Analysis of Income Inequalities by Microsimulation*

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The paper presents two applications of the static microsimulation model ECOS-TAX. Firstly, it is examined how the economic crisis afflicted the different strata, and how the income disparities developed in Hungary in the period of 2007 and 2010. The calculations are based on the Hungarian Household Budget Survey, therefore it has been possible to define and to examine different specific segments of the society. Secondly, the probable impacts of a hypothetic version of family taxation are examined by the model. This type of taxation is planned to be introduced in Hungary in the future, although the details has not been elaborated yet. This case study shows that the microsimulation model ECOS-TAX can be an effective tool to quantify the impacts of different tax regulations on the income distribution.

KEYWORDS:
Microsimulation model.
Income inequality.
Taxation.

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The economic crisis that burst out at the end of 2008 afflicted Hungary especially heavily. Due to economic equilibrium problems and to high national debt, investors lost their confidence and the Hungarian state had to ask for the support of the IMF, the World Bank and the European Union in order to finance the deficit of the general government. Credit use was subject to fiscal consolidation, which practically meant a drastic reduction of domestic demands. However, the necessary fiscal discipline had a procyclical effect, that is, it resulted in further real losses beyond the already diminishing performance of the private sector. The Hungarian economy decreased by more than 6 percent in 2009, while the decline in final consumption of households was even higher, reaching 6.7 percent. The disposable income of the residential sector was considerably reduced by wage losses that were due to massive layoffs, to the drastic wage reduction of the government sector and to the abolition of the 13th month pension. Another important factor of consumption decrease was that the residential sector had previously accumulated a huge amount of debt, most of which was denominated in foreign currencies. As a consequence of the economic crisis, the domestic currency weakened, which considerably increased the amount of credit repayments. The drastic growth of unemployment and the decrease in living standards are the main sources of serious social tensions. Certainly, the consequences of the crisis afflict primarily the poorest people.

The best source of data where the effects of the crisis and that of austerity measures can be followed across different social strata is the Household Budget Survey (HBS), the results of which are published annually by the Hungarian Central Statistical Office (HCSO). However, these data are published with delay, that is, the income data of 2008 was first published only in the first half of 2010. A possible method of replacing the data to be published later is the so-called microsimulation.[1] The point of this procedure is that the main characteristics and indicators of the micro units (of the households in our case) are determined starting from the last published data by simulating their probable evolution over time. The development of these characteristics is based on the changing macroeconomic environment and on the most probable reactions of the micro units defined by the modeller specifically for different social strata. The economic modelling experts of the ECOSTAT Government Institute for Strategic Research of Economy and Society (hereinafter ECOSTAT) have developed a microsimulation model called ECOS-TAX among others for such purposes. In the following, we analyze the results of the most recent model runs.

The primary purpose of this model is to follow the income inequalities after the outbreak of the economic crisis and to assess their future effects. It is a fundamental

[1] The methodology is discussed for example by *Molnár* [2003].

issue, what impact the present tendencies will have on sustainable development. Thus Section 1 analyzes the relationship between income inequality and sustainability. The next one discusses the possibilities of microsimulation modelling and presents the activity and experience of ECOSTAT linked to this area. Section 3 examines the results of the model runs. First, the simulation results concerning the forecasted development of income polarization are introduced. Then the possible effects of substituting the present personal taxes were quantified by a family taxation system since the position of different social strata is considerably influenced by the rules of income distribution, among others, by the tax system. The paper ends with some conclusions and policy recommendations.

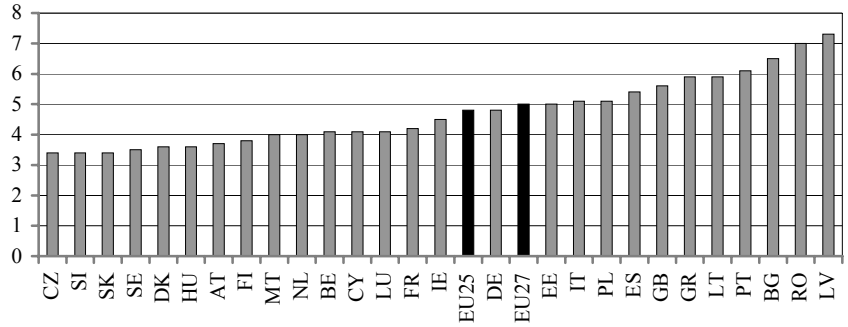
1. Income inequalities and sustainability

