variables.

[41] These elasticities are close to wage semi-elasticities reported in Tables 3 and 4 because the predicted participation rates are close to 1 (99.1 and 91.5 percent for men and women, respectively).

[42] Intuitively, the estimated elasticities are proportional to the covariance of employment with wage and are inversely related to variance of wage (think a linear version of our probability model). While the first term happens to be similar for both specifications, the higher variance of the effective net wage leads to a lower value of the estimated elasticity than in the model with gross wage.

[43] The variance of the effective net wage $ENW = NW + SB_{work} - SB_{nonwork}$ is higher than that of gross wage primarily due to the social benefits SB_{work} and especially $SB_{nonwork}$, which vary substantially across people. The distribution of simple after-tax wages, however, is (as in most countries) naturally more compressed than that of gross wages, due to the redistributive character of the Czech tax system.

Table 3: Marginal Effects—Men

	Gross Wage		Effective Net Wage	
Variable	Marg Eff	(Std Error)	Marg Eff	(Std Error)
Log Wage	0.0219	(0.0207)	0.0085**	(0.0018)
Other Income	−0.0088*	(0.0039)	−0.0076*	(0.0032)
Married^d	0.0064	(0.0042)	0.0019	(0.0032)
Higher Education^d	0.0042	(0.0079)	0.0028	(0.0028)
Other Ec Act in Hh	−0.0040*	(0.0018)	−0.0061**	(0.0017)
Children <2 Years^d	0.0036	(0.0039)	0.0063**	(0.0024)
Children 3–5 Years^d	−0.0083	(0.0072)	−0.0036	(0.0059)
Children 6–9 Years^d	−0.0019	(0.0047)	0.0007	(0.0035)
Children 10–15 Years^d	0.0019	(0.0038)	0.0039	(0.0030)
Partly Disabled^d	−0.1973†	(0.1129)	−0.1698**	(0.0500)
N	3094		3094	
Log-likelihood	−222.122		−205.291	
$\chi^2_{(10)}$	163.36		197.02	

Notes: Marginal effects evaluated at the means of variables. ^{d}: A discrete change of the dummy variable from 0 to 1. $\{^\dagger, ^*, ^{**}\}$ = Statistical significance at $\{10, 5, 1\}$ percent. Bootstrapped standard errors, 500 replications.

Table 4: Marginal Effects—Women

	Gross Wage		Effective Net Wage	
Variable	Marg Eff	(Std Error)	Marg Eff	(Std Error)
Log Wage	0.1616**	(0.0539)	0.0550**	(0.0063)
Other Income	−0.0608**	(0.0234)	−0.0418†	(0.0216)
Married^d	−0.0284*	(0.0111)	−0.0419**	(0.0100)
Higher Education^d	−0.0256	(0.0225)	−0.0150	(0.0109)
Other Ec Act in Hh	−0.0930**	(0.0074)	−0.1020**	(0.0077)
Children <2 Years^d	−0.5848**	(0.0300)	−0.5461**	(0.0322)
Children 3–5 Years^d	−0.3672**	(0.0274)	−0.3538**	(0.0285)
Children 6–9 Years^d	−0.0564**	(0.0165)	−0.0418**	(0.0146)
Children 10–15 Years^d	−0.0274*	(0.0128)	−0.0139	(0.0120)
Partly Disabled^d	−0.4981**	(0.0712)	−0.4738**	(0.0687)
N	3673		3673	
Log-likelihood	−923.349		−864.713	
$\chi^2_{(10)}$	1407.28		1524.56	

Notes: Marginal effects evaluated at the means of variables. ^{d}: A discrete change of the dummy variable from 0 to 1. $\{^\dagger, ^*, ^{**}\}$ = Statistical significance at $\{10, 5, 1\}$ percent. Bootstrapped standard errors, 500 replications.

Table 5: Marginal Effects by Wage and Gender – Gross Wages

Wage	Men		Women	
Quintile	Wage (CZK)	MFX	Wage (CZK)	MFX
Q1	Below 12,430	0.0787	Below 8,949	0.1891**
Q2	Below 13,204	0.0328	Below 9,732	0.1406**
Q3	Below 15,772	0.0289	Below 12,531	0.1553**
Q4	Below 17,142	0.0141	Below 13,534	0.1428**
Q5	Above 17,142	0.0118	Above 13,534	0.1011**
All		0.0313		0.1431**

Notes: Averages of individual-specific marginal effects in each quintile.
$\{^{\dagger}, ^{*}, ^{**}\}$ = Statistical significance at $\{10, 5, 1\}$ percent.

