A Microsimulation model of the Slovak Tax-Benefit System

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A Microsimulation model of the Slovak Tax-Benefit System

Zuzana Siebertová, Norbert Švarda, Jana Valachyová

ABSTRACT

This paper sets out in detail a microsimulation model of the Slovak tax and transfer system that builds on the existing EUROMOD platform. The objective is to give an overview of the development process, and to discuss differences relative to EUROMOD. In a validation exercise, we demonstrate that refinements to the current version of the EUROMOD can improve the match between simulated output, underlying data and official statistics. It is concluded that the model is a valid tool to conduct tax and benefit simulation exercises in the context of Slovakia.

Keywords: microsimulation, EUROMOD, tax and benefit policy, Slovakia

JEL classification: C81, I38, H24

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List of Abbreviations

The following table describes the significance of various abbreviations and acronyms used in the paper.

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>COLSAF</td>
<td>Central Office of Labour, Social Affairs and Family</td>
</tr>
<tr>
<td>CBR</td>
<td>Council for Budget Responsibility</td>
</tr>
<tr>
<td>HBS</td>
<td>Household Budget Survey</td>
</tr>
<tr>
<td>HFCS</td>
<td>Household Finance and Consumption Survey</td>
</tr>
<tr>
<td>ISAE</td>
<td>Information System on Average Earnings</td>
</tr>
<tr>
<td>LFS</td>
<td>Labour Force Survey</td>
</tr>
<tr>
<td>MNB</td>
<td>Material needs benefit</td>
</tr>
<tr>
<td>SIC</td>
<td>Social insurance contributions</td>
</tr>
<tr>
<td>SK-SILC</td>
<td>National version of the European Union Statistics on Income and Living Conditions (EU-SILC)</td>
</tr>
<tr>
<td>SSA</td>
<td>Social Security Agency</td>
</tr>
</tbody>
</table>
1 Introduction

In this paper we describe a microsimulation model that has been developed to simulate the Slovak tax and transfer system. The model is based on the existing EUROMOD platform, albeit several modules were customized and enlarged. We show that such adjustments provide us with simulated output that matches official statistics more closely.

The presented microsimulation model serves as an assessment tool developed primarily for the needs of the Council for Budget Responsibility (CBR). It is a key building block in a general equilibrium framework designed to assess the consequences of tax and benefit reform strategies. The paper documents the process of building the microsimulation model and outlines in detail the approach that has been applied. The intention is to provide a thorough documentation, with the lessons learned for those who might be interested in a detailed description of the model as well as for those who might wish to work with it.

More generally, researchers with interest in microsimulation might benefit from some of the innovative solutions applied here. In particular, our refinement to the modelling of benefits whose amount and duration is conditional on unobserved factors - such as the material needs, unemployment and maternity leave benefit – should be of interest to a larger audience. It is shown that our approach improves the fit between simulated output, underlying data and official statistics. It also has a positive effect on simulation-based econometric estimates, as reported in Siebertova et al. (2014).

The paper is structured as follows. Section 2 describes the selection of the appropriate microlevel dataset and the adjustments of the underlying data that were necessary. Section 3 shortly summarizes the tax and benefit system in Slovakia. Section 4 briefly reviews the EUROMOD microsimulation model, describes an adaptation of the existing EUROMOD modules and explains the need for more detailed simulations. Section 5 presents comparison and provides a discussion on the simulation results using EUROMOD and the CBR approach. Section 6 concludes.

2 Data

2.1 Available data sources and selection of dataset

A necessary precondition for the development of a microsimulation model is the existence of suitable micro-dataset containing information preferably both on individuals and households. Usually, household survey data are used for these types of analyses; use of the administrative (or census) data is rather scarce.

In Slovakia, there exist several surveys conducted by the Slovak Statistical Office and by the National Bank of Slovakia (NBS) that provide data on individual level. An obvious source for this

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5 The results presented in this paper are based on EUROMOD version F6.36 which was the best available version at the time of writing.
type of project would be the Household Budget Survey (HBS) or the European Union Statistics on Income and Living Conditions (EU-SILC). Both of these surveys are conducted on a yearly basis in Slovakia. HBS contains broad information on consumption and income measures (including gross wages and transfers), and also detailed individual characteristics. The main limitation of using this dataset in a microsimulation model is that there is no information on family relationship between household members (although the head of the household is identified). Other surveys that are currently run, but not suitable for this project, include Labour Force Survey (LFS) and Household and Finance Consumption Survey (HFCS). LFS concentrates primarily on working age population (i.e., those older than 15 years) and it does not collect information on income and family relationships. HFCS is conducted by National Bank of Slovakia and it is currently available as a pivotal dataset from 2010 which does contain unique information mainly on financial actives/passives of households. However, the coverage of income items and transfers is not sufficiently detailed to provide a comprehensive basis for a microsimulation model.

Except for the full Census (latest in 2011), that does not ask questions about income, there exist two administrative datasets that contain information on income. The first one is the quarterly Information System on Average Earnings (ISAE) that collects detailed information on income of employees and their characteristics. The second dataset comes from the Social Security Agency that collects social security contributions. This dataset provides detailed information on paid contributions and information on gross monthly wage can be retrieved out of it. Both datasets were ruled out since they contain no information on transfers and family relationships. Characteristics of available datasets is further detailed in Table A1 in the Appendix.

2.2 SK-SILC dataset

The national version of the EU-SILC survey, abbreviated as SK-SILC, was selected as a base dataset for the tax-benefit microsimulations. Currently, it does best at meeting the data requirements for a microsimulation model, when compared to other datasets described in the previous section. Compared to the user database version of the EU-SILC, SK-SILC dataset includes more variables.

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6 Technically, Social Security Agency (SSA) administers several individual level datasets. The one mentioned above comprises information on paid contributions of employees, vendors and self-employed. SSA also administers dataset that contains information on selected transfers paid to inhabitants (e.g., old-age and disability pensions, maternity benefits). Administrative data on paid unemployment benefits and different family related and social assistance transfers are governed by Central Office of Labour, Social Affairs and Family (COLSAF). Currently, these official datasets are not interconnected. However, there exist an ongoing pressure of analytical departments of government institutions and academic sector to create an effective database that will combine all available individual data from SSA, COLSAF and Tax Authorities.

7 Information on the EU-SILC database reported in this section are based on national Intermediate Quality Report EU-SILC 2010. Note that income data in a survey denoted as 2010 EU-SILC corresponds to the fiscal year 2009.
The EU-SILC is an annual survey that has been conducted in Slovakia since 2004, it is collected by the Statistical Office of the Slovak Republic on behalf of EUROSTAT. Survey questions are focused on the income and living conditions of different types of households, as well as on the individual demographic characteristics, education, health status, employment, housing conditions and deprivation measures.

The database contains cross-sectional data both at individual and household level. It has a panel\(^8\) rotational design with 4 sub-samples, each subsample lasts in the survey for 4 years. Private households are the primary sampling units, the sampling procedure is one-stage stratified sampling. The sampling frame was stratified on the basis of geographical criteria (NUTS3 region and degree of urbanisation) and proportional simple random sampling has been applied within each stratum. Concerning the data quality; the household response rate for the total 2010 SK-SILC sample yielded 88.59%.

Weights that scale up sample numbers to the population have been computed such that non-response at the household level has been taken into account. Each household in the sample is weighted in an inverse ratio to the probability by which it has been selected (i.e., it is multiplied by the inverse value of the response rate). In the next step, the weights have been calibrated to match the demographic structure in regions (based on external data). Finally, the cross-sectional household weights and personal weights have been integrated such that they are equal.

<table>
<thead>
<tr>
<th></th>
<th>SK-SILC 2010</th>
<th>SK-SILC 2011</th>
<th>SK-SILC 2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individuals</td>
<td>16,275</td>
<td>15,327</td>
<td>15,440</td>
</tr>
<tr>
<td>Households</td>
<td>5,376</td>
<td>5,200</td>
<td>5,291</td>
</tr>
<tr>
<td>Projected population</td>
<td>5,415,559</td>
<td>5,389,454</td>
<td>5,395,519</td>
</tr>
<tr>
<td>Projected households</td>
<td>1,911,664</td>
<td>1,911,664</td>
<td>1,911,664</td>
</tr>
<tr>
<td><strong>Grossing-up weight</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>332.753</td>
<td>351.631</td>
<td>349.451</td>
</tr>
<tr>
<td>Std. Dev.</td>
<td>117.117</td>
<td>113.936</td>
<td>125.988</td>
</tr>
<tr>
<td>Minimum</td>
<td>106.640</td>
<td>118.822</td>
<td>108.690</td>
</tr>
<tr>
<td>Maximum</td>
<td>1,137.724</td>
<td>1,641.253</td>
<td>1,226.095</td>
</tr>
</tbody>
</table>

The 2010 SK-SILC database collects information on 16,275 individuals living in 5,376 households, 2011 SK-SILC reports 15,327 individuals living in 5,200 households and 2012 SK-SILC contains 15,440 individuals in 5,291 households. Table 1 presents descriptive statistics of the grossing-up weight and population estimates of the re-weighted samples.

The database comprises detailed information describing the personal characteristics, household members’ relationships and labour market activity of individuals. Individual characteristics include age, gender, education, region of permanent residency and marital status.

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\(^8\) EU-SILC for Slovakia is available also as a panel dataset. In our micro-simulations we work with a national extended version SK-SILC, which is currently not available as a panel.
The dataset also reports detailed information related to labour market status – whether an individual was employed (full-time, part-time), self-employed or whether (s)he stayed unemployed in the reference period. Information on length of working history (in years) is also available. Furthermore, extensive information on the structure of individual income is available. Survey participants were asked to declare their yearly gross earnings from employment (and/or self-employment), fringe benefits, and also detailed transfers from the state, e.g. unemployment benefits or pensions (old-age, disability). Some of the transfers are legislatively defined for households and thus reported just on the household level (material needs benefit, child benefit or parental allowances). Further description and summary statistics of relevant income variables and transfers can be found in Table A2-Table A4 in the Appendix.

2.2.1. SK-SILC versus official statistics

The dataset is largely representative of the country population. However, as it is frequent in survey data, SK-SILC might also over-represent or under-represent certain cohorts. Particular limitations are inspected in details below, in such a way that SK-SILC data are compared to the appropriate official statistics. These comparisons serve indeed as highly instructive in later assessment of simulations.

Table 2 presents weighted data on number of individuals (in the selected age cohorts) in the input database used in the simulation model against external benchmark. The SK-SILC dataset underestimates number of new-born (age 0) and small children (under 3 years), but matches relatively well to the overall pre-prime age cohort (0-26 years). This applies both in 2009 and subsequent years 2010 and 2011.

<table>
<thead>
<tr>
<th>Age cohort</th>
<th>SK-SILC / population*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2009</td>
</tr>
<tr>
<td>0</td>
<td>0.58</td>
</tr>
<tr>
<td>0 - 3</td>
<td>0.66</td>
</tr>
<tr>
<td>0 - 16</td>
<td>0.84</td>
</tr>
<tr>
<td>0 - 26</td>
<td>0.97</td>
</tr>
<tr>
<td>Prime age</td>
<td>1.03</td>
</tr>
<tr>
<td>Retirement age</td>
<td>1.10</td>
</tr>
</tbody>
</table>

Source: Authors’ calculations using SK-SILC and Slovak Statistical Office

* Ratio displays number of individuals in SK-SILC (weighted) to population in the respective age cohort.

Prime age: 15-64 years. Retirement age: males 62+, females 58+

Data on representation of the economic activity of Slovak population is shown in Table 3. The results document that based on these criteria, SK-SILC dataset reflects official statistics well.
The only exception is the number of unemployed in 2009, which is 14% higher in the dataset used, than recorded by external benchmark.

Table 3: Economic activity of population (in thousands persons)

<table>
<thead>
<tr>
<th></th>
<th>LFS</th>
<th>SK-SILC</th>
<th>SK-SILC / LFS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Employed</td>
<td>2,365.80</td>
<td>2,317.50</td>
<td>2,315.30</td>
</tr>
<tr>
<td>Unemployed</td>
<td>324.20</td>
<td>389.00</td>
<td>364.60</td>
</tr>
<tr>
<td>Economic active pop.</td>
<td>2,690.00</td>
<td>2,706.50</td>
<td>2,680.00</td>
</tr>
<tr>
<td>Population total</td>
<td>5,409.50</td>
<td>5,421.80</td>
<td>5,392.40</td>
</tr>
</tbody>
</table>

Source: Authors’ calculations using SK-SILC and LFS.

Table 4 compares the aggregate number of unemployment benefit recipients to total number of unemployed persons in the input database to corresponding administrative data from COLSAF and data from LFS. The ratio of recipients of unemployment benefit to total number of unemployed is substantially smaller in SK-SILC compared to official statistics.

Table 4: Unemployment benefit validation: Aggregate number of recipients (in thousands pers.)

<table>
<thead>
<tr>
<th></th>
<th>Official statistics</th>
<th>SK-SILC</th>
<th>SK-SILC / Official statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recipients of unemp. benefit*</td>
<td>135.37</td>
<td>138.83</td>
<td>141.85</td>
</tr>
<tr>
<td>Unemployed**</td>
<td>324.20</td>
<td>389.00</td>
<td>364.60</td>
</tr>
<tr>
<td>Recipients / Unemployed</td>
<td>0.42</td>
<td>0.36</td>
<td>0.39</td>
</tr>
</tbody>
</table>

Source: Authors’ calculations using SK-SILC, COLSAF*, and LFS**.

In the next two tables, i.e. in Table 5 and Table 6, different sources of income reported in SK-SILC are related to official statistics given by SSA. A comparison is provided with respect to number of individuals receiving certain type of income as well as in terms of reported aggregate amounts of income. The number of people that have reported an income from employment is over-represented in the input SK-SILC data, while those who declare an income from agreements are under-represented and this applies to all three years. On the other hand, the number of self-employed matches relatively well when compared to the data from SSA in 2009 and 2010, in 2011 they are according to this statistics oversampled. However, comparing the number of self-employed to the statistics of SSA is not completely correct. SSA database is primary a dataset of paid social insurance contributions and gross income can be derived based on it. In case of self-employed SSA dataset captures those individuals who pay SIC. When the number of self-employed is taken from the registry of the Statistical Office, SK-SILC is in 2009 and 2010 substantially undersampled (corresponding ratios are 0.62 in 2009, 0.64 in 2010 and 0.92 in 2011).
The figures reported in Table 6 are in line with the evidence on recipients of different income provided in Table 5 above. Aggregate income from employment is approximately 18% higher than documented by SSA, while the income from agreements is substantially underreported. As it is inspected in detail in Appendix B, low-income earners are oversampled while high-income earners are undersampled in the input data. Note that income from self-employment should be validated with caution and results proposing substantial over-reporting in the input data are only indicative. The reason is that SK-SILC reports for the self-employed the value of profit/loss in the current year, while the SSA database reports the legislatively correct assessment base which is based on the value of declared return in the year t-2, i.e. there is an inconsistency both in variables that are equated and time aspect.

Furthermore, the main non-simulated benefits and pensions, which serve as an input to later simulations, are inspected in the next two tables. The aggregate numbers of recipients of maternity benefit and four types of pensions are exhibited in Table 7. Maternity benefit recipients are undersampled in the input databases in all tested years. Since the eligibility for the maternity benefit is up to approximately 6 months after the child’s birth (in 2011 this has been enlarged to 7 months after the child’s birth), the reported figures match with the undersampling of the youngest age cohort in SK-SILC as it is documented in Table 2. On the other hand, the elderly are oversampled in SK-SILC data in all three years. This again mirrors...
the higher share of old-age pension beneficiaries, documented in the input data, than reported by the official statistics. Disability pensioners and orphans are undersampled in the SK-SILC data, while widows and widowers well approximate the figure addressed by SSA.

Table 7: Non-simulated benefits and pensions: Number of recipients (in thousands persons)

<table>
<thead>
<tr>
<th>Benefits</th>
<th>SSA</th>
<th>SK-SILC</th>
<th>SK-SILC / SSA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maternity</td>
<td>20</td>
<td>20</td>
<td>23</td>
</tr>
<tr>
<td>Pensions</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Old age</td>
<td>932</td>
<td>955</td>
<td>958</td>
</tr>
<tr>
<td>Disability</td>
<td>204</td>
<td>214</td>
<td>223</td>
</tr>
<tr>
<td>Widow/er</td>
<td>338</td>
<td>337</td>
<td>337</td>
</tr>
<tr>
<td>Orphans</td>
<td>29</td>
<td>28</td>
<td>28</td>
</tr>
</tbody>
</table>

Source: Authors’ calculations using SK-SILC, Social Security Agency (SSA).

Table 8 summarizes the aggregate amounts of benefits and pensions: data in the input dataset are compared to external statistics from the SSA. Not surprisingly, old-age pension payments are approximately 20% higher in the SK-SILC data than reported by SSA. Other non-simulated benefit and pension payments are in general underestimated. The gap between official records and input data is extreme in case of sickness benefits, where aggregate payments reported in SK-SILC reached in 2010 only 40% of the official statistics, in subsequent years this gap has been even pronounced. Maternity benefit payments represent 40 to 60% of the official SSA records and these figures match with the underestimated number of recipients reported over the years 2009-2011 (see Table 7 above).

Table 8: Non-simulated benefits and pensions: Aggregate amounts (in mil. EUR)

<table>
<thead>
<tr>
<th>Benefits</th>
<th>SSA</th>
<th>SK-SILC</th>
<th>SK-SILC / SSA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maternity</td>
<td>67,933</td>
<td>76,650</td>
<td>107,124</td>
</tr>
<tr>
<td>Sickness</td>
<td>248,698</td>
<td>261,773</td>
<td>274,259</td>
</tr>
<tr>
<td>Pensions</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Old age</td>
<td>3,595,383</td>
<td>3,758,182</td>
<td>3,926,901</td>
</tr>
<tr>
<td>Disability</td>
<td>622,259</td>
<td>656,420</td>
<td>689,217</td>
</tr>
<tr>
<td>Widow/er</td>
<td>532,374</td>
<td>546,777</td>
<td>559,056</td>
</tr>
<tr>
<td>Orphans</td>
<td>44,490</td>
<td>43,283</td>
<td>43,057</td>
</tr>
</tbody>
</table>

Source: Authors’ calculations using SK-SILC, Social Security Agency (SSA).
2.2.2. Adjustments and re-weighting of the data

Only minor adjustments of variables were needed in the original SK-SILC databases. In particular, some corrections were necessary when we checked for the consistency in family relationships (to control for the appropriate difference in age of parents and their children). In few cases we had to correct the proclaimed number of months when transfers were received (mostly in case of maternity benefit or parental allowance) – when the reported numbers exceeded actual legislative maximum. These corrections were necessary, since this information enters as an input into our microsimulations. On the other hand, we did not correct in the original sample the reported unusually high values (above legislative maximum) of those transfers, which we subsequently simulate with our model.

