Estimates of Labour Supply Elasticities in Slovakia[1]

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This article provides a microeconometric analysis of extensive margin labour supply elasticities in Slovakia. We find that a one percent increase in net wage increases the probability of economic activity by 0.263 percentage points. Taking into account tax and transfer system details valid in 2009-2011, a one percent increase in transfers decreases the semi-elasticity of labour force participation by 0.04 percentage points. These results are broadly in line with the elasticities usually reported in the literature. Our results show that low-skilled, females and the elderly are the groups that are particularly responsive to changes in taxes and transfers. Labour market policies aimed to boost employment should concentrate on increasing marginal gains to work, especially for low-educated individuals and women.

1 Introduction

Motivation to work is greatly affected by income taxes levied and social system valid in the country. Analysis of labour supply behaviour is a key element when evaluating reforms of tax and transfer systems and the impact of different policies on changes in tax revenues, employment or wealth redistribution. Using tax and transfer system details we employ a full-parametric method to assess how the Slovak tax-benefit system can affect work incentives. Our tax-benefit model covers the joint effects of tax and benefit systems on individuals' net income.

We document that participation probabilities are in general dependent on the level of net income and transfers. We find that a one percent increase in net wage increases the probability of economic activity by 0.263 percentage points. Taking into account tax and transfer system details valid from 2009 to 2011, a one percent increase in transfers decreases the semi-elasticity of labour force participation by 0.04 percentage points. These results are broadly in line with the elasticities usually reported in the literature. Hence, our general message is that in terms of labour market behaviour, the Slovaks respond to incentives much the same way as their peers in V4/OECD economies. Policy initiatives likely to increase gains to work should result in higher participation and employment rates. Our results also show that, in line with findings for other countries, low-skilled, females and the elderly are the groups that are particularly responsive to changes in taxes and transfers. Labour market policies aimed to boost employment should, therefore, be primarily targeted at low-educated individuals and women.

These findings are important, as inactivity and unemployment rates persist to be high in Slovakia, and little has been done to formally assess the effects of taxes and social transfers on labour market inactivity. Our results help understanding the incentive effects of tax and benefit policies, and should help policy makers to achieve the right balance between the generosity of social benefits and financial incentives to find a job.

Our estimates are based on a structural model of labour supply where both taxes and transfers are simultaneously taken into account. We use a fully parametric approach to estimate a fully specified structural labour supply model where we address the questions of wage endogeneity[6], following Benczur et al. (2012). We enrich their approach with more complex tax-benefit simulation tool. Using this methodology, individual participation probabilities are determined by comparing two states: being in labour force and being out of labour force. A key component of this approach is to precisely evaluate disposable income (including also non-labour income and social transfers) of every individual in both states. In order to do so, a concept of *gains-to-work* is introduced and defined as the sum of net wage and transfers lost due to taking up a full-time job. Slovak tax system is incorporated in our model in detail and key elements of transfer system are taken into account. The major advantage of this method is that it allows computing predictions of the impact of tax and transfer system reforms and moreover, it permits evaluation of specific government interventions and policies.

Labour market outcomes and policies in Slovakia

Empirical evidence on labour supply behaviour in transition and post-transition countries is limited. From the historical point of view, in Central and Eastern European (CEE) countries that experienced communist regimes, the labour force participation was obligatory. In general, after change of regimes at the beginning of 1990's and during the transition period when national economies changed from planned to market, a continual withdrawal from the labour force has been detected on labour markets in all CEE countries.

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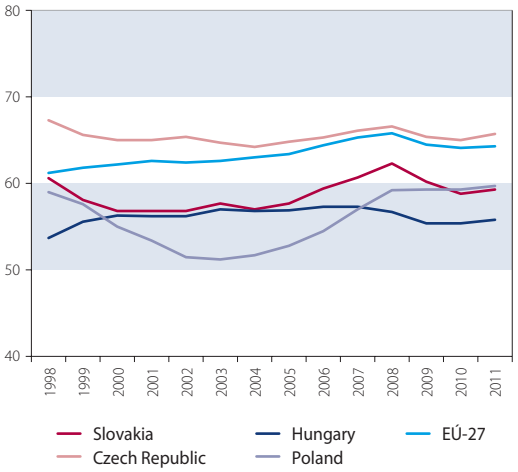
2 National Bank of Slovakia
3 Council for Budget Responsibility
4 Council for Budget Responsibility
5 Council for Budget Responsibility

6 Labour demand shifters are used as instruments for wages.

Figure 1 Employment rates in Slovakia and selected countries, 1998-2011



Source: Eurostat.
Note: 15 to 64 years.

