# miCROmodA report 2014-2018

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# Abbreviations

	Croatian	English
CBS	Državni zavod za statistiku	Croatian Bureau of Statistics
CG	Središnja država	Central government
CIR	civilni invalid rata	civil invalid of war
EMHR	EUROMOD modul za Hrvatsku	EUROMOD module for Croatia
EU	Europska unija	European Union
GOS	Grad Osijek	the City of Osijek
GRI	Grad Rijeka	the City of Rijeka
GST	Grad Split	the City of Split
GZG	Grad Zagreb	the City of Zagreb
HBDR	hrvatski branitelj iz Domovinskog rata	Croatian defender from the Homeland War
HMVI	mirnodopski vojni invalid	peace-time military invalid
HRVI	hrvatski ratni vojni invalid iz Domovinskog rata	Croatian military war invalid of the Homeland War
ILCS	Anketa o dohotku stanovništva	Income and Living Conditions Survey
LSG	Lokalna samouprava	Local self-government
RSG	regionalna (područna) samouprava	regional self-government
RVI	ratni vojni invalid	invalid from the 2nd World War
SSZNHBDR	smrtno stradali, zatočeni ili nestali HBDR	killed, imprisoned or missing HBDR
ZOB	Osječko-baranjska županija	Osijek-Baranja county
ZPG	Primorsko-goranska županija	Primorje-Gorski Kotar county
ZSD	Splitsko-dalmatinska županija	Split-Dalmatia county

### **1. INTRODUCTION**

Tax-benefit microsimulation models enable the simulation of taxes, social insurance contributions, and social benefits, thus enabling researchers to determine in advance the effects of a potential reform of these fiscal instruments on the distribution of disposable income, work incentives, as well as on budgetary revenue and expenditure.

Although microsimulation models are one of the key tools for academic and policy analysis in other EU countries, such models have not been systematically developed and used in Croatia in the past. In September 2015 researchers from the Institute of Public Finance therefore launched the research project "Application of Microsimulation Models in the Analysis of Taxes and Social Benefits in Croatia" (AMMATSBC). The main objective of the project was the analysis of taxes and benefits in Croatia through microsimulation models. The research has demonstrated the effects of both existing fiscal instruments and alternatively developed ones on the poverty rates, income distribution, and the economic activity of individuals.

When analysing reforms aimed at stimulating employment, reducing poverty rates, or achieving a more equitable distribution of income, the use of microdata and microsimulation models of taxes and social benefits is indispensable. Microdata are data that refer to individuals and households. These are usually collected from surveys; however, they can also be obtained from administrative sources. Microdata provide, for each individual in the sample, information on their demographic and socioeconomic characteristics, market income, and social benefits received, as well as various other types of data.

The microsimulation model of taxes and social benefits allows for tax liabilities and social benefits to be calculated for each individual in the microdata set. The model consists of two basic elements: a) a specially prepared set of variables containing microdata; b) computer-programmed procedures and parameters for the calculation of new variables.

EUROMOD "is a tax-benefit microsimulation model for the European Union that enables researchers and policy analysts to calculate, in a comparable manner, the effects of taxes and benefits on household incomes and work incentives for the population of each country and for the EU as a whole. As well as calculating the effects of actual policies it is also used to evaluate the effects of tax-benefit policy reforms and other changes on poverty, inequality, incentives and government budgets."<sup>1</sup> EUROMOD offers a unique framework for defining taxes and social benefits across countries (Sutherland and Figari, 2013), making it an ideal tool for the comparative analysis of different groups of countries or EU as a whole. Moreover, EUROMOD can be used for "supra-national" fiscal instrument analysis, i.e. the analysis of EUwide taxes and social benefits.

<sup>&</sup>lt;sup>1</sup> For more information about EUROMOD, refer to https://www.iser.essex.ac.uk/euromod.

Several months after Croatia's EU accession, an upgrade process has begun in order to extend the EUROMOD to cover the Croatian tax-benefit system. Researchers from the Institute of Public Finance participated in this project, which was finalized at the end of 2015. A new version of EUROMOD, containing modules for all EU member states, including, for the first time, Croatia, was released in early 2016.<sup>2</sup>

There are several rules regarding the choice of social benefits that are simulated in EUROMOD. First, the basic version of EUROMOD includes only social benefits paid *in cash*, whereas the benefits provided *in-kind* and in the form of *subsidy* are in principle not covered. Second, only benefits for which sufficient input data exist are simulated. For example, sickness benefits are almost never simulated, because the necessary data are lacking on the incidence of sickness. Third, typically only the benefits provided by the central government (CG) are simulated, whereas the benefits of lower tiers of government are excluded.

This is also the case for EUROMOD module for Croatia (EMHR), which includes selected cash social benefits provided by the CG, namely: social assistance benefit, child benefit, one-time grant for newborn children, maternity leave benefit, parental leave benefit, maternity and parental allowance, unemployment benefit, and compensation for electricity costs (Urban, Bezeredi, and Pezer, 2018). Thus, for example, health services provided by hospitals are not included, because they constitute a benefit in-kind; pension benefits are not simulated because there is no employment record information in the data set.

What about the benefits provided by the lower tiers of government? In Croatia, the regional self-government (RSG) entails 20 counties and the City of Zagreb, while the local self-government (LSG) involves 127 cities and 428 municipalities. Šućur et al. (2016) review social protection benefits at the CG, RSG and LSG levels in 2013. RSG and LSG units spent "only" 0.9 billion HRK on social benefits, compared to 68 billion HRK of outlays by the CG, which means that the Croatian social protection system is highly centralised.<sup>3</sup> The study counted about 3 thousand different benefits, schemes and programs provided by the RSG and LSG units. One third of the total amount at the local level is devoted to newborn and pre-school children; a third is given to socially vulnerable groups; the remaining third is targeted at pensioners, school children and students, and unemployed. In the total amount of benefits, 46% are subsidies, 42% are cash benefits, and the remaining is spent on in-kind benefits. Although having a share of 20% in total population, the City of Zagreb contributed with more than a half to total amount, which points toward large discrepancies in the generosity of social benefits at the local level.

<sup>&</sup>lt;sup>2</sup> Croatian national EUROMOD team members are Ivica Urban, Slavko Bezeredi and Martina Pezer. The EUROMOD developer responsible for Croatia is Chrysa Leventi. The Croatian module is described in detail in EUROMOD Country Reports for Croatia (Urban & Bezeredi, 2016a; Urban & Bezeredi, 2016b; Urban, Bezeredi, and Pezer, 2017; Urban, Bezeredi, and Pezer, 2018).

<sup>&</sup>lt;sup>3</sup> Croatian nominal GDP in 2013 was 331,4 billion HRK.

EUROMOD uses the EU-SILC microdata provided by Eurostat.<sup>4</sup> EU-SILC databases for each country contain cross-sectional data on incomes, information about labour, education and health status, and on social exclusion and housing conditions. EU-SILC databases are created from "national" SILC surveys, which are collected by national statistical offices. EU-SILC databases are created to be comparable for all countries involved. In that process, income component variables are aggregated into general groups (e.g., employment income, family benefits), and some details can be lost.

Croatian Bureau of Statistics (CBS) collects "Income and Living Conditions Survey" (ILCS).<sup>5</sup> ILCS contains more detailed data than the EU-SILC database for Croatia, particularly, data on employment and self-employment income, as well as data on social benefits. For example, EU-SILC database contains only two variables for employment income, while ILCS may be used to identify about twenty different components of employment income; similar is true for self-employment incomes and social benefits. Thus, the use of ILCS may bring more accuracy and precision in the calculations. However, ILCS can be obtained only by national scientific research organisations and is therefore not available for use by EUROMOD.

In the jargon of microsimulation research, EUROMOD is the static non-behavioural model. The *static* means that income units' characteristics are "frozen" in a certain point of time. This is in contrast to dynamic family of models, which include the time dimension into the analysis by allowing the units to progress over time. The *non-behavioural* means that policy changes do not affect the behaviour of micro units in terms of labour supply, taxable income, education, fertility, etc. The static non-behavioural models are often called "arithmetic", which epitomises their straightforwardness, in a sense they involve relatively simple tax-benefit calculations.

The discussion above has revealed three shortages of the EMHR: (1) It uses EU-SILC database, which is less accurate than ILCS, (2) It does not cover social benefits of local governments, (3) It cannot be used to analyse behavioural responses of income units following the tax-benefit reforms.

Within the AMMATSBC project, we therefore decided to create a new model of Croatian taxes and benefits -miCROmod – which aims to address the above mentioned issues. miCROmod has the following three main features:

<sup>&</sup>lt;sup>4</sup> EU-SILC stands for The European Union Statistics on Income and Living Conditions. It is "an instrument aiming at collecting timely and comparable cross-sectional and longitudinal multidimensional microdata on income, poverty, social exclusion and living conditions." For more details, see: https://ec.europa.eu/eurostat/web/microdata/european-union-statistics-on-income-and-living-conditions.

<sup>&</sup>lt;sup>5</sup> The original Croatian name is Anketa o dohotku stanovništva.

- The use of ILCS, i.e., the national SILC database, which is more accurate than EU-SILC database for Croatia.
- Simulation of local government benefits in the four major Croatian cities (Zagreb, Split, Rijeka and Osijek) for the year 2017.
- Simulation of labour supply behavioural response.

miCROmod consists of two models, which we call the *arithmetic* model (miCROmodA) and *behavioural* model (miCROmodB). The former is a standalone static non-behavioural model, like EUROMOD. The latter is the static behavioural model, which relies on the inputs from miCROmodA. As its title indicates, this report is devoted to miCROmodA. The details about miCROmodB can be found in Bezeredi, Ledić, Rubil and Urban (2018).

miCROmodA borrows the basic structure and many elements from the EMHR. It is being developed simultaneously with the EMHR in order to preserve compatibility. miCROmodA uses a hybrid database, which merges the EMHR database with the income variables from the ILCS. Before this merge, ILCS data on taxable incomes must be converted from net to gross terms. For this purpose we have designed a special program, which applies to all kinds of taxable incomes.