Table 6: Marginal Effects by Wage and Gender – Effective Net Wage

Wage	Men		Women	
Quintile	Wage (CZK)	MFX	Wage (CZK)	MFX
Q1	Below 12,430	0.0338**	Below 8,949	0.0638**
Q2	Below 13,204	0.0137**	Below 9,732	0.0468**
Q3	Below 15,772	0.0128*	Below 12,531	0.0539**
Q4	Below 17,142	0.0062†	Below 13,534	0.0500**
Q5	Above 17,142	0.0057†	Above 13,534	0.0375**
All		0.0136*		0.0497**

Notes: Averages of individual-specific marginal effects in each quintile.
$\{^{\dagger}, ^{*}, ^{**}\}$ = Statistical significance at $\{10, 5, 1\}$ percent.

marginal effects in the bottom lines of these two tables with the marginal effects in Tables 3 and 4 suggests that our main results are reasonably invariant to whether the effects are evaluated at means or whether mean marginal effects are computed.[44]

In agreement with previous literature, the results show that wage semi-elasticity decreases with wage level. This is true for both specifications and both genders, with the only exception of women in the second quintile that tend to be somewhat less responsive to the wage than those in the third and fourth quintile. The values are, however, very close, and the differences across these quintiles are insignificant.

The cross-quintile differences are substantially more pronounced for men than for women. The semi-elasticity of labor force participation of men with respect to the effective net wage is significant at 1 percent in the first quintile and is almost six times greater than the wage semi-elasticity in the fifth quintile, which is moreover only weakly significant. A one percent increase

[44]The earlier, however, allow us to obtain the correct standard errors through simple bootstrapping methods, which is why we choose to present these in the first two tables. The significance in the other two tables is only approximate.

in the effective net wage raises the labor force participation of men in the first quintile by 3.38 percentage points, almost three times more than what is the overall average marginal effect. The effect of gross wage on the probability of supplying labor is insignificant for each quintile. The wage-elasticity of women is distributed more equally across the quintiles, with the size in the first quintile being less than twice the size in the fifth quintile. While the gross wage semi-elasticity ranges from 0.19 in the first quintile to 0.10 in the fifth, the range for the effective net wage elasticity is between 0.06 and 0.04.

We interpret the difference between the two estimated elasticities as an indicator of the welfare system disincentives. This behavior-based measure suggests that in the presence of taxes and benefits, more substantial changes in the gross wage are required to induce the same increase in labor force participation compared to the case with no welfare system.

Measured as the difference between the marginal effects for the gross and the effective net wage specifications, the welfare system disincentives are greater for women than for men and vary only little with wages. The marginal effect of the effective net wage on labor force participation is lower than the effect of the gross wage by 65 and 57 percent for women and men, respectively. The disincentives vary between 52 and 57 percent for men and between 63 and 67 percent for women across the five wage quintiles and tend to be a bit lower for the rich.

Based on the comparison of the results from the two specifications, we conclude that the Czech welfare system in 2002 reduces the labor supply response of men and women to the market wage by 39 percent and 34 percent, respectively.

The estimated effects of other determinants of labor force participation are also in line with the results documented in the standard literature, which suggests that labor supply behavior in the post-transition Czech Republic is comparable to the one in mature market economies.

Both other income and other economic activity in the household capture other sources of non-social income, alternative to the income from the individual's labor supply. Their coefficients therefore measure the income effect on labor supply and are, in line with economic theory, both negative and significant.

Once we control for the wage levels, education has no effect on labor force participation for both specifications and for both genders. This result is not surprising as wages are highly correlated with education.[45] Partial disability substantially decreases the probability of supplying labor, with the size of the effect for women (decreasing participation probability by almost 0.5) being more than twice that for men.

Children have no effect on whether men supply labor, but they substantially reduce the labor force participation probability of women. The size of the effect sharply declines with children's age.[46] Similar to the effect of the

[45]The same holds for age and age squared that we decided to leave out of the final model of labor force participation as an additional exclusion restriction.

