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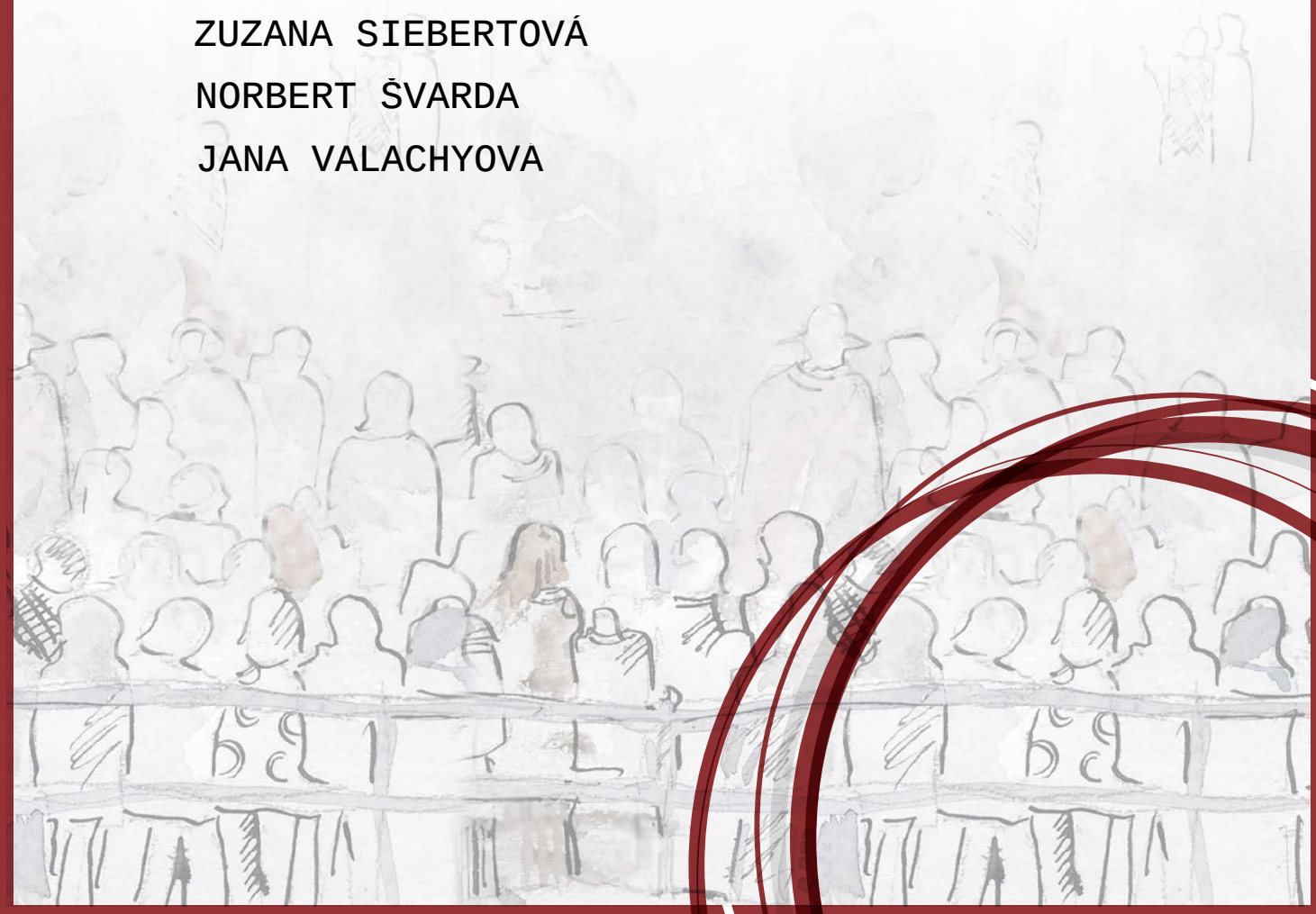

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A MICROSIMULATION MODEL OF THE SLOVAK TAX-BENEFIT SYSTEM

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ABSTRACT

SIMTAX: A Microsimulation model of the Slovak Tax-Benefit System

In this paper we introduce a microsimulation model of the Slovak tax and transfer system SIMTASK. It presents a complex toolkit for static microsimulations. Compared to earlier version of the CBR microsimulation model, simulated results are closer to reality. This has been achieved by recalibrating sample weights of the input database, where the income distribution has been taken into account directly. The improved fit is documented by validating the tax and transfer aggregates using both the original sample weights and the new ones against external data. Along with some other refinements to the model and external data considerations, the paper concludes that the validity of SIMTASK improved in terms of personal income tax simulations, social security contributions simulations, as well as simulations of family related benefits.

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

JEL Classification: C81, I38, H24

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1 Introduction

In this paper we present a revised version of SIMTASK (**SI**mulation **M**odel of **TA**xes and transfers in **S**lova**k**ia) that has been developed to simulate the Slovak tax and transfer system. The SIMTASK, as well as its earlier version introduced in Siebertova, Svarda and Valachyova (2014), is based on the existing EUROMOD platform, where several modules were customized and enlarged. In addition, sample weights of the underlying micro-dataset were recalibrated such that the income distribution has been taken into account directly. We show that such adjustments provide us with simulated output that matches official statistics more closely.

The presented microsimulation model SIMTASK serves as an assessment tool developed primarily for the needs of the Council for Budget Responsibility (CBR). It is a key building block of a more complex general equilibrium model designed to assess the consequences of tax and benefit reform strategies. This paper documents the process of building the SIMTASK 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 – might be of interest to a larger audience. In the earlier version of this paper, we dealt with insufficient representativeness of income in the underlying data by "scaling" the labour income to match the administrative data more closely.[5] This approach showed not to be sufficiently precise, especially when the model has been used to quantify the fiscal effects of legislative changes affecting the individuals at the lowest part of the income distribution. Therefore, now we propose a different approach where the sample weights of the underlying data are recalibrated such that the labour income distribution implied by the official statistics is taken into account directly. It is shown that the new approach applied in general improves the fit between simulated output, underlying data and official statistics. Improved fit has been documented convincingly for the simulations of payroll taxes and majority of family related benefits. However, when using the new calibrated weights, material needs benefit is still overestimated on aggregate. This is a somewhat paradoxical consequence of the fact that more weight is now put on low-income earners who are also the most likely material needs benefit recipients.

[5] Individual labour income reported in the underlying SILC dataset has been multiplied by the corresponding percentile-specific scaling factor. Scaling factors were computed by comparing the mean values of percentiles of gross labour income in SILC dataset and percentiles of gross labour income recorded in the administrative data taken from the Social Security Agency.

The paper is structured as follows. Section 2 describes the micro-level dataset that has been used 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 of the simulation results. Section 6 concludes.

2 Data

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.

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 that are available.[6] Compared to the EU-SILC, the SK-SILC dataset includes more variables that are country specific.

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[7] rotational design with 4 subsamples, each subsample is retained 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.

2.1 Adjustments and weighting of the SK-SILC dataset

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 a 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

[6] For a detailed overview of available individual level data in Slovakia, see Siebertova et al. (2014).

[7] 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.

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 most survey data, also SK-SILC does not correctly represent the income distribution of labour income when compared to the official statistics that can be retrieved from SSA database.[8] As it is graphed in Figure A3 in the Appendix, low-income groups and high-income groups are under-represented (the latter in fact missing) and incomes around the average monthly wage substantially over-represented. Therefore we use calibration weights that correct the income distribution in a way that it sufficiently matches the official statistics.

The SK-SILC dataset is calibrated and integrated weights (such that cross-sectional household weights and personal weights equal) are provided by the Statistical Office of the Slovak Republic. We now use the calibration tool "Calif" recently developed by the Slovak Statistical Office in which the income distribution is also directly taken into account, and the sample weights were correspondingly adjusted. Previously, the calibration was performed using CALMAR2, a SAS macro developed by INSEE (Sautory, 1993 and LeGuennec and Sautory, 2002). By using this macro, calibration was performed on a number of household members (5 categories), gender, 6 age categories and 5 variables describing labour market status of a person (working persons, employees, unemployed, self-employed and pensioners). Stratification is based on NUTS3 level (8 regions). Although the calibration used 22 different categories in one strata, it did not take into account income distribution. "Calif", on the other hand, uses the same inputs to calibration as CALMAR2 (8 strata and 22 categories) and moreover, the income distribution can be represented by 4 additional categories. For the detailed description, mode of use and the documentation on "Calif", see Glaser-Opitzova et al. (2015).

The SK-SILC[9] dataset corresponding to income reference period 2011 reports 15,440 individuals living in 5,291 households and SK-SILC referring to 2012 contains 15,426 individuals in 5,402 households. Table 1 presents descriptive statistics of the grossing-up weights and population estimates of the samples weighted by original weights and using weights computed with a new calibration tool. In addition, in Table A1 in the Appendix we present the descriptive statistics of main demographic and income related variables.

[8] SSA 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. For the microsimulations it is ruled out since it does not contain information on transfers and family relationships.

[9] Note that we label SK-SILC datasets in this analysis such that the year always corresponds to the income reference year and not to the period when survey has been collected.

Table 1 Descriptive statistics of grossing-up weights in SK-SILC samples

Reference period*	**2011**	**2011**	**2012**	**2012**	**2013**	**2014**
Underlying SILC dataset	**2011**	**2011**	**2012**	**2012**	**2012**	**2012**
Grossing-up weight	original	calibrated	original	calibrated	calibrated	calibrated
Mean	349.45	349.50	350.36	350.00	350.30	350.62
Std. Dev.	125.99	414.93	131.95	482.50	493.28	511.15
Minimum	108.69	12.00	119.91	12.00	12.00	12.00
Maximum	1,226.09	4,129.00	1,083.87	4,481.00	4,481.00	4,481.00
Dataset characteristics						
Individuals	15,440	15,440	15,426	15,426	15,426	15,426
Households	5,291	5,291	5,402	5,402	5,402	5,402
Projected population	5,395,519	5,396,355	5,404,664	5,398,917	5,403,748	5,408,641
Projected households	1,911,664	1,909,248	1,852,059	1,852,027	1,852,148	1,853,717

Source: Authors' calculations using SK-SILC.

** When underlying SILC dataset and the reference period do not match, external statistics that is necessary to calibrate weights is used from the reference year, while SILC data is taken as indicated.*

In order to test also the predictive accuracy of the SIMTASK, as an underlying dataset we are using the latest SILC survey.[10] In the first step, we update income variables in the dataset by the corresponding growth factors, which are listed in Table A2 in the Appendix. In the next step, we estimate the calibration weights by comparing the data from the updated dataset to the external statistics from the target year. Although demographic structure of population and economic activity of inhabitants is not adjusted directly, i.e. by using the corresponding growth rates, these factors are taken into account when new calibration weights are estimated. In last two columns of Table 1 we present calibration weights that are later used in the simulation exercise to test for the accuracy of SIMTASK in target years 2013 and 2014.