Given the huge number of RSG and LSG units in Croatia, it is impossible to cover them all – at least in a reasonable time – within the model. For the start, we have therefore decided to include only the four major cities in Croatia – Zagreb, Split, Rijeka and Osijek. We simulate their five most important benefits in terms of total spending: compensation for housing costs, grant for a newborn child, old-age income supplement, subsidy of kindergarten and city transport subsidy. The first three are cash social benefits and the other two are subsidies.

Because EUROMOD is a multi-country model, it must stick to certain general rules in order to achieve consistency and comparability. However, in this project we have an opportunity to tailor miCROmodA to our specific purposes.

First, in the segment of local government benefits, miCROmodA is obviously not representative of the whole country, because it captures benefits of only four major cities. About 25% of total population lives in these cities, but large cities are much more generous in providing benefits than smaller cities and municipalities. However, even if we had been able to model benefits in all RSG and LSG units, we would face a problem of identifying where a household lives. Namely, due to data confidentiality reasons, ILCS does not contain data on the place of living; such information is not available even for the City of Zagreb. Nevertheless, we can run hypothetical scenarios in which the tax-benefit system of one city is applied to the whole Croatian population.

Second, besides three types cash social benefits, we also include two subsidies into investigation (for kindergartens and city transport). We have revealed that a significant portion

of the overall support provided by the cities comes through these two subsidies. Therefore, exclusion of these benefits would underestimate the impact of LSG units' spending on the income distribution of its citizens.

The aim of this *miCROmodA report* is to inform about the purpose and the content of miCROmodA. EUROMOD Country Reports for Croatia (see footnote 2 for references) contain a detailed description of the Croatian tax-benefit system in the period from 2011 to 2018, and particularly for taxes and CG benefits simulated in EUROMOD. There is no need to repeat that information here. Therefore, the *miCROmodA report* will only present new information.

The report consists of four sections. In section 2, we first give a review of all social benefits provided by the four cities. We explain which of these benefits are simulated in miCROmodA, and which are not. After that, for simulated benefits -20 of them in total - detailed descriptions are given, explaining the rules of eligibility and benefit amount calculation. Section 3 first describes the structure of miCROmodA. We then turn to data issues, explaining how they are obtained. Section 4 contains the results of macrovalidation, which is a procedure of comparison of aggregated amounts of taxes and benefits outputted by the model, with the aggregate data from administrative sources.

### 2. SOCIAL BENEFITS

### 2.1 Brief overview of LSG benefits

As noted above, the EUROMOD Country Report for Croatia (Urban et al., 2018) describes in detail the Croatian tax-benefit system, but prevalently at the CG level. For a detailed review of social benefits at all government levels – CG, LSG and RSG – we recommend the study of Šućur et al. (2016). In this report, we provide a brief overview of social benefits, which is built on the information from the database *Pregled naknada socijalne zaštite u Hrvatskoj* (Overview of Social Protection Benefits in Croatia) (Urban, Pezer and Bezeredi, 2017).<sup>6</sup>

Table 2.1 shows the list of benefits, which can be obtained by the citizens of Zagreb. Information come from the above mentioned database on social protection benefits in Croatia. Similar tables are made for the other three cities (Table 2.2, Table 2.3 and Table 2.4). Notice that citizens in Split, Rijeka and Osijek can also obtain the county benefits. The City of Zagreb is an exception because it has a status of a city and a county at the same time.

Several types of benefits re-emerge in all cities: compensation for housing costs, grant for a newborn child, old-age income supplement, subsidy of kindergarten, city transport

<sup>&</sup>lt;sup>6</sup> The database is constructed within the AMMATSBC project. The database and accompanying document (Urban, Pezer and Bezeredi, 2017) are available in Croatian only. The summary in English can be found in Pezer and Urban (2017).

subsidy, subsidy of meals for primary school children, subsidy of extended stay in primary school (complemented with free meals for pupils) and free meals in community kitchen. Furthermore, all counties provide firewood grant. Thus, the overall structure of the city benefit systems is relatively similar.

The first five recurring benefits from the list above were chosen for simulation in this version of miCROmodA. Some benefits may be added in future versions of the model. The last column in Table 2.1 through Table 2.4 explains the status of the benefit in miCROmodA. There are three possible statuses: "S" denotes benefits that are simulated. "CS" marks the benefits which are not simulated, but are interesting candidates for simulation in future versions of miCROmodA. Finally, "NS" represents benefits which are not simulated, and will probably not be simulated later. The reason for not including a benefit into the model is the lack of necessary information in the database.

Benefit	Function	miCROmodA status
Compensation for housing costs	housing	S
Grant for a newborn child	family	S
Old-age income supplement	old-age	S
Subsidy of kindergarten	family	S
City transport subsidy	transport	S
Subsidy of meals for primary school children	family	CS
Subsidy of extended stay in primary school	family	CS
Baby food packages	family	CS
Gift packages with food and necessities	family	CS
Supplement for person with disability	old-age	CS
Free summer schools and excursions for children	family	NS
Firewood grant	housing	NS
Supplement for caregiver	disability	NS
Grant for child of SSZNHBDR	survivor	NS
Free meals in community kitchen	exclusion	NS

Table 2.1. LSG and RSG social benefits for the citizens of Zagreb, 2017

Source: Database Pregled naknada socijalne zaštite u Hrvatskoj.

Notes: S - simulated in the current version; CS - candidate for simulation in future versions; NS - not simulated and not planned for simulation.

Benefit	Function	miCROmodA
		status
Compensation for housing costs	housing	S
Grant for a newborn child	family	S
Old-age income supplement	old-age	S
Subsidy of kindergarten	family	S
City transport subsidy	transport	S
Subsidy of meals for primary school children	family	CS
Subsidy of extended stay in primary school	family	CS
Supplement for person with disability	disability	NS
Subsidy of home care services	disability	NS
Compensation for rental costs	housing	NS
One-time assistance for household in need	exclusion	NS
Free meals in community kitchen	exclusion	NS
City transport service for child with disability	transport	NS
City transport service for person with disability	transport	NS
Allowance for education and training of unemployed	unemployment	NS
Firewood grant (RSG)	housing	NS
One-time assistance for household in need (RSG)	exclusion	NS
Grant for a child of SSZNHBDR (RSG)	survivor	NS

Table 2.2. LSG and RSG social benefits for the citizens of Split, 2017

Source: Database Pregled naknada socijalne zaštite u Hrvatskoj.

Notes: All benefits are provided by the City of Split, except those denoted by RSG, which are provided by the Split-Dalmatia county. S – simulated in the current version; CS – candidate for simulation in future versions; NS – not simulated and not planned for simulation.

Table 2	2.3.	LSG	and K	RSG	social	benefits	for	the	citizens	of l	Riieka.	2017
						,				/		

Benefit	Function	miCROmodA status
Compensation for housing costs	housing	S
Grant for a newborn child (I)	family	S
Grant for a newborn child (II)	family	S
Old-age income supplement	old-age	S
City transport subsidy	transport	S
Subsidy of kindergarten	family	S
Subsidy of extended stay in primary school	family	CS
Subsidy of meals for primary school children	family	CS
Baby food packages	exclusion	CS
Home care services	disability	NS
Free meals in community kitchen	exclusion	NS
Firewood grant (RSG)	housing	NS

Source: Database Pregled naknada socijalne zaštite u Hrvatskoj.

Notes: All benefits are provided by the City of Rijeka, except those denoted by RSG, which are provided by the Primorje-Gorski Kotar county. S - simulated in the current version; CS - candidate for simulation in future versions; NS - not simulated and not planned for simulation.

Benefit	Function	miCROmodA
Compensation for housing costs	housing	Status
Grant for a newborn child	family	S
		<u> </u>
	old-age	5
Subsidy of kindergarten	Tamily	S
City transport subsidy	transport	S
Subsidy of extended stay in primary school	family	CS
Subsidy of meals for primary school children	family	CS
Home care services	disability	NS
Gift packages with food and necessities	exclusion	NS
Free summer schools and excursions for children	family	NS
One-time assistance for household in need	exclusion	NS
Cash gifts for pensioners and socially vulnerable families	exclusion	NS
Free meals in community kitchen	exclusion	NS
City transport service for person with disability	transport	NS
Grant for a newborn child (RSG)	family	CS
Firewood grant (RSG)	housing	NS
One-time assistance for household in need (RSG)	exclusion	NS

Table 2.4. Benefits for the citizens of Osijek, 2017

Source: Database Pregled naknada socijalne zaštite u Hrvatskoj.

Notes: All benefits are provided by the City of Osijek, except those denoted by RSG, which are provided by the Osijek-Baranja county. S – simulated in the current version; CS – candidate for simulation in future versions; NS – not simulated and not planned for simulation.

# 2.2 Five families of simulated LSG benefits

### Housing benefits

There are three types of housing benefits in Croatia: Compensation for housing costs, Firewood grant and Compensation for electricity costs. The latter is introduced in 2015, and administered by the CG. The former two are in jurisdiction of LSG units.

Compensation for housing costs (*naknada za troškove stanovanja*) is the housing benefit financed and disbursed by each LSG unit. The CG prescribes the basic rules of the benefit, while LSG units have the freedom to determine the details regarding the benefit amount, additional eligibility rules, the way the benefit is expended, etc. Therefore, there exists a large *family* of these benefits, one for each city and municipality; we call it "LSG compensations for housing costs".

Common properties, prescribed by the Law on Social Assistance, are as follows. The benefit is received for covering the costs of rent, electricity, gas, heating, water and other housing bills. The beneficiaries must be receivers of Subsistence benefit. The maximum amount

is equal to 50% of the "means of subsistence", which represents the value used to calculate the amount of Subsistence benefit.

The recipients of Subsistence benefit also have the right to claim the Firewood grant (*naknada za ogrjev*), at typical amount of HRK 950 per year, which is administered and financed by RSG units.

Compensation for electricity costs is simulated in EUROMOD. miCROmodA will simulate compensations for housing costs in four selected cities. Firewood grants will not be simulated in either of the models due to lack of data on type of household's heating device.