[46]The fact that the presence of children below 2 years of age increases male labor force participation for the effective net wage specification most likely captures the need for other

presence of children, marital status has no effect on men, but reduces labor force participation of women.

The sign and significance of the marginal effects of the variables other than wage seem to be fairly similar across the two specifications for both women and men.

Finally, in order to make our estimates directly comparable to the values estimated in the two previous studies of labor force participation of married women in Hungary and in the Czech and Slovak Republics (Saget, 1999 and Chase, 1995, respectively), we restrict our sample to married women and repeat our analysis. Although the estimated wage elasticity slightly increases, in line with the documented evidence that the labor supply of married women is typically more wage sensitive than that of single women, the results do not substantially change. While gross wage semi-elasticity increases from 0.1616 to 0.1758, the effective net wage semi-elasticity changes from 0.0550 to 0.0566.[47]

7 International Context and Policy Implications

In many Communist countries—including Czechoslovakia, East Germany, and the Soviet Union—labor force participation was obligatory.[48] Although a gradual withdrawal from the labor market occurred during the transition from planned to market economies,[49] the labor force participation rates in many European post-Communist countries, in particular among women, remain still high, when compared to mature market economies such as France, Germany and the US (see Table 7).[50]

The low estimates of wage elasticity of the labor supply in the Czech Republic are consistent with the evidence documented for mature market economies that labor force participation and wage sensitivity of labor supply are inversely related (see Blau and Kahn, 2007 and Alesina and Ichino, 2007). We therefore expect a weak response of labor supply to wages also in other post-transition countries which have retained high labor force participation rates since the Communist period.

Our findings suggest that changes in taxes or benefits resulting in changes of the effective net wage will have the greatest impact on individuals at the bottom of the wage distribution and also on women (rather than on men).[51]

sources of income when women stay at home with their very young children.

[47]The full estimation results for the subsample of married women are available from the authors upon request.

[48]Interestingly, this was not the case in other Communist countries, such as Poland or Hungary. However, female labor force participation rate in these countries was still fairly high according to the ILO statistics (around 80 percent), compared to the Western Europe.

[49]There are a few studies, such as Bonin and Euwals (2005), that try to disentangle whether this was due to the change in the supply (some people stopped working once the choice became available) or demand (obsolete human capital left many people jobless, some of whom left the labor force).

[50]Bonin and Euwals (2005) reports that the female participation rates in East Germany were over 80 percent before the change of the regime in 1989.

[51]For example Alesina and Ichino (2007) argue for gender-specific taxation: Because the

Table 7: Pre- and Post-Transition Participation Rates (Percent)

	Men		Women	
Country	1988	2005	1988	2005
Czech Republic	97.0	94.8	93.1	81.6
Slovakia	96.9	93.2	88.8	82.5
Russia	96.2	92.5	91.7	86.3
Germany†	90.6	93.3	60.8	80.0
France	95.6	93.6	71.2	80.3
United States	93.6	90.7	72.7	76.7

Notes: Participation rates (ratios of economically active to total population) for individuals between 25 and 54 years of age. †: The Federal Republic of Germany (1988 figures exclude the German Democratic Republic). Source: Economically Active Population Estimates and Projections, International Labour Organization, `http://laborsta.ilo.org/`.

Policy measures aimed at enhancing labor supply should therefore primarily target these groups and focus on income taxes at the lowest tax brackets and on the potential disincentives of the out-of-work benefits and benefits to low income families. Under the current benefit scheme, major changes in labor force participation should not be expected in response to changes in tax levels because the estimated effects are fairly small even for the most wage-elastic individuals.

As part of the changes in the Czech welfare system, tax reform implemented in January 2006 extended the range of the lowest tax bracket and decreased the tax rate in the lowest two brackets from 15 to 12 percent and from 20 to 19 percent, respectively. Its focus on the reduction of disincentives due to the tax burden of the individuals with wages in the lowest quintile of the wage distribution is in line with our finding that it is low wage individuals who are likely to respond to the changes in the effective net wage most.[52]

8 Conclusion

We provide one of the first estimates of labor supply using Czech data. We construct a measure of the effective net wage, which takes into account the tax and benefit system, and estimate wage elasticity of labor force partici-

labor supply of women is more responsive to wages, the optimal income tax rates (other things being equal), which minimize the dead-weight loss, are lower for women than for men.