The SK-SILC 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. 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

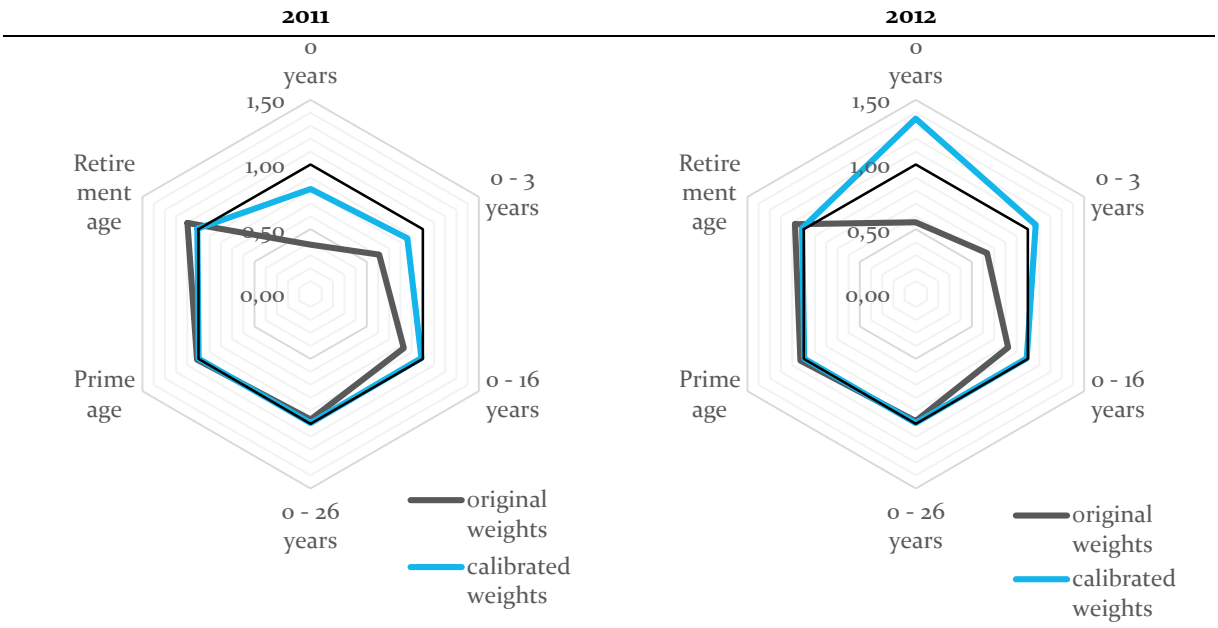
[10] At the time of writing this analysis, the newest SILC dataset available to us was the one corresponding to the income reference period 2012.

households and thus reported just on the household level (material needs benefit or some family related benefits).

2.2 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 population groups. Particular limitations are inspected in details below, in such a way that SK-SILC data are compared to the appropriate official statistics using both the original and calibrated weights. Graphs displayed below suggest that in most aspects the newly calibrated weights helped to improve the fit closer to reality. These comparisons are also highly instructive in later assessment of simulations computed by SIMTASK.

Figure 1 Age cohorts in SK-SILC and population



Source: Authors' calculations using SK-SILC.

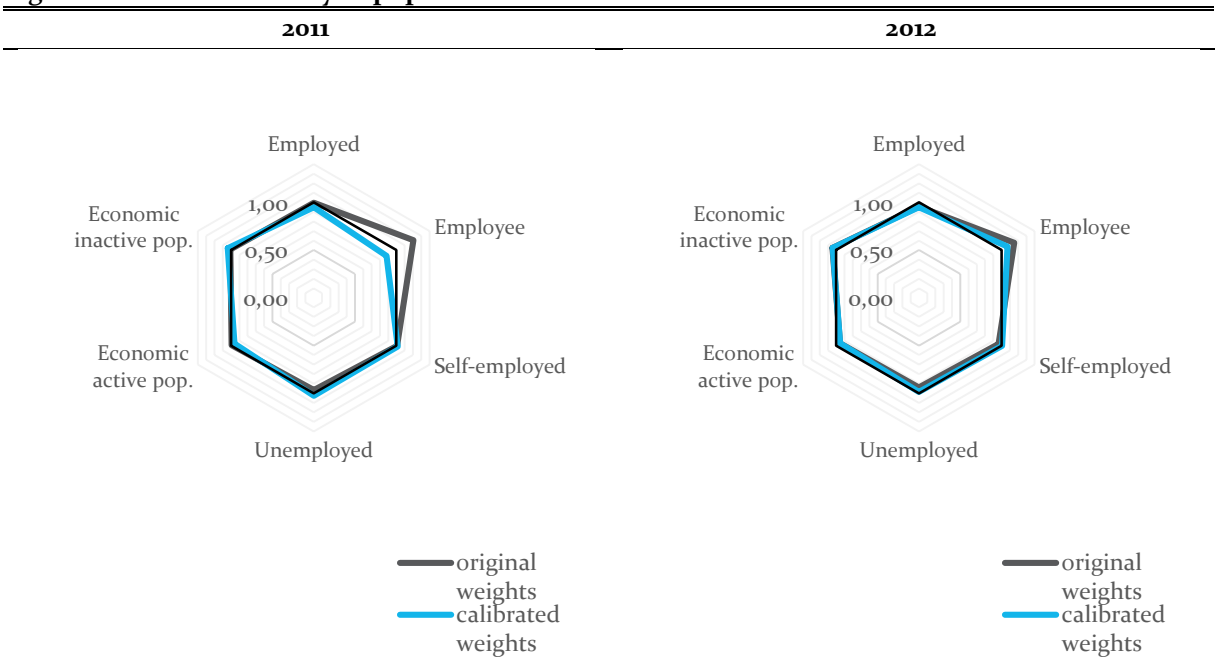
Note: Graphs display ratios of number of individuals in SK-SILC to the official population statistics provided by Statistical Office. Prime age: 15-64 years. Retirement age: males 62+, females 58+ in 2011, females 59+ in 2012.

Figure 1 presents ratios of number of individuals in the selected age cohort in the input SK-SILC database against external benchmark. To complete the information on demographic composition, shares of demographic cohorts expressed as a percentage of total population are displayed in Figure A1 in the Appendix. While 2011 and 2012 SK-SILC datasets weighted with original weights underestimate the number of new-born (age 0) and small children (under 3 years), using the calibrated weights in 2011 leads to substantially smaller underestimation, but in 2012 makes the dataset to overestimate these cohorts by 35 % and 7 %, respectively. If people until the age of 16 or 26 years are included in the inspected age cohorts, these datasets match

well to demographic statistics and corresponding ratios get very close to one. For the prime age and retirement age cohorts, datasets using calibrated weights match demographic statistics closely both in 2011 and 2012.

Data on representation of the economic activity of Slovak population is shown in Figure 2. Relative importance of different labour market categories expressed as a percentage of total population is displayed in Figure A1 in the Appendix. Graphs document that based on these criteria, SK-SILC dataset reflects the official statistics very well, the only exception is the group of employees. Comparing the two weighting schemes, the number of employees is originally significantly oversampled, but when calibrated weights are used the number of employed gets well closer to the official statistics (in both years).

Figure 2 Economic activity of population



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

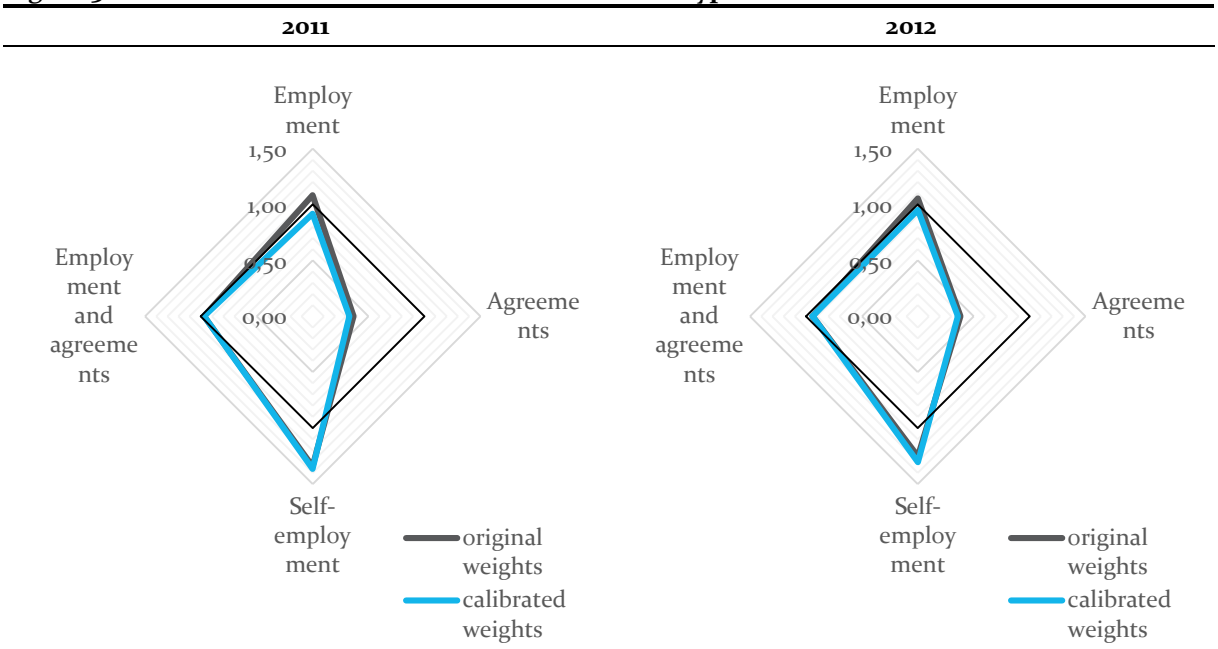
Note: Graphs display ratios of number of individuals in SK-SILC to the official statistics provided by LFS.

In the next graphs displayed in Figure 3 and Figure 4, different sources of income reported in SK-SILC are related to the 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 overall picture does not differ in 2011 and 2012; the number of people that have reported an income from employment is only slightly undersampled and matches relatively well with the data from SSA. Those who declare an income from agreements are significantly under-represented and this applies to both original and calibrated weights. On the other hand, the number of self-employed individuals compared to SSA statistics is substantially oversampled. It

should be stressed that 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 persons, SSA dataset captures only those individuals who pay SIC and not the total number of registered self-employees. However, it is instructive to show also these ratios, since our simulations of taxes and social security contributions are validated against the statistics provided by SSA.

Figure 3 Individuals with nonzero income of different type



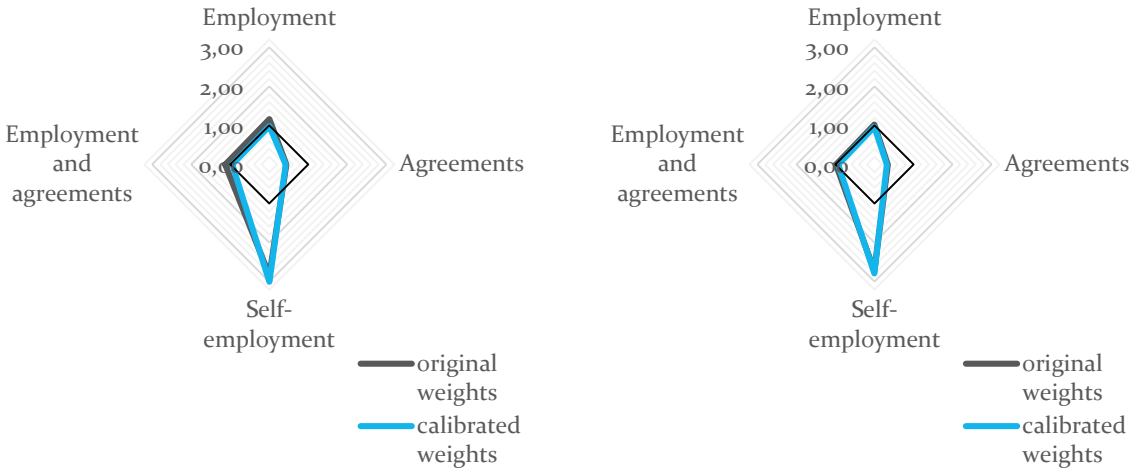
Source: Authors' calculations using SK-SILC and SSA.

Note: Graphs display ratios of number of individuals in SK-SILC to number of individuals recorded in SSA sample.

The graphs reported in Figure 4 are in line with the evidence on recipients of different income types based on the data from SSA provided in the previous paragraph. Aggregate income from employment approximately matches the aggregate amount documented by SSA, while the income from agreements is substantially underreported. Since the volume of agreements makes approximately only 5% when compared to the income from employment, the total effect of employment and agreements matches SSA dataset well.