There are different theories and opinions in the academic literature concerning the measure of polarization and its effects on sustainable development. According to a widely shared opinion, both a too low and a too high level of income inequalities may have several negative effects on a society. For example, *Cornia* and *Court* [2001] state that on the basis of income concentrations, the "suitable" value of the calculated Gini-index[2] is between 0.25 and 0.4, which they call the "efficient inequality range". These two limits are more or less typical for the Scandinavian countries and for the United States, respectively. If the level of polarization is too low, there are no work incentives, furthermore labour shirking is typical. The other extreme does not assure incentives either, but weakens social cohesion, and sharpens social tensions. Thus, for example, when we elaborated the model of sustainable development called SOCIO-LINE, the effects of inequalities were also taken into consideration and were formally built in the model (*Cserháti–Révész–Takács* [2001], *Révész* [2006]). In the Soviet bloc countries, inequalities were relatively low, then, after the regime change, increased. However, the main factor of polarization was typically not the good and effective work there but the stabilization of monopolistic and other privileged positions, which were obtained through "social capital" (for example through personal connections). The main problem is that a massive middle class has not evolved so far between the large lower and the small upper classes, although this would be a fundamental condition of a normal democracy and an effectively operating market economy. The global economic crisis has changed/has been changing the social structures in a wrong direction: the middle class weakened/is weakening as several families fell (and are still falling) behind.

[2] The ordinary Gini-index based on the Lorenz-curve may vary between 0 és 1, where 0 means perfect equality.

Based on the famous Kuznets curve (*Kuznets* [1955]), inequality increases until a certain stage of economic development and decreases thereafter. Although this paradigm has been disproved many times even by empirical data, the idea has emerged lately in the literature in a modified way (see for example *Galor* [2009]). In accordance with this theory, the growth and accumulation of physical capital play a more important role in the aggregate supply, in the earlier stages of economic development. Inequality rather stimulates the development in this period, since a social class emerges and it is able to accumulate large amount of savings, which can be the source of capital accumulation. However, later, which is also true today, the role of human capital is more and more important. The relative yield of human capital is greater than that of physical capital, and the lower level of income inequalities stimulates human investments better. Furthermore, it should be noted that the large amount of foreign direct investments, that is, the import of developed technology in the developing and accession countries makes the catch-up process possible without high inequality level in the household sector.

Figure 1. Income quintile share ratio[3] in the European Union, 2008



Note. Instead of country names, ISO country codes are used.
Source: Eurostat.

According to Eurostat data[4] (see Figure 1), the income quintile share ratio showing inequality of income distribution was relatively low in Hungary compared to other EU-members before the global economic crisis. However, we think that this value (3.6) is underestimated since the time series of Eurostat show a sudden setback in 2007. In this year, income quintile share ratio was lower than 4 that was below the value of 2006 (5.5). Thus, the value of Figure 1 seems to be unrealistic as the first

[3] The income quintile share ratio is the ratio of total income received by 20 percent of the population with the highest income (top quintile) to that received by 20 percent of the population with the lowest income (bottom quintile).

[4] For the time being, the Eurostat publishes data until 2008.

austerity measures were taken in 2007 after the government deficit was overshot in 2006. By all means, in Hungary, inequalities could not be considered extremely high before the crisis compared to other EU member states. We think that inequality itself is not the most relevant problem; the key issues are what income level it is realized at and how many people live in (deep) poverty. The poorest stratum reproduces itself in spite of serious government efforts (see *Ferge* [2005]). Unemployment implied by the economic crisis primarily afflicted the undereducated people; therefore, one could assume that income polarization increased during the past two years. One of our main goals was to verify this hypothesis in the absence of officially published data and to quantify income inequality according to different social strata.