[52]New tax reform, effective since January 2008, introduced a flat tax rate of 15 percent. Because the income tax is newly levied on the total labor cost (gross earnings plus employer's social security contributions) the tax rate effectively amounts to 23 percent. The overall effect of this new reform on the taxation of the poor is yet to be seen because the definitions of taxable income and non-taxable items have changed.

pation in the Czech Republic in 2002 using the gross and the effective net wage respectively.

While our analysis is subject to many limitations, a number of conclusions emerge clearly and robustly. We find that a one percent rise in the effective net wage increases the male labor force participation rate by a 0.01 percentage point and female labor force participation rate by a 0.06 percentage point.[53] The effective net wage semi-elasticity of the probability of labor supply decreases with wage, in particular for men. Wage elasticities of labor force participation of men and women in the bottom 20 percent of the wage distribution are 0.034 and 0.064 percentage points, respectively. Tax and benefit policies with the aim of enhancing labor force participation should thus primarily target low wage individuals and also women rather than men.

When we replace the effective net wage with the gross wage, the corresponding semi-elasticities are 0.16 for women and 0.02 (but insignificant) for men. We interpret the difference between the two estimated elasticities as a behavior-based measure as an indicator of the welfare system disincentives and conclude that the Czech tax and benefit system in 2002 reduces the labor supply response of women to the market wage by 65 percent and that of men by 57 percent.

While our qualitative results are in line with previous research, suggesting that labor supply behavior in the post-transition Czech Republic is comparable to the one in mature market economies, the estimated effects are relatively small. This result is consistent with the recent empirical evidence that the labor supply in countries with high labor force participation rates, such as in the Czech Republic, tends to be less sensitive to wages. We therefore expect a limited response of labor supply to wages also in other post-transition countries, which have retained high labor force participation rates since the Communist period.

[53] Given the high participation rates, the semi-elasticities are almost the same as elasticities.

References

Adamchik, V. A. and A. S. Bedi (2003). Gender pay differentials during the transition in Poland. *The Economics of Transition 11*(4), 697–726.

Alesina, A. and A. Ichino (2007). Gender-based taxation. mimeo, Harvard University.

Baltagi, B. H. (2002). *Econometrics* (Third ed.). Springer.

Bičáková, A., J. Slačálek, and M. Slavík (2006). Fiscal implications of personal tax adjustments in the Czech Republic. working paper 7, Czech National Bank.

Blau, F. D. and L. M. Kahn (2007). Changes in the labor supply behavior of married women: 1980–2000. *Journal of Labor Economics* (3), 393–438.

Blundell, R. and T. MaCurdy (1999). Labor supply: A review of alternative approaches. In O. Ashenfelter and D. Card (Eds.), *Handbook of Labor Economics*, Volume 3 of *Handbook of Labor Economics*, Chapter 27, pp. 1559–1695. Elsevier.

Bonin, H. and R. Euwals (2005). Participation behavior of the East German women after German unification. *Applied Economics Quarterly 51*(4).

Bound, J., C. Brown, G. J. Duncan, and W. L. Rodgers (1989). Measurement error in cross-sectional and longitudinal labor market surveys: Results from two validation studies. Technical report.

Chase, R. S. (1995). Women's labor force participation during and after Communism: A study of the Czech Republic and Slovakia. discussion paper 768, Economic Growth Center, Yale University.

Eissa, N., H. J. Kleven, and C. T. Kreiner (2004). Evaluation of four tax reforms in the United States: Labor supply and welfare effects for single mothers. Technical report.

Galuščák, K. and D. Münich (2005). Regional wage adjustments and unemployment: Estimating the time-varying wage curve (in English). *Czech Journal of Economics and Finance (Finance a uver, ISSN: 0015-1920) 55*(1–2), 68–82.

Galuščák, K. and D. Münich (2007). Structural and cyclical unemployment: What can be derived from the matching function? (in English). *Czech Journal of Economics and Finance (Finance a uver, ISSN: 0015-1920) 57*(3–4), 102–125.

Galuščák, K. and J. Pavel (2005). Does work pay? Incidence of unemployment and inactivity traps in the Czech Republic. mimeo, Czech National Bank, Prague.

Ham, J. C., J. Svejnar, and K. Terrell (1998). Unemployment and the social safety net during transitions to a market economy: Evidence from the Czech and Slovak republics. *American Economic Review 88*(5), 1117–42.