Note that aggregate 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 income reference period, 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. However, relative weight of self-employed in the labour market is rather low, and as indicated by Figure A1, they constitute only 7% of the total population.

Figure 4 Aggregate income



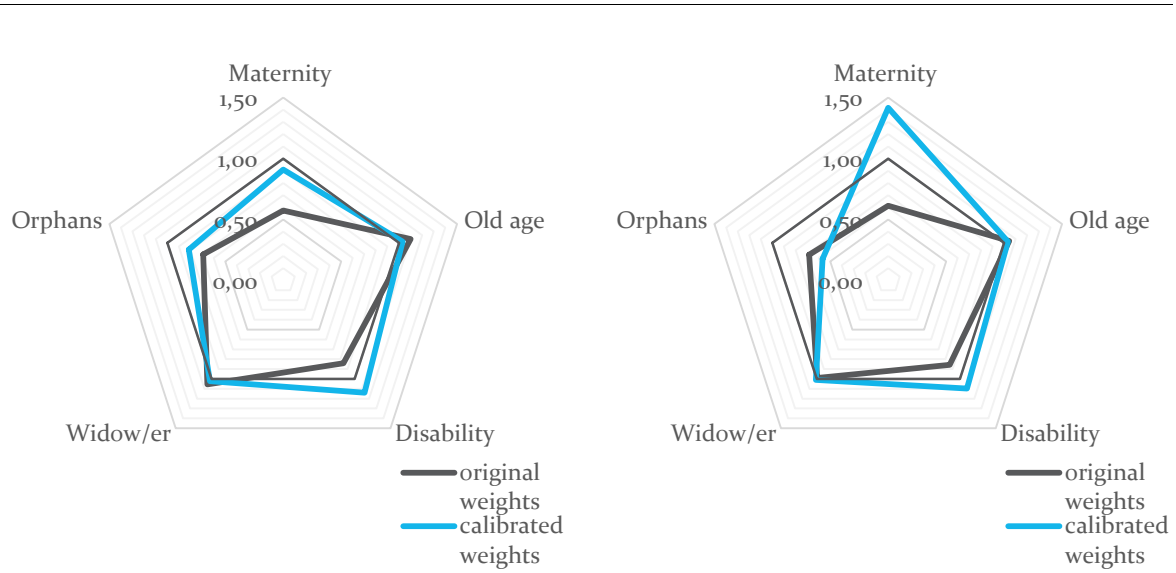
Source: Authors' calculations using SK-SILC and SSA.

Note: Graphs display ratios of aggregate amount of income of individuals in SK-SILC to aggregate income computed by using SSA sample.
** 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).*

The main non-simulated benefits and pensions, which serve as an input to later simulations, are inspected in the next two sets of figures. The aggregate numbers of recipients of maternity benefit and four types of pensions are depicted in
Figure 5. Maternity benefit recipients are substantially undersampled when the original weighting scheme has been applied. Using the calibrated weights makes the number of recipients to match well in 2011, but significantly overestimate in 2012. Since the eligibility for the maternity benefit is up to approximately 7 months after the child's birth, the reported ratios match with the undersampling of the youngest age cohort of new-born children in SK-SILC in 2011 and oversampling in 2012 as it is documented in Figure 1.

On the other hand, the demographic group of elderly is represented well in both input samples. This subsequently mirrors in the share of old-age pension beneficiaries close to one. Orphans are undersampled in the input data when both weighting schemes are used, while disability pensioners are slightly underestimated/overestimated when original/calibrated weights are applied. Widows and widowers well approximate the figure addressed by SSA.

Figure 5 Non-simulated benefits and pensions: Number of recipients

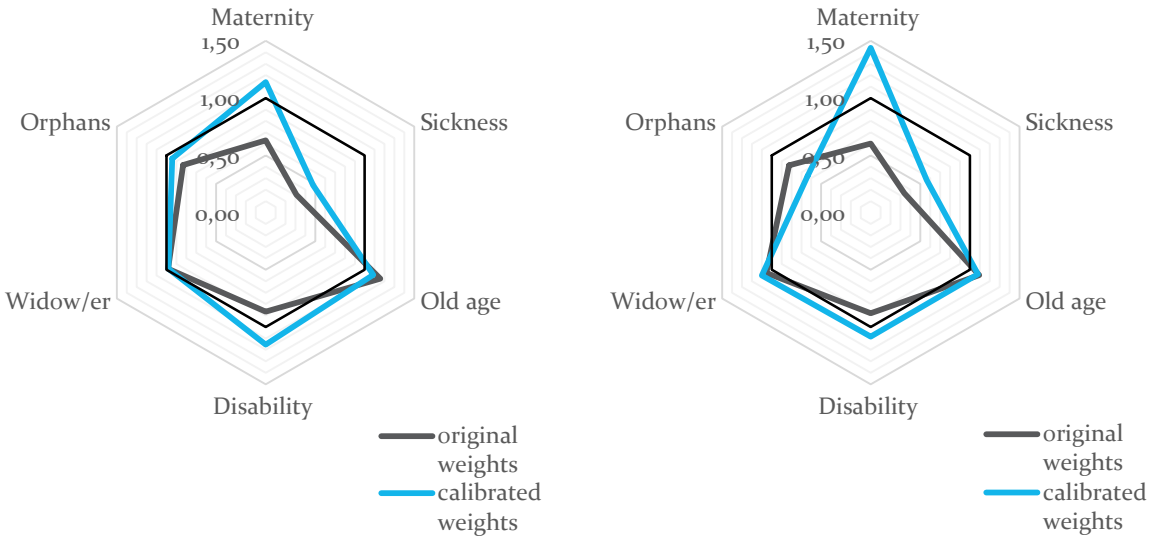


Source: Authors' calculations using SK-SILC and SSA.

Note: Graphs display ratios of number of individuals in SK-SILC to number of individuals recorded in SSA sample.

Figure 6 summarizes the aggregate amounts of paid benefits and pensions: data in input datasets are compared to the external statistics recorded by SSA. Not surprisingly, old-age pension payments are slightly overestimated, but match relatively well. Other non-simulated benefit and

Figure 6 Non-simulated benefits and pensions: Aggregate amounts



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

Note: Graphs display ratios of aggregate amount of payments to individuals in SK-SILC to aggregate amounts computed by using SSA sample.

pension payments are in general underestimated when original weighting has been used. The gap between official records and input data is extreme in case of sickness benefits, where aggregate payments reported in SK-SILC reached around 30% of the official statistics using the original weighting scheme. The gap has been slightly reduced with the calibrated weights to around 50%. Maternity benefit payments represent around 60% of the official SSA records with the original weights, while using the calibrated weights leads to overestimation. Both these ratios are in line with the number of recipients that has been already reported (see above).
To complete the information on benefits and pensions present in the input database, shares of aggregate amounts expressed as a percentage of the respective category are displayed in Figure A2 in the Appendix.

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 2012 PIT amounts to a 19% flat tax rate with a non-taxable allowance. From 2013, two tax brackets were introduced and incomes exceeding the threshold are taxed by 25% rate.

Tax expenditures that are deducted from the tax liability in the PIT and that are incorporated in SIMTASK include:

(a) Basic tax allowance: tax allowance each individual can apply, the amount of the allowance is based on the legally defined minimum subsistence level. A progressive reduction in basic tax allowance is applied when annual gross earnings exceed about 18,000 euros (approximately twice the Slovak average yearly gross wage) and it influences around top 10% of tax payers.

(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): 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[11].

(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. Up to 2012 maximum assessment base differed based on type of insurance and employment contract. Effective from 2013, assessment bases for social and health insurance contributions of employees were unified. For the self-employed, the computation of the assessment base was redefined.

(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 the previous version of our paper in Siebertova et al., 2014).
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.

3.2 The social system

The Slovak *benefit system* consists of three components, termed as contributory, social assistance and poverty, and state social support.

[11] 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.

(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 SIMTASK 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.[12] 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.

[12] For the current state and details of the EUROMOD project, see Sutherland and Figari (2013). The EUROMOD 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) or Strizencova and Hagara (2014).

- 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.

4.2 The need for a detailed model

The analysts' team in the CBR has currently developed a behavioural microsimulation model that is incorporated into a general equilibrium framework with search and matching frictions (Horvath et al., 2015). The model is able to provide an assessment of short- and long-run effects of actual or hypothetical tax and transfer system reforms on employment, GDP, wealth redistribution or government budget. This model is composed of three parts, namely tax-benefit microsimulation module SIMTASK, labour supply module[13] 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.[14] 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 a behavioural microsimulation model. Besides these considerations about the type of microsimulation model that was needed – in terms of its capability of the inclusion of behavioural responses, also the operation, i.e. how easy is to incorporate it to a model setup, where the convergence could be achieved only after several iterations, has been an issue.

[13] For the extensive margin of the labour supply module, see our related working paper by Siebertova et al. (2015).
[14] Software STATA has been used.

4.2.1. Overview of major differences between EUROMOD and SIMTASK

All tax and benefit instruments in the SIMTASK model are simulated in the same order as in EUROMOD "spine". Furthermore, SIMTASK 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 2014.

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.

In order to allow for changes in receiving different benefits during the annual period, a key difference between the two approaches is that in SIMTASK, eligibility to selected transfers is simulated on a monthly basis[15], depending on the predefined requirements. This applies particularly to family related and unemployment benefits, which are simulated in the following order:

- maternity benefit: the length of the eligibility period is simulated, which is 8 months (or 10 months in case of multiple births, or 9 months for lonely parent). The amount of benefit is presently not simulated because of lack of information on contribution history to health insurance.
- parental allowance: the length of the eligibility period is simulated, entitlement ends when the child reaches 3 years of age. Entitlement is possible up to 6 years in case of child's unfavourable health condition, but this cannot be simulated. The amount needs not to be simulated - it is a fix payment.
- unemployment benefit: the length of the eligibility period is simulated, maximum is 6 months.

[15] 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.

Minor modifications of tax-benefit system simulations used in SIMTASK are detailed in Siebertova et al. (2014). 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 (compared to EUROMOD). 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[16]. 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 A6 in the Appendix). 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 works. In the next step, we randomly draw[17] 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. In 2014 this "random draw" is applied also to the basic allowance. According to the new legislation a person eligible to the basic allowance must fulfil the requirement of working at least 32 hours per month of activation or voluntary works (as opposed to activation allowance where 64 hours of activation works per month are required). We then implicitly assumed that the person taking part in activation works is automatically eligible for the basic allowance. On the other hand we assumed that inactive, who ignore activation works won't work for the basic allowance either, although less hours worked are required.[18]

[16] 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.

[17] 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.

[18] Technically, penalty in the basic allowance is deducted if the person is in material need but is not eligible for activation allowance or doesn't fulfil at least one of the next conditions: has protection allowance; works at least 8 hours per week; is a fulltime student; is a parent of a child aged up to 3 years; is a lone parent of a child aged up to 6 years; is a child in the considered household.

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 complex general equilibrium model, and follows as a next step after tax-benefit calculations. When we model the extensive margin of labour supply, we simulate several hypothetical scenarios concerning the labour market status 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 material needs benefit, 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 validation of simulation results

Most surveys do contain caveats in the sample 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 a standard approach in the literature, also similar to EUROMOD country reports, where baseline systems 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 SIMTASK model, are compared to the official statistics in section 2.2 above. In

the next step we look in detail at transfers that are simulated by SIMTASK and compare the simulation results to the official statistics in 2011 and 2012.

When validating results with respect to total number of people, a concept of "unique occurrence" has been used. This applies to the aggregate number of benefit recipients, tax payers, unemployed, employed, self-employed or persons with agreement contracts. By construction, the SK-SILC dataset should include every person receiving a given benefit, paying taxes or having an employment contract during the reference period. Therefore, the statistics on "unique occurrence" should better correspond to the reality that is reflected in SK-SILC than the average monthly number, which is the statistics usually reported by the administrative source.