As it is frequent in a survey data, SK-SILC also over-represents low-income groups and under-represents high-income groups (these are in fact missing) when compared to the official statistics that can be retrieved from SSA database. We are aware of this caveat and we can include a correction step before actual microsimulation starts, if it is applicable. Correction of income distribution is subsequently applied in our general equilibrium model to evaluate fiscal effects of reforms more precisely.

The correction procedure works as follows. In both datasets we compute the mean value of gross income in every percentile. As a next step, we calculate the ratios of the computed means from the two datasets (percentile by percentile). These computed shares serve as a correction, we multiply the gross income in SK-SILC by these percentile specific factors. Scaling factors and corresponding income distributions are plotted in detail in Appendix B.

3 The Tax and Benefit System in Slovakia

3.1 Taxes and social insurance contributions

The Slovak tax system is largely unified; all important components are set at the state level. Taxation of income is conducted at an individual level and it is levied on gross income including wages, income from business activities, fringe benefits, capital incomes (dividends excluded), interest and rental income. Joint taxation of married couples is not possible. Social insurance contributions and social benefits are exempt from the tax base, i.e. the tax base is given as gross earnings net of employee social insurance contributions (SIC).

All relevant parameters needed to compute personal income tax (PIT) are available in the SK-SILC data - both those which are related to individual and household level. During the years 2009 to 2011 PIT amounts to a 19% flat tax rate with a constant non-taxable allowance. Tax expenditures that are deducted from the tax liability in the PIT include:

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9 Individual tax-return data are available in Slovakia starting from 2013.
(a) Basic tax allowance: tax allowance each individual can apply, the amount of the allowance is based on the legally defined minimum subsistence level.

(b) Spouse tax allowance: an individual may be entitled to a spouse tax allowance if the income of spouse satisfies certain conditions (earnings under a certain level).

(c) Employee tax credit (ETC, effective from 01.01.2009): the amount depends on employee’s income and on the period he has been working (at least 6 months). It is targeted at low-income groups who have to pay health and social insurance contributions.\footnote{If income is between 6 times of the minimum wage and 12 times of the minimum wage, the tax credit is calculated as 19\% of the difference between the basic tax allowance and the tax base, evaluated at the level of the minimum wage. If income exceeds 12 times the minimum wage, then the ETC is calculated as 19\% of the difference of the basic allowance and the tax base. There is no tax credit when the tax base is equal to or higher than the basic tax allowance.}

(d) Child tax credit: one spouse may claim an allowance for the children in the household (per every child) if the child satisfies certain conditions (e.g., aged under 18 or aged under 26 and in full time education or aged under 26 when physically or mentally disabled and not receiving disability pension). This tax credit can be received, if the parent annually earns at least 6 times the minimum wage. If the credit exceeds the tax liability, the excess is paid to the taxpayer.

The Slovak social insurance system is made up of two components; namely social insurance contributions and health insurance contributions. The assessment base for contributions is narrower compared to the PIT base since capital income is not considered.

(a) Social insurance contributions

Both employers and employees pay unemployment, sickness, disability and old age insurance (but different percentages from the social insurance assessment base, for a detailed overview of contribution rates valid in 2009-2011, see Table 9 below).

Old-age insurance is from January 2005 composed of public pay-as-you-go and private pillars. Employees already working before January 2005 had to choose whether they split their contributions between public and private pillar or pay the whole amount to the public pillar. Participation in the private pillar of employees who started to work in January 2005 and later had been stated as mandatory.

In addition, employers also pay contributions to a reserve solidarity fund, accident insurance and guarantee insurance.

The self-employed are treated differently; they pay sickness, disability and old age insurance and contributions to the reserve solidarity fund.

(b) Health insurance contributions

These contributions are paid by employers, employees and also self-employed. The percentage to be paid is different for the three categories of payers.
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Table 9: Social insurance contribution rates 2009-2011 (in %)

<table>
<thead>
<tr>
<th></th>
<th>Employees Public system</th>
<th>Combined system</th>
<th>Self-employed</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Employee</td>
<td>Employer</td>
<td>Employee</td>
</tr>
<tr>
<td>Health Insurance</td>
<td>4.00</td>
<td>10.00</td>
<td>4.00</td>
</tr>
<tr>
<td>Social Insurance</td>
<td>9.40</td>
<td>14.00</td>
<td>9.40</td>
</tr>
<tr>
<td>Sickness</td>
<td>3.00</td>
<td>1.40</td>
<td>3.00</td>
</tr>
<tr>
<td>Old-age</td>
<td>3.00</td>
<td>1.40</td>
<td>3.00</td>
</tr>
<tr>
<td>Disability</td>
<td>3.00</td>
<td>1.40</td>
<td>3.00</td>
</tr>
<tr>
<td>Unemployment</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Reserve solidarity f.</td>
<td>0.80</td>
<td>0.25</td>
<td>0.80</td>
</tr>
<tr>
<td>Accident</td>
<td>0.25</td>
<td>0.25</td>
<td></td>
</tr>
<tr>
<td>Guarantee</td>
<td>0.00</td>
<td></td>
<td>0.00</td>
</tr>
<tr>
<td>Total</td>
<td>13.40</td>
<td>35.20</td>
<td>13.40</td>
</tr>
</tbody>
</table>

*Note: Old-age insurance of self-employed can be paid either as 18% to public pillar, or 9% to public and 9% to private pillar.
**Voluntary payment.

3.2 The social system

The Slovak benefit system consists of three components, termed as contributory, social assistance and poverty, and state social support.
(a) Contributory benefits include old-age pension, early old-age pension, disability pension, widow’s and widower’s pension, orphan’s pension, sickness cash benefit, benefit for nursing a sick relative, equalization allowance, maternity benefit, and unemployment insurance benefit.
(b) Social assistance program covers material need benefit.
(c) State social support includes several programs, namely child birth grant, additional birth grant, multiple birth benefit, child benefit, additional child benefit, parental allowance, funeral benefit, scholarships for pupils in elementary school, scholarships for students in secondary school, and social scholarships for university students.

4 Tax and Benefit System Simulations

When constructing any microsimulation model, one needs to select policies that will be simulated and those that will be left out. Not surprisingly, these decisions are usually based on the underlying data constraints. Since the aim of using our microsimulation module is to use it as an input to other labour supply models (more details in section 4.2 below), the target is to
capture those policies that are primarily relevant with respect to their impact on individual and household incomes.

4.1 Existing models

To the best of our knowledge, the EUROMOD has been the only model available for the Slovak tax-benefit system microsimulations, which could be used equally by government agencies and the academic community. It is an EU-wide tax-benefit microsimulation model that can simulate individual and household tax liabilities and benefit entitlements according to policy rules valid in the respective EU states. EUROMOD is a unique tool that can be used both at national and cross-country levels; moreover it can serve as an input to different labour supply models. Its major advantage is the fact that it is openly accessible and users are able to either alter the existing or add completely new policies. The Slovak EUROMOD runs on SK-SILC data and the simulated policies currently include:

- Personal income tax is simulated in the model as a final tax liability, i.e. it is computed after all tax allowances and tax credits.
- Withholding income taxes are not simulated. Other direct taxes (such as local taxes) and indirect taxes (such as VAT, excise taxes) are also not simulated.
- All health and social insurance contributions paid by employers, employees and self-employed are simulated.
- Benefits that are fully simulated include family related programs, namely child birth grant, child benefit including additional child benefit and parental allowance.
- Means-tested material needs benefit and contributory unemployment insurance benefit are simulated partially under simplifying assumptions.

Simulations of other benefits, which may impact both individual and household incomes, are not included due to the lack of information on previous employment and contribution history. In particular, these include:

- Sickness benefits
- Disability pensions
- Old-age pensions are not simulated since there is no information on contribution record.
- Scholarships, which are means-tested, are not simulated – the reason is that the grades of potentially eligible students are not available.

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\[\text{For the current state and details of the EUROMOD project, see Sutherland and Figari (2013). The EUROMOD model for Slovakia is well documented in the EUROMOD Country Report, for a detailed overview of application rules and payable eligibility, see Porubsky et al. (2013).}\]
4.2 The need for a detailed model

The secretariat of the CBR is currently developing a dynamic behavioural micro-macro model that should be able to provide an assessment of tax and transfer system reforms and to calculate long-run dynamic impacts on employment, GDP, wealth redistribution or government budget. This model is composed of three parts, namely tax-benefit microsimulation module, labour supply module and macro module.

Given the requirements of the task outlined above, a decision to create an own microsimulation model has been taken. The new model has been developed using an existing platform, such that the whole setup of the EUROMOD model was recoded into an independent program\(^{12}\). It is important to stress that a primary intention has not been to replace the existing EUROMOD, which is a simple and transparent static tax-benefit calculator. Rather, the objective has been to expand its use and to tailor it directly to demands of dynamic behavioural microsimulation model. Besides these considerations about the type of microsimulation model that was needed – in terms of static/dynamic setup and capability of the inclusion of behavioural responses, also the operation, i.e. how easy is to incorporate it to a dynamic model setup, where the convergence could be achieved only after several iterations, has been an issue.

4.2.1. Overview of major differences between EUROMOD and the CBR microsimulation model

All tax and benefit instruments in the CBR model are simulated in the same order as in EUROMOD “spine”. Furthermore, the CBR model also includes the simulation of the length of the eligibility period to a maternity benefit (simulation is incorporated as a separate policy in the “spine”) and a substantial extension of simulation of material needs benefit. The order of simulation and policy interdependencies did not change during years 2009 to 2011.

Simulations “by months”

In the original EUROMOD setup all benefit instruments are simulated on a yearly basis. Based on predefined eligibility requirements, it is tested if an individual is entitled to receive certain benefit. An assignment is provided if the predefined conditions are met and subsequently the corresponding amount is simulated. For example, conditional eligibility to an unemployment benefit (among other conditions, an individual should not receive parental allowance) is checked and parental allowance is simulated prior to unemployment benefit. In other words, subsequent entitlement to certain transfers is ruled by the order of simulation policies. However, this procedure does not take into account possible variability that can occur during the whole period of one year – such that an individual might be eligible for several transfers that are available to him/her subsequently, if these transfers are paid for shorter period than one year.

\(^{12}\) For the extensive margin of the labour supply module, see our related working paper by Siebertova et al. (2014).

\(^{13}\) Software STATA has been used.
In order to allow for changes in receiving different benefits during the annual period, a key difference between the two approaches is that in the CBR model, eligibility to selected transfers is simulated on a monthly basis\textsuperscript{14}, depending on the predefined requirements. This applies particularly to family related and unemployment benefits, which are simulated in the following order:

- maternity benefit: length of eligibility period is simulated, which is 7 months (or 9 months in case of multiple births). The amount of benefit is presently not simulated because of lack of information on contribution history to health insurance.
- parental allowance: length of eligibility period is simulated, entitlement ends when the child reaches 3 years of age. Entitlement is possible up to 6 years in case of unfavourable child’s health condition, but this cannot be simulated. The amount needs not to be simulated - it is a fix payment.
- unemployment benefit: length of eligibility period is simulated, maximum is 6 months.

Minor modifications of tax-benefit system simulations used in CBR model are detailed in Table C1 in the Appendix. Two major modifications were implemented and these apply to the simulation of material needs benefit and unemployment benefit.

**Simulation of the material needs benefit**

The material needs benefit (MNB) is a means tested transfer that is intended for families with income below the minimum subsistence level. The actual benefit amount is calculated as a difference between the eligible maximum of MNB - composed of social benefit, health care allowance, housing allowance, activation and protection allowance - and the income of individuals living in a household. In our simulation, we include a more precise specification of the assessed income computation. Furthermore, we include a different computation of the protection allowance: in our implementation, it is based on the set of predefined eligibility conditions. The essential is the change in the definition of an individual allocation to the activation allowance\textsuperscript{15}. EUROMOD, in its original implementation, assigns activation allowance to all those, who are not eligible to receive protection allowance. However, this approach is not based on valid legislation and as a result, it largely overestimates the assignment of the activation allowance (see validation of simulation results in Table 11 below). On the contrary, in our approach we define eligibility conditions that an individual needs to fulfil in order to be entitled to draw this allowance. This gives us a set of people who potentially might take part in activation

\textsuperscript{14} This approach could be applied thanks to the fact that in SK-SILC dataset information on month of birth of an individual is recorded. Consequently, based on the month of the year when a child was born, it is possible to accurately allocate family related benefits.

\textsuperscript{15} SK-SILC survey contains a question on how many persons from the household received activation allowance in the income reference period. There is no assignment on the individual basis, who actually took part in activation works.
works. In the next step, we randomly draw 16 from this predefined group a subset of individuals (who will be finally assigned to activation works participation), such that the ratio of those who participate in activation works to total number of those who receive MNB equals, when compared to the official statistics. For a detailed summary on identified differences between the two models, see Table C1 in the Appendix.

Simulation of the unemployment benefit

The unemployment insurance benefit is a contributory transfer aimed to compensate temporarily for the income loss due to unemployment. In our adaptation (as compared with EUROMOD) we provide a more precise simulation of eligibility period on a monthly basis, this is possible also thanks to the more precise simulation of the length of the maternity benefit.

Another major adjustment closely connected with the simulation of this benefit appears in the labour supply module of our model, and follows as a next step after tax-benefit calculations. 17 When we model the extensive margin of labour supply, we simulate several hypothetical scenarios concerning the labour market states of individuals. In the situation, when the labour income of employed individuals is hypothetically set to zero (persons are hypothetically set out of workforce), eligibility conditions to receive an unemployment benefit are simulated. Based on the predefined eligibility conditions, a set of potential unemployment benefit recipients is formed. Using the same logic as in the simulation of MNB, a subset of beneficiaries is randomly drawn such that the ratio of recipients to the total number of unemployed matches the official statistics.

5 Model and validations of simulation results

Most surveys do contain caveats in the data and it is questionable to what extent a microsimulation model should reproduce reality. Frequently, there is a trade-off between developing realistic results and adjusting the underlying data to produce such results. Nevertheless, it is generally preferable to adjust the data minimally – unless the applied correction is overall robust.

Validation of model outputs, i.e. comparison of computed results with reality, is a useful approach to test the overall relevance and weak points of the microsimulation model. However, one should always bear in mind what the principal purpose of using the model is, and in this light, some discrepancies between simulated model and recorded reality might not be an important issue.

There are several possible approaches how to validate results produced by a microsimulation model. We adopt an approach similar to EUROMOD country reports, where baseline systems

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16 Another approach is to model a potential participation in the activation works based on individual demographic characteristics by using a probit model. This approach would be applicable in the future, since starting from 2014 SK-SILC; a survey question on individual participation in activation works will be included.

17 See the related paper by Siebertova et al. (2014).
are validated and tested at aggregate macro level. Results of microsimulations are validated also at the micro level, where we compare how well individual allocations of simulated transfers respond to records in the input data.

5.1 Aggregate validation

Total expenditures and the number of beneficiaries of those transfers that are not simulated, but act as inputs to the model, are compared to the official statistics in section 2.2.1 above. In the next step we look in detail at the transfers that are simulated by our model and compare the simulation results to the official statistics and to the results calculated by the EUROMOD. Finally, aggregate estimates of tax revenues, social security contributions and number of tax payers resulting from our microsimulations are linked to the official statistics and to the EUROMOD results.

5.1.1. Validation of outputs from simulation model

A summary on the aggregate validation process of the main simulated benefits is presented in Table 10 to Table 12, where the results produced by CBR and EUROMOD microsimulation models are validated against external official statistics. In addition, the last two columns of Table 10 and Table 11 compare results to the records in SK-SILC input dataset and thus provide information on how well simulations can replicate the original data.

The total number of recipients as well as aggregate amount of payments of unemployment benefit is underestimated both in CBR and EUROMOD\(^8\) models when compared to the official statistics (see columns (III)/(I) in Table 10 and Table 11). The allocation of this benefit can be rather precisely simulated using the information available in the input database. Not surprisingly, simulation results correlate with the overall undersampling of unemployment benefit recipients in SK-SILC (see Table 4).

Aggregate validation of family related benefits, i.e. parental allowance and child birth grant, shows that these transfers are underestimated in our microsimulation model when compared with the official statistics, both in terms of aggregate amounts and number of recipients. The reported underestimation of these transfers directly mirrors undersampling of newborn and small children in SK-SILC. Moreover, precision of simulation of parental allowance is limited also by the available information in the input data; it is not possible to capture cases when the allowance is granted up to 6 years of child’s age due to unfavourable child’s health condition. Child benefit payments and recipients are approximately 10% overestimated compared to the official data. Note that matching is relatively good since also the corresponding age cohort (0-26 years), where the eligibility applies, is well represented in SK-SILC. When these family benefits are compared to SK-SILC data, overall they match relatively well. The only exception is the child birth grant that is substantially overestimated both in 2010 and 2011. This fact can be

\(^8\) Differences in simulation of unemployment benefit in CBR and EUROMOD models are minor, see Table C1.
explained by the interplay of several factors. First, the child birth grant is a one-off payment to parents of a child. In our simulation, it covers also the additional child birth grant which is a one-off payment that can be paid out after one month (child should be at least 28 days old). If the child was born at the end of year, parents could have applied for this benefit only in the next year. However, in our simulation we did not take this timing into account and we might have incorrectly assigned the payment. Furthermore, under certain conditions, parents are only eligible to receive the child birth grant and not the additional child birth grant. Note that the additional child birth grant is more than four times higher than child birth grant. If the additional grant is incorrectly assigned, this may lead to substantial overestimation of the aggregate amount.