Participation and employment rates in Slovakia reached their bottom in the early 2000s. Later in the period of economic growth an increase in both rates has been observed; they started to decline again in 2009 as a consequence of the global financial crisis. Present situation in post-transition Slovakia can be characterized by employment rates (see Figure 1) permanently below the EU-27 average but still rather high compared to neighbouring Hungary and Poland. Lack of work opportunities in Slovakia especially for labour market entrants and for individuals with low qualification persist. Employment rates of youth and low-skilled (low educated) workers are extremely low, also compared to neighbouring V4 countries (see Figure 2).

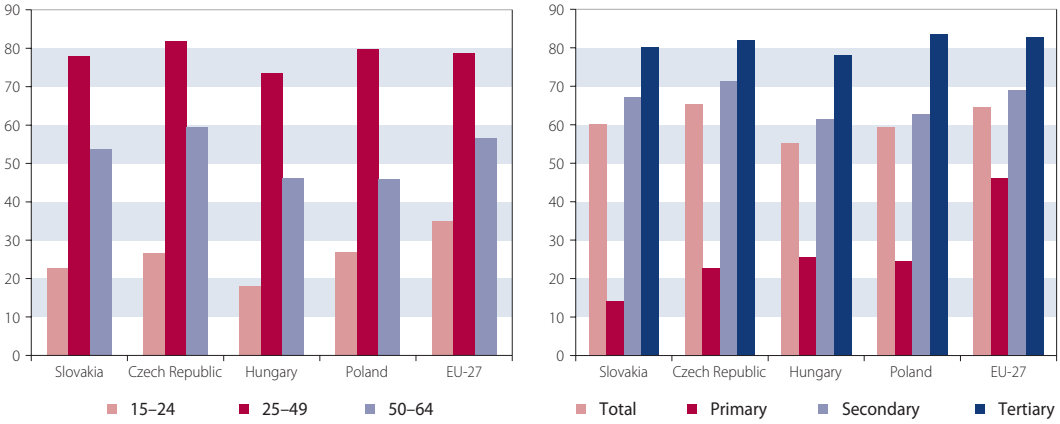
Slovak tax-benefit system experienced major changes over the last 10 years. Both tax and social transfer systems were considerably modified[7] in 2004 when a flat personal income tax scheme was implemented and social transfers were significantly cut down in levels in order to increase work incentives. Analysis of World Bank (2012) shows that these reforms considerably improved work incentives of low-income workers. However, this improvement has been achieved mainly due to a reduction in transfer levels. The tax-benefit system currently valid in Slovakia seems to encourage work more than the system valid before reforms in 2004. On the other hand, low-wage part time work is still not sufficiently attractive for those who are eligible to receive material needs benefit (MNB). Slovak transfer system is restrictive especially for labour market entrants and low-skilled workers employed at low-paid jobs. Structural changes both in tax and transfer systems that followed in 2005-2012 were minor and are well documented in Porubsky et al. (2013).

Slovak public social expenditure (expressed as a percentage of GDP) tends to be low also compared to neighbouring V4 countries and is significantly below OECD average (see OECD Employment Outlook 2011, Figure 2.1). Moreover, both passive (providing income replacement) and active (government interventions aimed to help unemployed to find a job) labour market policies in Slovakia can be described as some of the least inclusive among the EU countries. Protection against unemployment is low, both in terms of generosity and coverage of the allowance. Unemployment benefit coverage measured by the ratio of beneficiaries to the number of unemployed is currently around 12% in Slovakia (for detailed numbers see World Bank (2011), Table 3) and this compares to almost 50% coverage as an OECD average in 2007-08 (see OECD Employment Outlook 2011, Figure 2.5). Note that neighbouring Czech Republic and Hungary are placed among OECD countries with average coverage with respect to both indicators, i.e. public social expenditures and unemployment benefit recipiency rates. Since the access to unemployment benefit in Slovakia is rather tedious, benefit in material needs partly supplies its role as a non-contributory unemployment allowance.