The choice of an appropriate external statistics has been re-considered also regarding the aggregate validation of estimates of tax and different contributions revenues. The official statistics on PIT, SIC and HIC revenues published by the Ministry of Finance mirrors the payments received during the reference period, which might be distorted by the sum of unpaid contributions. Therefore, we have chosen a different approach compared to the previous version of SIMTASK. Now PIT, SIC and HIC revenues are calculated directly using the SSA database that contains individual records of payments on monthly basis. Note that this corresponds better to simulated aggregates by SIMTASK that represent liabilities that should be paid rather than actually received payments.

Finally, we provide a simulation exercise where the predictive ability of SIMTASK is tested - based on 2012 input data we simulate tax and transfer systems valid in 2013 and 2014 and verify simulation results against the official statistics.

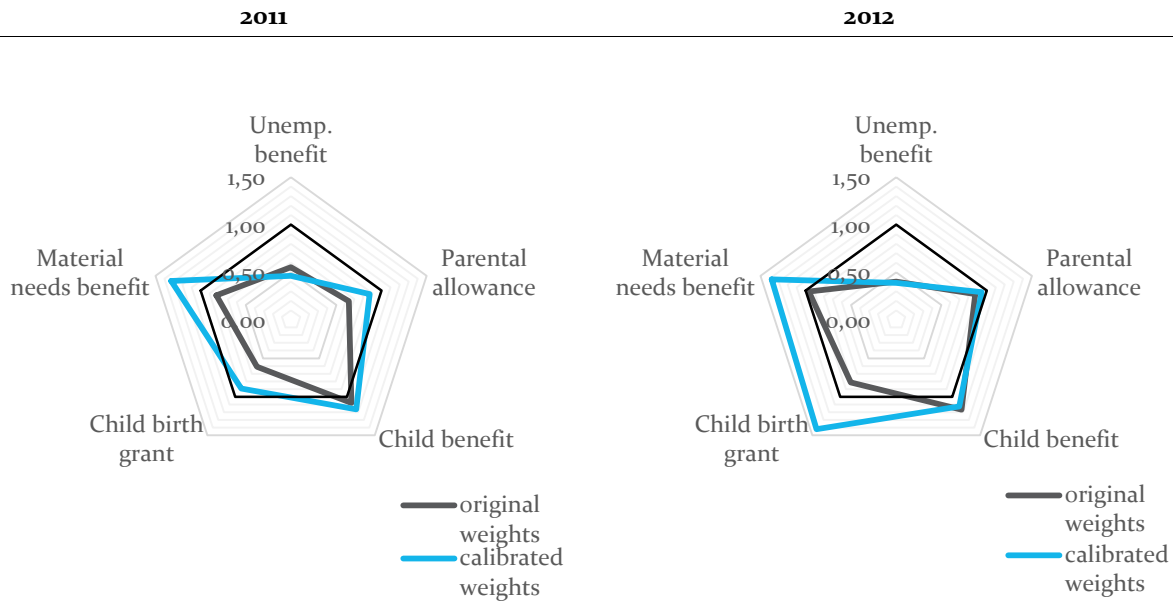
5.1.1. Validation of outputs from SIMTASK

A graphical summary on the aggregate validation of the main simulated benefits from SIMTASK against the external official statistics is depicted in

Figure 7 and Figure 8. In addition, simulation results from SIMTASK and EUROMOD models are compared to the records in SK-SILC input dataset and provide additional information on how well simulations can replicate the original data (see Table A4 - Table A7 in the Appendix).

The total number of recipients as well as aggregate amount of payments of *unemployment benefit* is substantially underestimated when compared to the official statistics and when both weighting schemes are applied. The allocation of this benefit can be precisely simulated using the information available in the input database. Note that simulation results directly correlate with the overall undersampling documented for the unemployment benefit recipients in SK-SILC (Table A3 in the Appendix).

Figure 7 Simulated benefits: Aggregate amounts



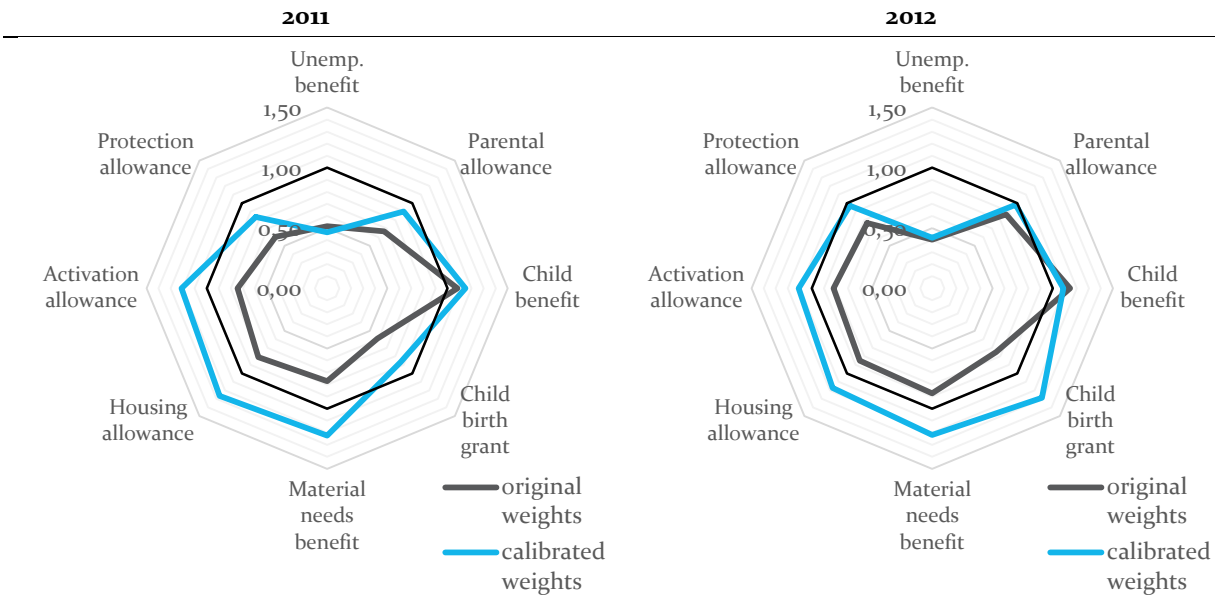
Source: Authors' calculations using SIMTASK, official stat. SSA (unemployment benefit), COLSAF (other benefits).

Note: Graphs display ratios of aggregate amount of payments to individuals computed by SIMTASK to aggregate amounts computed by using official statistics.

Aggregate validation of family related benefits, namely *parental allowance* and *child birth grant*, shows that simulations are underestimated in our SIMTASK model when compared with the official statistics in 2011, both in terms of aggregate amounts and number of recipients. Using the calibrated weights made the corresponding ratios get closer to one. The reported underestimation of these transfers directly mirrors undersampling of new-born and small children in SK-SILC. In 2012, child birth grant is significantly overestimated when the calibrated weights were used. This again mirrors substantial oversampling of new-born children in the input data. Note that precision of simulation of parental allowance is limited also by the information available 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 and similar under both weighting schemes. Note that matching is relatively good since also the corresponding age cohort (0-26 years), to which the eligibility condition applies, is well represented in SK-SILC.

Figure 8 Simulated benefits: Aggregate number of recipients



Source: Authors' calculations using SIMTASK, official stat. SSA (unemployment benefit), COLSAF (other benefits).

Note: Graphs display ratios of number of individuals computed by SIMTASK to number of individuals reported by corresponding official statistics.

When previously mentioned family benefits simulated by SIMTASK are compared to the underlying SK-SILC database (see the last two columns of Table A4 - Table A7 in the Appendix), overall they match relatively well to the input data.

The only exception is the *child birth grant* that is substantially overestimated both in 2011 and 2012. This fact can be 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.[19] If the additional grant is incorrectly assigned, this may lead to substantial overestimation of the aggregate amount.

Validation results for the *material needs benefit* differ substantially based on the weighting scheme that has been used. In the original weighting, the income distribution has not been taken into account and low-income earners in the input dataset were under-sampled. Using the calibrated weights, more weight has been placed on low-income earners that are possible

[19] In 2011 to 2014 child birth grant was 151.37 euro and additional child birth grant was 678.49 euro.

material needs benefit recipients, and finally this led to substantial overestimation of this transfer. The aggregate amount of payments under the original weighting scheme correspond rather well to the official data in both years, being lower 17% and 3% in 2011 and 2012, respectively. When using the calibrated weights, payments are overestimated by more than 30%. Note that in EUROMOD, this transfer is simulated differently and using both original and calibrated weighting schemes leads to even more pronounced overestimation of the total payments (numbers are detailed in Table A4 - Table A5 in the Appendix).

Another comparison can be based on aggregate number of recipients shown in Figure 8. Again, like in the case of aggregate payments, total number of recipients is underestimated/overestimated compared to the official statistics using the original/calibrated weighting scheme.

The results indicate that compared to the official statistics, EUROMOD significantly overestimates the number of recipients of MNB due to overestimation of the activation allowance (see Table A6 - Table A7 in the Appendix). When the simulation results are compared to the records of MNB reported in SK-SILC data, SIMTASK overestimates the number of beneficiaries less than EUROMOD. However, in both models and using both weighting schemes the overestimation of this transfer is still substantial.

Table 2 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.

Table 2 Individual matching of SIMTASK simulations to SILC: Number of recipients

	SILC (I)	SIMTASK* (II)	SIMTASK** (total)	SIMTASK/ SIMTASK total (%)	match (%) (I) / (II)
			2011		
Unemp. benefit	187	187	187	100%	100%
Parental allowance	265	245	309	79%	92%
Child benefit	2153	2054	2169	95%	95%
Child birth grant	76	73	85	86%	96%
Mat. needs benefit	240	111	444	25%	46%
			2012		
Unemp. benefit	157	157	157	100%	100%
Parental allowance	364	342	419	82%	94%
Child benefit	2230	2140	2244	95%	96%
Child birth grant	100	95	111	86%	95%
Mat. needs benefit	241	135	498	27%	56%

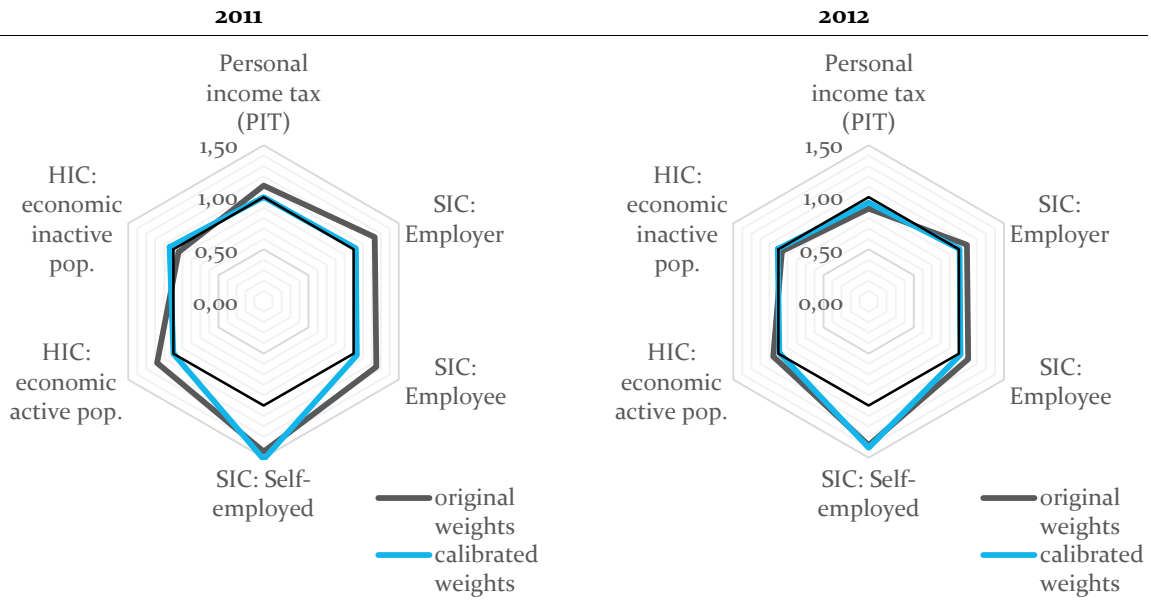
Source: Authors' calculations using SIMTASK.