2. Modelling of income disparities by microsimulation

Microsimulation models can be used to follow the dynamics of incomes, but primarily, they are tools to assess and to quantify the effects of planned economic policy measures (for example that of tax reforms). These analyses based thereon serve as an integral part of economic policy in several developed economies. In the United States, for example, Congress is not even willing to consider any plans of taking new measures, if such a microsimulation-based analysis is not available. In Europe (for example in Sweden and Italy), the decision makers also use several microsimulation models, and the EU itself has its own tax-benefit microsimulation model[5] too.

The usefulness of the results depends on the reliability of basic data and on the correct modelling of reactions at micro level. Certainly, the characteristics of the population vary over time, which is an important aspect if one wishes to analyze the middle or long-term effects of policy measures. A microsimulation model is dynamic, if it also takes population dynamics into account. However, it is practically satisfactory to use a simpler static model like ECOS-TAX to assess the sudden effects of a tax reform.

The economic modelling experts of ECOSTAT began to develop a microsimulation model in the spring of 2006 together with the professionals of the HCSO. The HBS income data of 2004 were the latest at that time, therefore, at first, the income data of the following year were simulated within the framework of the joint research. The model was later verified, when the actual data of 2005 were published. The impacts of the 2005 tax reform were modelled, and an experimental case study was also made focusing on the possible changes of family allowances. The results were published in a joint working paper of the HCSO and ECOSTAT (*Cserháti et*

[5] See details on http://www.iser.essex.ac.uk/research/euromod

al. 2007). The ECOS-TAX microsimulation model has been being developed since 2007, through which we can also follow the dynamics of family incomes for the period of 2007–2010 (see *Cserháti–Péter–Varga* [2009]). A case study of the planned tax reform has been prepared too. The first results are presented in Section 3 of this paper.

In the following, we briefly outline the main characteristics of the ECOS-TAX model. Its input data source is the data of the HBS conducted by the HCSO[6] that refer to a base year. For the time being, the latest information is used, namely, the data of 2007 covering income, expenditure, and living conditions for observed households and persons belonging to them. The 2007 sample comprises 8,547 households and 22,305 persons. The model simulates yearly about 150 income data depending on the characteristics of particular households and on the changing macroeconomic and social environment.

The model shall treat two main problems. On the one hand, income data are typically underreported; therefore consistency between macroeconomic and HBS data has to be assured in every year. On the other hand, every household has a weight in the HBS database, which guarantees that the sample represents the whole household sector in that particular year; and simulation has to maintain the representativeness of the sample during the time interval of simulation too.

The first problem has been solved by using external data sources. Wages, pensions and property incomes, which cover around 80 percent of disposable income of the whole household sector, have been adjusted for the model runs. Regarding wages, we used the personal income tax database of the Hungarian Tax and Financial Control Administration (APEH). As a first step, weights were adjusted in such a way that the limit values of the deciles in the HBS data equalled to those of personal income tax data. Then we compared the wages in "three-dimensional groups" of persons according to deciles, regions and age in the two databases, and modified the HBS data multiplying them by group-specific ratios. It was also ensured that the number of persons with the highest incomes (having more than 15 million HUF in the base year) was the same in both data sets. Data from the Hungarian National Bank were used for the estimation of property incomes. The majority of this latter type of income is net interest, which does not appear in the HBS since only interest withdrawn is reported from realized income. We assessed the distribution of this type of incomes among the deciles. The HBS dataset is not representative for pensioners, thus the values of pensions have been adjusted in such a way that the pension per capita equalled to the value given in the "stADAT" database of the HCSO[7].

[6] See a detailed description about the HBS in English on the webpage of the HCSO: http://portal.ksh.hu/pls/ksh/ksh_web.meta.objektum?p_lang=EN&p_menu_id=110&p_almenu_id=104&p_ot_id=100&p_obj_id=ZHC&p_session_id=39842802

[7] http://portal.ksh.hu/pls/ksh/docs/hun/xstadat/xstadat_eves/i_fsp001.html

We found a solution to the second problem by using external macroeconomic and demographic data. Since the actual HBS data are published with a one-and-a-half year delay, simulation is nothing else but "forecast" for past periods for what macro data are already available. If one wishes to calculate for the real future, certainly the macroeconomic data have to be first forecasted exogenously. Its suitable tool may be, for example, the ECO-LINE quarterly macro econometric model developed by ECOSTAT. Demographic data are also published by the HCSO, while the HCSO–Demographic Research Institute provides forecasted values. Determination of weights means solution of a mathematical programming problem with these macroeconomic, demographic, and other types of constraints. While determining the original weights for the households, only demographic data are considered. However, additional constraints are regarded, when the weights are adjusted during simulation. The increase of unemployment according to regions and (government and corporations) sectors and the constraints defined by different macroeconomic indicators are taken into account. The wages are simulated differently, based on NACE industries. The social transfers and other incomes are determined year by year specifically for each household according to the actual regulations and the laws of the particular years.