Ham, J. C., J. Svejnar, and K. Terrell (1999). Women's unemployment during transition. *The Economics of Transition 7*(1), 47–78.

Hausman, J. A. (1985). Taxes and labor supply. In A. J. Auerbach and M. Feldstein (Eds.), *Handbook of Public Economics*. Elsevier.

Heckman, J. J. (1979). Sample selection bias as a specification error. *Econometrica 47*(1), 153–161.

Heckman, J. J. (1993). What has been learned about labor supply in the past twenty years? *American Economic Review 83*(2), 116–21.

Hunt, J. (2002). The transition in East Germany: When is a ten-point fall in the gender wage gap bad news? *Journal of Labor Economics 20*(1), 148–169.

Jolliffe, D. (2002). The gender wage gap in Bulgaria: A semiparametric estimation of discrimination. *Journal of Comparative Economics 30*(2), 276–295.

Jurajda, Š. (2003). Gender wage gap and segregation in enterprises and the public sector in late transition countries. *Journal of Comparative Economics 31*(2), 199–222.

Jurajda, Š. (2005). Gender segregation and wage gap: An East–West comparison. *Journal of the European Economic Association 3*(2–3), 598–607.

Jurajda, Š. and H. Harmgart (2007). When do female occupations pay more? *Journal of Comparative Economics 35*(1), 170–187.

Jurajda, Š. and J. Zubrický (2005). Employment incentives in the Czech Republic: Comparing current and proposed social support systems. mimeo, CERGE–EI.

Juster, T. F. and F. P. Stafford (1991). The allocation of time: Empirical findings, behavioral models, and problems of measurement. *Journal of Economic Literature 29*(2), 471–522.

Killingsworth, M. R. (1983). *Labor supply*. Cambridge: Cambridge University Press.

Moffitt, R. (1984). The estimation of a joint wage-hours labor supply model. *Journal of Labor Economics 2*(4), 550–66.

Moffitt, R. (2002). Welfare programs and labor supply. In A. J. Auerbach and M. Feldstein (Eds.), *Handbook of Public Economics*, Volume 4 of *Handbook of Public Economics*, Chapter 34, pp. 2393–2430. Elsevier.

Münich, D. and J. Svejnar (2007). Unemployment in East and West Europe. *Labor Economics 14*(4), 681–694.

Münich, D., J. Svejnar, and K. Terrell (2005a). Is women's human capital valued more by markets than by planners? *Journal of Comparative Economics 33*(2), 278–299.

Münich, D., J. Svejnar, and K. Terrell (2005b). Returns to human capital under the Communist wage grid and during the transition to a market economy. *The Review of Economics and Statistics 87*(1), 100–123.

OECD (2004). *Benefits and Wages: OECD Indicators*. Organization for Economic Co-operation and Development.

Orazem, P. F. and M. Vodopivec (1997). Value of human capital in transition to market: Evidence from Slovenia. *European Economic Review 41*(3–5), 893–903.

Saget, C. (1999). The determinants of female labour supply in Hungary. *Economics of Transition 7*(17), 575–591.

Svejnar, J. (2002). Transition economies: Performance and challenges. *Journal of Economic Perspectives 16*(1), 3–28.

A Appendix

A.1 Definitions of Key Variables

Labor force participation: A binary indicator that equals one if an individual is working (employed) or looking for a job (unemployed), refers to the dominant economic activity during the past year[54]

Log Wage: Logarithm of either a gross monthly wage or the effective net monthly wage (predicted by the Heckman model and calculated by the authors)

Other Income: The sum of non-labor income of the individual and other household income (after tax and excluding social benefits)[55]

Married: A binary variable indicating whether the individual is married

Higher Education: An indicator of having completed high-school education or higher

Other Ec Act in Hh: The number of household members (excluding the head and, if present, the spouse), who currently work

Children <2 Years: A binary variable indicating whether any children younger than 2 years of age are present in the household

Children 3–5 Years: A binary variable indicating whether any children between 3 and 5 years of age are present in the household

Children 6–9 Years: A binary variable indicating whether any children between 6 and 9 years of age are present in the household

Children 10–15 Years: A binary variable indicating whether any children between 10 and 15 years of age are present in the household

Partly Disabled: A binary variable indicating whether the individual has partial disability (fully disabled individuals are excluded from the sample)

Age: Age of the individual

Age^2: The second power of the age of the individual

[54] Ideally, this indicator should reflect the current labor force status of the individual, but this information is not present in our data. This is may lead to an under-representation of short-run non-workers and an over-representation of long-term non-workers. Fortunately, for most people in the dataset (82 percent), the prevailing economic activity stays the same during the whole year.