### Grants for newborn children

Grants for newborn children are one of the most frequent types of cash social benefits of LSG and RSG units. According to Šućur et al. (2016), over 80% of cities and municipalities and 30% of counties provide grants for newborn children, for which a total of HRK 130 million was spent in 2013. These grants supplement the Lump-sum grant for a newborn children, the benefit given by the central government to all children in Croatia, for which HRK 90 million was spent in 2013. Similarly as earlier, we define a family of "LSG grants for newborn children". Lump-sum grant for newborn children is simulated in EUROMOD. However, similar grants given by cities, municipalities and counties are not.

In Osijek the citizens can obtain two separate grants – from the city and from the Osijek-Baranja county. The citizens of Split and Rijeka can obtain only the grant from their cities.

Grants for newborn children are typically non-means-tested, i.e., all children receive equal amounts. However, grants in Rijeka and Osijek provide supplemental amounts to low income households.

Grants are usually paid in one instalment. However, when larger amounts are involved, the benefit is paid in two or more instalments. For example, in Zagreb the benefit amount for the third child is considerably high (HRK 54.000) and is paid in six equal yearly instalments.

### Old-age income supplements

According to Šućur et al. (2016), about 15% of cities and 2.5% of municipalities give cash (or near-cash) supplements to pensioners and elder citizens. All of the four analysed cities provide such benefit. In Zagreb, Split and Rijeka the benefit is paid on a monthly basis, whereas in case of Osijek the benefit is paid twice a year in the form of holiday gifts.

A peculiarity of this benefit in some cases is that it is intended to pensioners only. In other words, a subgroup of low-income elderly people who do not receive pensions is excluded. One further issue is the income-test involved, which usually includes only the income of a potential beneficiary, while not taking account of incomes of other family members.

### Subsidies of kindergartens and subsidies of city transport

A large fraction of social protection expenditures by cities is made through in-kind benefits. miCROmodA captures two types of these benefits – for children in kindergartens and for citizens using the city transport. These services are provided by cities. Usually the users have to pay some participation price or fee, whose amount is diversified for different types of users. miCROmodA simulates these fees. In the next step, the value of the subsidy is calculated as the difference between the "economic price" of the service and the fee.

In case of subsidies of kindergartens, there are publicly available economic prices for each analysed city (Table 2.5). One option would be to include a city-specific economic price. However, for reason of comparability we choose to take the unique price of HRK 2,000 per month for all four cities; this amount is roughly equal to the average of the reported economic prices.

City	Price	Source
	(HRK per month)	
Zagreb	1,900	http://www.zagreb.hr/UserDocsImages/arhiva/odgoj_obrazovanje _spot/Obavijest%20o%20sufinanciranju%20dv%20Grada%20Zag reba.pdf
Split	2,045	http://www.split.hr/fgs.axd?id=1148
Rijeka	2,167	http://www.novilist.hr/Vijesti/Rijeka/Manja-potpora-Grada- Rijeke-privatnim-djecjim-vrticima
Osijek	1,760	http://hr.n1info.com/a195237/Vijesti/N1-suceljavanje-u-Osijeku- Sto-je-otjeralo-gradjane-iz-grada.html

Table 2.5. Economic prices of kindergartens for a full-day program

Regarding subsidies of city transport, there is no information on economic prices, but there are prices for yearly and monthly standard tickets, i.e., the prices for citizens who do not have reliefs (Table 2.6). Yearly tickets are available in Zagreb, Rijeka and Osijek, and they are 15.5 to 27.5% cheaper per month of usage. Based on average price of yearly standard tickets, we set the monthly "economic price" at HRK 250.

City	Monthly ticket (HRK)	Yearly ticket (HRK)	Source
Zagreb	360	3,132ª	http://www.zet.hr/cijene-prodaja-i-placanje/50
Split	290	-	http://www.promet-split.hr/cjenik/cjenik-putnih- karata
Rijeka	276	2,794	https://www.autotrolej.hr/karte/mjesecne-karte/ https://www.autotrolej.hr/karte/godisnje-karte/
Osijek	275	2,750	http://www.gpp-osijek.com/cjenik.php

Table 2.6. Standard monthly and yearly tickets for city transport (main zone)

Notes: <sup>a</sup> The price includes a 10% discount for one-time cash payment.

# 2.3 Housing benefits

### 2.3.1 GZG Compensation for housing costs (2017)

### Brief description

Benefit belongs to the family of LSG compensations for housing costs (section 2.2).

Basic features	
Provider:	City of Zagreb
Functions:	Housing, Social assistance
<i>Type</i> :	Subsidy
Beneficiary unit:	Household
Database code: <sup>7</sup>	HO01_GZG01 Naknada za troškove stanovanja (GZG)

### **Beneficiaries**

All households receiving Subsistence benefit. For households which rent the apartment from private persons, a legal rental contract must be available.

### Means testing

Income and assets test is implied via Subsistence benefit.

### Benefit amount

Benefit amount is equal to the costs incurred. The maximum amount of benefit equals 50% of the "means of subsistence".

Implementation in miCROmodA

Policy name: bho5101\_hr. Final variable: bho5101\_s.

(1) Housing costs are the sum of rental costs (xhcrt) and other housing costs (xhcot) minus the amount of Compensation for electricity costs (bhout\_s).

(2) It is assumed that LSG unit covers the costs up to the legal maximum (50% of the "means of subsistence").

(3) We assume that all households which rent the apartment have a legal contract with the rentier. About 10% of sample households eligible to Subsistence benefit are renting the apartment.

<sup>&</sup>lt;sup>7</sup> This is the code used in the database Overview of Social Protection Benefits in Croatia.

### 2.3.2 GST Compensation for housing costs (2017)

### Brief description

Benefit belongs to the family of LSG compensations for housing costs (section 2.2).

Basic features	
Provider:	City of Split
Functions:	Housing, Social assistance
<i>Type</i> :	Subsidy
Beneficiary unit:	Household
Database code:	HO01_GST01 Naknada za troškove stanovanja (GST)

### **Beneficiaries**

All households receiving Subsistence benefit. For households which rent the apartment from private persons, a legal rental contract must be available.

#### Means testing

Income and assets test is implied via Subsistence benefit.

### Benefit amount

Benefit amount is equal to the costs incurred for utility services, water, electricity, rent, collection of municipal waste, and other costs prescribed by the Law. The maximum amount of benefit equals 50% of the "means of subsistence.

### Implementation in miCROmodA

Policy name: bho5201\_hr. Final variable: bho5201\_s.

(1) Housing costs are the sum of rental costs (xhcrt) and other housing costs (xhcot) minus the amount of Compensation for electricity costs (bhout\_s).

(2) It is assumed that LSG unit covers the costs up to the legal maximum (50% of the "means of subsistence").

(3) We assume that all households which rent the apartment have a legal contract with the rentier. About 10% of sample households eligible to Subsistence benefit are renting the apartment.

### 2.3.3 GRI Compensation for housing costs (2017)

### Brief description

Benefit belongs to the family of LSG compensations for housing costs (section 2.2). In addition to the recipients of Subsistence benefit, GRI Compensation for housing costs can be obtained by other low-income households upon income test.

### Basic features

Provider:	City of Rijeka
Functions:	Housing, Social assistance
<i>Type</i> :	Subsidy
Beneficiary unit:	Household
Database code:	HO01_GRI01 Naknada za troškove stanovanja (GRI)

### Beneficiaries

There are two types of beneficiaries:

A. Household receiving Subsistence benefit;

B. Low-income household that does not receive Subsistence benefit.

#### Means testing

A. Implied via the Subsistence benefit.

B. Households that satisfy the "GRI income test".

This condition is fulfilled if the total net monthly income of a household with 1, 2, 3 and 4 members is lower than HRK 2,300, 2,900, 3,900 and 5,000, respectively; for households with n > 4 members, income must be below HRK (5,000 + (n - 4) \* 700).

For a single parent household with 2, 3 and 4 members, the total net monthly income must not exceed HRK 3,480, 4,680 and 6,000, respectively; for households with n > 4 members, income must be below HRK (6,000 + (n - 4) \* 840).

Income definition resembles the definition of Subsistence benefit.

### Benefit amount

(1) For rental costs:

(a) Rentier is legal person:

Both beneficiary groups A and B: 50% of the rent; maximum of HRK 1,000 per month.

(b) Rentier is individual person:

A. Single-person household: HRK 500 per month. Multiple-member household: up to 50% of the "means of subsistence"

B. Single-person household: HRK 500 per month. Multiple-member household: HRK 750 per month.

(2) For electricity costs:

Beneficiary group A. Household with 1, 2, 3 and 4 members receive up to HRK 150, 200, 300 and 400, respectively, per month. Households with n > 4 members receive up to HRK (400 + n \* 50).

Beneficiary group B. Not covered.

(3) For heating costs:

Both beneficiary groups A and B: Up to 50% of the "variable" part of the heating costs.

(4) For gas costs:

Both beneficiary groups A and B: The cost is covered for up to 6 m3 per household member, per month.

(5) For communal services costs:

Both beneficiary groups A and B:

(a) for communal waste disposal - the costs are fully covered

(b) for water delivery and sewage – costs are covered for up to 5 m3 per household member, per month.

(c) for discharge and disposal of waste water from septic tanks and sumps – costs are covered for up to 12m3 per year.

Implementation in miCROmodA

Policy name: bho5301\_hr. Final variable: bho5301\_s.

(1) For households who rent the apartment, we assume that the rentier is a legal person.

(2) In the data all the household costs are put in the "other housing costs" (xhcot) variable. Therefore, we arbitrary divide this amount into electricity costs (40%), heating costs (40%) and other costs (20%). Such division roughly corresponds to shares obtained in the national household consumption survey DZS (2012).

### 2.3.4 GOS Compensation for housing costs (2017)

### Brief description

Benefit belongs to the family of LSG compensations for housing costs (section 2.2).