Note: Child benefit, Child birth grant and Material needs benefit are validated at the family level.
** Number of recipients that are matched with recipients in SK-SILC.*
*** Total number of recipients in SIMTASK model.*

First, individual recipients of transfers in SIMTASK simulations are linked to the corresponding recipients observed in the input data (see column SIMTASK) 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 SIMTASK is presented (see column SIMTASK/SIMTASK total). Observed results suggest that family related instruments and unemployment benefit match well also at the individual level. Simulation of the material needs benefit remains to be a challenge, results documenting individual allocations confirm the significant overestimation already identified in the aggregate validation. Note that there is no difference in results in terms of used weighting scheme since individual matches are by construction not weighted and they depend only on the performed tax-benefit simulations.

SIMTASK output related to personal income tax and social (SIC) and health (HIC) insurance instruments is plotted in Figure 9. The aggregate sum of tax liabilities (including tax credits and tax allowances) compared to the official statistics differs by 10% when the original weighting scheme has been used and by less than 4% with calibrated weights. Shares of aggregate amounts considered as a percentage of total payroll taxes are depicted in Figure A2 in the Appendix.

Figure 9 Personal income tax and social insurance contributions: Aggregate amounts



Source: Authors' calculations using SIMTASK, official stat. Ministry of Finance (PIT and HIC), SSA (SIC).

Note: Graphs display ratios of aggregate amount of payments computed by SIMTASK to aggregate amounts computed by using official statistics. SIC stands for social insurance contributions and HIC for health insurance contributions.

This applies both in 2011 and 2012. Unfortunately, official statistics on aggregate amounts of tax credits and tax allowances from tax authorities is still not available.[20] A substantial difference in

[20] However, for comparison reasons we adjust the official statistics using the estimates of aggregate amounts of tax credits and allowances provided by the Ministry of Finance.

the validation of simulations of SIC for employees and employers and HIC can be observed when two weighting schemes are compared - using the calibrated weights leads to the almost perfect fit compared to the official statistics.

SIC paid by self-employed should be interpreted differently and results documented here are only indicative. The reason is an already mentioned inconsistency in variables that are equated; profit/loss of self-employed reported in SK-SILC versus the assessment base for SIC in the official SSA database that is based on the performance two years prior to the reference period. Detailed results of simulations are available in Table A8 - Table A11 in the Appendix.

Finally, when the results of the SIMTASK and EUROMOD are compared, significant difference can be identified in the simulation of SIC for self-employed (see Table A8 - Table A11 in the Appendix). Although both models overestimate it significantly, SIMTASK is closer to the official statistics due to the restriction on income of self-employed that was applied.[21]

5.2 Validation of the predictive accuracy

Quantitative assessments of planned reforms are always performed on the existing survey data. Ideally, micro data that are used for such projections should be adequately updated to match the predicted period of the evaluated tax and benefit system as closely as possible.

SIMTASK is designed so that it can be used also for ex-ante evaluation of the proposed legislative reforms of Slovak tax and social system. In order to test for the predictive accuracy of SIMTASK we have performed the following simulation exercise. As it has been already outlined in section 2.1, we proceed in two steps. First, selected income variables in the input SK-SILC dataset (reference year 2012) were updated with the corresponding growth factors to refer to 2013 and 2014, respectively. In the next step, new weights in the updated datasets were calibrated to match the population totals in 2013 and 2014 using the selected socio-demographic groups, groups defined based on economic activity and income distribution.

Aggregate validations of simulation of transfers, tax and social security contributions are summarized in Table 3 and Table 4. Overall picture is comparable to validation statistics of simulations for 2012 when calibrated weights have been used. This is not a surprise since the same underlying input dataset has been used, although weights were calibrated differently using the updated external statistics. To sum up, observed departures from the official statistics (either under- or over-sampling) are similar both in direction and magnitude to those reported for 2012. Detailed results are available in Table A5, Table A7, Table A12 and Table A13 in the Appendix.

[21] Assigment condition for computation of SIC for the self-employed is in SIMTASK redefined compared to EUROMOD. SIC is computed if current yearly gross profit exceeds yearly minimum wage. However, this approach is not entirely in line with valid legislative (current profit versus previous year return).

Table 3 Simulated benefits with calibrated weights

Aggregate number of recipients (in thousands persons)					
	2013	2014		2013	2014
Unemp. benefit	0.42	0.48	Child birth grant	1.39	1.51
Parental allowance	0.95	0.94	Material needs benefit	1.47	1.30
Child benefit	1.13	1.14			
Aggregate amounts (in mil. EUR)					
	2013	2014		2013	2014
Unemp. benefit	0.45	0.50	Material needs benefit	1.25	1.26
Parental allowance	0.97	0.97	Housing allowance	1.20	1.19
Child benefit	1.10	1.11	Activation allowance	1.14	1.22
Child birth grant	1.27	1.47	Protection allowance	1.12	0.95

Source: Authors' calculations using SIMTASK, official stat. SSA (unemployment benefit), COLSAF (other benefits).

Note: Table displays ratios of aggregate amount of payments to individuals (number of individuals) computed by SIMTASK to aggregate amounts (number of individuals) reported by corresponding official statistics.

Table 4 Personal income tax and social insurance contributions: Aggregate amounts (in mil. EUR)

	calibrated weights			calibrated weights	
	2013	2014		2013	2014
Personal income tax (PIT)	0.99	0.98	SIC: Employer	0.99	0.99
HIC: economic active pop.	1.04	1.06	SIC: Employee	0.99	1.00
HIC: economic inactive pop.	0.98	1.04	SIC: Self-employed	1.44	1.55

Source: Authors' calculations using SIMTASK, official stat. Ministry of Finance (PIT and HIC), SSA (SIC).

Note: Table displays ratios of aggregate amount of payments computed by SIMTASK to aggregate amounts computed by using official statistics. SIC stands for social insurance contributions and HIC for health insurance contributions.

6 Conclusion

This paper provides a summary on the construction of the Slovak tax and transfers microsimulation model SIMTASK. 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 more complex models. The architecture and the main setup of the SIMTASK 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 EUROMOD) such that the national tax and benefit system can be replicated as closely as possible. At this point, a major task was to precisely replicate the valid legislation in the corresponding years and to source appropriate micro-data. At the same time, we inspected the used micro dataset in great detail and we compared it with appropriate administrative statistics. We re-weighted the input data sample such that the new calibrated weights replicate, among other factors, also the labour income distribution directly. Hence, the validity of simulated output was interpreted further in light of differences between weighted survey data and official statistics.

Overall, these changes considerably improve the fit of the model with official data with respect to important tax and benefit categories. Hence, the SIMTASK model now provides us with a relevant tool to simulate and evaluate ex-post the impact of selected tax and transfer system policies. The model can be used as a principal tool for the ex-ante evaluation of legislative initiatives in these areas too.

Appendix

Table A1 Summary statistics of SK-SILC dataset (reference period 2012)

Demographic characteristics	Mean	St.Dev.	Min	Max	Non-zero obs.
Female	0.54	0.50	0	1	8,387
Age in years	39.78	21.28	0	99	15,313
Education: Primary	0.28	0.45	0	1	4,269
Education: Secondary	0.56	0.50	0	1	8,650
Education: Tertiary	0.16	0.37	0	1	2,507
Family: Single	0.42	0.49	0	1	6,426
Family: Married	0.44	0.50	0	1	6,827
Family: Divorced	0.06	0.24	0	1	930
Mother with child under 3years	0.03	0.17	0	1	454
Student	0.11	0.32	0	1	1,740
Pensioner	0.20	0.40	0	1	3,113
Labour income (yearly)					
Gross wage employment	3,275.85	4,874.78	0	79,060	6,099
Income from self-employment	382.39	2,280.21	0	51,200	692
Other payments made by employers	12.83	72.53	0	3,000	989
Income from agreements	55.77	508.40	0	50,000	1,048
Fringe Benefits except vouchers	6.45	79.43	0	5,013	1,238
Fringe Benefits vouchers	86.68	212.49	0	6,790	5,216
Severance payments	6.18	129.86	0	7,000	51
Termination pay (lump sum)	1.73	65.96	0	4,280	15
Income from abroad	82.35	1,100.79	0	36,800	141
Non-labour income (yearly)					
Unemployment benefit	12.18	148.09	0	6,300	157
Maternity benefit	13.43	202.99	0	6,750	95
Child birth grant	4.67	61.77	0	1,584	100
Child benefit (incl additional child benefit)	66.23	201.69	0	4,664	2,230
Parental Allowance	45.51	317.74	0	10,668	364
Material needs benefit	23.36	254.41	0	7,386	241
Nursing allowance	10.64	166.78	0	8,104	90
Sickness and nursing benefits	18.77	189.41	0	5,700	319
Education scholarships	8.25	167.34	0	7,600	90
Other survivor benefits	0.94	22.36	0	2,580	167
Disability pension	121.39	662.76	0	8,800	589
Old-age pension	938.05	1,914.65	0	14,960	3,258
Widow's and orphan's pension	133.54	582.57	0	12,000	1,113
Private pensions	1.86	42.13	0	2,000	50
Income from property	7.77	128.40	0	6,000	320
Investment income - interests	4.68	84.31	0	10,000	2,092
Investment income - dividends	0.54	18.00	0	1,245	66
Sample size	15,426				

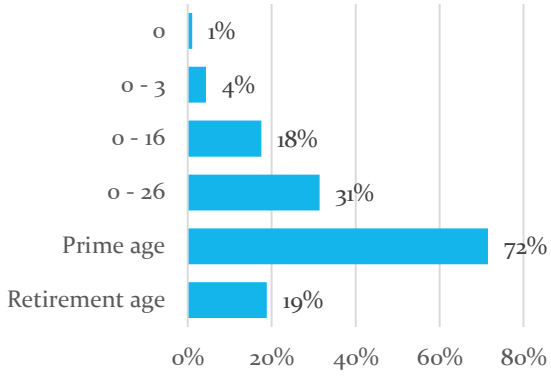
Table A2 Updating factors

Description	Index	Income source / Index type	2012-13	2012-14
Consumer Price Index	default	SO/ CPI index	1.0140	1.0154
Gross wage from main & second job	yemwg	SO/ Average nominal wage growth	1.0236	1.0671
Income from investments	yiy, yiyoo, yiydv	SO / Average growth in income from investments	0.8553	0.6845
Income from abroad	yemab	SO/ Average nominal wage growth	1.0236	1.0671
Other payments made by employer	yemot	SO/Average growth in bonuses and other irregular employment income	0.9641	1.0051
Profit shares	yemcs	SO /Average growth in profit from company shares	0.5397	0.5626
Income from agreements	yemaj	SSA/ Average growth in income from agreements	0.8777	0.9150
Bonuses and other irregular income	yemtj	SO / Average growth in compensation per employee	1.0310	1.0748
Income from self-employment	yse	SSA/ Average nominal growth in self-employment income	1.0236	1.0671
Severance payments	ysv	SO/ Average growth in severance payments per employee	0.8681	0.9050
Previous wage / for unemployment benefit calculation	yempv	SO /Average nominal wage growth	1.0236	1.0671
Property income	ypr	TO/ Average growth in property income	1.0195	1.0407
Pensions: old age, disability, survivor, orphan and widow/er	poaoo, pdioo, psuoo psuor, psuwd	SSA / Pension indexation; YoY indexation	1.0188	1.0369
Child benefit	bch	Based on policy descriptions	1.0248	1.0435
Child birth grant	bchba	Based on policy descriptions	1.0	1.0
Parental allowance	bcc	Based on policy descriptions	1.0252	1.0437
Material need benefit	bsa, bsaot	Based on the increase in the minimum subsistence level for 1 person	1.0	1.0
Unemployment benefit	bunct	SO /Average nominal wage growth	1.0236	1.0671
Sickness benefit	bhl	SO /Average nominal wage growth	1.0236	1.0671
Maternity	bma	SO /Average nominal wage growth	1.0236	1.0671

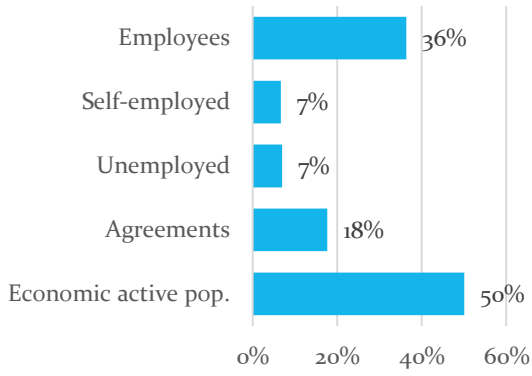
Note: SO Statistical Office, SSA Social Security Agency, TO Tax Office. Other income variables are updated based on default (CPI) index.