It should be noted, however, that only the income data of the HBS are simulated. There are plans for simulating also the expenditure side in the future by developing a new module for ECOS-TAX. The present version of the model is suitable for "flash" (or rapid) estimation[8] of the HBS income data, that is, it is possible to tackle the problem of the one-a-half-year delay of publishing the actual data.

3. Application of the ECOS-TAX model

In this section, we present two applications of the ECOS-TAX. The first one follows incomes and income disparities during the period of economic crisis. The second one is the examination of the impacts of family taxation with hypothetic parameters.

3.1. Dynamics of household incomes between 2008 and 2010

The dynamics of household incomes has been examined according to the following household characteristics:

[8] The notion of "flash" or rapid estimation is used by statisticians primarily for the first assessment of the quarterly GDP, which is based on models in the absence of actual data.

– Income deciles
– Number of dependent children
– Age structure of households
– Activity of the household head (active wage earner, inactive pensioner, other inactive person)
– Number of wage earners
– Regions
– Types of settlements.

The results of model runs are summarized in Tables 1–7. The incomes per capita were determined across different social strata. Our hypothesis was that the economic crisis afflicted the particular income deciles to a different extent. The results show that income polarization increased in such a way that the relative position of the lowest five deciles declined by about the same rate, while the relative position of the rest improved. The higher the decile we consider in the upper half of the population, the less the fall is. Only the highest two deciles showed less decrease than the average. However, despite the crisis, the relative position of the lowest decile did not worsened in 2009 (see Table 1) because surplus social incomes could still compensate the falling wages and salaries.

Table 1

Income polarization by decile*
(Previous year = 100.0 or 2007 as a base year = 100.0)

Income decile	Real growth of incomes, 2008 (percent)	Real growth of incomes, 2009 (percent)	Real growth of incomes, 2010 (percent)	Real growth of incomes, 2010/2007 (percent)	Number of households
Decile 1 (the lowest)	96.0	100.0	95.7	91.8	379 397
Decile 2	98.4	96.8	96.3	91.8	379 623
Decile 3	99.3	95.7	96.3	91.5	379 321
Decile 4	99.0	95.8	96.4	91.4	378 167
Decile 5	99.5	95.3	96.8	91.7	380 433
Decile 6	100.2	95.3	96.9	92.5	379 556
Decile 7	100.6	95.4	97.0	93.2	378 704
Decile 8	100.5	95.4	97.6	93.6	379 426
Decile 9	101.3	95.0	97.8	94.2	380 005
Decile 10 (the highest)	103.0	95.2	98.0	96.2	378 897
Total	100.6	95.9	97.4	93.9	*3 793 529*

* Net real income per capita.
Source: ECOS-TAX model results.

Éltető [1997] examined the development of the so-called Hungarian Inequality Measure (HIM) in the 1980s. HIM is the ration of the average income of those above the mean to the average income of those below the mean. The value of HIM under the state-controlled economy began to grow in the 1980s, its value was 2.01 in 1987, in case of households with active earners. HIM continued to increase under the circumstances of market economy, its value were 2.38, 2.45, 2.42 and 2.45 in the years between 2007 and 2010, respectively.

Considering the groups set up according to the number of dependent children, one can see that the economic setback afflicted the large families very seriously. Differences can be observed even among families with less than three dependent children in favour of families with one child or without a child. It is perhaps a bit astonishing that the position is/was better with one child than without in 2009 and 2010, but the difference is minimal. Certainly, the crisis afflicted the families with three or more children most of all because the family allowances were frozen. (See Table 2.)