Basic features	
Provider:	City of Osijek
Functions:	Housing, Social assistance
Type:	Subsidy
Beneficiary unit:	Household
Database code:	HO01_GOS01 Pomoć za stanovanje (GOS)

### **Beneficiaries**

All households receiving Subsistence benefit. For households which rent the apartment from private persons, a legal rental contract must be available.

#### Means testing

Implied via the Subsistence benefit.

### Benefit amount

The benefit covers the costs of rent, water, utility charges, household waste disposal, electricity, gas, wood and other fuels, heating, and other housing costs. The benefit amount equals 50% of the "means of subsistence".

### Implementation in miCROmodA

### Policy name: bho5401\_hr. Final variable: bho5401\_s.

(1) Housing costs are the sum of rental costs (xhcrt) and other housing costs (xhcot) minus the amount of Compensation for electricity costs (bhout\_s).

(2) It is assumed that LSG unit covers the costs up to the legal maximum (50% of the "means of subsistence").

(3) We assume that all households which rent the apartment have a legal contract with the rentier. About 10% of sample households eligible to Subsistence benefit are renting the apartment.

### 2.4 Grants for newborn children

### 2.4.1 GZG Grant for a newborn child (2017)

#### Brief description

Benefit belongs to the family of LSG grants for newborn children (section 2.2). Benefit is received by parents and adoptive parents with the residence in the City of Zagreb. The benefit amount increases with the number of children, reflecting the pronatalist aspect of this measure. The benefit is paid in instalments, over the course of one or more years.

<i>Basic features</i>
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Provider:	City of Zagreb
Functions:	Family
Type:	Cash benefit
Beneficiary unit:	Household
Database code:	FA03_GZG01 Novčana pomoć za opremu novorođenog djeteta (GZG)

#### **Beneficiaries**

The grant is received by a parent of a newborn or adopted child. The beneficiary parent must be a Croatian citizen with a residence in the City of Zagreb for at least five years preceding the birth of the child. The other parent must have residence in the City of Zagreb at the time of application for a benefit. The residence in the City of Zagreb must continue without interruption for both parents throughout the benefit duration. If the beneficiary parent dies or no longer lives with children (i.e. due to divorce), the beneficiary parent becomes the parent who continues caring and supporting children. The benefit is also available to adoptive parent.

#### *Means testing*

Not applied.

Benefit amount

Benefit amount depends on the number of children aged below 18, who are living in the same household with the beneficiary parent. The benefit is paid in two or more equal-amount instalments, according to Table 2.7.

Implementation in miCROmodA

Policy name: bfa5101\_hr. Final variable: bfa5101\_s.

(1) We only simulate the Grant for a newborn child, and not for the adopted children.

1 u d l c 2.7. 0 20 0 u l l l d l u l c w d d l l c l l u l c l c l c l l u l d l d l u l d l d	<i>Table 2.7.</i>	GZG	Grant	for c	ı newborn	child:	benefit	amount
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	Total amount (in HRK)	Instalments
first child	1,800	Year 0: HRK 1,800
second child	3,600	Years 0-1: HRK 1,800 in each
third and each subsequent child	54,000	Years 0-5: HRK 9,000 in each

### 2.4.2 GST Grant for a newborn child (2017)

#### Brief description

Benefit belongs to the family of LSG grants for newborn children (section 2.2). Benefit is received by parents and adoptive parents if a child is born in the City of Split and at least one parent has residence in this city. The benefit amount increases with the number of children, reflecting the pronatalist aspect of this measure.

Basic features	
Provider:	City of Split
Functions:	Family
<i>Type</i> :	Cash benefit
Beneficiary unit:	Household
Database code:	FA03_GST01 Naknada novorođenoj djeci (GST)

#### **Beneficiaries**

The grant is received by a parent of a newborn or adopted child. Newborn child must be born in the City of Split and one of the parents must be a resident of the City of Split. The adoptive parent may use the benefit if it was not already been used for this child by its biological parent.

#### Means testing

Not applied.

#### Benefit amount

Benefit amount equals HRK 2,000 for the first child in a family (Table 2.8). For each additional child the amount is increased by HRK 1,000. However, the benefit is paid in yearly instalments of HRK 2,000.

Implementation in miCROmodA

Policy name: bfa5201\_hr. Final variable: bfa5201\_s.

(1) We only simulate the Grant for a newborn child, and not for the adopted children.

	Total amount (in HRK)	Instalments
first child	2,000	Year 0: HRK 2,000
second child	3,000	Year 0: HRK 2,000 Year 1: HRK 1,000
third child	4,000	Year 0: HRK 2,000 Year 1: HRK 2,000
fourth child	5,000	Year 0: HRK 2,000 Year 1: HRK 2,000 Year 2: HRK 1,000
fifth child	6,000	Year 0: HRK 2,000 Year 1: HRK 2,000 Year 2: HRK 2,000

#### Table 2.8. GST Grant for a newborn child: benefit amount

### 2.4.3 GRI Grant for a newborn child (2017)

### Brief description

Benefit belongs to the family of LSG grants for newborn children (section 2.2). This benefit merges two grants for newborn children given by the City of Rijeka. The universal grant (henceforth, "main grant") is obtained by all newborn children. The second grant ("supplemental grant") is obtained by certain groups of children.

Basic features	
Provider:	City of Rijeka
Functions:	Family
Type:	Cash benefit
Beneficiary unit:	Household
Database code:	FA03_GRI01 Novčana potpora za novorođenče (GRI)
	FA03_GRI02 Pomoć za nabavu opreme novorođenčeta (GRI)

### **Beneficiaries**

Both grants are received by a parent of a newborn child. The main grant is obtained for every newborn child. The supplemental grant is obtained for the following groups of children:

A. Child in a household which receives Subsistence benefit.

B. Child in a household that satisfies the "GRI income test".

C. Child of HRVI and CIR.

D. Child of a lone parent.

#### *Means testing*

The main grant is not means-tested. For the supplemental grant, the means testing depends on the beneficiary subgroup:

A. Implied via the Subsistence benefit;

B. Households must satisfy the "GRI income test" (section 2.3.3);

C and D. Not applied.

#### Benefit amount

The amount of the main grant in 2017 is HRK 1,500 for the first child, HRK 2,000 for the second child, and 3,000 for the third and any further child in the family.

The supplemental grant is disbursed in the form of coupons that can be used for the purchase of child products. The value of a coupon for one child is HRK 2,000.

Implementation in miCROmodA

Policy name: bfa5301\_hr. Final variable: bfa5301\_s.

(1) The supplemental grant is not simulated for children of HRVIs and CIRs, due to the lack of data.

### 2.4.4 GOS Grant for a newborn child (2017)

### Brief description

The benefit combines two grants for a newborn child: from the City of Osijek and from the Osijek-Baranja county.

The City of Osijek grant is received by parents of newborn children with the residence in the City of Osijek. Grant is available to all children, but the beneficiaries of Subsistence benefit obtain it at a larger amount.

The Osijek-Baranja county grant is received by parents of newborn children with the residence in the Osijek-Baranja county. Equal amount is obtained by all beneficiaries.

#### Basic features

Provider:	City of Osijek
Functions:	Family
Type:	Cash benefit
Beneficiary unit:	Household
Database code:	FA03_GOS01 Novčana pomoć za opremu novorođenog djeteta (GOS)
	FA03 ZOB01 Jednokratne novčane pomoći obiteljima novorođene djece
	(ZOB)

### **Beneficiaries**

The City of Osijek grant is received by a parent of a newborn child, under condition that both parent and a child are residents of the City of Osijek. Two groups of parents are recognised:

A. Parents that are beneficiaries of Subsistence benefit;

B. Parents that are not beneficiaries of Subsistence benefit.

The Osijek-Baranja county grant is received by a parent of a newborn child, under condition that a child is a resident of the Osijek-Baranja county.

### Means testing

For the City of Osijek grant the means testing depends on the beneficiary subgroup:

A. Implied via the Subsistence benefit; B. Not applied.

For the Osijek-Baranja county grant there is no means-testing.

#### Benefit amount

For the City of Osijek grant, the benefit amount depends on the beneficiary subgroup:

A. HRK 3,000; B. HRK 2,000.

For the Osijek-Baranja county grant the benefit amount is HRK 1.000.

Implementation in miCROmodA

Policy name: bfa5401\_hr. Final variable: bfa5401\_s.

### 2.5 Old-age income supplements

### 2.5.1 GZG Old-age income supplement (2017)

### Brief description

Benefit is received by a pensioner with residence in the City of Zagreb, whose income is below certain threshold.

**Basic features** 

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#### **Beneficiaries**

Pensioner is a person receiving a pension. Elderly people not receiving a pension are not included. Beneficiaries of family pension living within a same family are treated as separate income units.

#### Means testing

Pensioner's individual income must not exceed HRK 1,500 per month.

#### Benefit amount

Benefit amount depends on pensioner's individual income and is obtained according to the rules described in Table 2.9. One-time Easter and Christmas bonuses, each amounting to HRK 100, are paid to all beneficiaries.

Implementation in miCROmodA

Policy name: boa5101\_hr. Final variable: boa5101\_s.

	Table 2.9. GZ	'G Old-age incom	e supplement: benefi	t amount (HRK	per month)
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Monthly individual income in HRK	Benefit amount
0 to 900	400
900 to 1,200	300
1,200 to 1,500	200

### 2.5.2 GST Old-age income supplement (2017)

### Brief description

Benefit is received by a pensioner with residence in the City of Split, whose pension is below certain threshold.

Basic features	
Provider:	City of Split
Functions:	Disability, Old-age, Survivors, Social assistance
<i>Type</i> :	Cash benefit
Beneficiary unit:	Individual
Database code:	OA02 GST01 Naknade umirovljenicima (GST)

### **Beneficiaries**

Pensioner is a person receiving a pension. Elderly people not receiving a pension are not included.

#### Means testing

Pension must not exceed HRK 2,000 per month.

### Benefit amount

Benefit amount depends on pension and is obtained according to the rules described in Table 2.10. One-time Christmas bonus is paid to all beneficiaries; the amount is HRK 300 for those with monthly pension up to HRK 1,500, and HRK 150 for those with pension between HRK 1,500 and 2,000.