Figure A1 Basic shares (as a % of total population in 2012)

A Demographic composition



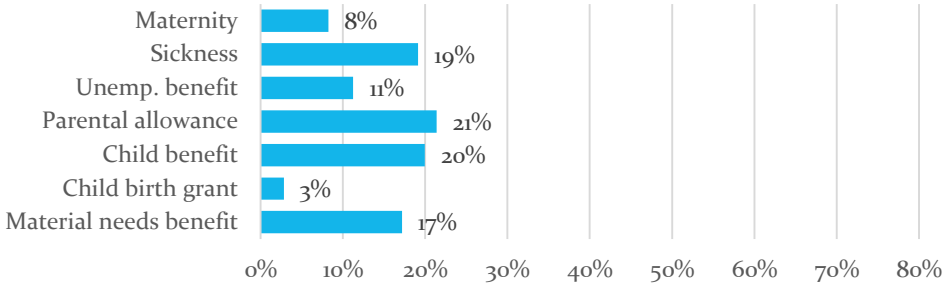
B Labour market composition



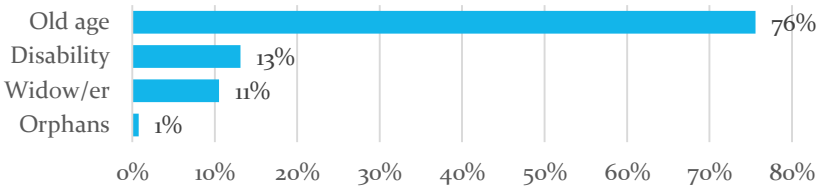
Source: Authors' calculations using external statistics.

Figure A2 Shares of aggregate amounts (as a % of respective category in 2012)

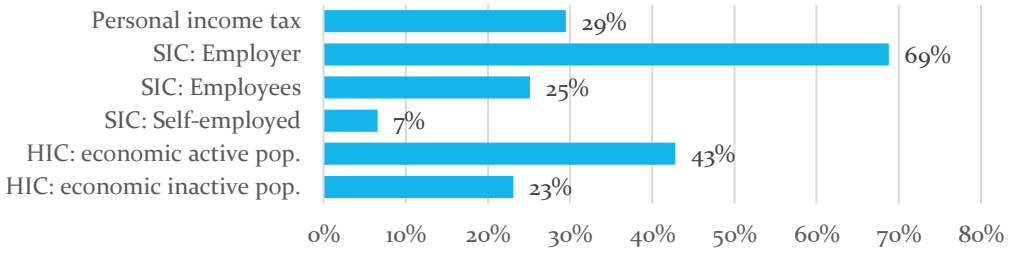
A Benefits



B Pensions

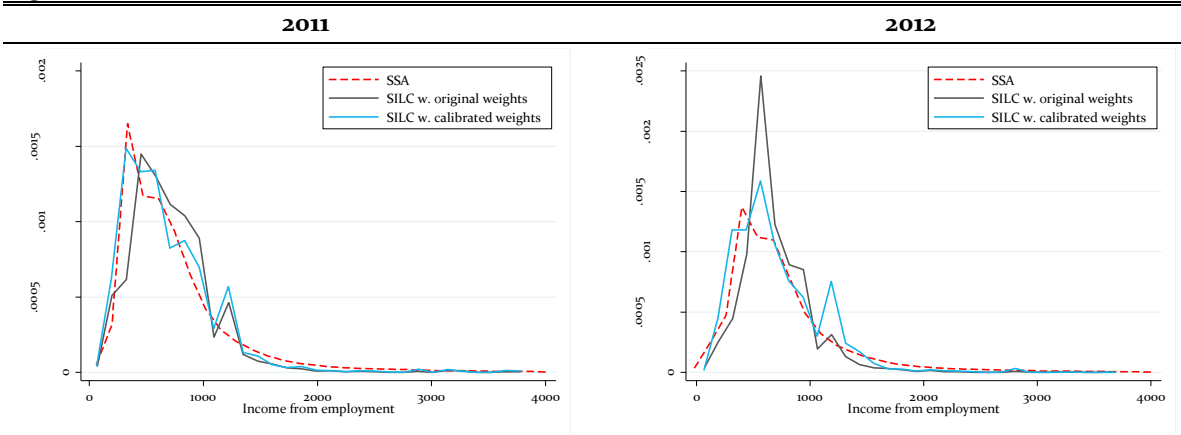


C Payroll taxes



Source: Authors' calculations using official statistics.

Figure A3 Income distribution SK-SILC versus SSA



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

Table A3 Unemployment benefit validation: Aggregate number of recipients (in thousands)

	Official statistics		SILC				SILC / Official statistics			
			original		calibrated		original		calibrated	
	2011	2012	2011	2012	2011	2012	2011	2012	2011	2012
Recipients of unemp. benefit*	142.9	143.9	73.4	58.1	66.1	60.4	0.51	0.40	0.46	0.42
Unemployed**	364.6	377.5	352.1	354.6	361.4	372.5	0.97	0.94	0.99	0.99
Recipients / Unemployed	0.39	0.38	0.21	0.16	0.18	0.16				

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

Table A4 Simulated benefits: Aggregate amounts (in mil. EUR, original weights)

	Official stat. (I)	SILC (II)	SIMTASK (III)	EURO-MOD(IV)	(III) / (I)	(IV) / (I)	(III) / (II)	(IV) / (II)
				2011				
Unemp. benefit	163,513.3	90,696.2	90,696.2	89,065.1	0.55	0.54	1.00	0.98
Parental allowance	341,842.2	204,241.0	217,874.2	265,460.3	0.64	0.78	1.07	1.30
Child benefit	310,682.2	330,690.9	335,774.1	269,538.9	1.08	0.87	1.02	0.82
Child birth grant	44,300.9	18,599.0	27,048.6	27,046.6	0.61	0.61	1.45	1.45
Material needs ben.	272,002.6	141,982.5	224,722.9	337,974.3	0.83	1.24	1.58	2.38
				2012				
Unemp. benefit	175,827.6	71,283.5	70,890.2	66,329.3	0.40	0.38	0.99	0.93
Parental allowance	334,405.0	272,907.0	292,219.8	363,720.9	0.87	1.09	1.07	1.33
Child benefit	312,106.1	370,233.9	364,840.6	303,502.3	1.17	0.97	0.99	0.82
Child birth grant	44,147.1	27,583.6	35,972.9	35,283.1	0.81	0.80	1.30	1.28
Material needs ben.	268,438.5	162,974.5	259,416.8	392,671.7	0.97	1.46	1.59	2.41

Source: Authors' calculations using SIMTASK and EUROMOD, official statistics SSA (unemployment benefit), COLSAF (other benefits).

Note: Darker colour in last four columns indicate larger deviation from external statistics or SILC, respectively.

Table A5 Simulated benefits: Aggregate amounts (in mil. EUR, calibrated weights)

	Official stat. (I)	SILC (II)	SIMTASK (III)	EURO-MOD (IV)	(III) / (I)	(IV) / (I)	(III) / (II)	(IV) / (II)
				2011				
Unemp. benefit	163,513.3	75,839.1	75,839.1	73,856.4	0.46	0.45	1.00	0.97
Parental allowance	341,842.2	290,182.1	297,514.3	347,698.4	0.87	1.02	1.03	1.20
Child benefit	310,682.2	351,695.2	361,664.7	310,115.3	1.16	1.00	1.03	0.88
Child birth grant	44,300.9	26,009.6	39,536.5	39,533.5	0.89	0.89	1.52	1.52
Material needs ben.	272,002.6	193,323.4	360,257.3	491,613.8	1.32	1.81	1.86	2.54
				2012				
Unemp. benefit	175,827.6	69,981.8	68,513.0	59,907.4	0.39	0.34	0.98	0.86
Parental allowance	334,405.0	294,373.6	316,131.6	369,663.6	0.95	1.11	1.07	1.26
Child benefit	312,106.1	351,372.7	351,968.3	303,332.4	1.13	0.97	1.00	0.86
Child birth grant	44,147.1	53,103.0	62,794.0	60,816.5	1.42	1.38	1.18	1.15
Material needs ben.	268,438.5	174,994.1	369,637.2	518,003.9	1.38	1.93	2.11	2.96
				2013				
Unemp. benefit	174,406.9	74,700.8	72,992.3	61,951.6	0.42	0.36	0.98	0.83
Parental allowance	341,925.8	302,398.7	323,707.7	381,310.1	0.95	1.12	1.07	1.26
Child benefit	313,818.6	356,091.2	355,799.3	306,559.2	1.13	0.98	1.00	0.86
Child birth grant	45,194.4	53,354.3	62,803.1	60,825.6	1.39	1.35	1.18	1.14
Material needs ben.	270,082.5	182,066.2	397,751.7	535,928.9	1.47	1.98	2.18	2.94
				2014				
Unemp. benefit	155,596.8	76,733.7	74,580.0	58,988.3	0.48	0.38	0.97	0.77
Parental allowance	348,817.2	305,566.7	328,700.0	386,513.5	0.94	1.11	1.08	1.26
Child benefit	314,005.4	358,884.6	357,901.8	309,091.4	1.14	0.98	1.00	0.86
Child birth grant	41,980.8	53,824.5	63,547.0	61,569.4	1.51	1.47	1.18	1.14
Material needs ben.	244,353.9	162,239.1	316,806.2	521,175.5	1.30	2.13	1.95	3.21

Source: Authors' calculations using SIMTASK and EUROMOD, official statistics SSA (unemployment benefit), COLSAF (other benefits).

Note: Darker colour in last four columns indicate larger deviation from external statistics or SILC, respectively.