Table 2

Income polarization by the number of dependent children*
(Previous year = 100.0 or 2007 as a base year = 100.0)

Household category according to the number of children	Real growth of incomes, 2008 (percent)	Real growth of incomes, 2009 (percent)	Real growth of incomes, 2010 (percent)	Real growth of incomes, 2010/2007 (percent)	Number of persons
No children	103.1	95.4	97.3	95.7	4 529 559
One child	100.8	97.4	97.7	95.9	2 402 609
Two children	97.9	98.3	97.3	93.7	2 020 548
Three or more children	93.6	96.8	97.6	88.4	925 117
Total	100.6	95.9	97.4	93.9	*9 877 833*

* Net real income per capita.
Source: ECOS-TAX model results.

Considering the age structure, it seems that families comprising more generations could better adjust to the crisis than the average, while the position of those consisting of only young members greatly worsened (see Table 3) since the unemployment rate of young people starting out a career increased considerably during the slump. The activity status of the household heads shows that the relative position of families with an inactive but not a pensioner head definitely deteriorated. (See Table 4.) The regulation of the pension system changed in such a way that pensions could preserve purchasing power relatively better than wages and salaries, thus the relative position of households with a pensioner household head improved. The model provided an obvious result according to the number of wage earners: the fewer earners a family

has, the worse its position is. (See Table 5.) While the inactive households had more than 5 percent real loss in 2009, the households with three or more earners may experience a considerable loss only in 2010.

Table 3

Income polarization by the age structure of the household*
(Previous year = 100.0 or 2007 as a base year = 100.0)

Age structure of the household members	Real growth of incomes, 2008 (percent)	Real growth of incomes, 2009 (percent)	Real growth of incomes, 2010 (percent)	Real growth of incomes, 2010/2007 (percent)	Number of persons
Only young	95.7	95.1	97.6	88.8	537 395
Only middle-aged	100.5	94.9	97.9	93.4	894 780
Only aged	102.6	92.9	96.7	92.2	1 269 847
Young and middle-aged	101.4	96.9	97.5	95.9	5 571 500
Young and aged	105.8	99.2	97.4	102.3	113 576
Middle-aged and aged	100.4	96.0	97.3	93.7	678 913
Three generations	98.1	100.6	97.2	96.0	811 822
Total	100.6	95.9	97.4	93.9	*9 877 833*

* Net real income per capita.
Source: ECOS-TAX model results.

Table 4

Income polarization by the activity status of the household head*
(Previous year = 100.0 or 2007 as a base year = 100.0)

Activity status of the household head	Real growth of incomes, 2008 (percent)	Real growth of incomes, 2009 (percent)	Real growth of incomes, 2010 (percent)	Real growth of incomes, 2010/2007 (percent)	Number of persons
Wage earner, active	101.0	95.9	97.7	94.7	2 712 557
Pensioner, inactive	98.9	99.8	97.2	95.9	5 872 090
Other inactive	99.8	94.7	96.1	90.8	981 240
Total	100.6	95.9	97.4	93.9	*9 877 833*

* Net real income per capita.
Source: ECOS-TAX model results.

Table 5

Income polarization by the number of wage earners*
(Previous year = 100.0 or 2007 as a base year = 100.0)

Household category according to the number of wage earners	Real growth of incomes, 2008 (percent)	Real growth of incomes, 2009 (percent)	Real growth of incomes, 2010 (percent)	Real growth of incomes, 2010/2007 (percent)	Number of persons
No active wage earner	100.3	94.6	96.8	91.9	2 712 557
One wage earner	100.0	95.5	97.6	93.1	3 152 810
Two wage earners	101.9	97.2	97.6	96.7	3 206 271
Three or more wage earners	100.1	99.2	97.6	96.9	806 195
Total	100.6	95.9	97.4	93.9	*9 877 833*

* Net real income per capita.
Source: ECOS-TAX model results.