Table 10: Simulated benefits: Aggregate amounts (in mil. EUR)

<table>
<thead>
<tr>
<th></th>
<th>Official stat. (I)</th>
<th>SILC (II)</th>
<th>CBR (III)</th>
<th>EUROMOD (IV)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(III) / (I)</td>
</tr>
<tr>
<td>2009 Unemp. benefit</td>
<td>172,578.56</td>
<td>136,889.93</td>
<td>134,162.71</td>
<td>133,288.45</td>
</tr>
<tr>
<td>Parental allowance</td>
<td>259,206.43</td>
<td>170,507.04</td>
<td>155,786.39</td>
<td>211,746.99</td>
</tr>
<tr>
<td>Child benefit</td>
<td>304,585.41</td>
<td>320,340.84</td>
<td>333,368.22</td>
<td>262,247.34</td>
</tr>
<tr>
<td>Child birth grant</td>
<td>40,786.36</td>
<td>25,066.60</td>
<td>27,599.30</td>
<td>27,555.47</td>
</tr>
<tr>
<td>Material needs benefit</td>
<td>231,354.18</td>
<td>142,857.85</td>
<td>318,576.85</td>
<td>338,549.19</td>
</tr>
<tr>
<td>2010 Unemp. benefit</td>
<td>150,681.94</td>
<td>100,557.64</td>
<td>97,668.35</td>
<td>97,668.46</td>
</tr>
<tr>
<td>Parental allowance</td>
<td>316,604.87</td>
<td>210,282.95</td>
<td>240,385.72</td>
<td>270,012.11</td>
</tr>
<tr>
<td>Child benefit</td>
<td>314,465.07</td>
<td>339,682.57</td>
<td>344,624.78</td>
<td>272,451.34</td>
</tr>
<tr>
<td>Child birth grant</td>
<td>43,881.52</td>
<td>11,632.61</td>
<td>17,512.15</td>
<td>16,921.22</td>
</tr>
<tr>
<td>Material needs benefit</td>
<td>281,400.95</td>
<td>162,570.05</td>
<td>263,224.53</td>
<td>373,028.80</td>
</tr>
<tr>
<td>2011 Unemp. benefit</td>
<td>163,513.25</td>
<td>90,696.19</td>
<td>89,065.05</td>
<td>89,065.18</td>
</tr>
<tr>
<td>Parental allowance</td>
<td>341,842.21</td>
<td>204,240.96</td>
<td>217,780.94</td>
<td>265,460.47</td>
</tr>
<tr>
<td>Child benefit</td>
<td>310,682.24</td>
<td>330,690.92</td>
<td>341,801.55</td>
<td>269,538.82</td>
</tr>
<tr>
<td>Child birth grant</td>
<td>44,300.91</td>
<td>18,599.04</td>
<td>27,046.61</td>
<td>27,046.61</td>
</tr>
<tr>
<td>Material needs benefit</td>
<td>272,002.58</td>
<td>141,982.45</td>
<td>259,416.99</td>
<td>337,974.34</td>
</tr>
</tbody>
</table>

Source: Authors’ calculations using SK-SILC, official statistics on unemployment benefit from SSA, other benefits COLSAF.

The aggregate amount of payments of material needs benefit in the CBR model correspond well to the official data, being on average 5% lower. In EUROMOD, this transfer is simulated differently and the applied approach leads to substantial overestimation of the total payments. Table 11, where aggregate numbers of recipients are displayed, offers another comparison. Total number of recipients is underestimated compared to the official statistics mainly due to considerable underestimation of the activation allowance. Note that EUROMOD significantly overestimates this transfer due to overestimation of the activation allowance. Compared to SK-

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19 In 2009 to 2011 child birth grant was 151.37 euro and additional child birth grant was 678.49 euro.
SILC, CBR approach overestimates the number of beneficiaries less than EUROMOD, although in both methodologies, the overestimation is still substantial.

Table 11: Simulated benefits: Aggregate number of recipients (in thousands)

<table>
<thead>
<tr>
<th>Type of Benefit</th>
<th>Official stat. (I)</th>
<th>SILC (II)</th>
<th>CBR (III)</th>
<th>EUROMOD (IV)</th>
<th>(III) / (I)</th>
<th>(IV) / (I)</th>
<th>(III) / (II)</th>
<th>(IV) / (II)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>2009</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unemp. benefit</td>
<td>163.48</td>
<td>123.10</td>
<td>121.01</td>
<td>120.44</td>
<td>0.74</td>
<td>0.74</td>
<td>0.98</td>
<td>0.98</td>
</tr>
<tr>
<td>Parental allowance</td>
<td>177.60</td>
<td>101.94</td>
<td>100.59</td>
<td>122.70</td>
<td>0.57</td>
<td>0.69</td>
<td>0.99</td>
<td>1.20</td>
</tr>
<tr>
<td>Child benefit*</td>
<td>712.87</td>
<td>767.04</td>
<td>769.64</td>
<td>632.97</td>
<td>1.08</td>
<td>0.89</td>
<td>1.00</td>
<td>0.83</td>
</tr>
<tr>
<td>Child birth grant</td>
<td>56.53</td>
<td>33.83</td>
<td>35.33</td>
<td>35.33</td>
<td>0.62</td>
<td>0.62</td>
<td>1.04</td>
<td>1.04</td>
</tr>
<tr>
<td>Material needs benefit</td>
<td>231.30</td>
<td>98.60</td>
<td>202.23</td>
<td>269.18</td>
<td>0.87</td>
<td>1.16</td>
<td>2.05</td>
<td>2.73</td>
</tr>
<tr>
<td>Housing allowance</td>
<td>118.47</td>
<td>39.11</td>
<td>102.95</td>
<td>240.61</td>
<td>0.87</td>
<td>2.03</td>
<td>2.63</td>
<td>6.15</td>
</tr>
<tr>
<td>Activation allowance</td>
<td>74.30</td>
<td>54.93</td>
<td>62.42</td>
<td>460.99</td>
<td>0.84</td>
<td>6.20</td>
<td>1.14</td>
<td>8.39</td>
</tr>
<tr>
<td>Protection allowance</td>
<td>108.60</td>
<td>n.a.</td>
<td></td>
<td>160.54</td>
<td>0.80</td>
<td></td>
<td>1.48</td>
<td></td>
</tr>
<tr>
<td><strong>2010</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unemp. benefit</td>
<td>150.14</td>
<td>91.89</td>
<td>88.26</td>
<td>88.26</td>
<td>0.59</td>
<td>0.59</td>
<td>0.96</td>
<td>0.96</td>
</tr>
<tr>
<td>Parental allowance</td>
<td>183.05</td>
<td>100.65</td>
<td>102.85</td>
<td>121.13</td>
<td>0.56</td>
<td>0.66</td>
<td>1.02</td>
<td>1.20</td>
</tr>
<tr>
<td>Child benefit*</td>
<td>706.33</td>
<td>745.45</td>
<td>762.14</td>
<td>621.56</td>
<td>1.08</td>
<td>0.88</td>
<td>1.02</td>
<td>1.02</td>
</tr>
<tr>
<td>Child birth grant</td>
<td>56.74</td>
<td>17.57</td>
<td>22.22</td>
<td>22.22</td>
<td>0.39</td>
<td>0.39</td>
<td>1.26</td>
<td>1.26</td>
</tr>
<tr>
<td>Material needs benefit</td>
<td>244.58</td>
<td>101.18</td>
<td>226.10</td>
<td>273.58</td>
<td>0.92</td>
<td>1.12</td>
<td>2.23</td>
<td>2.70</td>
</tr>
<tr>
<td>Housing allowance</td>
<td>116.14</td>
<td>39.32</td>
<td>126.89</td>
<td>250.38</td>
<td>1.09</td>
<td>2.16</td>
<td>3.23</td>
<td>6.37</td>
</tr>
<tr>
<td>Activation allowance</td>
<td>85.95</td>
<td>45.47</td>
<td>77.22</td>
<td>467.09</td>
<td>0.90</td>
<td>5.43</td>
<td>1.70</td>
<td>10.27</td>
</tr>
<tr>
<td>Protection allowance</td>
<td>103.59</td>
<td>n.a.</td>
<td></td>
<td>161.23</td>
<td>0.84</td>
<td></td>
<td>1.56</td>
<td></td>
</tr>
<tr>
<td><strong>2011</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unemp. benefit</td>
<td>142.87</td>
<td>73.41</td>
<td>70.86</td>
<td>70.86</td>
<td>0.50</td>
<td>0.50</td>
<td>0.97</td>
<td>0.97</td>
</tr>
<tr>
<td>Parental allowance</td>
<td>184.97</td>
<td>105.36</td>
<td>123.69</td>
<td>126.26</td>
<td>0.67</td>
<td>0.67</td>
<td>1.17</td>
<td>1.20</td>
</tr>
<tr>
<td>Child benefit*</td>
<td>697.65</td>
<td>749.21</td>
<td>754.59</td>
<td>613.24</td>
<td>1.08</td>
<td>0.88</td>
<td>1.01</td>
<td>1.01</td>
</tr>
<tr>
<td>Child birth grant</td>
<td>56.90</td>
<td>20.79</td>
<td>33.60</td>
<td>33.60</td>
<td>0.59</td>
<td>0.59</td>
<td>1.13</td>
<td>1.13</td>
</tr>
<tr>
<td>Material needs benefit</td>
<td>243.68</td>
<td>100.28</td>
<td>217.15</td>
<td>243.50</td>
<td>0.89</td>
<td>1.00</td>
<td>2.17</td>
<td>2.43</td>
</tr>
<tr>
<td>Housing allowance</td>
<td>113.80</td>
<td>37.84</td>
<td>111.23</td>
<td>218.69</td>
<td>0.98</td>
<td>1.92</td>
<td>2.94</td>
<td>5.78</td>
</tr>
<tr>
<td>Activation allowance</td>
<td>94.40</td>
<td>46.53</td>
<td>77.33</td>
<td>441.77</td>
<td>0.82</td>
<td>4.68</td>
<td>1.66</td>
<td>9.49</td>
</tr>
<tr>
<td>Protection allowance</td>
<td>94.88</td>
<td>n.a.</td>
<td></td>
<td>134.18</td>
<td>0.81</td>
<td></td>
<td>1.41</td>
<td></td>
</tr>
</tbody>
</table>

Source: Authors' calculations using SK-SILC, official statistics on unemployment benefit from SSA, other benefits from COLSAF.

* Official statistics on child benefit recipients is taken as the average of monthly data over the year. Official statistics on other benefits is the total number of individual recipients (i.e. incidence).

Table 12 offers a different point of view on the analysis of simulated benefits, here the transfers are validated at the individual level. Individual matching is inspected by using two perspectives. First, individual recipients of transfers in CBR simulations are linked to the corresponding recipients observed in the input data (see column CBR in Table 12) and the share of the two is defined as the match ratio. To complete the picture, also the ratio of matched individual allocations to total number of recipients simulated by CBR model is presented (see column CBR/CBR total). Observed results suggest that family related instruments and unemployment benefit match well also at the individual level. Simulation of the material needs...
benefit is a challenge, results documenting individual allocations confirm the significant overestimation already identified in the aggregate validation.

Table 12: Individual matching of CBR simulation to SILC: Number of recipients

<table>
<thead>
<tr>
<th></th>
<th>SILC</th>
<th>CBR* (total)</th>
<th>CBR / CBR total (%)</th>
<th>match (%)</th>
<th>SILC</th>
<th>CBR* (total)</th>
<th>CBR / CBR total (%)</th>
<th>match (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unemp. benefit 2009</td>
<td>291</td>
<td>287</td>
<td>100</td>
<td>99</td>
<td>210</td>
<td>202</td>
<td>100</td>
<td>96</td>
</tr>
<tr>
<td>Parental allowance 2009</td>
<td>301</td>
<td>278</td>
<td>95</td>
<td>92</td>
<td>252</td>
<td>227</td>
<td>88</td>
<td>90</td>
</tr>
<tr>
<td>Child benefit 2009</td>
<td>2356</td>
<td>2262</td>
<td>96</td>
<td>96</td>
<td>2131</td>
<td>2065</td>
<td>95</td>
<td>97</td>
</tr>
<tr>
<td>Child birth grant 2009</td>
<td>104</td>
<td>95</td>
<td>88</td>
<td>91</td>
<td>47</td>
<td>43</td>
<td>75</td>
<td>91</td>
</tr>
<tr>
<td>Mat. needs benefit 2009</td>
<td>222</td>
<td>115</td>
<td>23</td>
<td>52</td>
<td>214</td>
<td>120</td>
<td>518</td>
<td>34</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>SILC</th>
<th>CBR* (total)</th>
<th>CBR / CBR total (%)</th>
<th>match (%)</th>
<th>SILC</th>
<th>CBR* (total)</th>
<th>CBR / CBR total (%)</th>
<th>match (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unemp. benefit 2011</td>
<td>187</td>
<td>181</td>
<td>100</td>
<td>97</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parental allowance 2011</td>
<td>265</td>
<td>245</td>
<td>95</td>
<td>92</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Child benefit 2011</td>
<td>2153</td>
<td>2054</td>
<td>95</td>
<td>95</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Child birth grant 2011</td>
<td>76</td>
<td>71</td>
<td>85</td>
<td>84</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mat. needs benefit 2011</td>
<td>240</td>
<td>112</td>
<td>513</td>
<td>22</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Authors’ calculations based on SK-SILC.

* Number of recipients that were matched with recipients in SK-SILC.

** Total number of recipients in CBR model.

*** Ratio CBR matched / SILC.

An extensive set of information on simulations related to tax and social insurance instruments is presented in Table 13 where the estimates provided by the CBR model and EUROMOD are compared to the official statistics. Detailed overview of simulated SIC and HIC can be found in Table C2 - Table C4 in the Appendix. Overall, the aggregate sum of tax liabilities is underestimated compared to the official statistics in all three years. Unfortunately, official data on aggregate amounts of tax credits and tax allowances from tax authorities are not available. Therefore, we can relate the observed underestimation of personal income tax only to corresponding overestimation of social and health insurance contributions. Note that the overestimation of HIC for the economic active population corresponds well to the over-reported aggregate income from employment and agreements in SK-SILC (see Table 6).

---

20 SK-SILC survey asks an explicit question on paid taxes and social insurance contributions only at the household level (aggregate sum). On the individual level, total of paid PIT and SIC has been imputed.
Table 13: Personal income tax and social insurance contributions: Aggregate amounts (in mil. EUR)

<table>
<thead>
<tr>
<th></th>
<th>Official stat. (I)</th>
<th>CBR (II)</th>
<th>EUROMOD (III)</th>
<th>(II) / (I)</th>
<th>(III) / (I)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2009</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Personal income tax (PIT)</td>
<td>1,519,334</td>
<td>1,172,067</td>
<td>1,210,532</td>
<td>0.77</td>
<td>0.80</td>
</tr>
<tr>
<td>Social Insurance Contrib. (SIC)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SIC: Employer</td>
<td>3,198,574</td>
<td>4,206,585</td>
<td>4,210,148</td>
<td>1.32</td>
<td>1.32</td>
</tr>
<tr>
<td>SIC: Employee</td>
<td>1,174,680</td>
<td>1,551,264</td>
<td>1,553,046</td>
<td>1.32</td>
<td>1.32</td>
</tr>
<tr>
<td>SIC: Self-employed</td>
<td>273,892</td>
<td>279,905</td>
<td>355,568</td>
<td>1.02</td>
<td>1.30</td>
</tr>
<tr>
<td>Health Insurance Contrib. (HIC)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HIC: economic active pop.</td>
<td>2,192,718</td>
<td>2,563,744</td>
<td>2,547,488</td>
<td>1.17</td>
<td>1.16</td>
</tr>
<tr>
<td>HIC: economic inactive pop.</td>
<td>1,162,382</td>
<td>1,551,264</td>
<td>1,553,046</td>
<td>1.32</td>
<td>1.32</td>
</tr>
<tr>
<td></td>
<td>2010</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Personal income tax</td>
<td>1,513,900</td>
<td>1,221,974</td>
<td>1,354,659</td>
<td>0.81</td>
<td>0.89</td>
</tr>
<tr>
<td>Social Insurance Contrib. (SIC)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SIC: Employer</td>
<td>3,246,656</td>
<td>4,301,687</td>
<td>4,304,876</td>
<td>1.32</td>
<td>1.33</td>
</tr>
<tr>
<td>SIC: Employee</td>
<td>1,197,070</td>
<td>1,587,656</td>
<td>1,589,165</td>
<td>1.33</td>
<td>1.33</td>
</tr>
<tr>
<td>SIC: Self-employed</td>
<td>266,332</td>
<td>336,498</td>
<td>409,417</td>
<td>1.26</td>
<td>1.54</td>
</tr>
<tr>
<td>Health Insurance Contrib. (HIC)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HIC: economic active pop.</td>
<td>2,243,248</td>
<td>2,626,041</td>
<td>2,618,195</td>
<td>1.17</td>
<td>1.17</td>
</tr>
<tr>
<td>HIC: economic inactive pop.</td>
<td>1,282,803</td>
<td>1,254,064</td>
<td>1,231,558</td>
<td>0.98</td>
<td>0.96</td>
</tr>
<tr>
<td></td>
<td>2011</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Personal income tax</td>
<td>1,730,483</td>
<td>1,657,723</td>
<td>1,750,768</td>
<td>0.96</td>
<td>1.01</td>
</tr>
<tr>
<td>Social Insurance Contrib. (SIC)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SIC: Employer</td>
<td>3,449,425</td>
<td>4,512,209</td>
<td>4,525,709</td>
<td>1.31</td>
<td>1.31</td>
</tr>
<tr>
<td>SIC: Employee</td>
<td>1,266,174</td>
<td>1,669,469</td>
<td>1,670,967</td>
<td>1.32</td>
<td>1.32</td>
</tr>
<tr>
<td>SIC: Self-employed</td>
<td>288,366</td>
<td>504,814</td>
<td>600,843</td>
<td>1.75</td>
<td>2.08</td>
</tr>
<tr>
<td>Health Insurance Contrib. (HIC)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HIC: economic active pop.</td>
<td>2,385,268</td>
<td>2,705,210</td>
<td>2,718,284</td>
<td>1.13</td>
<td>1.14</td>
</tr>
<tr>
<td>HIC: economic inactive pop.</td>
<td>1,197,816</td>
<td>1,135,574</td>
<td>1,223,780</td>
<td>0.95</td>
<td>1.02</td>
</tr>
</tbody>
</table>

Source: Official statistics on PIT and HIC from Ministry of Finance, SIC from Social Security Agency (SSA).