Current Slovak system of social assistance is rather insensitive to overall changes in labour market

7 *Due to data limitation, we cannot evaluate the effects of these reforms using our methodology.*

Figure 2 Employment rates by age and education in 2009



Source: Eurostat.
Note: 15 to 64 years.

conditions. As documented by World Bank (2011), a decline in the number of registered unemployed (jobseekers) during the period of growth in 2004-08 was not reflected in a drop in MNB recipients. Later, the rise in unemployment during the financial crisis did not lead to a corresponding increase in number of MNB recipients. This suggests that there exist a stable group of prime-age population locked in social assistance system.

2 Methodology

First we briefly summarize the setup of the model and its identification. In the next subsection we present the structure of tax and benefit system in Slovakia and corresponding simulations.

Model and Identification

Methodologically, we closely follow the approach presented in Benczur et al. (2012). The underlying theory starts with a standard utility maximization problem (defined as a labour-leisure trade off) by using an additively separable utility function. Adding taxes and transfers to the model leads to redefinition of the reservation wage, such that the participation decision needs to be constrained to a full time job[8] (otherwise undefined in the structural model, see Benczur et al. (2012) for details). Estimating the probability of being economically active or employed then yields to a structural probit equation.

To derive formal expressions, in the first step we introduce a concept of a so called *gains-to-work* variable W_i defined as a difference between net wage w_i and change in conditional transfers ΔT_i:

$$W_i = w_i - \Delta T_i$$

where $\Delta T_i = T_i^{hyp} - T_i^{obs}$ denotes a difference between hypothetical and observed transfers.

Based on the underlying theory, the gains-to-work W_i should be interpreted as a difference between the net effect from being employed full-time and the net effect gained from transfers at zero hours worked. Therefore, we construct gains-to-work W_i for an individual i as follows:

- For the *employed* we first compute the net income – as a sum of net income from employment, non-labour income and transfers that an individual i is entitled to at a given level of income. Net income from employment is computed from the reported gross income less the simulated (by our tax-benefit model) personal income tax and social security contributions. In the next step we assume a hypothetical scenario: income from employment is set to zero (non-labour income is left at its original level) and we compute the corresponding amount of transfers an individual is entitled to. W_i is then defined as a difference between the former and latter scenario.
- For the *unemployed and inactive* we predict their gains-to-work by using Heckman selection model (see below).

Second variable of principal interest to us is a *non-labour income* NY_i which is defined as a sum of three components, namely conditional transfers, other non-labour income that an individual receives (e.g. pensions, income from property, interest, dividend payments, etc.) and income of other members of the household. Other non-labour income and income of other members of the household are independent of the labour market status of an individual, therefore they are computed in the same way for every person. However, the construction of the conditional transfers component T_i in the variable NY_i should be divided into following steps:

- For the *employed* we assume hypothetical situation where labour income is set to zero (i.e. income "at zero hours worked") and non-labour income is left at its original values. Conditional transfers are then computed as hypothetical values an individual is entitled to by using our model of tax-benefit system described below.
- For the *unemployed* we add one more step. First, we assign to all unemployed individuals predicted potential gross income (wage) by using Heckman's methodology, where the driving factors in the model are based on personal characteristics. Then we proceed like in the case of employed and we compute their conditional transfers.
- For the *pensioners* and *other inactive* we use the actual transfers they are entitled to.[9]

Equipped with vectors gains-to-work and non-labour income we can focus on modelling and identification of driving factors of participation decisions to enter the labour market. Therefore, we consider two specifications of structural probit regression model; first one uses *economic activity* and second one uses dummy variable *employed* as dependent variable:

$$Pr(activity_i) = \Phi(\gamma \log W_i + Z_i' \alpha + \psi \log NY_i)$$

$$Pr(employed_i) = \Phi(\gamma \log W_i + Z_i' \alpha + \psi \log NY_i)$$

where vectors of gains-to-work $\log W_i$ and non-labour income $\log NY_i$ enter the model in a logarithmic form[10] and Z_i denotes a vector of characteristics that affect the labour supply of an individual.