Table A6 Simulated benefits: Aggregate number of recipients (in thousands, original weights)

	Official stat. (I)	SILC (II)	SIMTASK (III)	EUROMOD (IV)	(III) / (I)	(IV) / (I)	(III) / (II)	(IV) / (II)
				2011				
Unemp. benefit	142.87	73.41	73.41	70.86	0.51	0.50	1.00	0.97
Parental allowance	184.97	105.36	123.69	126.26	0.67	0.68	1.17	1.20
Child benefit*	697.65	749.21	754.59	613.24	1.08	0.88	1.01	0.82
Child birth grant	56.90	29.79	33.60	33.60	0.59	0.59	1.13	1.13
Material needs benefit	243.68	100.28	187.77	243.50	0.77	1.00	1.87	2.43
Housing allowance	113.80	37.84	92.09	218.69	0.81	1.92	2.43	5.78
Activation allowance	94.40	46.53	70.23	441.77	0.74	4.68	1.51	9.49
Protection allowance	94.88	0.00	57.27	134.18	0.60	1.41		
				2012				
Unemp. benefit	143.90	58.06	58.06	54.14	0.40	0.38	1.00	0.93
Parental allowance	187.62	140.11	162.76	164.52	0.87	0.88	1.16	1.17
Child benefit*	688.34	779.74	788.18	663.65	1.15	0.96	1.01	0.85
Child birth grant	56.99	38.02	42.71	42.71	0.75	0.75	1.12	1.12
Material needs benefit	239.87	102.40	209.43	256.51	0.87	1.07	2.05	2.50
Housing allowance	112.90	39.43	96.13	239.04	0.85	2.12	2.44	6.06
Activation allowance	92.31	54.03	75.64	484.34	0.82	5.25	1.40	8.96
Protection allowance	82.04	0.00	62.81	168.23	0.77	2.05		

Source: Authors' calculations using SIMTASK and EUROMOD, official statistics SSA (unemployment benefit), COLSAF (other benefits).

** 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).*

Note: Darker colour in last four columns indicate larger deviation from external statistics or SILC, respectively.

Table A7 Simulated benefits: Aggregate number of recipients (in thousands, calibrated weights)

	Official stat. (I)	SILC (II)	SIMTASK (III)	EUROMOD (IV)	(III) / (I)	(IV) / (I)	(III) / (II)	(IV) / (II)
				2011				
Unemp. benefit	142.87	66.13	66.13	63.09	0.46	0.44	1.00	0.95
Parental allowance	184.97	149.02	166.37	166.97	0.90	0.90	1.12	1.12
Child benefit*	697.65	781.95	800.75	694.83	1.15	1.00	1.02	0.89
Child birth grant	56.90	42.53	49.23	49.23	0.87	0.87	1.16	1.16
Material needs benefit	243.68	116.28	298.43	336.60	1.22	1.38	2.57	2.89
Housing allowance	113.80	49.89	143.79	303.63	1.26	2.67	2.88	6.09
Activation allowance	94.40	66.48	114.10	608.21	1.21	6.44	1.72	9.15
Protection allowance	94.88	0.00	79.40	184.14	0.84	1.94		
				2012				
Unemp. benefit	143.90	60.40	60.40	56.12	0.42	0.39	1.00	0.93
Parental allowance	187.62	164.28	184.09	172.84	0.98	0.92	1.12	1.05
Child benefit*	688.34	738.75	750.02	650.18	1.09	0.94	1.02	0.88
Child birth grant	56.99	70.30	73.43	73.43	1.29	1.29	1.04	1.04
Material needs benefit	239.87	118.57	292.42	345.19	1.22	1.44	2.47	2.91
Housing allowance	112.90	46.07	132.00	317.59	1.17	2.81	2.87	6.89
Activation allowance	92.31	71.33	102.42	645.68	1.11	6.99	1.44	9.05
Protection allowance	82.04	0.00	79.35	228.09	0.97	2.78		
				2013				
Unemp. benefit	137.83	62.51	62.51	57.70	0.45	0.42	1.00	0.92
Parental allowance	188.33	163.87	183.54	173.47	0.97	0.92	1.12	1.06
Child benefit*	677.01	731.27	742.83	643.46	1.10	0.95	1.02	0.88
Child birth grant	57.71	70.30	73.42	73.42	1.27	1.27	1.04	1.04
Material needs benefit	239.89	119.92	299.19	357.46	1.25	1.49	2.49	2.98
Housing allowance	112.09	46.18	134.12	328.60	1.20	2.93	2.90	7.12
Activation allowance	92.45	76.56	105.70	668.40	1.14	7.23	1.38	8.73
Protection allowance	71.36	0.00	80.02	235.89	1.12	3.31		
				2014				
Unemp. benefit	122.20	60.70	60.70	55.64	0.50	0.46	1.00	0.92
Parental allowance	187.98	162.78	182.83	172.68	0.97	0.92	1.12	1.06
Child benefit*	666.93	729.10	739.49	641.45	1.11	0.96	1.01	0.88
Child birth grant	50.48	70.88	74.36	74.36	1.47	1.47	1.05	1.05
Material needs benefit	220.07	110.51	278.07	350.51	1.26	1.59	2.52	3.17
Housing allowance	101.83	43.39	121.05	323.60	1.19	3.18	2.79	7.46
Activation allowance	100.95	71.70	123.41	663.48	1.22	6.57	1.72	9.25
Protection allowance	73.57	0.00	69.72	233.51	0.95	3.17		

Source: Authors' calculations using SIMTASK and EUROMOD, official statistics SSA (unemployment benefit), COLSAF (other benefits).

** 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).*

Note: Darker colour in last four columns indicate larger deviation from external statistics or SILC, respectively.

Table A8 Personal income tax and social insurance contributions: Aggregate amounts (in mil. EUR, original weights) in 2011

	Official stat. (I)	SIMTASK (II)	EUROMOD (III)	(II) / (I)	(III) / (I)
Personal income tax	1,536,932	1,708,472	1,750,768	1.11	1.14
Social Insurance Contrib. (SIC)					
SIC: Employer	*3,660,191*	*4,512,211*	*4,525,711*	*1.23*	*1.24*
Sickness insurance	178,101	237,710	238,268	1.33	1.34
Old-age insurance	2,054,472	2,520,514	2,528,026	1.23	1.23
Disability insurance	426,472	532,238	533,908	1.25	1.25
Unemployment insurance	141,485	175,926	176,499	1.24	1.25
Guarantee insurance	31,906	42,445	42,534	1.33	1.33
Reserve solidarity fund	697,053	855,177	857,725	1.23	1.23
Accident insurance	130,702	144,572	145,121	1.11	1.11
Insurance paid from agreements		3,628	3,629		
SIC: Employee	*1,333,050*	*1,669,469*	*1,670,968*	*1.25*	*1.25*
Sickness insurance	178,101	238,097	238,268	1.34	1.34
Old-age insurance	586,992	721,733	722,292	1.23	1.23
Disability insurance	426,472	533,344	533,908	1.25	1.25
Unemployment insurance	141,485	176,295	176,499	1.25	1.25
SIC: Self-employed	*350,289*	*504,814*	*600,843*	*1.44*	*1.72*
Sickness insurance	44,883	66,458	79,297	1.48	1.77
Old-age insurance	193,370	276,451	328,971	1.43	1.70
Disability insurance	60,801	88,952	105,765	1.46	1.74
Reserve solidarity fund	51,235	72,952	86,810	1.42	1.69
Health Insurance Contrib. (HIC)					
HIC: economic active pop.	*2,290,036*	*2,699,894*	*2,718,055*	*1.18*	*1.19*
HIC: employees	588,769	689,711	695,452	1.17	1.18
HIC: employers	1,472,023	1,720,091	1,736,697	1.17	1.18
HIC: self-employed	148,649	233,351	240,642	1.57	1.62
HIC: voluntary (*)	80,595	56,741	45,264	0.70	0.56
HIC: economic inactive pop. (*)	*1,199,731*	*1,131,265*	*1,224,008*	*0.94*	*1.02*

Source: Official statistics SSA (PIT, HIC, SIC), Ministry of Finance (selected HIC(*)).

Note: Darker colour in last two columns indicate larger deviation from external statistics.

Table A9 Personal income tax and social insurance contributions: Aggregate amounts (in mil. EUR, calibrated weights) in 2011

	Official stat. (I)	SIMTASK (II)	EUROMOD (III)	(II) / (I)	(III) / (I)
Personal income tax	1,536,932	1,539,426	1,569,952	1.00	1.02
Social Insurance Contrib. (SIC)					
SIC: Employer	3,660,191	3,741,442	3,754,231	*1.02*	*1.03*
Sickness insurance	178,101	192,215	192,703	1.08	1.08
Old-age insurance	2,054,472	2,092,694	2,099,920	1.02	1.02
Disability insurance	426,472	441,734	443,235	1.04	1.04
Unemployment insurance	141,485	145,525	146,034	1.03	1.03
Guarantee insurance	31,906	34,321	34,398	1.08	1.08
Reserve solidarity fund	697,053	710,027	712,477	1.02	1.02
Accident insurance	130,702	121,424	121,962	0.93	0.93
Insurance paid from agreements		3,502	3,503		
SIC: Employee	1,333,050	1,380,649	1,381,946	*1.04*	*1.04*
Sickness insurance	178,101	192,567	192,703	1.08	1.08
Old-age insurance	586,992	599,403	599,974	1.02	1.02
Disability insurance	426,472	442,799	443,235	1.04	1.04
Unemployment insurance	141,485	145,880	146,034	1.03	1.03
SIC: Self-employed	350,289	530,586	626,640	*1.51*	*1.79*
Sickness insurance	44,883	69,337	82,178	1.54	1.83
Old-age insurance	193,370	290,455	342,982	1.50	1.77
Disability insurance	60,801	94,145	110,972	1.55	1.83
Reserve solidarity fund	51,235	76,648	90,508	1.50	1.77
Health Insurance Contrib. (HIC)					
HIC: economic active pop.	2,290,036	2,290,406	2,321,295	*1.00*	*1.01*
HIC: employees	588,769	568,696	578,767	0.97	0.98
HIC: employers	1,472,023	1,417,016	1,441,978	0.96	0.98
HIC: self-employed	148,649	244,610	252,137	1.65	1.70
HIC: voluntary (*)	80,595	60,084	48,413	0.75	0.60
HIC: economic inactive pop. (*)	1,199,731	1,248,741	1,315,877	*1.04*	*1.10*

Source: Official statistics SSA (PIT, HIC, SIC), Ministry of Finance (selected HIC(*)).

Note: Darker colour in last two columns indicate larger deviation from external statistics.

Table A10 Personal income tax and social insurance contributions: Aggregate amounts (in mil. EUR, original weights) in 2012

	Official stat. (I)	SIMTASK (II)	EUROMOD (III)	(II) / (I)	(III) / (I)
Personal income tax	1,624,617	1,444,711	1,483,477	0.89	0.91
Social Insurance Contrib. (SIC)					
SIC: Employer	*3,790,435*	*4,126,284*	*4,140,157*	*1.09*	*1.09*
Sickness insurance	183,218	220,693	221,164	1.20	1.21
Old-age insurance	2,123,603	2,302,288	2,309,676	1.08	1.09
Disability insurance	445,875	487,017	489,233	1.09	1.10
Unemployment insurance	148,227	160,619	161,397	1.08	1.09
Guarantee insurance	32,836	39,404	39,491	1.20	1.20
Reserve solidarity fund	720,508	781,142	783,648	1.08	1.09
Accident insurance	136,168	131,932	132,357	0.97	0.97
Insurance paid from agreements	0	3,188	3,191		
SIC: Employee	*1,384,064*	*1,529,705*	*1,531,697*	*1.11*	*1.11*
Sickness insurance	183,218	221,082	221,164	1.21	1.21
Old-age insurance	606,744	659,401	659,903	1.09	1.09
Disability insurance	445,875	488,207	489,233	1.09	1.10
Unemployment insurance	148,227	161,016	161,397	1.09	1.09
SIC: Self-employed	*361,341*	*499,020*	*589,684*	*1.38*	*1.63*
Sickness insurance	46,121	64,874	77,005	1.41	1.67
Old-age insurance	198,178	272,962	322,585	1.38	1.63
Disability insurance	64,523	89,147	104,958	1.38	1.63
Reserve solidarity fund	52,519	72,038	85,136	1.37	1.62
Health Insurance Contrib. (HIC)					
HIC: economic active pop.	*2,359,181*	*2,496,789*	*2,515,439*	*1.06*	*1.07*
HIC: employees	609,385	632,255	637,172	1.04	1.05
HIC: employers	1,523,571	1,576,817	1,592,562	1.03	1.05
HIC: self-employed	152,147	232,811	239,638	1.53	1.58
HIC: voluntary (*)	74,078	54,906	46,067	0.74	0.62
HIC: economic inactive pop. (*)	*1,271,912*	*1,222,565*	*1,310,730*	*0.96*	*1.03*

Source: Official statistics SSA (PIT, HIC, SIC), Ministry of Finance (selected HIC(*)).