A possible explanation for the substantial overestimation of SIC can be as follows. The total effect (around 30% both for employees and employers) can be decomposed into several parts. Substantial part (approximately 15 percentage points) might be attributed to the over-reporting of employment income, like in the case of HIC. SIC for employees and employers are in the CBR model simulated based on the reported gross income in SK-SILC database. These aggregates are in validation tables compared to the actually paid amounts, as they are reported in the SSA official statistics. However, SSA total income from insurance should cover also unpaid obligations, which constitute approximately 5% of the total volume of income. These unpaid obligations are not covered in the assessment base of the official SSA statistics in our validation tables since SSA reports only aggregate number (for employees, employers and self-employed) and more detailed structure (that should be related to different categories) is not available. Therefore, the unpaid obligations can constitute additional 5 percentage points part of the overestimation. As a final point, we estimate that extra 5 percentage points can be associated
with the practise when high reward is paid only once a year (here the ceiling for insurance contributions applies) and for the rest of the year only some average wage is paid. The point is that in SK-SILC income is reported on a yearly basis and in our simulations we suppose that income is uniformly distributed across all months. However, as it is clear from SSA data, aggregate gross income is not uniformly distributed across the year.

Finally, when the results of the CBR approach and EUROMOD are compared, the significant difference can be identified in the simulation of SIC for self-employed. Although both models overestimate it significantly, CBR model is closer to the official statistics due to the restriction on income of self-employed that was applied. For details and other differences in the two approaches refer to Table C1 in the Appendix.

5.2 Validation of income distribution

<table>
<thead>
<tr>
<th></th>
<th>Official stat. (I)</th>
<th>CBR (II) scaled</th>
<th>CBR (III) original</th>
<th>(II) / (I)</th>
<th>(III) / (I)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>2009</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Personal income tax (PIT)</td>
<td>1,519,334</td>
<td>1,555,022</td>
<td>1,172,067</td>
<td>1.02</td>
<td>0.77</td>
</tr>
<tr>
<td>Social Insurance Contrib. (SIC)</td>
<td>3,198,574</td>
<td>4,528,719</td>
<td>4,206,585</td>
<td>1.42</td>
<td>1.32</td>
</tr>
<tr>
<td>SIC: Employer</td>
<td>1,174,680</td>
<td>1,659,386</td>
<td>1,551,264</td>
<td>1.41</td>
<td>1.32</td>
</tr>
<tr>
<td>SIC: Employee</td>
<td>273,892</td>
<td>279,905</td>
<td>279,905</td>
<td>1.02</td>
<td>1.02</td>
</tr>
<tr>
<td>Health Insurance Contrib. (HIC)</td>
<td>2,192,718</td>
<td>2,717,287</td>
<td>2,563,744</td>
<td>1.24</td>
<td>1.17</td>
</tr>
<tr>
<td>HIC: economic active pop.</td>
<td>1,162,382</td>
<td>1,004,136</td>
<td>1,004,150</td>
<td>0.86</td>
<td>0.86</td>
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<tr>
<td><strong>2010</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Personal income tax</td>
<td>1,513,900</td>
<td>1,597,163</td>
<td>1,221,974</td>
<td>1.05</td>
<td>0.81</td>
</tr>
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<td>4,619,716</td>
<td>4,301,687</td>
<td>1.42</td>
<td>1.32</td>
</tr>
<tr>
<td>SIC: Employer</td>
<td>1,197,070</td>
<td>1,694,254</td>
<td>1,587,565</td>
<td>1.42</td>
<td>1.33</td>
</tr>
<tr>
<td>SIC: Self-employed</td>
<td>266,332</td>
<td>336,498</td>
<td>336,498</td>
<td>1.26</td>
<td>1.26</td>
</tr>
<tr>
<td>Health Insurance Contrib. (HIC)</td>
<td>2,243,248</td>
<td>2,783,354</td>
<td>2,626,041</td>
<td>1.24</td>
<td>1.17</td>
</tr>
<tr>
<td>HIC: economic active pop.</td>
<td>1,282,803</td>
<td>1,254,436</td>
<td>1,254,064</td>
<td>0.98</td>
<td>0.98</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>2011</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Personal income tax</td>
<td>1,730,483</td>
<td>2,067,058</td>
<td>1,657,723</td>
<td>1.19</td>
<td>0.96</td>
</tr>
<tr>
<td>Social Insurance Contrib. (SIC)</td>
<td>3,449,425</td>
<td>4,840,497</td>
<td>4,512,209</td>
<td>1.40</td>
<td>1.31</td>
</tr>
<tr>
<td>SIC: Employer</td>
<td>1,266,174</td>
<td>1,775,597</td>
<td>1,669,469</td>
<td>1.40</td>
<td>1.32</td>
</tr>
<tr>
<td>SIC: Self-employed</td>
<td>288,366</td>
<td>504,814</td>
<td>504,814</td>
<td>1.75</td>
<td>1.75</td>
</tr>
<tr>
<td>Health Insurance Contrib. (HIC)</td>
<td>2,385,268</td>
<td>2,846,953</td>
<td>2,705,210</td>
<td>1.19</td>
<td>1.13</td>
</tr>
<tr>
<td>HIC: economic active pop.</td>
<td>1,197,816</td>
<td>1,136,712</td>
<td>1,135,574</td>
<td>0.95</td>
<td>0.95</td>
</tr>
</tbody>
</table>

Source: Authors’ calculations using SK-SILC, official statistics on PIT and HIC from Ministry of Finance, SIC from Social Security Agency (SSA).
It was already mentioned above that low-income groups are over-sampled, while high-income are under-sampled in the input data. In Table 14 simulated taxes and social insurance contributions, when the underlying income distribution is rescaled (see section 2.2.2 for details), are compared to original simulation results. The aggregate amount of SIC and HIC for the income related to employment and agreements is over-simulated compared to the official statistics and also compared to the original situation when income has not been rescaled (in all three years it rose by approximately 10 percentage points). On the other hand, simulation of PIT now matches the official statistics well, as it was significantly undersampled in the original dataset, now it is around 20 percentage points higher. Asymmetry observed in the rise of SIC versus rise of PIT could be attributed to the fact that rescaling defined more high-income individuals that pay higher aggregate amount of PIT, while in the payments of SIC there is a ceiling. Income of self-employed has not been rescaled, therefore the results did not change.

6 Conclusion

This paper provides a summary on the construction of the Council for Budget Responsibility microsimulation model. An independent model has been developed due to the CBR’s need to have a flexibly designed model which can be easily incorporated as a part of larger models. The architecture and the main setup of the CBR model is based on the existing EUROMOD tax-benefit microsimulation model.

A number of challenges were addressed during the process of development. First, we considered issues that were related to the simulation of social structures themselves, i.e. we identified possible improvements (compared to the current version of EUROMOD) such that the tax and benefit system can be replicated as closely as possible. At this point, a major task was to precisely replicate the valid legislation and to source appropriate micro-data. At the same time, we inspected the used micro dataset in great detail and we compared it with administrative statistics. Hence, the simulated output was interpreted also in light of differences between survey data and official statistics. Based on the results obtained so far, we conclude that the identified differences in the survey data do not have a substantial influence on our model’s validity.

As a next step, we will extend the tax and benefit model to cover the legislation valid in years 2012 to 2014. This allows us to simulate and ex-post evaluate selected policies and based on the performance to assess the model’s validity. Model will be used as a principal tool for the ex-ante evaluation of the suggested changes in legislation.
7 References


OECD: Benefits and Wages, retrieved from http://www.oecd.org/els/social/workincentives


Appendix A – Characteristics and summary statistics of SK-SILC samples

Table A1: Characteristics of available micro-level datasets in Slovakia

<table>
<thead>
<tr>
<th>Dataset</th>
<th>SK-SILC</th>
<th>HFCS</th>
<th>HBS</th>
<th>ISCP</th>
<th>Social Security Agency</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Statistics on Income and Living Conditions</td>
<td>Household Finance and Consumption Survey</td>
<td>Household Budget Survey</td>
<td>Information System on Average Earnings - matched employer/employee administrative dataset</td>
<td>Administrative data from the agency collecting social security contributions</td>
</tr>
<tr>
<td>Frequency</td>
<td>yearly / from 2004</td>
<td>one wave available (2010)</td>
<td>yearly</td>
<td>quarterly - data available from the end of 1990s</td>
<td>monthly</td>
</tr>
<tr>
<td>Panel</td>
<td>yes</td>
<td>no</td>
<td>no</td>
<td>yes / limited usage</td>
<td>yes</td>
</tr>
<tr>
<td>Observations</td>
<td>5,291 HH / 15,440 individuals (SK-SILC 2012)</td>
<td>2,057 HH / 5,351 individuals</td>
<td>4,698 HH</td>
<td>6,600 enterprises / more than 1mil employees</td>
<td>more than 2.7mil individuals</td>
</tr>
<tr>
<td>Contents</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Income</td>
<td>detailed info on income and transfers of individuals</td>
<td>gross yearly income of individuals (wage, unempl. benefits), transfers to HH</td>
<td>gross monthly income of individuals (wage, unempl. benefits), transfers</td>
<td>gross wage including bonuses and allowances, net wage, average hourly wage</td>
<td>gross monthly wage (derived from the paid contributions)</td>
</tr>
<tr>
<td>Demography</td>
<td>age, gender, education (ISCED), marital status, region</td>
<td>age, gender, education (ISCED), marital status, region</td>
<td>age, gender, education (ISCED), region, marital status</td>
<td>age, gender, education (ISCED), region (ZIP code), age, gender, (s)he works</td>
<td>age, gender, region (ZIP code) where a person resides and where (s)he works</td>
</tr>
<tr>
<td>Labour market</td>
<td>LM status (work/unemployed, student retired, disability), for employees sector (NACE), occupation (ISCO)</td>
<td>LM status (work/unemployed,..), for employees sector (NACE), occupation (ISCO)</td>
<td>LM status (work/unemployed,..), for employees sector (NACE), occupation (ISCO)</td>
<td>only employees: detailed sector (NACE), occupation (ISCO)</td>
<td>only employees: detailed sector (NACE), occupation (ISCO)</td>
</tr>
<tr>
<td>Advantage</td>
<td>extensive information on individual and family relationships, detailed income and transfers</td>
<td>information on financial actives/passives on HH level: bank accounts, funds, mortgages, etc</td>
<td>detailed information on consumption and income</td>
<td>precise computation of hourly wage (comparable across enterprises), good representation of high/low income groups</td>
<td>administrative data - comprises all individuals paying social security contributions</td>
</tr>
<tr>
<td>Limits</td>
<td>caveats documented in text</td>
<td>undersampled high income groups, no information on number of months when wage or unemployment benefits were paid</td>
<td>no family relationship, undersampled low/high income groups</td>
<td>information only on employees, taxes paid only implicitly, no information on transfers, no family relationships</td>
<td>information only on gross wage, no information on family relationships</td>
</tr>
</tbody>
</table>

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A Microsimulation model of the Slovak Tax-Benefit System

Table A2: Summary statistics of 2010 SK-SILC (refers to 2009)

<table>
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<tr>
<th>Demographic characteristics</th>
<th>Mean</th>
<th>Std.Dev.</th>
<th>Min</th>
<th>Max</th>
<th>Non-zero obs.</th>
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<tbody>
<tr>
<td>Female</td>
<td>0.531</td>
<td>0.499</td>
<td>0</td>
<td>1</td>
<td>8,634</td>
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<tr>
<td>Age in years</td>
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<td>98</td>
<td>16,163</td>
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<td>9,131</td>
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<tr>
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<td>0.356</td>
<td>0</td>
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<tr>
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<tr>
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<td>0.498</td>
<td>0</td>
<td>1</td>
<td>7,454</td>
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<tr>
<td>Family: Divorced</td>
<td>0.047</td>
<td>0.211</td>
<td>0</td>
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<td>763</td>
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<td>0.023</td>
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<td>0</td>
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<tr>
<td>Pensioner</td>
<td>0.190</td>
<td>0.392</td>
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<td>3,092</td>
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**Labour income (yearly)**

<table>
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<tr>
<th></th>
<th>Mean</th>
<th>Std.Dev.</th>
<th>Min</th>
<th>Max</th>
<th>Non-zero obs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gross wage employment</td>
<td>3,095.468</td>
<td>4,610.848</td>
<td>0</td>
<td>90,000</td>
<td>6,750</td>
</tr>
<tr>
<td>Income from self-employment</td>
<td>340.967</td>
<td>2,061.485</td>
<td>0</td>
<td>55,000</td>
<td>763</td>
</tr>
<tr>
<td>Other payments made by employers</td>
<td>14.693</td>
<td>195.156</td>
<td>0</td>
<td>20,304</td>
<td>1,009</td>
</tr>
<tr>
<td>Income from agreements</td>
<td>42.860</td>
<td>292.125</td>
<td>0</td>
<td>11,784</td>
<td>941</td>
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<tr>
<td>Fringe Benefits except vouchers</td>
<td>12.169</td>
<td>150.752</td>
<td>0</td>
<td>6,000</td>
<td>2,008</td>
</tr>
<tr>
<td>Fringe Benefits vouchers</td>
<td>89.970</td>
<td>179.324</td>
<td>0</td>
<td>5,943</td>
<td>5,392</td>
</tr>
<tr>
<td>Severance payments</td>
<td>7.931</td>
<td>122.459</td>
<td>0</td>
<td>4,500</td>
<td>100</td>
</tr>
<tr>
<td>Termination pay (lump sum)</td>
<td>4.460</td>
<td>258.286</td>
<td>0</td>
<td>26,500</td>
<td>16</td>
</tr>
<tr>
<td>Income from abroad</td>
<td>62.445</td>
<td>871.442</td>
<td>0</td>
<td>35,890</td>
<td>143</td>
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**Non-labour income (yearly)**

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<th></th>
<th>Mean</th>
<th>Std.Dev.</th>
<th>Min</th>
<th>Max</th>
<th>Non-zero obs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unemployment benefit</td>
<td>19.033</td>
<td>168.797</td>
<td>0</td>
<td>4,680</td>
<td>291</td>
</tr>
<tr>
<td>Maternity benefit</td>
<td>7.656</td>
<td>122.365</td>
<td>0</td>
<td>4,270</td>
<td>80</td>
</tr>
<tr>
<td>Child birth grant</td>
<td>4.634</td>
<td>62.315</td>
<td>0</td>
<td>1,811.7</td>
<td>104</td>
</tr>
<tr>
<td>Child benefit (incl additional child benefit)</td>
<td>62.750</td>
<td>180.440</td>
<td>0</td>
<td>3,588</td>
<td>2,356</td>
</tr>
<tr>
<td>Parental Allowance</td>
<td>30.518</td>
<td>247.099</td>
<td>0</td>
<td>12,081</td>
<td>301</td>
</tr>
<tr>
<td>Material needs benefit</td>
<td>19.770</td>
<td>239.467</td>
<td>0</td>
<td>9,473</td>
<td>222</td>
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<tr>
<td>Nursing allowance</td>
<td>13.080</td>
<td>175.121</td>
<td>0</td>
<td>7,999.9</td>
<td>118</td>
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<td>Sickness and nursing benefits</td>
<td>17.513</td>
<td>188.141</td>
<td>0</td>
<td>8,172</td>
<td>352</td>
</tr>
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<td>Education scholarships</td>
<td>7.489</td>
<td>139.877</td>
<td>0</td>
<td>8,916</td>
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</tr>
<tr>
<td>Other survivor benefits</td>
<td>0.776</td>
<td>8.463</td>
<td>0</td>
<td>521.29</td>
<td>180</td>
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<tr>
<td>Disability pension</td>
<td>98.804</td>
<td>568.563</td>
<td>0</td>
<td>9,840</td>
<td>551</td>
</tr>
<tr>
<td>Old-age pension</td>
<td>797.165</td>
<td>1,682.937</td>
<td>0</td>
<td>13,200</td>
<td>3,233</td>
</tr>
<tr>
<td>Widow's and orphan's pension</td>
<td>96.884</td>
<td>457.753</td>
<td>0</td>
<td>19,200</td>
<td>1,039</td>
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<tr>
<td>Private pensions</td>
<td>1.228</td>
<td>41.894</td>
<td>0</td>
<td>3,984</td>
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<tr>
<td>Income from property</td>
<td>5.457</td>
<td>137.491</td>
<td>0</td>
<td>13,507</td>
<td>289</td>
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<tr>
<td>Investment income - interests</td>
<td>3.223</td>
<td>99.336</td>
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<td>Investment income - dividends</td>
<td>0.422</td>
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**Sample size**

16,272
A Microsimulation model of the Slovak Tax-Benefit System

Table A3: Summary statistics of 2011 SK-SILC (refers to 2010)

<table>
<thead>
<tr>
<th>Demographic characteristics</th>
<th>Mean</th>
<th>Std.Dev.</th>
<th>Min</th>
<th>Max</th>
<th>Non-zero obs</th>
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<tr>
<td>Female</td>
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<td>0</td>
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<td>4,286</td>
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<tr>
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<td>0.562</td>
<td>0.496</td>
<td>0</td>
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<td>8,606</td>
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<td>0.222</td>
<td>0</td>
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<td>793</td>
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<tr>
<td>Mother with child under 3 years</td>
<td>0.021</td>
<td>0.143</td>
<td>0</td>
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<tr>
<td>Student</td>
<td>0.126</td>
<td>0.332</td>
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<td>0.019</td>
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<tr>
<td>Labour income (yearly)</td>
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<td></td>
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<td>Gross wage employment</td>
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<td>5,301.625</td>
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<td>14,600</td>
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<td>2,399.673</td>
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<td>89,458</td>
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<td>Other payments made by employers</td>
<td>11.806</td>
<td>128.926</td>
<td>0</td>
<td>89,458</td>
<td>742</td>
</tr>
<tr>
<td>Income from agreements</td>
<td>41.656</td>
<td>266.504</td>
<td>0</td>
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<td>923</td>
</tr>
<tr>
<td>Fringe Benefits except vouchers</td>
<td>11.458</td>
<td>122.295</td>
<td>0</td>
<td>5,500</td>
<td>1,872</td>
</tr>
<tr>
<td>Fringe Benefits vouchers</td>
<td>84.490</td>
<td>206.541</td>
<td>0</td>
<td>11,800</td>
<td>4,777</td>
</tr>
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<td>Severance payments</td>
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<td>251.338</td>
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<td>150.128</td>
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<td>59.416</td>
<td>852.556</td>
<td>0</td>
<td>30,000</td>
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<td>Non-labour income (yearly)</td>
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<td></td>
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<tr>
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<td>14.267</td>
<td>146.651</td>
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<td>Maternity benefit</td>
<td>5.915</td>
<td>115.568</td>
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<td>40.133</td>
<td>0</td>
<td>905.54</td>
<td>47</td>
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<tr>
<td>Child benefit (incl additional child benefit)</td>
<td>64.229</td>
<td>194.645</td>
<td>0</td>
<td>4,968</td>
<td>213</td>
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<td>288.886</td>
<td>0</td>
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<tr>
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<td>275.232</td>
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<td>139.521</td>
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<td>89</td>
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<tr>
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<td>155.963</td>
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<tr>
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<td>171.935</td>
<td>0</td>
<td>7,200</td>
<td>80</td>
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<tr>
<td>Other survivor benefits</td>
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<td>7.494</td>
<td>0</td>
<td>254.3</td>
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<tr>
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<td>611.249</td>
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<td>11,664</td>
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<tr>
<td>Old-age pension</td>
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<td>1,792.113</td>
<td>0</td>
<td>16,620</td>
<td>3,213</td>
</tr>
<tr>
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<td>104.855</td>
<td>450.501</td>
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<td>8,581</td>
<td>1,038</td>
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<td>1.628</td>
<td>63.827</td>
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<td>6,000</td>
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<tr>
<td>Income from property</td>
<td>8.771</td>
<td>152.781</td>
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</tr>
<tr>
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<td>Sample size</td>
<td>15,325</td>
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### Table A4: Summary statistics of 2012 SK-SILC (refers to 2011)