When unobserved characteristics of employed people systematically differs from the unobserved characteristics of unemployed, a simple wage regression estimated by OLS will provide biased estimates. Since income from employment is unobservable for those who are unemployed (it's an endogenous dummy variable), we first apply Heckman's sample selection methodology to predict the gains-to-work. In Heckman's framework, model is defined by the two equations: selection equation that estimates the probability (propensity score) of an individual to be employed/unemployed:

$$Pr(employed_i) = \Phi(X_i' \beta + Z_i' \alpha + \psi \log NY_i)$$

where X_i is a vector of those characteristics that affect the labour demand of an individual. The es-

8 *In Slovakia, most typical form of employment is a full-time employment. Only 2% of respondents in SK-SILC survey reported that they work part-time. Similar situation has been documented in Hungary.*

9 *In fact, to be consistent in the whole set up of our labour-supply model, we use the simulated values of transfers and other non-labour income when they are available, i.e. when they can be computed by our tax-benefit model. We use the actually observed values, as they were reported by survey participants, only when these are not simulated with our tax-benefit model.*

10 *This comes from the derivation of the structural form of the model, see Benczur et al. (2012) for details.*

timated propensity score model is then used to estimate the coefficients of regression equation that models the market wage (more specifically the gains-to-work).

Formally, we estimate the wage regression by using the Heckman methodology to overcome sample selection problem:

$$\log W_i = X_i'\beta + \rho\lambda\,(X_i'\beta + Z_i'\alpha + \psi \log NY_i) + \\ + u_i$$

where X_i is a vector of those characteristics that affect the labour demand of an individual, u_i is an error term and λ denotes the inverse Mill's ratio[11]. We assume that error terms corresponding to equations (3) and (4) are independent across individual observations and jointly normally distributed with correlation ρ. The model is estimated jointly by a maximum likelihood method.

Finally, $\log W_i = X_i'\beta$ comes as a result of unconditional linear prediction from Heckman's model. These estimates then enter structural probit equation (2). In order to reduce the division bias, we use the predicted gains-to-work $\log W_i$ for all observations (i.e. not only for employed but also for unemployed and inactive , as it is common in the labour supply literature, e.g. Bargain et al., 2012 or Breunig and Mercante, 2010).

3 Data and tax-benefit system simulations

The data used for microeconometric analysis come from three waves (2010-2012) of SK-SILC, the national version of EU-SILC[12]. Data are collected on an annual basis from 2004 by the Statistical Office of the Slovak Republic on behalf of EUROSTAT. Dataset contains cross-sectional data on household and individual level and it provides information on income, living conditions, social exclusion and poverty. The Original datasets contain information on more than 15,000 individuals and 5,200 households yearly.[13] 2010 SK-SILC database collects information on 16,275 individuals living in 5,376 households and 2011 SK-SILC survey contains 15,327 individuals in 5,200 households. We combined these three datasets to a pooled cross-section and estimate structural models as a pooled regression.[14]

The SK-SILC comprises detailed information describing the personal characteristics of individuals. These include age, gender, education and region of permanent residency and marital status. Dataset also reports detailed information related to labour market status – whether an individual was employed (full-time, part-time), self-employed or whether he stayed unemployed in the reference period. Information on length of working history (in years) is also available. Further, extensive information on the structure of individual income is available. Survey participants were asked to declare their yearly gross earnings from employment (self-employment), fringe benefits, and also transfers from the state, e.g. unemployment benefits or pensions (old-age, disability).

Slovak tax-benefit system simulations

The simulations of the tax-benefit system in Slovakia follow EUROMOD, a microsimulation tool designed to simulate the redistributive systems of EU countries. Simulations cover direct taxes (namely labour and capital income taxes), social insurance contributions and selected transfers. Our contribution is that we provide a more precise simulations of selected transfers compared to EUROMOD.

Identification of variables in the model

We first focus on definition of economic activity and employment status that are dependent variables in the structural probit model. We define employed/unemployed status of an individual based on the prevailing economic activity in the reference period. Being active is defined in terms of ILO definition of economic activity.[15]

Income variables are necessary to generate gains-to-work; those which are collected on the individual level are listed in gross terms in SK-SILC. The only exception is the net profit (loss) from self-employment. Information on disposable income, income taxes and social security contributions are available in the SK-SILC database only as an aggregate at the household level. Therefore, all income variables are used in gross terms and the net income is simulated.

Actually, we distinguish between three different types of income: labour-income, non-labour income and transfers from the government. Labour-income includes gross wage from main and second job, income from self-employment, income from company shares and income from agreements. Information on fringe benefits, severance and termination payments, and company car is also available. Non-labour income covers income from rental of a property or land, interests, dividends and profit from capital investments.