Implementation in miCROmodA

Policy name: boa5201\_hr. Final variable: boa5201\_s.

<i>Table 2.10.</i>	GST	Old-age in	ncome sup	plement:	benefit	amount (	HRK	per mon	th)
		0	1	1	~ ~ ~	1		4	

Monthly pension in HRK	Benefit amount
0 to 900	250
900 to 1,200	200
1,200 to 1,500	150
1,500 to 2,000	100

### 2.5.3 GRI Old-age income supplement (2017)

### Brief description

Benefit is received by two groups of persons with residence in the City of Rijeka: (a) pensioners whose pension is below certain threshold, and (b) persons aged above 65 years without personal income, who live in low-income households.

Basic features	
Provider:	City of Rijeka
Functions:	Disability, Old-age, Survivors, Social assistance
Type:	Cash benefit
Beneficiary unit:	Individual
Database code:	OA02_GRI01 Novčana pomoć za umirovljenike (GRI)
	OA02_GRI02 Novčana pomoć za starije osobe bez dohotka (GRI)

### Beneficiaries

A. Pensioners with low pension amount;

B. Persons aged above 65 years with low income.

### Means testing

Beneficiaries must not own: (a) an apartment or house, which does not serve them for living, (b) property for business purposes, (c) weekend house.

A. Pension must not exceed HRK 1,400 per month;

B. Person must have no personal income and household must satisfy the GRI income test.

#### Benefit amount

A. Benefit amount is obtained according to the rules described in Table 2.11.

B. Benefit amount is HRK 150 per month;

One-time Christmas bonus of HRK 300 is paid to all beneficiaries.

Implementation in miCROmodA

Policy name: boa5301\_hr. Final variable: boa5301\_s.

(1) Property asset test is not simulated, due to the lack of data.

Table 2.11. GRI Old-age income supplement: benefit amount for pensioners (HRK per month)

Monthly pension in HRK	Benefit amount
0 to 1,000	1,200 minus the amount of pension
1,000 to 1,400	150

### 2.5.4 GOS Old-age income supplement (2017)

### Brief description

Benefit is received by two groups of persons with residence in the City of Osijek: (a) pensioners whose pension is below certain threshold, and (b) low-income households. Benefit is paid as one-time gift twice a year, at Easter and Christmas.

**Basic features** 

Provider:	City of Osijek
Functions:	Disability, Old-age, Survivors, Social assistance
<i>Type</i> :	Cash benefit
Beneficiary unit:	Individual
Database code:	SA04_GOS01 Jednokratna pomoć za umirovljenike i socijalno ugrožene
	obitelji povodom Uskrsa i Božića (GOS)

### **Beneficiaries**

A. Pensioners with low pension amount;

B. Low income households.

### Means testing

A. Pension must not exceed HRK 2,000 per month;

B. Household that is a recipient of GOS Compensation for housing costs.

### Benefit amount

Benefit consists of two one-time grants per year, amounting between HRK 100 and 250 each, depending on the monthly pension (Table 2.12). Thus, the total yearly amount is between HRK 200 and 500.

Implementation in miCROmodA

Policy name: boa5401\_hr. Final variable: boa5401\_s.

Table 2.12. GOS Old-age income supplement: benefit amount (HRK per year)

Monthly pension in HRK	Benefit amount
0 to 1,000	250 + 250
1,000 to 1,700	200 + 200
1,700 to 2,000	100 + 100

### 2.6 Subsidies of kindergartens

### 2.6.1 GZG Subsidy of kindergarten (2017)

### Brief description

Benefit is received by the parents of children involved in the City of Zagreb programs of pre-school day care. Parents pay the fee, which is lower than the "economic price"; the difference between the latter and the former makes the benefit amount. Different groups of parents pay different fees, according to income test and other criteria.

#### **Basic** features

Provider:	City of Zagreb
Functions:	Family, Education
Type:	Subsidy
Beneficiary unit:	Individual
Database code:	FA23_GZG01 Subvencioniranje učešća roditelja u cijeni predškolskih programa (GZG)

#### **Beneficiaries**

The beneficiary is a child involved in the City of Zagreb program of pre-school day care.

#### Means testing

The definition of household income resembles the definition of income for Subsistence benefit. Two items are deducted, if they are related to the property where the household is living: (a) mortgage payments, and (b) rental paid.

#### Benefit amount

Benefit amount is the difference between the economic price of the child-care service and the fee paid by the parent. The calculation of the fee consists of the following steps:

(1) The "basic price per child" (BPC), is determined according to Table 2.13.

(2) "Total price before reliefs" is obtained as TPBR = BPC \* NC, where NC is the total number of children from a family currently involved in the program.

(3) From the set of reliefs, the beneficiary chooses the one that results in the smallest fee in the end. These reliefs are shown in Table 2.14.

(4) The fee is the difference between TPBR and the value of chosen relief.

Economic price equals HRK 1,900 per month (Table 2.5).

Implementation in miCROmodA

Policy name: bfa5102\_hr. Fee: i\_bfa5102\_fee. Subsidy (benefit amount): bfa5102\_s.

(a) Benefit is obtained by children who spent 10 or more hours per week in the pre-school programs, according to our input data. We assume that all children are included in the full-day program.

(b) The reliefs R6 and R7 are not simulated, due to the lack of data.

Monthly household income per member	Full-day program	Half-day program
less than 2,500	150	97.50
2,500 to 3,500	300	195.00
3,500 to 4,500	450	292.50
more than 4 500	600	390.00

Table 2.13. GZG Subsidy of kindergarten: basic price per child (HRK per month)

# Table 2.14. Reliefs, GZG Subsidy of kindergarten

#	Condition	Amount
R1	For the second child currently involved in the program the price is reduced by 25%.	0.25 * BPC
R2	For the third and any subsequent child currently involved in the program the price is 0.	(NC – 2) * BPC
R3	For a child of a parent with 10%-50% disability, the price is reduced by 25%.	0.25 * TPBR
R4	For a child of a lone parent, the price is reduced by 25%.	0.25 * TPBR
R5	For a child whose family receives Subsistence benefit, the price is reduced by 80%.	0.80 * TPBR
R6	For a child of a parent with 60%-80% disability, the price is reduced by 50%.	0.5 * TPBR
R7	For a child of a parent with 90%-100% disability, the price is 0.	TPBR

### 2.6.2 GST Subsidy of kindergarten (2017)

### Brief description

Benefit is received by the parents of children involved in the City of Split programs of pre-school day care. Parents pay the fee, which is lower than the "economic price"; the difference between the latter and the former makes the benefit amount. Different groups of parents pay different fees, according to income test and other criteria.

Basic features	
Provider:	City of Split
Functions:	Family, Education
<i>Type</i> :	Subsidy
Beneficiary unit:	Individual
Database code:	FA23_GST01 Sufinanciranje cijene programa jaslica i dječjih vrtića (GST)

### **Beneficiaries**

The beneficiary is a child involved in the City of Split program of pre-school day care.

Means testing

Not applied.

#### Benefit amount

Benefit amount is the difference between the economic price of the child-care service and the fee paid by the parent. The calculation of the fee consists of the following steps.

(1) The "basic price per child" (BPC), is determined according to Table 2.15.

(2) "Total price before reliefs" is obtained as TPBR = BPC \* NC, where NC is the total number of children from a family currently involved in the program.

(3) From the set of reliefs, the beneficiary chooses the one that results in the smallest fee in the end. These reliefs are shown in Table 2.16.

(4) The fee is the difference between TPBR and the value of chosen relief.

Economic price equals HRK 2,045 (Table 2.5).

Implementation in miCROmodA

Policy name: bfa5202\_hr. Fee: i\_bfa5202\_fee. Subsidy (benefit amount): bfa5202\_s

(a) Benefit is obtained by children who spent 10 or more hours per week in the pre-school programs, according to our input data. We assume that all children are included in the 10-hour kindergarten program.

(b) The reliefs R8, R9 and R10 are not simulated, due to the lack of data.

Program type	Price
10-hour nursery program	495
10-hour kindergarten	480
8-hour kindergarten	410
6-hour kindergarten	250
5-hour kindergarten	230

Table 2.15. GST Subsidy of kindergarten: basic price per child (HRK per month)

Table 2.16. Reliefs, GST Subsidy of kindergarten

#	Condition	Amount
R1	For the second child currently involved in the program the price is reduced by 30%.	0.3 * BPC
R2	For the third and any subsequent child currently involved in the program the price is 0.	(NC – 2) * BPC
R3	For a child whose family receives Subsistence benefit, the price is zero.	TPBR
R4	For a child without both parents, the price is zero.	TPBR
R5	For a child from a family with three or more children, which receives Child benefit, the price is reduced by 50%.	0.5 * TPBR
R6	For a child of a lone parent, the price is reduced by 50%.	0.5 * TPBR
R7	For a child with health impairment or disability, the price is reduced by 50%.	0.5 * TPBR
R8	For a child of HRVI, HMVI or CIR with 80%-100% disability, the price is zero.	TPBR
R9	For a child of HRVI, HMVI or CIR with 10%-70% disability, the price is reduced by 50%.	0.5 * TPBR
R10	For a child in foster care, the price is reduced by 50%.	0.5 * TPBR

### 2.6.3 GRI Subsidy of kindergarten (2017)

### Brief description

Benefit is received by the parents of children involved in the City of Rijeka programs of pre-school day care. Parents pay the fee, which is lower than the "economic price"; the difference between the latter and the former makes the benefit amount. Different groups of parents pay different fees, according to income test and other criteria.

Dusic jeutures	
Provider: City of Rijeka	
Functions: Family, Education	
<i>Type</i> : Subsidy	
Beneficiary unit: Individual	
<i>Database code:</i> FA23_GRI01 Pomoć za podmirenje troškova boravka djece u j vrtićima (GRI)	aslicama i

### **Beneficiaries**

The beneficiary is a child involved in the City of Rijeka program of pre-school day care.