[55] It has been constructed as the net monetary household income minus social income minus the net working income of the individual. As only gross labor income is reported for individuals, net working income is in turn computed as 0.875×total gross income from main employment minus tax. The factor 0.875 reflects the employee contribution to health and social insurance.

Region 2 to Region 14: A binary indicators of the level 2 NUTS region of residence of the household (Region 1 denotes the capital, Prague, and is the base category)

Size of Town: Categorical variable denoting the degree of urbanization of the place of household's residence

Local Unemployment: The unemployment rate in the district (level 2 NUTS region) of the residence of the household

A.2 Other Estimation Results

A.2.1 Constructing Wages—The Heckman Model

When workers systematically differ in their unobserved characteristics from non-workers and when the unobservable component of the decision to work is related to the unobservable component of the wage level,[56] a simple wage equation is affected by sample selection and the standard OLS estimates are biased. We follow Heckman (1979) and estimate a wage equation controlling for the selection into employment.

We specify a system of a wage equation and a selection-to-employment equation

$$\ln GHW_i = Z_i'\delta + u_i,$$
$$EMP_i = X_i'\beta + e_i,$$
$$GHW_i \text{ is observed only if } EMP_i = 1,$$

where GHW_i is the gross hourly wage, EMP_i is an indicator whether an individual i works, and GHW_i is observed only if $EMP_i = 1$. Z_i and X_i are vectors of variables that determine the individual's i's wage and employment respectively. Error terms u_i and e_i are assumed to be independent across individuals and jointly normally distributed with zero means, variances σ_u^2 and σ_e^2 and correlation ρ_{ue}. The two equations are estimated jointly by maximum likelihood.

Gross hourly wage is calculated by dividing the annual wage with hours worked per year.[57] We exclude outliers (i.e., the top and bottom 1 percent of the sample), by replacing the top and bottom percentiles, 147 observations in total, with missing values before running the Heckman regression.

Tables 8 and 9 report the estimates of the wage and the selection-to-employment equations, as well as the correlation of the error terms from the Heckman model.

We use the estimated system to predict gross hourly wages for everybody in the sample. We next convert the gross hourly wage to full-time equivalent gross monthly wage by multiplying the predicted gross hourly wage

[56] For example, individuals who are more likely to work may have on average higher wages.

[57] The annual hours worked equal the weekly hours times months worked (both given in the dataset) times 4.33 (the assumed number of weeks per month).

by 40×4.3. Predicted gross monthly earnings that fell below the Czech statutory minimum wage in 2002 (36 individuals or 0.5 percent of the predicted wages) were set to the level of the minimum wage of 5,700 CZK (277 USD).

Table 8: Heckman Estimation Results—Men

Variable	Coefficient	(Std. Err.)
Equation 1 : logarithm of gross hourly wage		
Age	0.018*	(0.008)
Age^2	-0.021*	(0.010)
Higher Education	0.271**	(0.013)
NUTS Region CZ02	-0.032	(0.031)
NUTS Region CZ03	-0.134**	(0.035)
NUTS Region CZ04	-0.134**	(0.035)
NUTS Region CZ05	-0.102*	(0.041)
NUTS Region CZ06	-0.157**	(0.053)
NUTS Region CZ07	-0.139**	(0.043)
NUTS Region CZ08	-0.119**	(0.040)
NUTS Region CZ09	-0.164**	(0.039)
NUTS Region CZ10	-0.132**	(0.036)
NUTS Region CZ11	-0.136**	(0.037)
NUTS Region CZ12	-0.193**	(0.043)
NUTS Region CZ13	-0.114**	(0.039)
NUTS Region CZ14	-0.135**	(0.047)
Size of Town	0.014**	(0.004)
Local Unemployment	0.004	(0.003)
Partly Disabled	-0.341**	(0.068)
Intercept	3.923**	(0.151)
Equation 2 : selection to employment		
Age	0.049	(0.086)
Age^2	-0.095	(0.107)
Other Income	-0.493**	(0.134)
Married	0.551**	(0.156)
Higher Education	0.387*	(0.164)
Other Ec Act in Hh	-0.182†	(0.095)
Kids < 2 Years	-0.032	(0.274)
Kids 3-5 Years	-0.492*	(0.232)
Children 6–9 Years	-0.236	(0.219)
Children 10–15 Years	-0.044	(0.191)
Partly Disabled	-1.936**	(0.187)
NUTS Region CZ02	0.126	(0.322)
NUTS Region CZ03	0.060	(0.396)
NUTS Region CZ04	-0.302	(0.321)
NUTS Region CZ05	1.041	(0.750)
NUTS Region CZ06	-0.182	(0.281)
NUTS Region CZ07	0.430	(0.633)
NUTS Region CZ08	-0.525	(0.327)
NUTS Region CZ10	-0.345	(0.309)
NUTS Region CZ11	0.423	(0.366)
NUTS Region CZ12	-0.527†	(0.278)
NUTS Region CZ13	-0.482†	(0.293)
NUTS Region CZ14	-0.259	(0.245)
Size of Town	0.018	(0.035)
Intercept	1.724	(1.687)