Referring to equation (4), covariates in the Heckman selection model consist of two sets of variables: labour demand shifters X_i and labour supply shifters Z_i. As it has already been documented in the literature (see e.g. Kimmel and Kniesner, 1998 or Benczur et al., 2012) labour demand shifters X_i contain controls that affect market wage while the labour supply shifters Z_i include demographic and family characteristics.

In our implementation, the labour demand group composed of X_i controls for the wage and therefore does not affect labour supply directly (or has only marginal impact). These variables contain the degree of urbanization of a region where a person resides (dense, normal and sparse density) and a regional value added per capita. These two variables should capture differences in regional economic environment and thus control for the activity indirectly. We include also age and age squared and interaction terms of age with education dummies. These variables serve as instruments for our wage estimations – we argue that age as a proxy for experience significantly influences the market wage, but it does not affect selection into employ-

11 *Inverse Mill's ratio is defined as a ratio of probability density function to the cumulative distribution function of a distribution.*

12 *Abbreviation SILC stands for "Statistics on Income and Living Conditions". 2010 SK-SILC denotes the fact that survey data were collected in 2010, while the reference period is 2009.*

13 *2010 SK-SILC database collects information on 16,275 individuals living in 5,376 households, 2011 SK-SILC database contains 15,327 individuals in 5,200 households and 2012 SK-SILC database 15,440 individuals in 5291 households.*

14 *EU-SILC database for Slovakia is constructed as a rotating panel database with one fourth of data updated each year. However, in our micro-simulations we need to work with a national extended version SK-SILC, which is not available as a panel.*

15 *For the definition of labour market status we use the SILC variable „prevailing activity in the income reference period", it comprises the following categories: children, employed, unemployed, pensioners and other inactive. Economically active are those who declared themselves as employed or unemployed, category of inactive consists of pensioners and other inactive.*

ment, i.e., it can serve as a labour demand shifter. Besides this, these variables also serve as a source of additional variation in the model (consider prediction of the $\log W_i$ in Heckman's model). Note that different phases of individual life cycle (pre-prime age, prime-age, elderly, student, pensioner) are already controlled in the labour supply equation.

Labour supply shifters group Z_i contains controls like gender, three age groups (15-24, prime age 25-49 and elderly 50+), three educational groups (education level is stated as a dummy of the highest level achieved) and working experience expressed as a share of actual to potential experience. Here, age group dummies are included as a labour supply shifter that control for the life-cycle position. We also include family status (single, divorced, married, widowed), living with working partner, being a mother of child under 3 years of age, being a pensioner and attending a full-time education. Moreover, we include dummy variables for car ownership and monthly instalments of mortgage and loans.

Setup of the sample

The dataset we use is restricted by age to persons older than 15 and younger than 75, to exclude children in full-time education and those in retirement. Persons who declare themselves as employed (reporting positive number of months being employed), but who report income below minimal wage, are also dropped. Moreover, we also exclude those individuals, where the prevailing economic activity in the income reference period could not be defined. These adjustments leave us with approximately 36,000 individual observations in the estimation sample.

4 Findings

In this section we present and discuss a large set of estimation results. The estimation results of the two equations of the Heckman model as well as the estimates of two structural probit models are reported in Siebertova, Senaj, Svarda and Valachyova (2013).

In Table 1 we report our main results, the marginal effects from the estimated structural probit model evaluated at sample means. Later we concentrate mainly on labour force participation (economic activity), for the probability of employment we display only results of the main specification. In the upper part of the table, the point estimates of the gains-to-work and non-labour income are reported. Looking at both specifications, computed results are statistically significant and have the expected sign, i.e. an increase in gains-to-work increases the probability of participation, while the opposite is true for non-labour income. Qualitatively the results of both specifications are comparable[16].

A one percent rise in gains-to-work increases the individuals' probability of economic activity by 0.233 percentage points, this effect is even more pronounced for the net wage. On contrary, the effect of non-labour income and transfers is lower (in absolute value); a one percent increase in non-labour income leads to 0.106 percentage points decrease in supplying labour. Since transfers are only a part of non-labour income, the effect of transfers is substantially smaller.