#### Means testing

Household income includes taxable incomes, net of SICs and PITS. Household income per member is then obtained. For some groups separate income tests are used (GRI income test).

### Benefit amount

Benefit amount is the difference between the economic price of the child-care service and the fee paid by the parent. The calculation of the fee consists of the following steps.

(1) The "basic price per child" (BPC), is determined according to Table 2.17.

(2) "Total price before reliefs" is obtained as TPBR = BPC \* NC, where NC is the total number of children from a family currently involved in the program.

(3) From the set of reliefs, the beneficiary chooses the one that results in the smallest fee in the end. These reliefs are shown in Table 2.18.

(4) The fee is the difference between TPBR and the value of chosen relief.

Economic price equals HRK 2,167 per month (Table 2.5).

Implementation in miCROmodA

Policy name: bfa5302\_hr. Fee: i\_bfa5302\_fee. Subsidy (benefit amount): bfa5302\_s.

(a) Benefit is obtained by children who spent 10 or more hours per week in the pre-school programs, according to our input data. We assume that all children are included in the full-day program.

(b) The reliefs R7 and R8 are not simulated, due to the lack of data.

Monthly household income per member	Full-day program	Half-day program
less than 1/3 of ANWPY2	550	385
1/3 to 1/2 of ANWPY2	600	420
above 1/2 of ANWPY2	720	504

Table 2.17. GRI Subsidy of kindergarten: basic price per child (HRK per month)

# Table 2.18. Reliefs, GRI Subsidy of kindergarten

#	Condition	Amount
R1	For the second child currently involved in the program, the price is reduced by 30%.	0.3 * BPC
R2	For the third child currently involved in the program, the price is reduced by 60%.	0.6 * BPC
R3	For the fourth and any subsequent child currently involved in the program, the price is 0.	(NC – 3) * BPC
R4	For a child in a family which receives Child benefit, the price is reduced by 30%.	0.3 * TPBR
R5	For a child whose family receives Subsistence benefit or the "GRI income test", the price is 0.	TPBR
R6	For a child receiving Supplement for assistance and care or Personal disability allowance, the price is 0.	TPBR
R7	For a child of SSZNHBDR, HRVI and CIR, the price is 0.	TPBR
R8	For a child in foster care, the price is 0.	TPBR

### 2.6.4 GOS Subsidy of kindergarten (2017)

### Brief description

Benefit is received by the parents of children involved in the City of Osijek programs of pre-school day care. Parents pay the fee, which is lower than the "economic price"; the difference between the latter and the former makes the benefit amount. Different groups of parents pay different fees, according to income test and other criteria.

Basic features	
Provider:	City of Osijek
Functions:	Family, Education
<i>Type</i> :	Subsidy
Beneficiary unit:	Individual
Database code:	FA23_GOS01 Subvencioniranje cijene predškolskih programa (GOS)

### **Beneficiaries**

The beneficiary is a child involved in the City of Osijek program of pre-school day care.

#### Means testing

The definition of household income resembles the definition of income for Subsistence benefit. Two items are deducted, if they are related to the property where the household is living: (a) mortgage payments, and (b) rental paid.

### Benefit amount

Benefit amount is the difference between the economic price of the child-care service and the fee paid by the parent. The calculation of the fee consists of the following steps.

The calculation of the fee consists of several steps.

(1) The "basic price per child" (BPC), is determined according to Table 2.19.

(2) "Total price before reliefs" is obtained as TPBR = BPC \* NC, where NC is the total number of children from a family currently involved in the program.

(3) From the set of reliefs, the beneficiary chooses the one that results in the smallest fee in the end. These reliefs are shown in Table 2.20.

(4) The fee is the difference between TPBR and the value of chosen relief.

Economic price equals HRK 1,760 per month (Table 2.5).

Implementation in miCROmodA

Policy name: bfa5402\_hr. Fee: i\_bfa5402\_fee. Subsidy (benefit amount): bfa5402\_s.

(a) Benefit is obtained by children who spent 10 or more hours per week in the pre-school programs, according to our input data. We assume that all children are included in the full-day program.
(b) The reliefs D(c and D7 are not simulated, due to the lock of data.

(b) The reliefs R6 and R7 are not simulated, due to the lack of data.

Household income per member (HRK per month)	Full-day program	Half-day program, lunch included	Half-day program, lunch excluded	Two-hour program
up to 1,000	0	0	0	0
above 1,000	640	520	400	325

Table 2.19. GOS Subsidy of kindergarten: basic price per child (HRK per month)

# Table 2.20. Reliefs, GOS Subsidy of kindergarten

#	Condition	Amount
R1	For the second child currently involved in the program, the price is reduced by 10%.	0.1 * BPC
R2	For the third and any subsequent child currently involved in the program, the price is 0.	(NC – 2) * BPC
R3	For the third child in a family, the total amount is reduced by 20%	0.2 * BPC
R4	For the fourth and any subsequent child in a family, the total amount is reduced by $30\%$ .	0.3 * BPC
R5	For children of a "lone parent", the price is reduced by 30%.	0.3 * TPBR
R6	For a child with 80%-100% disability, the price is 0.	BPC
R7	For a child of a parent with 80%-100% disability or deaf-mute parent, the price is reduced by 60%.	0.6 * TPBR

# 2.7 Subsidies of city transport

### 2.7.1 GZG City transport subsidy (2017)

### Brief description

City transport monthly or yearly tickets are charged at lower than standard price for some groups of citizens, while for some groups the tickets are free. The subsidy is the difference between the price of the standard ticket and the price paid by the user.

Basic feature	S
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Provider:	City of Zagreb
Functions:	various
Type:	Subsidy
Beneficiary unit:	Individual
Database code:	TR01_GZG01 Besplatne pokazne karte ZET-a (GZG)

### **Beneficiaries**

There are several types of beneficiaries:

A1. Not-low-income pensioner or person aged 65 or more;

- A2. Low-income pensioner or person aged 65 or more;
- B1. Not-low-income pupil at primary school;
- B2. Not-low-income pupil at secondary school;
- B3. Not-low-income student;
- B4. Low-income pupils and students;
- C. Beneficiary of Subsistence benefit who is unable to work;
- D. Family member of a killed HBDR;
- E1. A non-employed person with disability;
- E2. Caregiver;

E3. Voluntary blood donor; man (woman) with more than 40 (20) donations;

F. Low-income unemployed person.

### Means testing

A2. Pensioner's individual income must not be greater than HRK 3,200 per month.

B4. The household income per household member must not be greater than HRK 2,000 per month. F. The household income per household member must not be greater than HRK 2,000 per month. Other groups: not applied.

### Benefit amount

Monthly benefit amount equals the difference between the monthly economic price of HRK 250 (section 2.2) and the monthly ticket price paid by the beneficiary (Table 2.21).

Implementation in miCROmodA

Policy name: btt5101\_hr. Monthly ticket price: i\_btt5101\_fee. Subsidy (benefit amount): btt5101\_s.

(a) We assume that all eligible individuals receive the subsidy.

(b) Groups D, E2 and E3 are not simulated, due to the lack of data.

Group	Price (HRK)
A1	100
B1	90
B2 and B3	100
A2, B4, C, D, E1, E2, E3, F	0

Table 2.21. Prices of monthly tickets in Zagreb (main zone)

### 2.7.2 GST City transport subsidy (2017)

### Brief description

City transport monthly or yearly tickets are charged at lower than standard price for some groups of citizens, while for some groups the tickets are free. The subsidy is the difference between the price of the standard ticket and the price paid by the user.

<i>Basic features</i>
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Provider:	City of Split
Functions:	various
<i>Type</i> :	Subsidy
Beneficiary unit:	Individual
Database code:	TR01_GST01 Subvencija gradskog prijevoza za građane (GST)

### Beneficiaries

There are several types of beneficiaries:

- A1. Pensioner aged below 65 years;
- A2. Pensioner aged 65 years or more; person aged 65 or more;
- B1. Pupil or student;
- B2. Pupil or student from the family with three or more children, which receives Child benefit;
- B3. Pupil or student who is a sportsman;
- C1. User of soup kitchens for the poor;
- C2. Low-income person, if city transport is necessary to obtain medical treatments;
- D1. Unemployed HBDR;
- D2. Family member of SSZNHBDR;
- E1. Person with 70%-100% disability;

E2. Voluntary blood donor; man (woman) with more than 40 (20) donations.

### Means testing

A2. Individual income is used to determine the fee; see Table 2.22.

Other groups: not applied.

### Benefit amount

Monthly benefit amount equals the difference between the monthly economic price of HRK 250 (section 2.2) and the monthly ticket price paid by the beneficiary (Table 2.22).

Implementation in miCROmodA

Policy name: btt5201\_hr. Monthly ticket price: i\_btt5201\_fee. Subsidy (benefit amount): btt5201\_s.

(a) We assume that all eligible individuals receive the subsidy.(b) Only groups A1, A2, B1 and B2 are simulated; other groups are not, due to the lack of data.

Group	Price (HRK)
A1	143
B1	130
B3	65
A2, according to income	
(HRK per month):	
less than 2,000	10/12
2,000 to 3,000	70/12
3,000 to 3,500	100/12
3,500 to 4,000	140/12
4,000 to 5,000	200/12
5,000 to 6,000	250/12
Above 6,000	300/12
B2, C1, C2, D1, D2, E1, E2	0

Table 2.22. Prices of monthly tickets in Split (main zone)

### 2.7.3 GRI City transport subsidy (2017)

### Brief description

City transport monthly or yearly tickets are charged at lower than standard price for some groups of citizens, while for some groups the tickets are free. The subsidy is the difference between the price of the standard ticket and the price paid by the user.