<table>
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<tr>
<th>Demographic characteristics</th>
<th>Mean</th>
<th>Std.Dev.</th>
<th>Min</th>
<th>Max</th>
<th>Non-zero obs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>0.536</td>
<td>0.499</td>
<td>0</td>
<td>1</td>
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<td>20.868</td>
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<td>99</td>
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<td>0</td>
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</tr>
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<td>0.496</td>
<td>0</td>
<td>1</td>
<td>8,675</td>
</tr>
<tr>
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<td>0</td>
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<td>2,569</td>
</tr>
<tr>
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<td>0.419</td>
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<td>0.497</td>
<td>0</td>
<td>1</td>
<td>6,876</td>
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<td>0.055</td>
<td>0.229</td>
<td>0</td>
<td>1</td>
<td>855</td>
</tr>
<tr>
<td>Mother with child under 3yrs</td>
<td>0.022</td>
<td>0.147</td>
<td>0</td>
<td>1</td>
<td>341</td>
</tr>
<tr>
<td>Student</td>
<td>0.125</td>
<td>0.330</td>
<td>0</td>
<td>1</td>
<td>1,925</td>
</tr>
<tr>
<td>Pensioner</td>
<td>0.201</td>
<td>0.401</td>
<td>0</td>
<td>1</td>
<td>3,105</td>
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</tbody>
</table>

### Labour income (yearly)

| Gross wage employment       | 3,560.444 | 5,153.741 | 0   | 71,172 | 6,378        |
| Income from self-employment | 381.008   | 2,128.760 | 0   | 45,000 | 740          |
| Other payments made by employers | 12.295   | 79.484    | 0   | 4,600  | 973          |
| Income from agreements      | 61.615    | 370.490   | 0   | 10,314 | 963          |
| Fringe Benefits except vouchers | 11.098   | 120.152   | 0   | 4,900  | 1,503        |
| Fringe Benefits vouchers    | 86.991    | 181.676   | 0   | 4,803  | 5,328        |
| Severance payments          | 6.311     | 121.809   | 0   | 7,000  | 58           |
| Termination pay (lump sum)  | 2.288     | 83.409    | 0   | 5,700  | 19           |
| Income from abroad          | 65.937    | 87.967    | 0   | 25,244 | 134          |

### Non-labour income (yearly)

| Unemployment benefit        | 14.667    | 158.873   | 0   | 3,762.6 | 187          |
| Maternity benefit           | 11.005    | 178.001   | 0   | 4760    | 77           |
| Child birth grant           | 3.146     | 49.231    | 0   | 835.8   | 76           |
| Child benefit (incl additional child benefit) | 61.267   | 183.333   | 0   | 4,968   | 2,153        |
| Parental Allowance          | 33.519    | 270.173   | 0   | 4,276.8 | 265          |
| Material needs benefit      | 20.073    | 230.808   | 0   | 6,235.2 | 240          |
| Nursing allowance           | 10.276    | 144.858   | 0   | 3360    | 91           |
| Sickness and nursing benefits | 16.988   | 154.732   | 0   | 4400    | 336          |
| Education scholarships      | 8.610     | 185.987   | 0   | 7200    | 81           |
| Other survivor benefits     | 0.798     | 7.637     | 0   | 232.36  | 182          |
| Disability pension          | 111.062   | 622.229   | 0   | 8,730.8 | 551          |
| Old-age pension             | 899.707   | 1,849.127 | 0   | 13,200 | 3,227        |
| Widow’s and orphan’s pension| 110.484   | 452.722   | 0   | 8,365.6 | 1,098        |
| Private pensions            | 1.372     | 33.634    | 0   | 1500    | 44           |
| Income from property        | 6.905     | 129.701   | 0   | 7000    | 280          |
| Investment income - interests | 3.633    | 28.063    | 0   | 2490    | 1,885        |
| Investment income - dividends | 1.629    | 87.864    | 0   | 10,000  | 83           |

### Sample size

Sample size: 15,440
Appendix B - Income distribution and scaling factors

One way how to look at the income distribution of individuals reported in SK-SILC is to calculate percentage shares how the selected income groups contribute to the total labour income. Based on the results reported in Table B1 we can conclude that the weight of the respective income groups is stable over time; approximately 85% corresponds to income from employment, while self-employment reveals only 10%.

### Table B1: Weight of selected income groups on total income in SK-SILC datasets (in %)

<table>
<thead>
<tr>
<th>Income Source</th>
<th>SK-SILC 2010</th>
<th>SK-SILC 2011</th>
<th>SK-SILC 2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gross wage from employment</td>
<td>84.32</td>
<td>84.15</td>
<td>85.02</td>
</tr>
<tr>
<td>Income from self-employment</td>
<td>9.29</td>
<td>10.16</td>
<td>9.10</td>
</tr>
<tr>
<td>Other payments made by employers</td>
<td>0.40</td>
<td>0.31</td>
<td>0.29</td>
</tr>
<tr>
<td>Income from agreements</td>
<td>1.17</td>
<td>1.08</td>
<td>1.47</td>
</tr>
<tr>
<td>Fringe Benefits except vouchers</td>
<td>0.33</td>
<td>0.30</td>
<td>0.26</td>
</tr>
<tr>
<td>Fringe Benefits vouchers</td>
<td>2.45</td>
<td>2.19</td>
<td>2.08</td>
</tr>
<tr>
<td>Severance payments</td>
<td>0.22</td>
<td>0.23</td>
<td>0.15</td>
</tr>
<tr>
<td>Termination pay (lump sum)</td>
<td>0.12</td>
<td>0.06</td>
<td>0.05</td>
</tr>
<tr>
<td>Income from abroad</td>
<td>1.70</td>
<td>1.54</td>
<td>1.57</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100.00</strong></td>
<td><strong>100.00</strong></td>
<td><strong>100.00</strong></td>
</tr>
</tbody>
</table>

When computing the scaling factors, in the first step observations below minimum wage and those above the 99\textsuperscript{th} percentile are excluded both from SSA and SK-SILC datasets. In the next step the mean value of gross income\textsuperscript{21}, defined as an income from employment and income from agreements, is computed in every percentile. Scaling factors are constituted as ratios of the percentile specific means from SSA data to SK-SILC.

**Figure B1: Scaling factors and income distribution**

\textsuperscript{*Note: Income from employment and agreements.}

\textsuperscript{21} Only income from employment and agreements is compared when scaling factors of the two datasets are computed. Self-employed are not included since based on the data from SSA database more than 80% of them report income at the level of minimum wage.
As graphically displayed in Figure B1, low income is over-valued and high income is under-valued in all SK-SILC datasets. Notice that both in 2009 and 2010 income recorded in SK-SILC datasets had comparable median values with the corresponding administrative SSA databases, i.e. scaling factors around the 50th percentile were close to one. However, this does not hold in 2011, where the scaling factors equal one around the 65th percentile.

Kernel densities of the income distribution that document possible over and under-samplings of SK-SILC are graphed in Figure B2 below. Again, observations below minimum wage and above the 99th percentile are left out. Graphs document that individuals with the lowest income around minimum wage are undersampled in SK-SILC. However, lower-income groups with wages below approximately 600 euro per month are over-sampled.
Figure B2: Kernel densities of the income distribution

SSA and SK-SILC Income Distributions 2009

Income from employment and agreements

SSA and SK-SILC Income Distributions 2010

Income from employment and agreements

SSA and SK-SILC Income Distributions 2011

Income from employment and agreements
Appendix C - Differences between CBR tax-benefit module and EUROMOD

<table>
<thead>
<tr>
<th>Code</th>
<th>Policy</th>
<th>Changes in CBR module</th>
<th>Details of CBR approach</th>
<th>EUROMOD approach</th>
</tr>
</thead>
<tbody>
<tr>
<td>TUDef_sk</td>
<td>Tax units definition</td>
<td>Definition of &quot;in education&quot;</td>
<td>PhD students are excluded</td>
<td>all students in tertiary education are included (university and postgraduate)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Definition of IsDepChild_fam</td>
<td>IsDepChild_fam definition includes condition age&lt;=16</td>
<td>IsDepChild_fam definition includes condition age&lt;=16</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>il_tscee_base</td>
<td>Income list definition</td>
<td>Definition of assessment bases il_tscee_base, il_tscer_base</td>
<td>il_tscee_base and il_tscer_base are composed of yemwg only, which already includes yemcs</td>
<td>il_tscee_base and il_tscer_base are composed of yemwg and yemcs</td>
</tr>
<tr>
<td>tscse_sk</td>
<td>SIC self-employed</td>
<td>Assignment condition: definition</td>
<td>SIC are computed if current yearly gross profit exceeds minimum wage (formally, restriction yse<em>12 &gt;= 12</em>MinWage is applied). This is not entirely in line with valid legislative (current profit vs. previous year return).</td>
<td>Restriction is not included</td>
</tr>
<tr>
<td>Code</td>
<td>Policy</td>
<td>Changes in CBR module</td>
<td>Details of CBR approach</td>
<td>EUROMOD approach</td>
</tr>
<tr>
<td>---------</td>
<td>-------------------</td>
<td>----------------------------------------</td>
<td>------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>tsce_sk</td>
<td>SIC employed</td>
<td>Eligibility condition on paying disability insurance contributions</td>
<td>More accurate calculation of the number of months when disability insurance contributions are paid, taking into account the months in which a person worked as an old age pensioner (a possible overlap between yemmy and poamy).</td>
<td>Disability insurance contributions are assigned when poamy&lt;12. This excludes only those persons that were old age pensioners during the whole year.</td>
</tr>
<tr>
<td>tscer_sk</td>
<td></td>
<td>Eligibility condition on paying unemployment insurance contributions</td>
<td>More accurate calculation of the number of months when unemployment insurance contributions are paid, taking into account the months in which a person worked as an old age/disability pensioner (a possible overlap between yemmy, poamy and pdimy).</td>
<td>Disability insurance contributions are assigned only when poamy&lt;12 &amp; pdimy&lt;12.</td>
</tr>
<tr>
<td>bcc_sk</td>
<td>Parental allowance</td>
<td>Simulation of length of eligibility period</td>
<td>Eligibility period to the benefit is simulated on monthly level, it takes into account length of recipiency of maternity benefit simulated before</td>
<td>Simulation is not included</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Eligibility condition: definition</td>
<td>Eligibility is conditional on valid legislative, in 2009 it is restricted to those who have no employment income.</td>
<td>Restriction is not included</td>
</tr>
<tr>
<td>bunct_sk</td>
<td>Unemployment benefit</td>
<td>Simulation of length of eligibility period</td>
<td>Eligibility period to the benefit is simulated on monthly level, it takes into account length of recipiency of maternity benefit and parental allowance simulated before</td>
<td>Simulation is not included</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Hours worked per week (lhw): definition</td>
<td>Variable lhw is necessary for the simulation of benefit amount. We do not impute missing values when constructing lhw.</td>
<td>Missing values of lhw are imputed - it seems that imputation is not completely correct. Unusually frequently value 96 has been imputed.</td>
</tr>
<tr>
<td>Code</td>
<td>Policy</td>
<td>Changes in CBR module</td>
<td>Details of CBR approach</td>
<td>EUROMOD approach</td>
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<td>--------</td>
<td>------------------------------</td>
<td>------------------------------------------------------------</td>
<td>-----------------------------------------------------------------------------------------</td>
<td>----------------------------------</td>
</tr>
<tr>
<td>bma_sk</td>
<td>Maternity benefit</td>
<td>Simulation of length of eligibility period</td>
<td>Length of eligibility period is simulated based on child's age and on information whether children are twins. The amount of maternity benefit is not simulated.</td>
<td>Simulation is not included</td>
</tr>
<tr>
<td>bchba_sk</td>
<td>Additional child birth grant</td>
<td>Eligibility condition: definition</td>
<td>Additional child benefit in case of multiple births included for every child that was born.</td>
<td>Additional child benefit in case of multiple births included only once.</td>
</tr>
<tr>
<td>bsa_sk</td>
<td>Material needs benefit</td>
<td>Assessed income: definition</td>
<td>Expanded definition of the assessed income. Assessed income <strong>does not</strong> include: 25% of old-age pension plus 1% if work history is documented for more than 25 years, 25% of widow/er pension if (s)he exceeds retirement age, 25% of orphan pension, 25% of maternity benefit, 25% of the income from employment. Income from agreements is considered as the assessed income only if it exceeds twice the minimum subsistence level.</td>
<td>Assessed income <strong>does not</strong> include: 25% of old-age pension plus 1% if work history is documented for more than 25 years, 25% of widow/er and orphan pensions, 25% of maternity benefit, 25% of the income from employment.</td>
</tr>
<tr>
<td></td>
<td>Allowance for a pregnant woman</td>
<td>Eligibility defined for women with non-zero number of small children (&lt;1y.), allowance is added to MNB claim, only if MNB has been already approved.</td>
<td></td>
<td>Not included</td>
</tr>
<tr>
<td></td>
<td>Child schooling allowance</td>
<td>Eligibility defined for all children (6-16y.), allowance is added to MNB claim, only if MNB has been already approved.</td>
<td></td>
<td>Not included</td>
</tr>
<tr>
<td>Code</td>
<td>Policy</td>
<td>Changes in CBR module</td>
<td>Details of CBR approach</td>
<td>EUROMOD approach</td>
</tr>
<tr>
<td>--------</td>
<td>-------------------------------</td>
<td>------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>bsa_sk</td>
<td>Material needs benefit</td>
<td>Protection allowance:</td>
<td>Eligibility defined by set of conditions: old-age pensioners, disabled, dependent children, single parent of a small child (&lt;1 year), people taking care of disabled, people with strong activity constraint and very bad health status</td>
<td>Eligibility defined by set of conditions: old-age pensioners, disabled, dependent children, single parent of a small child (&lt;1 year)</td>
</tr>
<tr>
<td></td>
<td>(continue)</td>
<td>eligibility conditions</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Activation allowance:</td>
<td>Eligibility defined by set of conditions, first is assumed that all claimants are eligible. Next those who fulfill given constraints are <strong>ruled out</strong> from the set of potential participants: recipients of protection allowance, underaged (&lt;18 y.), completed tertiary education, inactive (based on a declared labour market status), full-time workers. Individual participants at activation works are randomly drawn from the set of eligible persons such that the ratio of number of participants in activation works to number of those who receive material needs benefit match the official statistics reported by COLSAF. In 2009 this ratio is set to 0.32, in 2010 it equals 0.35 and in 2011 it is 0.39*</td>
<td>All who are not eligible to protection allowance receive an activation allowance</td>
</tr>
<tr>
<td></td>
<td></td>
<td>simulation of number of participants to match the official statistics</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Social assistance calculation</td>
<td>Person can change his/her status (maternity leave, (un)employed, etc.) during the reference period. Social assistance is computed at the end for every status independently and it takes into account an actual income at that moment, not some average income.</td>
<td></td>
<td>Not included</td>
</tr>
</tbody>
</table>

* Source: Authors’ calculations based on data from COLSAF.
Table C 2: Personal income tax and social insurance contributions: Aggregate amounts (in mil. EUR) in 2009

<table>
<thead>
<tr>
<th></th>
<th>Official stat. (I)</th>
<th>CBR (II)</th>
<th>EUROMOD (III)</th>
<th>(II) / (I)</th>
<th>(III) / (I)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Personal income tax</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Insurance Contrib. (SIC)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>SIC: Employer</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sickness insurance</td>
<td>3,198,574</td>
<td>4,206,585</td>
<td>4,210,148</td>
<td>1.32</td>
<td>1.32</td>
</tr>
<tr>
<td>Old-age insurance</td>
<td>1,786,852</td>
<td>2,351,972</td>
<td>2,353,535</td>
<td>1.32</td>
<td>1.32</td>
</tr>
<tr>
<td>Disability insurance</td>
<td>373,348</td>
<td>494,178</td>
<td>495,128</td>
<td>1.32</td>
<td>1.33</td>
</tr>
<tr>
<td>Unemployment insurance</td>
<td>123,226</td>
<td>163,435</td>
<td>163,757</td>
<td>1.33</td>
<td>1.33</td>
</tr>
<tr>
<td>Guarantee insurance</td>
<td>25,310</td>
<td>39,592</td>
<td>39,607</td>
<td>1.56</td>
<td>1.56</td>
</tr>
<tr>
<td>Reserve solidarity fund</td>
<td>616,148</td>
<td>797,996</td>
<td>798,526</td>
<td>1.30</td>
<td>1.30</td>
</tr>
<tr>
<td>Accident insurance</td>
<td>112,982</td>
<td>135,185</td>
<td>135,303</td>
<td>1.20</td>
<td>1.20</td>
</tr>
<tr>
<td>Insurance paid from agreements</td>
<td>2,564</td>
<td>2,566</td>
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<td></td>
</tr>
<tr>
<td><strong>SIC: Employee</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Sickness insurance</td>
<td>1,174,680</td>
<td>1,551,264</td>
<td>1,553,046</td>
<td>1.32</td>
<td>1.32</td>
</tr>
<tr>
<td>Old-age insurance</td>
<td>518,790</td>
<td>671,988</td>
<td>672,435</td>
<td>1.30</td>
<td>1.30</td>
</tr>
<tr>
<td>Disability insurance</td>
<td>372,597</td>
<td>494,178</td>
<td>495,128</td>
<td>1.33</td>
<td>1.33</td>
</tr>
<tr>
<td>Unemployment insurance</td>
<td>123,013</td>
<td>167,515</td>
<td>207,508</td>
<td>1.28</td>
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</tr>
<tr>
<td><strong>SIC: Self-employed</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sickness insurance</td>
<td>273,892</td>
<td>279,905</td>
<td>355,568</td>
<td>1.30</td>
<td></td>
</tr>
<tr>
<td>Old-age insurance</td>
<td>37,393</td>
<td>38,996</td>
<td>48,784</td>
<td>1.30</td>
<td></td>
</tr>
<tr>
<td>Disability insurance</td>
<td>143,489</td>
<td>155,128</td>
<td>157,743</td>
<td>1.10</td>
<td></td>
</tr>
<tr>
<td>Reserve solidarity fund</td>
<td>50,565</td>
<td>54,783</td>
<td>67,571</td>
<td>1.34</td>
<td></td>
</tr>
<tr>
<td><strong>Health Insurance Contrib. (HIC)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>HIC: economic active pop.</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HIC: employees</td>
<td>2,102,718</td>
<td>2,563,744</td>
<td>2,547,488</td>
<td>1.17</td>
<td>1.16</td>
</tr>
<tr>
<td>HIC: employers</td>
<td>579,787</td>
<td>729,469</td>
<td>729,956</td>
<td>1.26</td>
<td>1.26</td>
</tr>
<tr>
<td>HIC: self-employed</td>
<td>143,489</td>
<td>155,128</td>
<td>157,743</td>
<td>1.10</td>
<td></td>
</tr>
<tr>
<td>HIC: employers</td>
<td>1,428,094</td>
<td>1,631,080</td>
<td>1,631,781</td>
<td>1.14</td>
<td>1.14</td>
</tr>
<tr>
<td>HIC: voluntary</td>
<td>41,348</td>
<td>48,067</td>
<td>28,007</td>
<td>0.68</td>
<td></td>
</tr>
<tr>
<td><strong>HIC: economic inactive pop.</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HIC: voluntary</td>
<td>1,162,382</td>
<td>1,004,150</td>
<td>1,153,021</td>
<td>0.86</td>
<td>0.99</td>
</tr>
</tbody>
</table>