Continued on next page...

... table 8 continued

Variable	Coefficient	(Std. Err.)
Equation 3 : athrho		
Intercept	-0.328	(0.243)
Equation 4 : lnsigma		
Intercept	-1.081**	(0.014)
N	2891	
Log-likelihood	-1145.726	
$\chi^2_{(19)}$	658.711	

Significance levels : † : 10% ∗ : 5% ∗∗ : 1%; "NUTS Region CZ. . . ": dummy variables indicating the region (denoted with its 2 level NUTS number).

Table 9: Heckman Estimation Results—Women

Variable	Coefficient	(Std. Err.)
Equation 1 : logarithm of gross hourly wage		
Age	0.012	(0.008)
Age^2	-0.012	(0.010)
Higher Education	0.355**	(0.013)
NUTS Region CZ02	-0.047	(0.030)
NUTS Region CZ03	-0.126**	(0.033)
NUTS Region CZ04	-0.167**	(0.033)
NUTS Region CZ05	-0.090*	(0.039)
NUTS Region CZ06	-0.136**	(0.052)
NUTS Region CZ07	-0.163**	(0.040)
NUTS Region CZ08	-0.108**	(0.038)
NUTS Region CZ09	-0.136**	(0.038)
NUTS Region CZ10	-0.210**	(0.035)
NUTS Region CZ11	-0.109**	(0.036)
NUTS Region CZ12	-0.139**	(0.041)
NUTS Region CZ13	-0.184**	(0.037)
NUTS Region CZ14	-0.148**	(0.045)
Size of Town	0.022**	(0.004)
Local Unemployment	-0.002	(0.003)
Partly Disabled	-0.233**	(0.065)
Intercept	3.701**	(0.156)
Equation 2 : selection to employment		
Age	0.112*	(0.046)
Age^2	-0.136*	(0.058)
Other Income	-0.420**	(0.155)
Married	-0.146†	(0.080)
Higher Education	0.265**	(0.072)
Other Ec Act in Hh	-0.581**	(0.048)
Children < 2 Years	-2.164**	(0.103)
Children 3-5 Years	-1.472**	(0.096)
Children 6–9 Years	-0.385**	(0.089)
Children 10–15 Years	-0.257**	(0.087)
Partly Disabled	-1.944**	(0.163)
NUTS Region CZ02	0.109	(0.150)
NUTS Region CZ03	0.013	(0.171)
NUTS Region CZ04	-0.002	(0.170)

Continued on next page...

... table 9 continued

Variable	Coefficient	(Std. Err.)
NUTS Region CZ05	0.039	(0.190)
NUTS Region CZ06	-0.179	(0.142)
NUTS Region CZ07	-0.160	(0.189)
NUTS Region CZ08	0.248	(0.228)
NUTS Region CZ10	-0.088	(0.166)
NUTS Region CZ11	-0.042	(0.146)
NUTS Region CZ12	0.128	(0.162)
NUTS Region CZ13	-0.102	(0.164)
NUTS Region CZ14	-0.474**	(0.122)
Size of Town	0.031†	(0.018)
Intercept	-0.175	(0.868)
Equation 3 : athrho		
Intercept	-0.140†	(0.080)
Equation 4 : lnsigma		
Intercept	-1.113**	(0.013)

N	3425
Log-likelihood	-1700.847
$\chi^2_{(19)}$	1203.444

Significance levels : † : 10% ∗ : 5% ∗∗ : 1%; "NUTS Region CZ..." : dummy variables indicating the region (denoted with its 2 level NUTS number).