Note: Darker colour in last two columns indicate larger deviation from external statistics.

Table A11 Personal income tax and social insurance contributions: Aggregate amounts (in mil. EUR, calibrated weights) in 2012

	Official stat. (I)	SIMTASK (II)	EUROMOD (III)	(II) / (I)	(III) / (I)
Personal income tax	1,624,617	1,540,477	1,564,345	0.95	0.96
Social Insurance Contrib. (SIC)					
SIC: Employer	3,790,435	3,823,993	3,834,299	*1.01*	*1.01*
Sickness insurance	183,218	197,848	198,104	1.08	1.08
Old-age insurance	2,123,603	2,138,397	2,144,120	1.01	1.01
Disability insurance	445,875	451,557	453,033	1.01	1.02
Unemployment insurance	148,227	148,268	148,801	1.00	1.00
Guarantee insurance	32,836	35,324	35,371	1.08	1.08
Reserve solidarity fund	720,508	725,537	727,478	1.01	1.01
Accident insurance	136,168	124,096	124,423	0.91	0.91
Insurance paid from agreements		2,967	2,969		
SIC: Employee	1,384,064	1,410,838	1,412,540	*1.02*	*1.02*
Sickness insurance	183,218	198,047	198,104	1.08	1.08
Old-age insurance	606,744	611,970	612,603	1.01	1.01
Disability insurance	445,875	452,303	453,033	1.01	1.02
Unemployment insurance	148,227	148,517	148,801	1.00	1.00
SIC: Self-employed	361,341	507,913	610,857	*1.41*	*1.69*
Sickness insurance	46,121	66,287	80,009	1.44	1.73
Old-age insurance	198,178	277,743	333,873	1.40	1.68
Disability insurance	64,523	90,584	108,859	1.40	1.69
Reserve solidarity fund	52,519	73,299	88,115	1.40	1.68
Health Insurance Contrib. (HIC)					
HIC: economic active pop.	2,359,181	2,332,339	2,378,870	*0.99*	*1.01*
HIC: employees	609,385	579,488	592,670	0.95	0.97
HIC: employers	1,523,571	1,446,258	1,481,415	0.95	0.97
HIC: self-employed	152,147	243,634	250,196	1.60	1.64
HIC: voluntary (*)	74,078	62,959	54,590	0.85	0.74
HIC: economic inactive pop. (*)	1,271,912	1,283,175	1,355,929	*1.01*	*1.07*

Source: Official statistics SSA (PIT, HIC, SIC), Ministry of Finance (selected HIC(*)).

Note: Darker colour in last two columns indicate larger deviation from external statistics.

Table A12 Personal income tax and social insurance contributions: Aggregate amounts (in mil. EUR, calibrated weights) in 2013

	Official stat. (I)	SIMTASK (II)	EUROMOD (III)	(II) / (I)	(III) / (I)
Personal income tax	1,629,085	1,607,793	1,490,490	0.99	0.91
Social Insurance Contrib. (SIC)					
SIC: Employer	4,057,866	4,008,819	3,939,775	0.99	0.97
Sickness insurance	223,710	219,894	215,496	0.98	0.96
Old-age insurance	2,267,708	2,198,889	2,154,977	0.97	0.95
Disability insurance	467,368	464,250	455,277	0.99	0.97
Unemployment insurance	154,070	152,430	149,522	0.99	0.97
Guarantee insurance	40,542	39,260	38,493	0.97	0.95
Reserve solidarity fund	769,401	746,050	731,163	0.97	0.95
Accident insurance	135,066	126,698	124,123	0.94	0.92
Insurance paid from agreements		61,347	70,723		
SIC: Employee	1,493,065	1,482,428	1,454,153	0.99	0.97
Sickness insurance	223,710	220,208	215,496	0.98	0.96
Old-age insurance	647,917	629,159	615,706	0.97	0.95
Disability insurance	467,368	464,917	455,277	0.99	0.97
Unemployment insurance	154,070	152,651	149,522	0.99	0.97
SIC: Self-employed	394,996	569,084	1,082,171	1.44	2.74
Sickness insurance	53,011	75,851	144,239	1.43	2.72
Old-age insurance	216,865	310,313	590,066	1.43	2.72
Disability insurance	67,729	101,031	192,148	1.49	2.84
Reserve solidarity fund	57,390	81,890	155,717	1.43	2.71
Health Insurance Contrib. (HIC)					
HIC: economic active pop.	2,441,284	2,543,717	2,551,765	1.04	1.05
HIC: employees	631,083	665,992	682,414	1.06	1.08
HIC: employers	1,577,809	1,500,894	1,505,816	0.95	0.95
HIC: self-employed	166,196	286,088	280,401	1.72	1.69
HIC: voluntary (*)	66,195	72,024	61,808	1.09	0.93
HIC: economic inactive pop. (*)	1,242,777	1,215,459	1,320,017	0.98	1.06

Source: Official statistics SSA (PIT, HIC, SIC), Ministry of Finance (selected HIC(*)).

Note: Darker colour in last two columns indicate larger deviation from external statistics.

Table A13 Personal income tax and social insurance contributions: Aggregate amounts (in mil. EUR, calibrated weights) in 2014

	Official stat. (I)	SIMTASK (II)	EUROMOD (III)	(II) / (I)	(III) / (I)
Personal income tax	1,749,754	1,607,793	1,490,490	0.92	0.85
Social Insurance Contrib. (SIC)					
SIC: Employer	4,262,033	4,235,795	3,993,820	*0.99*	*0.94*
Sickness insurance	235,303	232,593	218,747	0.99	0.93
Old-age insurance	2,381,778	2,325,931	2,187,491	0.98	0.92
Disability insurance	490,687	490,943	462,016	1.00	0.94
Unemployment insurance	162,023	161,132	151,697	0.99	0.94
Guarantee insurance	42,541	41,525	39,074	0.98	0.92
Reserve solidarity fund	808,103	789,152	742,195	0.98	0.92
Accident insurance	141,598	134,040	125,932	0.95	0.89
Insurance paid from agreements	0	60,479	66,667		
SIC: Employee	1,568,521	1,566,446	1,474,516	*1.00*	*0.94*
Sickness insurance	235,303	232,891	218,747	0.99	0.93
Old-age insurance	680,508	665,399	624,995	0.98	0.92
Disability insurance	490,687	491,575	462,016	1.00	0.94
Unemployment insurance	162,023	161,342	151,697	1.00	0.94
SIC: Self-employed	375,700	583,317	1,060,853	*1.55*	*2.82*
Sickness insurance	50,480	87,368	141,375	1.73	2.80
Old-age insurance	206,511	311,943	578,363	1.51	2.80
Disability insurance	64,086	101,684	188,490	1.59	2.94
Reserve solidarity fund	54,623	82,322	152,625	1.51	2.79
Health Insurance Contrib. (HIC)					
HIC: economic active pop.	2,555,512	2,706,788	2,609,315	*1.06*	*1.02*
HIC: employees	663,774	707,135	691,753	1.07	1.04
HIC: employers	1,659,534	1,584,881	1,531,678	0.96	0.92
HIC: self-employed	158,126	321,809	305,936	2.04	1.93
HIC: voluntary (*)	74,078	74,833	60,135	1.01	0.81
HIC: economic inactive pop. (*)	1,195,444	1,237,828	1,275,392	*1.04*	*1.07*

Source: Official statistics SSA (PIT, HIC, SIC), Ministry of Finance (selected HIC(*)).

Note: Darker colour in last two columns indicate larger deviation from external statistics.

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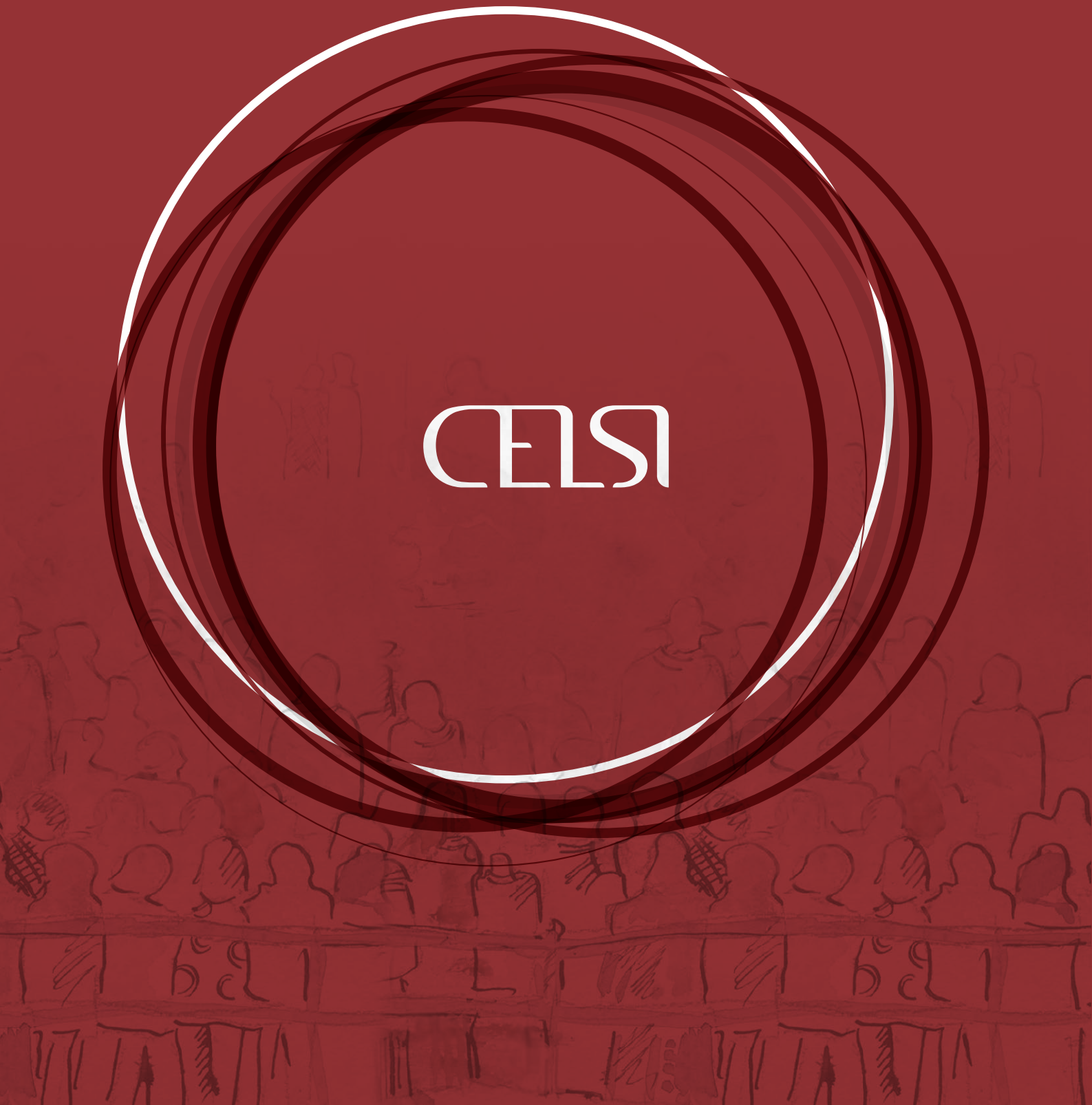
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