Source: Official statistics on PIT and HIC from Ministry of Finance, SIC from Social Security Agency (SSA).
### Table C 3: Personal income tax and social insurance contributions: Aggregate amounts (in mil. EUR) in 2010

<table>
<thead>
<tr>
<th></th>
<th>Official stat. (I)</th>
<th>CBR (II)</th>
<th>EUROMOD (III)</th>
<th>(II) / (I)</th>
<th>(III) / (I)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Personal income tax</strong></td>
<td>1,513,900</td>
<td>1,221,974</td>
<td>1,354,659</td>
<td>0.81</td>
<td>0.89</td>
</tr>
<tr>
<td><strong>Social Insurance Contrib. (SIC)</strong></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>SIC: Employer</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sickness insurance</td>
<td>3,246,656</td>
<td>4,301,687</td>
<td>4,304,876</td>
<td>1.32</td>
<td>1.33</td>
</tr>
<tr>
<td>Old-age insurance</td>
<td>1,811,424</td>
<td>2,403,104</td>
<td>2,404,495</td>
<td>1.33</td>
<td>1.33</td>
</tr>
<tr>
<td>Disability insurance</td>
<td>378,284</td>
<td>505,577</td>
<td>506,403</td>
<td>1.34</td>
<td>1.34</td>
</tr>
<tr>
<td>Unemployment insurance</td>
<td>125,001</td>
<td>167,158</td>
<td>167,474</td>
<td>1.34</td>
<td>1.34</td>
</tr>
<tr>
<td>Guarantee insurance</td>
<td>25,974</td>
<td>40,758</td>
<td>40,771</td>
<td>1.57</td>
<td>1.57</td>
</tr>
<tr>
<td>Reserve solidarity fund</td>
<td>624,209</td>
<td>815,350</td>
<td>815,823</td>
<td>1.31</td>
<td>1.31</td>
</tr>
<tr>
<td>Accident insurance</td>
<td>113,956</td>
<td>139,151</td>
<td>139,256</td>
<td>1.22</td>
<td>1.22</td>
</tr>
<tr>
<td>Insurance paid from agreements</td>
<td>0</td>
<td>2,355</td>
<td>2,358</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>SIC: Employee</strong></td>
<td>1,197,070</td>
<td>1,587,565</td>
<td>1,589,165</td>
<td>1.33</td>
<td>1.33</td>
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<tr>
<td>Sickness insurance</td>
<td>167,798</td>
<td>228,235</td>
<td>228,296</td>
<td>1.36</td>
<td>1.36</td>
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<tr>
<td>Old-age insurance</td>
<td>525,957</td>
<td>686,594</td>
<td>686,961</td>
<td>1.31</td>
<td>1.31</td>
</tr>
<tr>
<td>Disability insurance</td>
<td>378,320</td>
<td>505,577</td>
<td>506,403</td>
<td>1.34</td>
<td>1.34</td>
</tr>
<tr>
<td>Unemployment insurance</td>
<td>124,995</td>
<td>167,158</td>
<td>167,474</td>
<td>1.34</td>
<td>1.34</td>
</tr>
<tr>
<td><strong>SIC: Self-employed</strong></td>
<td>266,632</td>
<td>336,498</td>
<td>409,417</td>
<td>1.26</td>
<td>1.54</td>
</tr>
<tr>
<td>Sickness insurance</td>
<td>37,441</td>
<td>46,595</td>
<td>55,779</td>
<td>1.24</td>
<td>1.49</td>
</tr>
<tr>
<td>Old-age insurance</td>
<td>161,110</td>
<td>202,119</td>
<td>239,695</td>
<td>1.25</td>
<td>1.49</td>
</tr>
<tr>
<td>Disability insurance</td>
<td>49,990</td>
<td>65,327</td>
<td>77,320</td>
<td>1.31</td>
<td>1.55</td>
</tr>
<tr>
<td>Reserve solidarity fund</td>
<td>17,791</td>
<td>22,457</td>
<td>36,623</td>
<td>1.26</td>
<td>2.06</td>
</tr>
<tr>
<td><strong>Health Insurance Contrib. (HIC)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>HIC: economic active pop.</strong></td>
<td>2,243,248</td>
<td>2,626,041</td>
<td>2,618,195</td>
<td>1.17</td>
<td>1.17</td>
</tr>
<tr>
<td>HIC: employees</td>
<td>584,698</td>
<td>741,181</td>
<td>741,967</td>
<td>1.27</td>
<td>1.27</td>
</tr>
<tr>
<td>HIC: self-employed</td>
<td>139,724</td>
<td>185,188</td>
<td>179,422</td>
<td>1.33</td>
<td>1.28</td>
</tr>
<tr>
<td>HIC: employers</td>
<td>1,470,265</td>
<td>1,668,936</td>
<td>1,668,062</td>
<td>1.14</td>
<td>1.13</td>
</tr>
<tr>
<td>HIC: voluntary</td>
<td>48,561</td>
<td>30,736</td>
<td>28,744</td>
<td>0.63</td>
<td>0.59</td>
</tr>
<tr>
<td><strong>HIC: economic inactive pop.</strong></td>
<td>1,282,803</td>
<td>1,254,064</td>
<td>1,231,558</td>
<td>0.98</td>
<td>0.96</td>
</tr>
</tbody>
</table>

Source: Official statistics on PIT and HIC from Ministry of Finance, SIC from Social Security Agency (SSA).
### Table C 4: Personal income tax and social insurance contributions: Aggregate amounts (in mil. EUR) in 2011

<table>
<thead>
<tr>
<th></th>
<th>Official stat. (I)</th>
<th>CBR (II)</th>
<th>EUROMOD (III)</th>
<th>(II) / (I)</th>
<th>(III) / (I)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Personal income tax</strong></td>
<td>1,730,483</td>
<td>1,657,723</td>
<td>1,750,768</td>
<td>0.96</td>
<td>1.01</td>
</tr>
<tr>
<td><strong>Social Insurance Contrib. (SIC)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>SIC: Employer</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sickness insurance</td>
<td>3,449,425</td>
<td>4,512,209</td>
<td>4,525,709</td>
<td>1.31</td>
<td>1.31</td>
</tr>
<tr>
<td>Old-age insurance</td>
<td>1,925,348</td>
<td>2,520,513</td>
<td>2,528,025</td>
<td>1.31</td>
<td>1.31</td>
</tr>
<tr>
<td>Disability insurance</td>
<td>405,650</td>
<td>532,238</td>
<td>533,908</td>
<td>1.31</td>
<td>1.32</td>
</tr>
<tr>
<td>Unemployment insurance</td>
<td>134,253</td>
<td>175,926</td>
<td>176,499</td>
<td>1.31</td>
<td>1.31</td>
</tr>
<tr>
<td>Guarantee insurance</td>
<td>27,972</td>
<td>42,445</td>
<td>42,534</td>
<td>1.52</td>
<td>1.52</td>
</tr>
<tr>
<td>Reserve solidarity fund</td>
<td>665,061</td>
<td>855,177</td>
<td>857,725</td>
<td>1.29</td>
<td>1.29</td>
</tr>
<tr>
<td>Accident insurance</td>
<td>124,838</td>
<td>144,572</td>
<td>145,121</td>
<td>1.16</td>
<td>1.16</td>
</tr>
<tr>
<td>Insurance paid from agreements</td>
<td>3,628</td>
<td>3,629</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>SIC: Employee</strong></td>
<td>1,266,174</td>
<td>1,669,469</td>
<td>1,670,967</td>
<td>1.32</td>
<td>1.32</td>
</tr>
<tr>
<td>Sickness insurance</td>
<td>166,297</td>
<td>238,097</td>
<td>238,268</td>
<td>1.43</td>
<td>1.43</td>
</tr>
<tr>
<td>Old-age insurance</td>
<td>559,964</td>
<td>721,733</td>
<td>722,292</td>
<td>1.30</td>
<td>1.29</td>
</tr>
<tr>
<td>Disability insurance</td>
<td>405,664</td>
<td>533,344</td>
<td>533,908</td>
<td>1.31</td>
<td>1.32</td>
</tr>
<tr>
<td>Unemployment insurance</td>
<td>134,249</td>
<td>176,295</td>
<td>176,499</td>
<td>1.31</td>
<td>1.31</td>
</tr>
<tr>
<td><strong>SIC: Self-employed</strong></td>
<td>288,366</td>
<td>504,814</td>
<td>600,843</td>
<td>2.08</td>
<td></td>
</tr>
<tr>
<td>Sickness insurance</td>
<td>37,354</td>
<td>66,458</td>
<td>79,297</td>
<td>2.12</td>
<td></td>
</tr>
<tr>
<td>Old-age insurance</td>
<td>158,976</td>
<td>276,451</td>
<td>328,971</td>
<td>2.07</td>
<td></td>
</tr>
<tr>
<td>Disability insurance</td>
<td>49,705</td>
<td>88,952</td>
<td>105,765</td>
<td>2.13</td>
<td></td>
</tr>
<tr>
<td>Reserve solidarity fund</td>
<td>42,331</td>
<td>72,952</td>
<td>86,810</td>
<td>2.05</td>
<td></td>
</tr>
<tr>
<td><strong>Health Insurance Contrib. (HIC)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>HIC: economic active pop.</strong></td>
<td>2,385,268</td>
<td>2,705,210</td>
<td>2,718,284</td>
<td>1.13</td>
<td>1.14</td>
</tr>
<tr>
<td>HIC: employees</td>
<td>607,952</td>
<td>692,434</td>
<td>695,452</td>
<td>1.14</td>
<td>1.14</td>
</tr>
<tr>
<td>HIC: self-employed</td>
<td>167,327</td>
<td>239,355</td>
<td>240,642</td>
<td>1.43</td>
<td>1.44</td>
</tr>
<tr>
<td>HIC: employers</td>
<td>1,527,510</td>
<td>1,727,020</td>
<td>1,736,696</td>
<td>1.13</td>
<td>1.14</td>
</tr>
<tr>
<td>HIC: voluntary</td>
<td>82,478</td>
<td>46,402</td>
<td>45,494</td>
<td>0.56</td>
<td>0.55</td>
</tr>
<tr>
<td><strong>HIC: economic inactive pop.</strong></td>
<td>1,197,816</td>
<td>1,135,574</td>
<td>1,223,780</td>
<td>0.95</td>
<td>1.02</td>
</tr>
</tbody>
</table>

Source: Official statistics on PIT and HIC from Ministry of Finance, SIC from Social Security Agency (SSA).
Appendix D – Validation of Tax-Benefit System 2012

The national version of SK-SILC 2013 has been used as a base dataset for the validation exercise of the Microsimulation model of the Slovak Tax-Benefit System valid in 2012.

In the following, tables and graphs of the main text are updated such that they cover also the reference year 2012 and test the validity of the microsimulation model using the system effective in 2012.

Part 1: Descriptive statistics of the underlying SK-SILC 2013 sample

Table D1: Descriptive statistics of the grossing-up weight in SK-SILC samples

<table>
<thead>
<tr>
<th>SK-SILC 2010</th>
<th>SK-SILC 2011</th>
<th>SK-SILC 2012</th>
<th>SK-SILC 2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individuals</td>
<td>16,275</td>
<td>15,327</td>
<td>15,440</td>
</tr>
<tr>
<td>Households</td>
<td>5,376</td>
<td>5,200</td>
<td>5,291</td>
</tr>
<tr>
<td>Projected population</td>
<td>5,415,559</td>
<td>5,389,454</td>
<td>5,395,519</td>
</tr>
<tr>
<td>Projected households</td>
<td>1,911,664</td>
<td>1,911,664</td>
<td>1,911,664</td>
</tr>
</tbody>
</table>

Grossing-up weight

Mean 332.753  351.631  349.451  350.361  350.361
Std. Dev. 117.117  113.936  125.988  131.954  131.954
Minimum 106.640  118.822  108.690  119.909  119.909
Maximum 1,137.724  1,641.253  1,226.095  1,083.874  1,083.874

Table D2: Age cohorts in SK-SILC and population

<table>
<thead>
<tr>
<th>Age cohort</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0.58</td>
<td>0.38</td>
<td>0.55</td>
<td>0.78</td>
</tr>
<tr>
<td>0 - 3</td>
<td>0.66</td>
<td>0.61</td>
<td>0.63</td>
<td>0.84</td>
</tr>
<tr>
<td>0 - 16</td>
<td>0.84</td>
<td>0.83</td>
<td>0.82</td>
<td>0.96</td>
</tr>
<tr>
<td>0 - 26</td>
<td>0.97</td>
<td>0.97</td>
<td>0.98</td>
<td>1.04</td>
</tr>
<tr>
<td>Prime age***</td>
<td>1.03</td>
<td>1.02</td>
<td>1.03</td>
<td>1.01</td>
</tr>
<tr>
<td>Retirement age</td>
<td>1.10</td>
<td>1.11</td>
<td>1.08</td>
<td>1.01</td>
</tr>
</tbody>
</table>

Source: Authors’ calculations using SK-SILC and Slovak Statistical Office

* Ratio displays number of individuals in SK-SILC (weighted) to population in the respective age cohort.
### Table D3: Summary statistics of SK-SILC 2013 (refers to 2012)

<table>
<thead>
<tr>
<th>Demographic characteristics</th>
<th>Mean</th>
<th>Std.Dev.</th>
<th>Min</th>
<th>Max</th>
<th>Non-zero obs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>0.544</td>
<td>0.498</td>
<td>0</td>
<td>1</td>
<td>8,387</td>
</tr>
<tr>
<td>Age in years</td>
<td>39.783</td>
<td>21.285</td>
<td>0</td>
<td>99</td>
<td>15,313</td>
</tr>
<tr>
<td>Education: Primary</td>
<td>0.277</td>
<td>0.447</td>
<td>0</td>
<td>1</td>
<td>4,269</td>
</tr>
<tr>
<td>Education: Secondary</td>
<td>0.561</td>
<td>0.496</td>
<td>0</td>
<td>1</td>
<td>8,650</td>
</tr>
<tr>
<td>Education: Tertiary</td>
<td>0.163</td>
<td>0.369</td>
<td>0</td>
<td>1</td>
<td>2,507</td>
</tr>
<tr>
<td>Family: Single</td>
<td>0.417</td>
<td>0.493</td>
<td>0</td>
<td>1</td>
<td>6,426</td>
</tr>
<tr>
<td>Family: Married</td>
<td>0.443</td>
<td>0.497</td>
<td>0</td>
<td>1</td>
<td>6,827</td>
</tr>
<tr>
<td>Family: Divorced</td>
<td>0.060</td>
<td>0.238</td>
<td>0</td>
<td>1</td>
<td>930</td>
</tr>
<tr>
<td>Mother with child under 3 years</td>
<td>0.029</td>
<td>0.169</td>
<td>0</td>
<td>1</td>
<td>454</td>
</tr>
<tr>
<td>Student</td>
<td>0.113</td>
<td>0.316</td>
<td>0</td>
<td>1</td>
<td>1,740</td>
</tr>
<tr>
<td>Pensioner</td>
<td>0.202</td>
<td>0.401</td>
<td>0</td>
<td>1</td>
<td>3,113</td>
</tr>
</tbody>
</table>

### Labour income (yearly)

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Std.Dev.</th>
<th>Min</th>
<th>Max</th>
<th>Non-zero obs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gross wage employment</td>
<td>3,275.848</td>
<td>4,874.778</td>
<td>0</td>
<td>79,060</td>
<td>6,099</td>
</tr>
<tr>
<td>Income from self-employment</td>
<td>382.389</td>
<td>2,280.213</td>
<td>0</td>
<td>51,200</td>
<td>692</td>
</tr>
<tr>
<td>Other payments made by employers</td>
<td>12,835</td>
<td>72,531</td>
<td>0</td>
<td>50,000</td>
<td>1,048</td>
</tr>
<tr>
<td>Income from agreements</td>
<td>55,774</td>
<td>508,396</td>
<td>0</td>
<td>5,012.5</td>
<td>1,238</td>
</tr>
<tr>
<td>Fringe Benefits except vouchers</td>
<td>6,453</td>
<td>79,434</td>
<td>0</td>
<td>6,790</td>
<td>5,216</td>
</tr>
<tr>
<td>Fringe Benefits vouchers</td>
<td>86,675</td>
<td>212,492</td>
<td>0</td>
<td>7,000</td>
<td>51</td>
</tr>
<tr>
<td>Severance payments</td>
<td>6,178</td>
<td>129,863</td>
<td>0</td>
<td>4,280</td>
<td>15</td>
</tr>
<tr>
<td>Termination pay (lump sum )</td>
<td>1,735</td>
<td>65,957</td>
<td>0</td>
<td>36,800</td>
<td>141</td>
</tr>
<tr>
<td>Income from abroad</td>
<td>82,352</td>
<td>1,000,795</td>
<td>0</td>
<td>258,000</td>
<td>1,048</td>
</tr>
</tbody>
</table>