### Basic features

Provider:	City of Rijeka
Functions:	various
<i>Type</i> :	Subsidy
Beneficiary unit:	Individual
Database code:	TR01_GRI01 Pomoć za podmirenje troškova javnog prijevoza (GRI)

### Beneficiaries

There are several types of beneficiaries:

A. Person aged 65 years or more;

B1. Not-low-income pupil at primary school;

B2. Not-low-income pupil at secondary school or student;

B3. Low-income pupil or student (according to Subsistence benefit or GRI income test) ;

C1. Head of a low-income household (receiving Subsistence benefit);

C2. Head of a low-income household (according to GRI income test);

D. HRVI; RVI; CIR family survivor of SSZNHBDR; Child of HRVI; Child of PUN RVI or PUN CIR; Child of CIRDR;

E1. Various groups of persons with disability and health problems, if out of work;

E2. Voluntary blood donor; man (woman) with more than 40 (25) donations, if out of work;

F. Unemployed person, receiving Subsistence benefit or according to GRI income test.

### Means testing

A. Individual income is used to determine the fee; see Table 2.23.

Other groups: not applied.

### Benefit amount

Monthly benefit amount equals the difference between the monthly economic price of HRK 250 (section 2.2) and the monthly ticket price paid by the beneficiary (Table 2.23).

Implementation in miCROmodA

Policy name: btt5301\_hr. Monthly ticket price: i\_btt5301\_fee. Subsidy (benefit amount): btt5301\_s

(a) We assume that all eligible individuals receive the subsidy, opting for "zone I".

(b) Groups D and E2 are no simulated, due to the lack of data.

Group	Price (HRK)
Standard	276
B1	92
B2	134
A, according to income	
(HRK per month):	
less than 2,000	30/12
2,000 to 3,000	78/12
3,000 to 4,000	144/12
above HRK 4,000	198/12
B3, C1, C2, D, E1, E2, F	0

Table 2.23. Prices of monthly tickets in Rijeka (main zone)

### 2.7.4 GOS City transport subsidy (2017)

### Brief description

City transport monthly or yearly tickets are charged at lower than standard price for some groups of citizens, while for some groups the tickets are free. The subsidy is the difference between the price of the standard ticket and the price paid by the user.

### Basic features

Provider:	City of Osijek
Functions:	various
<i>Type</i> :	Subsidy
Beneficiary unit:	Individual
Database code:	TR01_GOS01 Pomoć za podmirenje troškova javnog prijevoza (GOS)

### **Beneficiaries**

There are several types of beneficiaries:

A. Pensioner or person aged 65 years or more;

- B1. Pupil at primary school;
- B2. Pupil at secondary school;

B3. Student;

B4. Low-income pupil or student (recipient of GOS Compensation for housing costs);

- C1. Head of a low-income household (recipient of GOS Compensation for housing costs) ;
- C2. Head of a low-income household (recipient of GOS Free meals in community kitchen) ;
- E. 100% deaf person (if not in work or pensioner); 100% blind person; deaf and blind person;
- F1. Unemployed person receiving Unemployment benefit;

F2. Unemployed person not receiving Unemployment benefit.

#### Means testing

A. Individual income is used to determine the fee; see Table 2.24. Other groups: not applied.

### Benefit amount

Monthly benefit amount equals the difference between the monthly economic price of HRK 250 (section 2.2) and the monthly ticket price paid by the beneficiary (Table 2.24).

Implementation in miCROmodA

Policy name: btt5401\_hr. Monthly ticket price: i\_btt5401\_fee. Subsidy (benefit amount): btt5401\_s.

(a) We assume that all eligible individuals receive the subsidy, opting for "zone I".

(b) Group E is not simulated, due to the lack of data.

Group	Price (HRK)
B1	55
B2	55
B3	120
F1	50
F2	30
A, according to income	
(HRK per month):	
less than 1,000	20
1,000 to 2,000	40
2,000 to 3,000	60
3,000 to 4,000	80
above HRK 4,000	100
B4, C1, C2, E	0

Table 2.24	Prices of	<sup>c</sup> monthly	tickets in	Osiiek I	(main zone)
10010 2.2 /.	1 11000 05	monny	menens m	Oblyen	11101111 20110)

### **3. POLICY SPINE AND DATA**

### 3.1 Taxes and social benefits in EMHR

EMHR simulates a dozen tax-benefit instruments at the central government level. Among the benefits we have: Unemployment benefit (bunct\_s), Child benefit (bch\_s), Maternity leave benefit (bfama\_s), Parental leave benefit (bfapl\_s), Maternity and parental allowance (bmanc\_s), Lump-sum grant for a newborn child (bfaba\_s) and Subsistence benefit (bsa\_s). Other benefits are not simulated in EUROMOD, but the data for them are taken directly from the SILC; these include pension, sickness, disability, housing, education, old-age and survivors benefits, as well as some not-simulated unemployment and social assistance benefits.

On the tax side, EMHR simulates a wide range of social insurance contributions: employers (tscer\*\_s), employees (tscee\*\_s), pensioners (tscbesi\_s), self-employed and "contractual workers" (tscse\*\_s) and credited SICs (tscct\_s). Furthermore, Personal income tax (pit\_s) and Surtax (tmu\_s) are simulated, while personal property taxes (tpr) are taken directly from SILC.

Thus, EMHR simulates many important taxes and social benefits, all of which are administered by the CG. The exception is Surtax, which is the LGU tax that is obtained as a proportion of PIT obligation, where this proportion, or rate, is determined by each municipality. Thus, the surtax rates vary greatly across the country, but SILC data do not include information on municipality or surtax rate. Therefore, EMHR approximates the surtax rate using the variables on the population density areas.

EUROMOD contains the modules for all 28 EU countries, and EMHR is one of them. In EUROMOD terminology, EMHR is a "country", and it contains several "systems", each representing a Croatian tax-benefit system in particular year. The version Y8 of EUROMOD contains the years 2011-2017, while the version Y9 will add the year 2018. Each system has its "policy spine", which is the list of tax-benefit policies set in the order in which these policies are executed. For EMHR, the policy spine can be found in the EUROMOD Country Report (Urban et al., 2018; section 2.2).

### 3.2 Taxes and social benefits in miCROmodA

miCROmodA covers the period from 2014 to 2018, and contains nine systems. The systems HR\_2014, ..., HR\_2018 are very similar to their counterparts in the EMHR: they simulate the same taxes and benefits. There are differences regarding the input data sets, whereby miCROmodA uses more detailed variables regarding employment and self-employment income. In case of contractual work, the data enable separate simulation of SICs on "regular"

and "authors' honoraria" components.<sup>8</sup> The systems HR\_2014, ..., HR\_2018 do not simulate LSG social benefits, but they are simulated in the special systems HRZG\_2017, HRST\_2017, HRRI\_2017 and HROS\_2017, for Zagreb, Split, Rijeka and Osijek, respectively, in 2017. The latter four systems contain both the CG and LSG tax-benefit instruments.

Table 3.1 presents the miCROmodA spine for selected systems.<sup>9</sup> Policies at the upper part of the spine are identical for all systems, while those in the bottom part are related to local social benefits. First, there are five "definition" policies (tudefmu\_hr, ..., cvmu02\_hr), which are used to create pre-requisite tax units, income definition and certain intermediate variables necessary for simulation of LSG benefits. This is followed by 20 benefit policies for the four cities.

Policy	HR_2017	HRZG_ 2017	HRST_ 2017	HRRI_ 2017	HROS_ 2017	Description of policies
SetDefault_hr	on	on	on	on	on	DEF: Default values for variables
uaa_hr	switch	switch	switch	switch	switch	SWITCH: Uprating by Average Adjustment (for pensions)
Uprate_hr	on	on	on	on	on	DEF: Uprating factors
ConstDef_hr	on	on	on	on	on	DEF: Constants
ilsdef_hr	on	on	on	on	on	DEF: Standardised income lists
ildef_hr	on	on	on	on	on	DEF: Non-standardised income lists
tudef_hr	on	on	on	on	on	DEF: Assessment units
cv_hr	on	on	on	on	on	DEF: Common variables
bta_hr	switch	switch	switch	switch	switch	SWITCH: Benefit Take-up Adjustments (ON=non take-up; OFF=full take up)
yem_hr	off	off	off	off	off	DEF: Minimum wage
neg_hr	on	on	on	on	on	DEF: Recode negative self-employment income to zero
InitVars hr	on	on	on	on	on	DEF: Initialise variables
tscer hr	on	on	on	on	on	SIC: Employers
tscee_hr	on	on	on	on	on	SIC: Employees
tscse00_hr	on	on	on	on	on	SIC: Self-employed
tscsecw00_hr	on	on	on	on	on	SIC: Income from contractual work (regular)
tscsecw01_hr	on	on	on	on	on	SIC: Income from contractual work (authors' honoraria)
tscbesi_hr	on	on	on	on	on	SIC: Pensioners
tin_hr	on	on	on	on	on	TAX: Personal income tax
bfama_hr	on	on	on	on	on	BEN: Maternity leave benefit
bfapl_hr	on	on	on	on	on	BEN: Parental leave benefit
bfaba_hr	on	on	on	on	on	BEN: Lump-sum Grant for a newborn children
bmanc_hr	on	on	on	on	on	BEN: Maternity and parental allowance
bunct_hr	on	on	on	on	on	BEN: Unemployment benefit
tin_hr	on	on	on	on	on	TAX: Personal income tax (repetition of policy)
tmu_hr	on	on	on	on	on	TAX: Surtax

Table 3.1. miCROmodA spine: order of simulations

<sup>8</sup> Policy tscse01\_hr in EMC is replaced by tscsecw00\_hr and tscsecw01\_hr in miCROmod.