Table 6

Income polarization by region*
(Previous year = 100.0 or 2007 as a base year = 100.0)

Region	Real growth of incomes, 2008 (percent)	Real growth of incomes, 2009 (percent)	Real growth of incomes, 2010 (percent)	Real growth of incomes, 2010/2007 (percent)	Number of persons
Budapest	101.2	95.6	97.6	94.4	1 684 665
Pest County	102.4	96.9	97.8	97.1	1 171 890
Central Transdanubia	98.9	96.9	97.5	93.5	1 072 663
Western Transdanubia	103.7	93.1	97.5	94.1	945 868
Southern Transdanubia	99.4	96.3	97.1	93.0	937 476
Northern Hungary	94.8	99.7	97.3	91.9	1 239 775
Northern Great Plain	99.5	96.0	97.0	92.7	1 526 562
Southern Great Plain	97.7	97.8	97.2	92.8	1 298 934
Total	100.6	95.9	97.4	93.9	*9 877 833*

* Net real income per capita.
Source: ECOS-TAX model results.

Families in the capital city were examined separately in the regional analysis. (See Table 6.) It is conspicuous that the relative position of Budapest became worse than that of Pest County surrounding the capital. This county suffered from the smallest decline compared to other regions. The result can be explained by the fact that families with higher incomes moved out from the capital to the suburbs in the

past 15 years. The relatively worsening position of Budapest shows that, although the income per capita is the highest here, there is a broad and increasing social stratum dropping behind. At national level, the regional differences increased, the traditionally less developed Eastern regions endure the most considerable economic downturn. The setback of the Northern Hungarian region is the largest, but the relative position of the two regions of the Great Hungarian Plain is almost as unfavourable. The results concerning settlement types show that villages are in the worst position. (See Table 7.) The lowest decline is observed in small towns, but this is only the consequence of surplus growth experienced before the economic crisis.

Table 7

Income polarization by the type of settlements*
(Previous year = 100.0 or 2007 as a base year = 100.0)

Type of settlements	Real growth of incomes, 2008 (percent)	Real growth of incomes, 2009 (percent)	Real growth of incomes, 2010 (percent)	Real growth of incomes, 2010/2007 (percent)	Number of persons
Budapest (capital)	101.2	95.6	97.6	94.4	1 684 665
Towns with county rights	99.9	96.5	97.8	94.3	1 932 606
Other towns	103.2	94.8	97.3	95.3	2 844 143
Villages	98.1	97.6	97.0	92.9	3 416 419
Total	100.6	95.9	97.4	93.9	*9 877 833*

* Net real income per capita.
Source: ECOS-TAX model results.

3.2. Investigation of family taxation

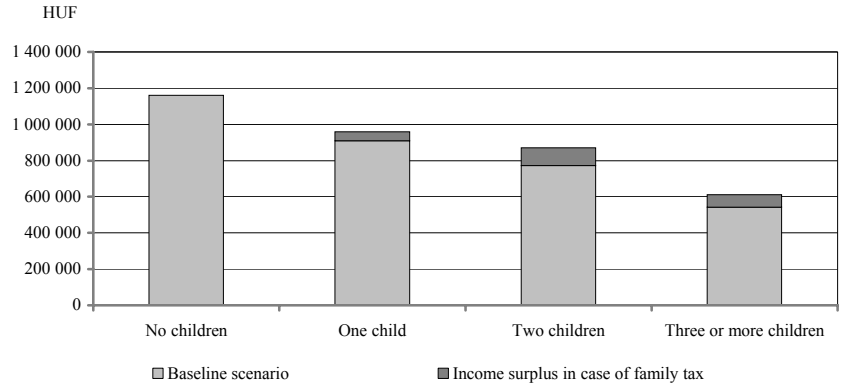
Personal income taxes amount to the quarter of state revenues in the EU. There are relevant differences regarding the volume and structure of taxes in various countries. The number and values of tax rates, bands, preferences, exemptions and the types of income fully liable to taxation differ from country to country. Each of them has an influence on the effectiveness of taxation, in particular on the amount of tax revenues, on the measure of redistribution and indirectly on the level of unemployment. Different personal income tax systems have been developed in the countries, and they are far from being uniform even within the EU (see *ECOSTAT* [2010]). In most of the countries, personal income taxation is applied, but there is a family taxation system in Germany, Denmark, France, Belgium, and Luxembourg, while Spain applies a mixed system. Certainly, these latter countries have different types of fam-

ily taxation, thus, for example, the tax rule may allow different shares of income among family members, which affects the calculated tax.