Next we focus on selected subgroups of individuals and explore how the estimated semi-elasticities vary. In Table 2 we present a comparison of marginal effects computed for the three educational subgroups (elementary or less, secondary and tertiary education). The estimated semi-elasticities are substantially different by educational subgroups, highest responsiveness is observed in a low-educated group with elementary education (these individuals are often highly transfers dependent). Our results suggest that participation elasticities substantially decrease with educational level, especially when prime-age sub-sample is considered. Notice that in agreement with previous studies, prime-age subgroup of higher educated individuals exhibits overall low responsiveness to the tax and transfer system reforms compared to the full sample of entire population.

In Table 3 we report results for the sub-groups classified by gender and marital status. Overall responsiveness of females is larger than of males. However, prime-age married males are identified as a sub-group with the smallest elasticity. We do not find in our data substantial differences in responsiveness when single and married prime-age women are compared. The group of elderly (above 50 years) shows the highest responsive-

16 *Conditional marginal effects for the dependent variable "Employed" divided by subgroups are available upon request.*

Table 1 Marginal effects – main specification

Dependent variable	ACTIVE		EMPLOYED	
Point estimates	coef	std err	coef	std err
Gains to work (*logW*)	0.670	0.062	0.572	0.069
Non-labour income (*logNY*)	-0.305	0.019	-0.357	0.016
Marginal effects*	dy/dx	std err	dy/dx	std err
Gains to work (*logW*)	0.233	0.020	0.226	0.027
Non-labour income (*logNY*)	-0.106	0.007	-0.142	0.006
Net wage	0.263	0.023	0.255	0.031
Transfers	-0.039	0.003	-0.042	0.003

**Note: Marginal effects are evaluated at sample means. Bootstrapped standard errors, 200 replications.*

*Table 2 Marginal effects by educational subgroups**

	Prime age		Full sample	
Marginal effects by subgroups**	dy/dx	std err	dy/dx	std err
Elementary education				
Gains to work (*logW*)	0.236	0.022	0.122	0.015
Non-labour income (*logNY*)	-0.107	0.007	-0.055	0.004
Net wage	0.274	0.025	0.128	0.015
Transfers	-0.058	0.004	-0.007	0.001
Secondary education				
Gains to work (*logW*)	0.083	0.008	0.211	0.019
Non-labour income (*logNY*)	-0.038	0.003	-0.096	0.007
Net wage	0.098	0.009	0.241	0.021
Transfers	-0.022	0.002	-0.039	0.003
Tertiary education				
Gains to work (*logW*)	0.051	0.008	0.114	0.012
Non-labour income (*logNY*)	-0.023	0.003	-0.052	0.005
Net wage	0.061	0.009	0.132	0.014
Transfers	-0.015	0.002	-0.025	0.002

**Note: Probit estimates are computed using full sample and marginal effects are evaluated at sub-group specific sample means. Bootstrapped standard errors, 200 replications.*
***Note: Dependent variable ACTIVE.*

*Table 3 Marginal effects by selected subgroups**

Marginal effects by subgroups**	dy/dx	std err	Marginal effects by subgroups**	dy/dx	std err
Prime age, males			**Prime age, females**		
Gains to work (*logW*)	0.052	0.004	Gains to work (*logW*)	0.112	0.013
Non-labour income (*logNY*)	-0.023	0.002	Non-labour income (*logNY*)	-0.051	0.004
Net wage	0.060	0.005	Net wage	0.136	0.016
Transfers	-0.014	0.001	Transfers	-0.032	0.003
Prime age, single males			**Prime age, single females**		
Gains to work (*logW*)	0.085	0.008	Gains to work (*logW*)	0.125	0.014
Non-labour income (*logNY*)	-0.039	0.003	Non-labour income (*logNY*)	-0.057	0.005
Net wage	0.104	0.010	Net wage	0.156	0.017
Transfers	-0.036	0.002	Transfers	-0.053	0.004
Prime age, married males			**Prime age, married females**		
Gains to work (*logW*)	0.035	0.003	Gains to work (*logW*)	0.104	0.012
Non-labour income (*logNY*)	-0.016	0.002	Non-labour income (*logNY*)	-0.047	0.004
Net wage	0.040	0.004	Net wage	0.123	0.015
Transfers	-0.007	0.001	Transfers	-0.024	0.002
Prime age (25-49)			**Elderly (>=50)**		
Gains to work (*logW*)	0.079	0.008	Gains to work (*logW*)	0.261	0.025
Non-labour income (*logNY*)	-0.036	0.003	Non-labour income (*logNY*)	-0.118	0.007
Net wage	0.093	0.009	Net wage	0.280	0.027
Transfers	-0.021	0.002	Transfers	-0.027	0.002

**Note: Probit estimates are computed using full sample and marginal effects are evaluated at sub-group specific sample means. Bootstrapped standard errors, 200 replications.*
***Note: Dependent variable ACTIVE.*

ness, this can explain the large difference between prime age group semi-elasticity and semi-elasticity of the whole sample.