### Non-labour income (yearly)

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Std.Dev.</th>
<th>Min</th>
<th>Max</th>
<th>Non-zero obs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unemployment benefit</td>
<td>12,181</td>
<td>148,094</td>
<td>0</td>
<td>6,300</td>
<td>157</td>
</tr>
<tr>
<td>Maternity benefit</td>
<td>13,433</td>
<td>202,986</td>
<td>0</td>
<td>6,750</td>
<td>95</td>
</tr>
<tr>
<td>Child birth grant</td>
<td>4,667</td>
<td>61,773</td>
<td>0</td>
<td>1,584</td>
<td>100</td>
</tr>
<tr>
<td>Child benefit (incl additional child benefit)</td>
<td>66,228</td>
<td>201,692</td>
<td>0</td>
<td>4,664</td>
<td>2,230</td>
</tr>
<tr>
<td>Parental Allowance</td>
<td>45,514</td>
<td>317,743</td>
<td>0</td>
<td>10,668</td>
<td>364</td>
</tr>
<tr>
<td>Material needs benefit</td>
<td>23,357</td>
<td>254,490</td>
<td>0</td>
<td>7,386</td>
<td>241</td>
</tr>
<tr>
<td>Nursing allowance</td>
<td>10,641</td>
<td>166,783</td>
<td>0</td>
<td>8,104</td>
<td>90</td>
</tr>
<tr>
<td>Sickness and nursing benefits</td>
<td>18,766</td>
<td>189,412</td>
<td>0</td>
<td>5,700</td>
<td>319</td>
</tr>
<tr>
<td>Education scholarships</td>
<td>8,252</td>
<td>167,340</td>
<td>0</td>
<td>7,600</td>
<td>90</td>
</tr>
<tr>
<td>Other survivor benefits</td>
<td>0.941</td>
<td>22,357</td>
<td>0</td>
<td>2,580</td>
<td>167</td>
</tr>
<tr>
<td>Disability pension</td>
<td>121,394</td>
<td>662,763</td>
<td>0</td>
<td>8,800</td>
<td>589</td>
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<tr>
<td>Old-age pension</td>
<td>938,055</td>
<td>1,914,652</td>
<td>0</td>
<td>14,960</td>
<td>3,258</td>
</tr>
<tr>
<td>Widow's and orphan's pension</td>
<td>133,337</td>
<td>582,575</td>
<td>0</td>
<td>12,000</td>
<td>1,113</td>
</tr>
<tr>
<td>Private pensions</td>
<td>1,858</td>
<td>42,128</td>
<td>0</td>
<td>2,000</td>
<td>50</td>
</tr>
<tr>
<td>Income from property</td>
<td>7,766</td>
<td>128,397</td>
<td>0</td>
<td>6,000</td>
<td>320</td>
</tr>
<tr>
<td>Investment income - interests</td>
<td>4,681</td>
<td>84,308</td>
<td>0</td>
<td>10,000</td>
<td>2,092</td>
</tr>
<tr>
<td>Investment income - dividends</td>
<td>0.541</td>
<td>17,996</td>
<td>0</td>
<td>1,245</td>
<td>66</td>
</tr>
</tbody>
</table>

**Sample size** 15,426
A Microsimulation model
of the Slovak Tax-Benefit System

Table D4: Economic activity of population (in thousands persons)

<table>
<thead>
<tr>
<th></th>
<th>LFS</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>SK-SILC</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>SILC / LFS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-prime age</td>
<td>830.46</td>
<td>832.57</td>
<td>830.58</td>
<td>666.81</td>
<td>666.55</td>
<td>783.15</td>
<td>0.80</td>
<td>0.80</td>
<td>0.94</td>
</tr>
<tr>
<td>Prime age*</td>
<td>3,932.09</td>
<td>3,881.09</td>
<td>3,870.04</td>
<td>3,986.02</td>
<td>3,990.65</td>
<td>3,904.05</td>
<td>1.01</td>
<td>1.03</td>
<td>1.01</td>
</tr>
<tr>
<td>Post-prime age</td>
<td>672.72</td>
<td>690.66</td>
<td>710.22</td>
<td>735.75</td>
<td>738.32</td>
<td>717.47</td>
<td>1.09</td>
<td>1.07</td>
<td>1.01</td>
</tr>
<tr>
<td>Employed</td>
<td>2,317.50</td>
<td>2,315.30</td>
<td>2,329.00</td>
<td>2,314.18</td>
<td>2,312.76</td>
<td>2,233.98</td>
<td>1.00</td>
<td>1.00</td>
<td>0.96</td>
</tr>
<tr>
<td>Unemployed</td>
<td>389.00</td>
<td>364.60</td>
<td>377.50</td>
<td>375.08</td>
<td>355.17</td>
<td>360.01</td>
<td>0.96</td>
<td>0.97</td>
<td>0.95</td>
</tr>
<tr>
<td>Economic active</td>
<td>2,706.50</td>
<td>2,680.00</td>
<td>2,706.50</td>
<td>2,689.26</td>
<td>2,667.92</td>
<td>2,593.99</td>
<td>0.99</td>
<td>1.00</td>
<td>0.96</td>
</tr>
<tr>
<td>Population total</td>
<td>5,421.80</td>
<td>5,392.40</td>
<td>5,410.84</td>
<td>5,388.58</td>
<td>5,395.52</td>
<td>5,404.66</td>
<td>1.00</td>
<td>0.99</td>
<td>1.00</td>
</tr>
</tbody>
</table>

Source: Authors’ calculations using SK-SILC and LFS.

* Prime-age: 15-64 years.

Part 2: Non-simulated benefits, pensions and statistics on income types

Table D5: Unemployment benefit validation: Aggregate number of recipients (in thousands)

<table>
<thead>
<tr>
<th></th>
<th>Official statistics</th>
<th>SILC</th>
<th>SILC / Official statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recipients of unemp. benefit*</td>
<td>138.83</td>
<td>141.85</td>
<td>143.90</td>
</tr>
<tr>
<td>Unemployed**</td>
<td>389.00</td>
<td>364.60</td>
<td>377.50</td>
</tr>
<tr>
<td>Recipients / Unemployed</td>
<td>0.36</td>
<td>0.39</td>
<td>0.38</td>
</tr>
</tbody>
</table>

Source: Authors’ calculations using SK-SILC, COLSAF* and LFS**.

Table D6: Individuals with nonzero income (in thousands persons)

<table>
<thead>
<tr>
<th></th>
<th>SSA</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>SK-SILC</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>SK-SILC / SSA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Income from</td>
<td></td>
<td>2010</td>
<td>2011</td>
<td>2012</td>
<td>2010</td>
<td>2011</td>
<td>2012</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employment</td>
<td>1,835</td>
<td>1,859</td>
<td>1,828</td>
<td>2,172</td>
<td>2,078</td>
<td>1,983</td>
<td>1.18</td>
<td>1.12</td>
<td>1.08</td>
</tr>
<tr>
<td>Agreements</td>
<td>779</td>
<td>859</td>
<td>888</td>
<td>319</td>
<td>337</td>
<td>364</td>
<td>0.41</td>
<td>0.39</td>
<td>0.41</td>
</tr>
<tr>
<td>Self-employment</td>
<td>282</td>
<td>277</td>
<td>277</td>
<td>264</td>
<td>372</td>
<td>347</td>
<td>0.93</td>
<td>1.34</td>
<td>1.25</td>
</tr>
<tr>
<td>Employment and agreements</td>
<td>2,614</td>
<td>2,718</td>
<td>2,716</td>
<td>2,491</td>
<td>2,414</td>
<td>2,348</td>
<td>0.95</td>
<td>0.89</td>
<td>0.86</td>
</tr>
</tbody>
</table>

Source: Authors’ calculations using SK-SILC and SSA (based on total number of employees and self-employed paying SIC).
Table D7: Aggregate income (in mil. euro)

<table>
<thead>
<tr>
<th>Income from</th>
<th>SSA</th>
<th>SK-SILC</th>
<th>SK-SILC / SSA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2010</td>
<td>2011</td>
<td>2012</td>
</tr>
<tr>
<td>Employment</td>
<td>14,632</td>
<td>15,625</td>
<td>16,213</td>
</tr>
<tr>
<td></td>
<td>2010</td>
<td>2011</td>
<td>2012</td>
</tr>
<tr>
<td>Agreements</td>
<td>663</td>
<td>798</td>
<td>904</td>
</tr>
<tr>
<td></td>
<td>2010</td>
<td>2011</td>
<td>2012</td>
</tr>
<tr>
<td>Self-employment*</td>
<td>1,084</td>
<td>1,079</td>
<td>1,106</td>
</tr>
<tr>
<td></td>
<td>2010</td>
<td>2011</td>
<td>2012</td>
</tr>
<tr>
<td>Empl. and agreements</td>
<td>15,295</td>
<td>16,423</td>
<td>17,116</td>
</tr>
</tbody>
</table>

Source: Authors’ calculations using SK-SILC and SSA.

* Validation of income for self-employed is only indicative. SK-SILC reports for self-employed the value of profit/loss in the current year, while the SSA database reports the assessment base which is based on the value of return in the year t-2 (inconsistency both in variable and time).

Table D8: Non-simulated benefits and pensions: Number of recipients (in thousands persons)

<table>
<thead>
<tr>
<th>Benefits</th>
<th>SSA</th>
<th>SK-SILC</th>
<th>SK-SILC / SSA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maternity</td>
<td>20</td>
<td>23</td>
<td>24</td>
</tr>
<tr>
<td>Old age</td>
<td>955</td>
<td>958</td>
<td>981</td>
</tr>
<tr>
<td>Disability</td>
<td>214</td>
<td>223</td>
<td>228</td>
</tr>
<tr>
<td>Widow/er</td>
<td>337</td>
<td>337</td>
<td>337</td>
</tr>
<tr>
<td>Orphans</td>
<td>28</td>
<td>28</td>
<td>27</td>
</tr>
</tbody>
</table>

Source: SK-SILC, Social Security Agency (SSA)

Table D9: Non-simulated benefits and pensions: Aggregate amounts (in mil. EUR)

<table>
<thead>
<tr>
<th>Benefits</th>
<th>SSA</th>
<th>SK-SILC</th>
<th>SK-SILC / SSA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maternity</td>
<td>76,650</td>
<td>107,124</td>
<td>128,873</td>
</tr>
<tr>
<td>Sickness</td>
<td>261,773</td>
<td>274,259</td>
<td>299,235</td>
</tr>
<tr>
<td>Old age</td>
<td>3,758,182</td>
<td>3,926,901</td>
<td>4,165,740</td>
</tr>
<tr>
<td>Disability</td>
<td>656,420</td>
<td>689,217</td>
<td>722,918</td>
</tr>
<tr>
<td>Widow/er</td>
<td>546,777</td>
<td>559,056</td>
<td>580,013</td>
</tr>
<tr>
<td>Orphans</td>
<td>43,283</td>
<td>43,057</td>
<td>42,801</td>
</tr>
</tbody>
</table>

Source: SK-SILC, Social Security Agency (SSA)
Part 3: Simulated benefits, personal income tax and social security contributions

Table D10: Simulated benefits: Aggregate amounts (in mil. EUR)

<table>
<thead>
<tr>
<th>Benefit</th>
<th>Official stat. (I)</th>
<th>SILC (II)</th>
<th>CBR (III)</th>
<th>EUROMOD (IV)</th>
<th>(III) / (I)</th>
<th>(IV) / (I)</th>
<th>(III) / (II)</th>
<th>(IV) / (II)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>2010</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unemp. benefit</td>
<td>150,681.94</td>
<td>100,557.64</td>
<td>97,668.35</td>
<td>97,668.46</td>
<td>0.65</td>
<td>0.65</td>
<td>0.97</td>
<td>0.97</td>
</tr>
<tr>
<td>Parental allowance</td>
<td>316,604.87</td>
<td>210,282.95</td>
<td>240,385.72</td>
<td>270,012.11</td>
<td>0.76</td>
<td>0.85</td>
<td>1.14</td>
<td>1.28</td>
</tr>
<tr>
<td>Child benefit</td>
<td>314,465.07</td>
<td>339,682.57</td>
<td>344,624.78</td>
<td>272,451.34</td>
<td>1.10</td>
<td>0.87</td>
<td>1.01</td>
<td>0.80</td>
</tr>
<tr>
<td>Child birth grant</td>
<td>43,881.52</td>
<td>11,632.61</td>
<td>17,512.15</td>
<td>16,921.22</td>
<td>0.40</td>
<td>0.39</td>
<td>1.51</td>
<td>1.45</td>
</tr>
<tr>
<td>Material needs benefit</td>
<td>281,400.95</td>
<td>162,870.05</td>
<td>263,224.53</td>
<td>373,028.80</td>
<td>0.94</td>
<td>1.33</td>
<td>1.62</td>
<td>2.29</td>
</tr>
<tr>
<td><strong>2011</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unemp. benefit</td>
<td>163,513.25</td>
<td>90,696.19</td>
<td>89,065.05</td>
<td>89,065.18</td>
<td>0.54</td>
<td>0.54</td>
<td>0.98</td>
<td>0.98</td>
</tr>
<tr>
<td>Parental allowance</td>
<td>341,842.21</td>
<td>204,240.96</td>
<td>217,780.94</td>
<td>265,460.47</td>
<td>0.64</td>
<td>0.78</td>
<td>1.07</td>
<td>1.30</td>
</tr>
<tr>
<td>Child benefit</td>
<td>310,682.24</td>
<td>330,690.92</td>
<td>341,801.55</td>
<td>269,538.82</td>
<td>1.10</td>
<td>0.87</td>
<td>1.03</td>
<td>0.82</td>
</tr>
<tr>
<td>Child birth grant</td>
<td>44,300.91</td>
<td>18,599.04</td>
<td>27,048.62</td>
<td>27,046.61</td>
<td>0.61</td>
<td>0.61</td>
<td>1.45</td>
<td>1.45</td>
</tr>
<tr>
<td>Material needs benefit</td>
<td>272,002.58</td>
<td>141,982.45</td>
<td>259,416.99</td>
<td>337,974.34</td>
<td>0.95</td>
<td>1.24</td>
<td>1.83</td>
<td>2.38</td>
</tr>
<tr>
<td><strong>2012</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unemp. benefit</td>
<td>175,827.58</td>
<td>71,283.54</td>
<td>70,890.17</td>
<td>66,329.35</td>
<td>0.40</td>
<td>0.38</td>
<td>0.99</td>
<td>0.93</td>
</tr>
<tr>
<td>Parental allowance</td>
<td>334,404.98</td>
<td>272,907.03</td>
<td>292,145.00</td>
<td>363,720.70</td>
<td>0.87</td>
<td>1.09</td>
<td>1.07</td>
<td>1.33</td>
</tr>
<tr>
<td>Child benefit</td>
<td>312,106.11</td>
<td>370,233.93</td>
<td>372,191.51</td>
<td>303,502.47</td>
<td>1.19</td>
<td>0.97</td>
<td>1.01</td>
<td>0.82</td>
</tr>
<tr>
<td>Child birth grant</td>
<td>44,147.10</td>
<td>27,583.57</td>
<td>35,800.56</td>
<td>35,283.12</td>
<td>0.81</td>
<td>0.80</td>
<td>1.30</td>
<td>1.28</td>
</tr>
<tr>
<td>Material needs benefit</td>
<td>268,438.46</td>
<td>162,974.48</td>
<td>302,474.47</td>
<td>392,671.75</td>
<td>1.13</td>
<td>1.46</td>
<td>1.86</td>
<td>2.41</td>
</tr>
</tbody>
</table>

Source: Official statistics on unemployment benefit from Social Security Agency (SSA), other benefits from Central Office of Labour, Social Affairs and Family (COLSAF).
Table D1: Simulated benefits: Aggregate number of beneficiaries (in thousands)