Table 10: Probit Estimation Results—Gross Wages, Men

Variable	Coefficient	(Std Error)
Log Wage	0.867	(1.107)
Other Income	−0.347*	(0.157)
Married	0.229	(0.151)
Higher Education	0.167	(0.365)
Other Ec Act in Hh	−0.159*	(0.076)
Kids <2 Years	0.163	(0.285)
Kids 3–5 Years	−0.257	(0.216)
Kids 6–9 Years	−0.070	(0.199)
Kids 10–15 Years	0.077	(0.219)
Partly Disabled	−1.566**	(0.521)
Intercept	−6.106	(10.463)
N		3094
Log-likelihood		−222.122
$\chi^2_{(10)}$		163.36

Notes: Predicted gross monthly wage, other income is all non-labor income and other household non-social income in 2002 CZK. Bootstrap standard errors, 500 replications. $\{^\dagger, *, **\}$ = Statistical significance at $\{10, 5, 1\}$ percent.

Table 11: Probit Estimation Results—Gross Wages, Women

Variable	Coefficient	(Std Error)
Log Wage	1.039**	(0.351)
Other Income	−0.391**	(0.151)
Married	−0.192*	(0.079)
Higher Education	−0.167	(0.149)
Other Ec Act in Hh	−0.598**	(0.050)
Kids <2 Years	−1.944**	(0.092)
Kids 3–5 Years	−1.352**	(0.084)
Kids 6–9 Years	−0.315**	(0.079)
Kids 10–15 Years	−0.168*	(0.078)
Partly Disabled	−1.605**	(0.192)
Intercept	−7.346*	(3.210)
N		3673
Log-likelihood		−923.349
$\chi^2_{(10)}$		1407.28

Notes: Predicted gross monthly wage, other income is all non-labor income and other household non-social income in 2002 CZK. Bootstrap standard errors, 500 replications. $\{^\dagger, *, **\}$ = Statistical significance at $\{10, 5, 1\}$ percent.

Table 12: Probit Estimation Results—Net Wages, Men

Variable	Coefficient	(Std Error)
Log Wage	0.412**	(0.074)
Other Income	−0.368*	(0.183)
Married	0.089	(0.170)
Higher Education	0.137	(0.154)
Other Ec Act in Hh	−0.294**	(0.073)
Kids <2 Years	0.460	(0.322)
Kids 3–5 Years	−0.151	(0.236)
Kids 6–9 Years	0.036	(0.204)
Kids 10–15 Years	0.211	(0.224)
Partly Disabled	−1.543**	(0.217)
Intercept	−1.338*	(0.634)
N	3094	
Log-likelihood	−205.291	
$\chi^2_{(10)}$	197.02	

Notes: Predicted gross monthly wage, other income is all non-labor income and other household non-social income in 2002 CZK. Bootstrap standard errors, 500 replications. $\{^\dagger, ^*, ^{**}\}$ = Statistical significance at $\{10, 5, 1\}$ percent.

Table 13: Probit Estimation Results—Net Wages, Women

Variable	Coefficient	(Std Error)
Log Wage	0.386**	(0.037)
Other Income	−0.294†	(0.150)
Married	−0.320**	(0.082)
Higher Education	−0.106	(0.076)
Other Ec Act in Hh	−0.716**	(0.050)
Kids <2 Years	−1.882**	(0.084)
Kids 3–5 Years	−1.362**	(0.082)
Kids 6–9 Years	−0.260**	(0.082)
Kids 10–15 Years	−0.095	(0.081)
Partly Disabled	−1.583**	(0.176)
Intercept	−0.859**	(0.304)
N	3673	
Log-likelihood	−864.713	
$\chi^2_{(10)}$	1524.56	

Notes: Predicted gross monthly wage, other income is all non-labor income and other household non-social income in 2002 CZK. Bootstrap standard errors, 500 replications. $\{^\dagger, ^*, ^{**}\}$ = Statistical significance at $\{10, 5, 1\}$ percent.

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