In Hungary, the necessity of introducing family taxation – that stimulates the willingness to have more children – has lately emerged again. Since there are many variants regarding the realization of such a profound change in the taxation system, it is unavoidable to assess the possible effects by model simulations, which allows the quantitative comparison of these variants. The ECOS-TAX model in its present form is already suitable for such types of analyses. The effects of the variants can be compared by determining different sets of parameters. On the one hand, the tax revenue from the residential sector can be determined at macroeconomic level, and on the other hand, the impacts on different segments of the society can also be assessed (for example, it is possible to analyze how the system of redistribution may change).

We present the results of a model run, which simulated the hypothetical scenario of the family taxation system for 2009. The positions of different family types were examined, and the results were compared to the baseline scenario, that is the actual tax system of 2009. The parameters were set in such a way that families can reduce the calculated tax by 20, 50, 75, and 100 percent having one, two, three, or more dependent children, respectively. The resulting net income of this system was compared to the actual realized net income. Figure 2 shows that the family taxation system decreased income inequalities, and the relative position of families with two children became the most favourable. At first sight, it might be astonishing that families with higher incomes benefit more from a family taxation system (see Table 8). The obvious explanation of this phenomenon is that a certain percentage tax deduction means a higher amount of benefit in absolute terms for richer families as their average tax burden is higher.

Figure 2. Annual net household income in different family types



Source: ECOS-TAX model results.

Table 8

Possible surplus income of households in family taxation

Income Decile	Family tax scenario per baseline (percent)	Number of households with			
		no children	one child	two children	three or more children
Decile 1 (the lowest)	100.1	99 884	106 016	99 748	73 227
Decile 2	100.2	160 225	96 516	89 795	33 639
Decile 3	100.6	209 995	92 819	59 291	17 012
Decile 4	100.8	249 931	72 967	46 975	9 387
Decile 5	101.2	252 498	75 935	45 341	5 938
Decile 6	102.0	275 688	66 036	34 227	3 117
Decile 7	102.6	287 225	62 291	24 780	5 036
Decile 8	103.8	293 344	52 356	28 547	5 027
Decile 9	104.9	282 732	57 846	33 944	5 062
Decile 10 (the highest)	108.4	292 532	51 653	29 556	5 391

Source: ECOS-TAX model results.

4. Conclusions

The ECOS-TAX microsimulation model is a tool for following the dynamics of income of different social strata before the official publication of HBS data. The strata can be specified according to all indicators for which the HBS provides information. The model is also suitable for forecasting income data and for quantifying the effects of planned measures, for example, those of a tax reform. This latter one is a topical feature since for the time being the Hungarian tax system is facing profound changes.

In this study, the model was used for two purposes. Firstly, we wished to assess income polarization experienced during the economic crisis. The results showed that income inequalities increased although the position of all deciles worsened. The decline was less than the average only in the two highest deciles. There was a growth in the number of families falling behind. Supposedly, a certain share of them could be compensated for their losses in hidden economy. The negative effects of the crisis were especially serious for young and large families. The simulations proved that income polarization increased as a result of deep recession. The crisis afflicted the poorest strata, the households with three or more dependent children and young peo-

ple starting out a career most of all, while households comprising more generations and having several earners could minimize its effects.

The other investigation is connected to the first one: it quantified the effects of a family taxation system. The actual data of 2009 were compared to the results of an alternative scenario, in which it was supposed that the family taxation had already been employed in 2009. Introducing a family taxation system is on the agenda, although it is unknown which type with what parameters and what tax rates will be applied. Therefore, we assumed a hypothetical case with certain parameters. The results showed that families would do realize surplus income that was larger in the higher income deciles. For the time being, there are several other plans concerning this issue. A probable scenario is the application of flat-rate personal income tax combined with family taxation, which may increase income inequalities. If the long-term goal of economic policy is to decrease the dependence on foreign capital, domestic sources should be accumulated and devoted to capital investment. This may involve the growth of income inequalities. Long-term processes, however, cannot be followed only by static models. Therefore, we intend to develop ECOS-TAX in such a way that it will be capable of taking account of population dynamics as well as suitable for mid- and long-term analyses.

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