<table>
<thead>
<tr>
<th></th>
<th>Official stat. (I)</th>
<th>SILC (II)</th>
<th>CBR (III)</th>
<th>EUROMOD (IV)</th>
<th>(III) / (I)</th>
<th>(IV) / (I)</th>
<th>(III) / (II)</th>
<th>(IV) / (II)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>2010</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unemp. benefit</td>
<td>150.14</td>
<td>91.89</td>
<td>88.26</td>
<td>88.26</td>
<td>0.59</td>
<td>0.59</td>
<td>0.96</td>
<td>0.96</td>
</tr>
<tr>
<td>Parental allowance</td>
<td>183.05</td>
<td>100.65</td>
<td>102.85</td>
<td>121.13</td>
<td>0.56</td>
<td>0.66</td>
<td>1.02</td>
<td>1.20</td>
</tr>
<tr>
<td>Child benefit*</td>
<td>706.33</td>
<td>745.45</td>
<td>762.14</td>
<td>621.56</td>
<td>1.08</td>
<td>0.88</td>
<td>1.02</td>
<td>0.83</td>
</tr>
<tr>
<td>Child birth grant</td>
<td>56.74</td>
<td>17.57</td>
<td>22.22</td>
<td>22.22</td>
<td>0.39</td>
<td>0.39</td>
<td>1.26</td>
<td>1.26</td>
</tr>
<tr>
<td>Material needs benefit</td>
<td>244.58</td>
<td>101.18</td>
<td>226.10</td>
<td>273.58</td>
<td>0.92</td>
<td>1.12</td>
<td>2.23</td>
<td>2.70</td>
</tr>
<tr>
<td>Housing allowance</td>
<td>16.14</td>
<td>39.32</td>
<td>126.89</td>
<td>250.38</td>
<td>1.09</td>
<td>2.16</td>
<td>3.23</td>
<td>6.37</td>
</tr>
<tr>
<td>Activation allowance</td>
<td>85.95</td>
<td>45.47</td>
<td>77.22</td>
<td>467.09</td>
<td>0.90</td>
<td>5.43</td>
<td>1.70</td>
<td>10.27</td>
</tr>
<tr>
<td>Protection allowance</td>
<td>103.59</td>
<td>86.87</td>
<td>161.23</td>
<td>161.23</td>
<td>0.84</td>
<td>1.56</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>2011</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unemp. benefit</td>
<td>142.87</td>
<td>73.41</td>
<td>70.86</td>
<td>70.86</td>
<td>0.50</td>
<td>0.50</td>
<td>0.97</td>
<td>0.97</td>
</tr>
<tr>
<td>Parental allowance</td>
<td>184.97</td>
<td>105.36</td>
<td>123.69</td>
<td>126.26</td>
<td>0.67</td>
<td>0.68</td>
<td>1.17</td>
<td>1.20</td>
</tr>
<tr>
<td>Child benefit*</td>
<td>697.65</td>
<td>749.21</td>
<td>754.59</td>
<td>613.24</td>
<td>1.08</td>
<td>0.88</td>
<td>1.01</td>
<td>0.82</td>
</tr>
<tr>
<td>Child birth grant</td>
<td>56.90</td>
<td>29.79</td>
<td>33.60</td>
<td>33.60</td>
<td>0.59</td>
<td>0.59</td>
<td>1.13</td>
<td>1.13</td>
</tr>
<tr>
<td>Material needs benefit</td>
<td>243.68</td>
<td>100.28</td>
<td>217.15</td>
<td>243.50</td>
<td>0.89</td>
<td>1.00</td>
<td>2.17</td>
<td>2.43</td>
</tr>
<tr>
<td>Housing allowance</td>
<td>113.80</td>
<td>37.84</td>
<td>111.23</td>
<td>218.69</td>
<td>0.98</td>
<td>1.92</td>
<td>2.94</td>
<td>5.78</td>
</tr>
<tr>
<td>Activation allowance</td>
<td>94.40</td>
<td>46.53</td>
<td>77.33</td>
<td>447.77</td>
<td>0.82</td>
<td>4.68</td>
<td>1.66</td>
<td>9.49</td>
</tr>
<tr>
<td>Protection allowance</td>
<td>94.88</td>
<td>n.a.</td>
<td>76.61</td>
<td>134.18</td>
<td>0.81</td>
<td>1.41</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>2012</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unemp. benefit</td>
<td>143.90</td>
<td>58.06</td>
<td>58.06</td>
<td>54.14</td>
<td>0.40</td>
<td>0.38</td>
<td>1.00</td>
<td>0.93</td>
</tr>
<tr>
<td>Parental allowance</td>
<td>187.62</td>
<td>140.11</td>
<td>162.76</td>
<td>164.52</td>
<td>0.87</td>
<td>0.88</td>
<td>1.16</td>
<td>1.17</td>
</tr>
<tr>
<td>Child benefit*</td>
<td>678.74</td>
<td>779.74</td>
<td>788.18</td>
<td>663.65</td>
<td>1.16</td>
<td>0.98</td>
<td>1.01</td>
<td>0.85</td>
</tr>
<tr>
<td>Child birth grant</td>
<td>56.99</td>
<td>38.02</td>
<td>42.71</td>
<td>42.71</td>
<td>0.75</td>
<td>0.75</td>
<td>1.12</td>
<td>1.12</td>
</tr>
<tr>
<td>Material needs benefit</td>
<td>239.87</td>
<td>102.40</td>
<td>232.02</td>
<td>256.51</td>
<td>0.97</td>
<td>1.07</td>
<td>2.27</td>
<td>2.50</td>
</tr>
<tr>
<td>Housing allowance</td>
<td>112.90</td>
<td>39.43</td>
<td>112.33</td>
<td>239.04</td>
<td>0.99</td>
<td>2.12</td>
<td>2.85</td>
<td>6.06</td>
</tr>
<tr>
<td>Activation allowance</td>
<td>92.31</td>
<td>54.03</td>
<td>83.57</td>
<td>484.34</td>
<td>0.91</td>
<td>5.25</td>
<td>1.55</td>
<td>8.96</td>
</tr>
<tr>
<td>Protection allowance</td>
<td>82.04</td>
<td>n.a.</td>
<td>79.08</td>
<td>168.23</td>
<td>1.02</td>
<td>2.05</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Official statistics on unemployment benefit from Social Security Agency (SSA), other benefits from Central Office of Labour, Social Affairs and Family (COSAF).

* Official statistics on child benefit recipients is taken as the average of monthly data over the year. Official statistics on other benefits is the number of individual recipients (i.e. incidence).
### Table D12: Individual matching of CBR simulation to SILC: Number of recipients

<table>
<thead>
<tr>
<th>Benefit</th>
<th>SILC</th>
<th>CBR*</th>
<th>CBR**</th>
<th>CBR / CBR total (%)</th>
<th>match (%) ***</th>
<th>SILC</th>
<th>CBR*</th>
<th>CBR**</th>
<th>CBR / CBR total (%)</th>
<th>match (%) ***</th>
<th>2009</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unemp. benefit</td>
<td>291</td>
<td>287</td>
<td>287</td>
<td>100</td>
<td>99</td>
<td>210</td>
<td>202</td>
<td>202</td>
<td>100</td>
<td>96</td>
<td>2009</td>
<td>2010</td>
</tr>
<tr>
<td>Parental allowance</td>
<td>301</td>
<td>278</td>
<td>294</td>
<td>95</td>
<td>92</td>
<td>252</td>
<td>227</td>
<td>259</td>
<td>88</td>
<td>90</td>
<td>2009</td>
<td>2010</td>
</tr>
<tr>
<td>Child benefit</td>
<td>2356</td>
<td>2262</td>
<td>2365</td>
<td>96</td>
<td>96</td>
<td>2131</td>
<td>2065</td>
<td>2184</td>
<td>95</td>
<td>97</td>
<td>2009</td>
<td>2010</td>
</tr>
<tr>
<td>Child birth grant</td>
<td>104</td>
<td>95</td>
<td>108</td>
<td>88</td>
<td>91</td>
<td>47</td>
<td>43</td>
<td>57</td>
<td>75</td>
<td>91</td>
<td>2009</td>
<td>2010</td>
</tr>
<tr>
<td>Mat. needs benefit</td>
<td>222</td>
<td>115</td>
<td>503</td>
<td>23</td>
<td>52</td>
<td>214</td>
<td>120</td>
<td>518</td>
<td>23</td>
<td>56</td>
<td>2009</td>
<td>2010</td>
</tr>
<tr>
<td>Parental allowance</td>
<td>265</td>
<td>245</td>
<td>309</td>
<td>79</td>
<td>92</td>
<td>364</td>
<td>342</td>
<td>419</td>
<td>82</td>
<td>94</td>
<td>2009</td>
<td>2010</td>
</tr>
<tr>
<td>Child benefit</td>
<td>2153</td>
<td>2054</td>
<td>2169</td>
<td>95</td>
<td>95</td>
<td>2230</td>
<td>2140</td>
<td>2244</td>
<td>95</td>
<td>96</td>
<td>2009</td>
<td>2010</td>
</tr>
<tr>
<td>Child birth grant</td>
<td>76</td>
<td>71</td>
<td>85</td>
<td>84</td>
<td>93</td>
<td>100</td>
<td>93</td>
<td>111</td>
<td>84</td>
<td>93</td>
<td>2009</td>
<td>2010</td>
</tr>
<tr>
<td>Mat. needs benefit</td>
<td>240</td>
<td>112</td>
<td>513</td>
<td>22</td>
<td>47</td>
<td>241</td>
<td>135</td>
<td>555</td>
<td>24</td>
<td>56</td>
<td>2009</td>
<td>2010</td>
</tr>
</tbody>
</table>

Source: Authors’ calculations based on SK-SILC.
* Number of recipients that were matched with recipients in SK-SILC.
** Total number of recipients in CBR model.
*** Ratio CBR matched / SILC.
### Table D13: Personal income tax and social insurance contributions: Aggregate amounts (in mil. EUR) in 2012

<table>
<thead>
<tr>
<th>Category</th>
<th>Official stat. (I)</th>
<th>CBR (II)</th>
<th>EUROMOD (III)</th>
<th>(II) / (I)</th>
<th>(III) / (I)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Personal income tax</strong></td>
<td>1,864,391</td>
<td>1,443,612</td>
<td>1,483,477</td>
<td>0.77</td>
<td>0.80</td>
</tr>
<tr>
<td><strong>Social Insurance Contrib. (SIC)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>SIC: Employer</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sickness insurance</td>
<td>3,580,520</td>
<td>4,123,097</td>
<td>4,136,967</td>
<td>1.15</td>
<td>1.16</td>
</tr>
<tr>
<td>Old-age insurance</td>
<td>174,005</td>
<td>220,693</td>
<td>221,164</td>
<td>1.27</td>
<td>1.27</td>
</tr>
<tr>
<td>Disability insurance</td>
<td>2,002,287</td>
<td>2,302,889</td>
<td>2,309,677</td>
<td>1.15</td>
<td>1.15</td>
</tr>
<tr>
<td>Unemployment insurance</td>
<td>421,158</td>
<td>487,017</td>
<td>489,233</td>
<td>1.16</td>
<td>1.16</td>
</tr>
<tr>
<td>Guarantee insurance</td>
<td>139,359</td>
<td>160,619</td>
<td>161,397</td>
<td>1.15</td>
<td>1.16</td>
</tr>
<tr>
<td>Reserve solidarity fund</td>
<td>26,951</td>
<td>39,404</td>
<td>39,491</td>
<td>1.46</td>
<td>1.47</td>
</tr>
<tr>
<td>Accident insurance</td>
<td>687,164</td>
<td>781,143</td>
<td>783,648</td>
<td>1.14</td>
<td>1.14</td>
</tr>
<tr>
<td>Insurance paid from agreements</td>
<td>129,596</td>
<td>131,932</td>
<td>132,357</td>
<td>1.02</td>
<td>1.02</td>
</tr>
<tr>
<td><strong>SIC: Employee</strong></td>
<td>1,313,414</td>
<td>1,529,705</td>
<td>1,531,697</td>
<td>1.16</td>
<td>1.17</td>
</tr>
<tr>
<td>Sickness insurance</td>
<td>174,058</td>
<td>221,082</td>
<td>221,164</td>
<td>1.27</td>
<td>1.27</td>
</tr>
<tr>
<td>Old-age insurance</td>
<td>578,600</td>
<td>659,401</td>
<td>659,903</td>
<td>1.14</td>
<td>1.14</td>
</tr>
<tr>
<td>Disability insurance</td>
<td>421,358</td>
<td>488,207</td>
<td>489,233</td>
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<td>1.16</td>
</tr>
<tr>
<td>Unemployment insurance</td>
<td>139,398</td>
<td>161,016</td>
<td>161,397</td>
<td>1.16</td>
<td>1.16</td>
</tr>
<tr>
<td><strong>SIC: Self-employed</strong></td>
<td>286,852</td>
<td>499,020</td>
<td>539,684</td>
<td>1.74</td>
<td>2.06</td>
</tr>
<tr>
<td>Sickness insurance</td>
<td>37,250</td>
<td>60,374</td>
<td>60,491</td>
<td>1.74</td>
<td>2.07</td>
</tr>
<tr>
<td>Old-age insurance</td>
<td>158,111</td>
<td>272,962</td>
<td>272,585</td>
<td>1.73</td>
<td>2.04</td>
</tr>
<tr>
<td>Disability insurance</td>
<td>49,490</td>
<td>89,147</td>
<td>104,958</td>
<td>1.80</td>
<td>2.12</td>
</tr>
<tr>
<td>Reserve solidarity fund</td>
<td>42,001</td>
<td>72,038</td>
<td>85,136</td>
<td>1.72</td>
<td>2.03</td>
</tr>
<tr>
<td><strong>Health Insurance Contrib. (HIC)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>HIC: economic active pop.</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HIC: employees</td>
<td>2,426,335</td>
<td>2,512,629</td>
<td>2,515,440</td>
<td>1.04</td>
<td>1.04</td>
</tr>
<tr>
<td>HIC: self-employed</td>
<td>668,052</td>
<td>635,344</td>
<td>637,472</td>
<td>0.95</td>
<td>0.95</td>
</tr>
<tr>
<td>HIC: employers</td>
<td>151,854</td>
<td>239,475</td>
<td>239,639</td>
<td>1.58</td>
<td>1.58</td>
</tr>
<tr>
<td>HIC: voluntary</td>
<td>1,496,882</td>
<td>1,584,597</td>
<td>1,592,962</td>
<td>1.06</td>
<td>1.06</td>
</tr>
<tr>
<td><strong>HIC: economic inactive pop.</strong></td>
<td>1,268,006</td>
<td>1,226,680</td>
<td>1,310,730</td>
<td>0.97</td>
<td>1.03</td>
</tr>
</tbody>
</table>

Source: Official statistics on PIT and HIC from Ministry of Finance, SIC from Social Security Agency (SSA).
Part 4: Scaling factors and income distribution

Table D14: Weight of selected income groups on total income in SK-SILC datasets (in %)

<table>
<thead>
<tr>
<th>Income Source</th>
<th>SK-SILC 2011</th>
<th>SK-SILC 2012</th>
<th>SK-SILC 2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gross wage from employment</td>
<td>84.15</td>
<td>85.02</td>
<td>83.78</td>
</tr>
<tr>
<td>Income from self-employment</td>
<td>10.16</td>
<td>9.10</td>
<td>9.78</td>
</tr>
<tr>
<td>Other payments made by employers</td>
<td>0.31</td>
<td>0.29</td>
<td>0.33</td>
</tr>
<tr>
<td>Income from agreements</td>
<td>1.08</td>
<td>1.47</td>
<td>1.43</td>
</tr>
<tr>
<td>Fringe Benefits except vouchers</td>
<td>0.30</td>
<td>0.26</td>
<td>0.17</td>
</tr>
<tr>
<td>Fringe Benefits vouchers</td>
<td>2.19</td>
<td>2.08</td>
<td>2.22</td>
</tr>
<tr>
<td>Severance payments</td>
<td>0.23</td>
<td>0.15</td>
<td>0.16</td>
</tr>
<tr>
<td>Termination pay (lump sum)</td>
<td>0.06</td>
<td>0.05</td>
<td>0.04</td>
</tr>
<tr>
<td>Income from abroad</td>
<td>1.54</td>
<td>1.57</td>
<td>2.11</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100.00</strong></td>
<td><strong>100.00</strong></td>
<td><strong>100.00</strong></td>
</tr>
</tbody>
</table>

Note: Income from employment is considered.
Table D15: Personal income tax and social insurance contributions: Aggregate amounts (in mil. EUR) in 2012, scaled income distribution

<table>
<thead>
<tr>
<th></th>
<th>Official stat. (I)</th>
<th>CBR (II)</th>
<th>CBR scaled (III)</th>
<th>(II) / (I)</th>
<th>(III) / (I)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Personal income tax</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Social Insurance Contrib. (SIC)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>SIC: Employer</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sickness insurance</td>
<td>1,864,391</td>
<td>1,443,612</td>
<td>1,730,778</td>
<td>0.77</td>
<td>0.93</td>
</tr>
<tr>
<td>Old-age insurance</td>
<td>2,002,287</td>
<td>2,302,289</td>
<td>2,500,235</td>
<td>1.15</td>
<td>1.25</td>
</tr>
<tr>
<td>Disability insurance</td>
<td>421,158</td>
<td>487,017</td>
<td>529,257</td>
<td>1.16</td>
<td>1.26</td>
</tr>
<tr>
<td>Unemployment insurance</td>
<td>139,359</td>
<td>160,619</td>
<td>174,656</td>
<td>1.15</td>
<td>1.25</td>
</tr>
<tr>
<td>Guarantee insurance</td>
<td>26,951</td>
<td>39,404</td>
<td>39,865</td>
<td>1.46</td>
<td>1.48</td>
</tr>
<tr>
<td>Reserve solidarity fund</td>
<td>687,164</td>
<td>781,143</td>
<td>848,293</td>
<td>1.14</td>
<td>1.23</td>
</tr>
<tr>
<td>Accident insurance</td>
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<td>131,932</td>
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<td>1.02</td>
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</tr>
<tr>
<td>Insurance paid from agreements</td>
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<td></td>
</tr>
<tr>
<td><strong>SIC: Employee</strong></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sickness insurance</td>
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<td>1,529,705</td>
<td>1,645,180</td>
<td>1.16</td>
<td>1.25</td>
</tr>
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<td>220,693</td>
<td>223,723</td>
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</tr>
<tr>
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<td>659,401</td>
<td>715,958</td>
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<td>1.24</td>
</tr>
<tr>
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<td>488,207</td>
<td>530,447</td>
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<td>1.26</td>
</tr>
<tr>
<td><strong>SIC: Self-employed</strong></td>
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<td></td>
<td></td>
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</tr>
<tr>
<td>Sickness insurance</td>
<td>37,250</td>
<td>64,874</td>
<td>64,874</td>
<td>1.74</td>
<td>1.74</td>
</tr>
<tr>
<td>Old-age insurance</td>
<td>158,111</td>
<td>272,962</td>
<td>272,962</td>
<td>1.73</td>
<td>1.73</td>
</tr>
<tr>
<td>Disability insurance</td>
<td>49,490</td>
<td>89,147</td>
<td>89,147</td>
<td>1.80</td>
<td>1.80</td>
</tr>
<tr>
<td>Reserve solidarity fund</td>
<td>42,001</td>
<td>72,038</td>
<td>72,038</td>
<td>1.72</td>
<td>1.72</td>
</tr>
<tr>
<td><strong>Health Insurance Contrib. (HIC)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>HIC: economic active pop.</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HIC: employees</td>
<td>2,426,335</td>
<td>2,512,629</td>
<td>2,688,164</td>
<td>1.04</td>
<td>1.11</td>
</tr>
<tr>
<td>HIC: self-employed</td>
<td>668,952</td>
<td>635,344</td>
<td>685,572</td>
<td>0.95</td>
<td>1.03</td>
</tr>
<tr>
<td>HIC: employers</td>
<td>151,854</td>
<td>239,475</td>
<td>239,475</td>
<td>1.58</td>
<td>1.58</td>
</tr>
<tr>
<td>HIC: voluntary</td>
<td>74,078</td>
<td>52,803</td>
<td>52,803</td>
<td>0.72</td>
<td>0.71</td>
</tr>
<tr>
<td><strong>HIC: economic inactive pop.</strong></td>
<td>1,268,096</td>
<td>1,226,680</td>
<td>1,227,039</td>
<td>0.97</td>
<td>0.97</td>
</tr>
</tbody>
</table>

Source: Official statistics on PIT and HIC from Ministry of Finance, SIC from Social Security Agency (SSA).