Finally, in Table 4 we look at the sub-groups divided by income levels, here represented by the gains-to-work quintiles. Results for the full sample of entire population are mixed: elasticities decrease with income level, but for the fifth quintile they show to be unexpectedly high. This may result from the presence of working pensioners

*Table 4 Marginal effects by income quintiles**

Marginal effects by Gains to Work quintiles**	dy/dx	std err	dy/dx	std err
Q1 (below 3,570 euro)	Prime Age		Full sample	
Gains to work (*logW*)	0.164	0.023	0.252	0.027
Non-labour income (*logNY*)	-0.075	0.006	-0.115	0.008
Net wage	0.233	0.032	0.348	0.037
Transfers	-0.083	0.010	-0.109	0.010
Q2 (below 4,712 euro)	Prime Age		Full sample	
Gains to work (*logW*)	0.101	0.013	0.112	0.013
Non-labour income (*logNY*)	-0.046	0.004	-0.051	0.004
Net wage	0.132	0.017	0.147	0.018
Transfers	-0.042	0.004	-0.045	0.004
Q3 (below 5,807 euro)	Prime Age		Full sample	
Gains to work (*logW*)	0.072	0.008	0.087	0.009
Non-labour income (*logNY*)	-0.033	0.003	-0.040	0.003
Net wage	0.091	0.011	0.110	0.012
Transfers	-0.026	0.003	-0.031	0.003
Q4 (below 7,317 euro)	Prime Age		Full sample	
Gains to work (*logW*)	0.053	0.006	0.061	0.006
Non-labour income (*logNY*)	-0.024	0.002	-0.028	0.002
Net wage	0.063	0.007	0.071	0.007
Transfers	-0.014	0.001	-0.015	0.001
Q5 (above 7,317 euro)	Prime Age		Full sample	
Gains to work (*logW*)	0.068	0.004	0.267	0.024
Non-labour income (*logNY*)	-0.031	0.003	-0.121	0.008
Net wage	0.074	0.004	0.275	0.024
Transfers	-0.010	0.001	-0.012	0.001

**Note: Probit estimates are computed using full sample and marginal effects are evaluated at sub-group specific sample means. Bootstrapped standard errors, 200 replications.*
***Note: Dependent variable ACTIVE.*

with high non-labour income in the sub-group. Therefore, we report separately results for the prime age group and in line with previous analyses we find that the overall elasticity of this group decreases with income level. Cross quintiles differences in computed elasticities are larger at the lower end, i.e. between first, second and third quintiles. There is practically no difference between the reported elasticities in the fourth and fifth quintile.

Overall, thus, our results suggest that policies that make work pay would lead to an increase in participation and employment. The low-skilled, females and the elderly are groups that are more responsive to changes in taxes and transfers. This implies that labour market policies (i.e. tax and transfer system reforms) that are aimed to boost employment should be primarily targeted at low-educated individuals and women.

5 Conclusion

In this article we provide the first estimates of Slovak labour supply responsiveness at the extensive margin. We use a structural labour supply model that takes into account both taxes and transfers and estimate net income semi-elasticity of labour force participation.

This analysis shows several clear results. We identify significant individual responsiveness to tax and transfer system. It turns out that the results are qualitatively comparable to those reported for mature market economies: highly responsive groups of population are low-skilled, females and elderly. These findings fulfill the initial expectations, however the overall transfers' elasticity has been found low. This is also not surprising, since more detailed insight at the construction of the individual non-labour income shows that transfers constitute only a small part of it and thus indicate a low generosity of the Slovak benefit system. Our results validate those reported for Hungary by Benczur et al. (2012) and they are consistent also with the preliminary results of the similar analysis conducted for the Czech Republic (mimeo). In terms of magnitude of the computed elasticities, we found lower values (both net income and transfers elasticities) compared to the ones reported in Benczur et al. (2012) for Hungary, and comparable (in terms of low transfers elasticities) to the preliminary results computed for the Czech Republic.

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