<sup>9</sup> HR\_2014, HR\_2015, HR\_2016 and HR\_2018 are not shown here, but they are almost identical to HR 2017.

tscct_hr	on	on	on	on	on	SIC: Credited
bch_hr	on	on	on	on	on	BEN: Child benefit
bsa_hr	on	on	on	on	on	BEN: Subsistence benefit
bhout_hr	on	on	on	on	on	BEN: Compensation for electricity costs
tudefmu hr	n/a	on	on	on	on	DEF: Assessment units for LSG units
il defmu hr	n/a	on	on	on	on	DEF: Income lists for LSG units
cvmu00 hr	n/a	on	on	on	on	DEF: Common variables for LSG units I
cvmu01 hr	n/a	on	on	on	on	DEF: Common variables for LSG units II
cvmu02_hr	n/a	n/a	n/a	on	n/a	DEF: GRI 'SOCIAL' AND 'INCOME' CONDITIONS
bho5101 hr	n/a	on	n/a	n/a	n/a	BEN: GZG Compensation for housing costs
bfa5101_hr	n/a	on	n/a	n/a	n/a	BEN: GZG Grant for a newborn child
bfa5102_hr	n/a	on	n/a	n/a	n/a	BEN: GZG Subsidy of kindergarten
boa5101_hr	n/a	on	n/a	n/a	n/a	BEN: GZG Old-age income supplement
btt5101_hr	n/a	on	n/a	n/a	n/a	BEN: GZG City transport subsidy
bho5201_hr	n/a	n/a	on	n/a	n/a	BEN: GST Compensation for housing costs
bfa5201_hr	n/a	n/a	on	n/a	n/a	BEN: GST Grant for a newborn child
bfa5202_hr	n/a	n/a	on	n/a	n/a	BEN: GST Subsidy of kindergarten
boa5201_hr	n/a	n/a	on	n/a	n/a	BEN: GST Old-age income supplement
btt5201_hr	n/a	n/a	on	n/a	n/a	BEN: GST City transport subsidy
bho5301_hr	n/a	n/a	n/a	on	n/a	BEN: GRI Compensation for housing costs
bfa5301_hr	n/a	n/a	n/a	on	n/a	BEN: GRI Grant for a newborn child
bfa5302_hr	n/a	n/a	n/a	on	n/a	BEN: GRI Subsidy of kindergarten
boa5301_hr	n/a	n/a	n/a	on	n/a	BEN: GRI Old-age income supplement
btt5301 hr	n/a	n/a	n/a	on	n/a	BEN: GRI City transport subsidy
bho5401_hr	n/a	n/a	n/a	n/a	on	BEN: GOS Compensation for housing costs
bfa5401_hr	n/a	n/a	n/a	n/a	on	BEN: GOS Grant for a newborn child
bfa5402_hr	n/a	n/a	n/a	n/a	on	BEN: GOS Subsidy of kindergarten
boa5401_hr	n/a	n/a	n/a	n/a	on	BEN: GOS Old-age income supplement
btt5401_hr	n/a	n/a	n/a	n/a	on	BEN: GOS City transport subsidy
output_std_hr	on	on	on	n/a	on	DEF: Standard output individual level
output std hh hr	off	off	off	off	off	DEF: Standard output household level

### 3.3 Dataset

miCROmodA uses a combination of EMHR data and ILCS data. The procedure for obtaining EMHR data is described in EUROMOD Country Report (Urban et al., 2018). We merge the EMHR input data with ILCS data set. The features of the sample are presented in Table 3.2. The sample is collected in 2016, but incomes relate to 2015. Sample contains 19,635 individuals in 7,567 households.

Database	HR_2016_m1
	(a) EU-SILC 2016
Original sources	(b) ILCS 2016
Provider	(a) Eurostat; (b) CBS
Year of collection	2016
Income reference period	2015
Sample size	Individuals: 19,635; households: 7,567

Table 3.2. miCROmodA database description

### 3.4 New variables

UDB SILC, the database used by EMHR, highly aggregates the data on employment and selfemployment incomes. There are only two variables for employment income: "employee cash or near cash income" (py010) and "non-cash employee income" (py020). Also, there is only one variable on self-employment income: "cash benefits or losses from self-employment" (py050).

ILCS contains much more data about different components of employment income. Table 3.3 shows that there are 15 cash or near cash components (denoted by "C" in the first column) and 11 in-kind components ("K"). Each of these items has its own specific tax treatment: some items are taxable in full amount, while some are partly taxable. Using information from ILSC, we can calculate the amounts of taxable and non-taxable income for each component. miCROmodA has four variables on employment income: taxable cash (yemtx), non-taxable cash (yemnt), taxable in-kind (kfbtx) and non-taxable in-kind (kfbnt) employment income.

EU-SILC does not differentiate between taxable and non-taxable employment income. Therefore, EMHR assumes that the whole employment income is taxable. However, Table 3.3 reveals that a large amount of employment income is not taxable, namely, around HRK 3,5 million or 3.1% of total employment income.

		Taxable	Not taxable	Total
С	Basic part	105,371	0	105,371
С	Vacation and Christmas allowance	98	701	799
С	Overtime work supplement	591	0	591
С	Bonus for successful business	216	0	216
С	The 13th salary	62	0	62
С	Separate living allowance	2	19	21
С	Jubilee award	20	90	110
С	Public transport allowance	0	2,229	2,229
С	Hot meal allowance	274	0	274
С	Disability allowance	1	3	4
С	Death of family member allowance	1	11	12
С	Allowance for sickness leave (over 90 days)	9	19	28
С	Gifts for children under 15y	41	77	118
С	Supplement for maritime and field work	0	243	243
С	Birth grant	0	15	15
	Total cash employment income	106,686	3,406	110,092
Κ	Private use of company's car	291	0	291
Κ	Tickets for public transport	0	53	53
Κ	Private use of mobile phone	288	0	288
Κ	Free or subsidised meals	352	0	352

Table 3.3. Cash and in-kind employment income in 2015 (HRK million)

### miCROmodA report 2014-2018

K	Free goods and services from the company	72	0	72
Κ	Free or subsidised accommodation from the company	219	0	219
Κ	Subsidised loan from the company	0	0	0
Κ	Value of stock shares received	3	0	3
Κ	Free use of recreational facilities	20	0	20
Κ	Total in-kind employment income	1,244	53	1,297
	Total employment income	107,931	3,459	111,390

Source: miCROmodA, using ILCS 2016 data.

A similar problem arises in relation to self-employment income. The Croatian tax system recognises many different kinds of income from self-employment, and ILCS contains separate variables for the major sub-sources, such as the income of self-employed, income of self-employees in agriculture and two types of income from contractual work. Unfortunately, all this information is lost in the EU-SILC aggregation. The EMHR researchers had to create a special procedure in order to artificially divide persons with positive self-employment income into various groups. With ILCS, in miCROmodA, this is not necessary.

EU-SILC has only one variable for self-employment and contractual work income (py050), but for purposes of the EMHR, this variable is artificially disaggregated into four components: taxable income from contractual work (ysere01), non-taxable income from contractual work (ysere01), taxable income of self-employed persons (ysere00) and non-taxable income of self-employed persons (ysere00).<sup>10</sup> The variable py050 is present in gross and net terms in EU-SILC. If the net and gross amounts for one person are equal, it means that no taxes are paid; this condition is used to distinguish between taxable and non-taxable parts. The difference between self-employed persons and contractual work is revealed using the variables on economic status.

Contrarily, ILCS offers seven different variables to capture the above-mentioned incomes, which leads us to the following miCROmodA variables: (a) taxable self-employment income of small entrepreneurs (ysebstx), (b) non-taxable self-employment income of small entrepreneurs (ysebsnt), (c) taxable self-employment income in agriculture (yseagtx), (d) non-taxable self-employment income in agriculture (yseagnt), (e) income from contractual work – "regular" (ysecw00), (f) income from contractual work – "authors' honoraria" (ysecw01), and (g) income from contractual work – "informal" (ysecw02).<sup>11</sup> Because there exist separate variables for each income type, there is no need for disaggregation and guessing procedures.

<sup>&</sup>lt;sup>10</sup> The variable py050 is present in gross and net terms in EU-SILC. If the net and gross amounts for one person are equal, it means that no taxes is paid; this condition is used to distinguish between taxable and non-taxable parts. The difference between self-employed persons and contractual work is revealed using the variables on economic status.

<sup>&</sup>lt;sup>11</sup> "Authors' honoraria" relate to contractual work performed by artists, scientists, sportsmen, etc.; this income has a different tax treatment than the "regular" contractual work. "Informal" contractual work relates to occasional work paid in cash.

In Table 3.4 we are comparing the aggregate amounts obtained from external sources with those obtained by EMHR and miCROmodA. Items are grouped into four sections. According to external sources (Tax administration), the taxable income from contractual work amounted to about HRK 3.8 billion. However, miCROmodA data (based on ILCS) register less than a third of that amount. EMHR fairs better in that respect, but recall that the variable ysere01 is artificially obtained. Contrarily, ysecw00 and ysecw01 are based directly on sample respondents' answers. EMHR also indicates much larger non-taxable income from contractual work.

Regarding the income of self-employed persons, miCROmodA has higher total values than EMHR, both for taxable and non-taxable components (Table 3.4). Both models show considerably higher taxable amounts from those reported by external sources. Thus, miCROmodA deals with HRK 10.7 billion versus HRK 6.1 billion as reported by Tax administration.

	Amount (HRK million)
Taxable income from contractual work	
External data	3,759
miCROmodA (ysecw00 + ysecw01)	841
EMHR (ysere01)	2,224
Non-taxable income from contractual work	
External data	N/A
miCROmodA (ysecw02)	673
EMHR (ysenr01)	1,451
Taxable income of self-employed persons	6,147
miCROmodA (ysebstx + yseagtx)	10,656
EMHR (ysere00)	9,722
Non-taxable income of self-employed persons	
External data	N/A
miCROmodA (ysebsnt + yseagnt)	1,061
EMHR (ysenr00)	483

Table 3.4. Income	from contractual	work and i	income of se	lf-employed	persons in 2015
					1

Source: miCROmodA, using ILCS 2016 data; ECM, using EU-SILC 2016 data.

Besides employment and self-employment income, investment income (yiy) is shown separately for dividends (yiydv) and interest income (yiyit). Naturally, social benefits in ILCS are represented by separate variables, at least a dozen most important ones. In UDB SILC they are aggregated into several large groups, and EUROMOD researchers have to develop strategies to disaggregate these variables. Fortunately, since SILC 2014 edition, additional variables are created, which divide each major group of benefits (e.g., family benefits) into four subgroups – contributory means-tested, contributory non-means-tested, non-contributory means-tested and non-contributory non-means-tested benefits. With the help of these variables, we can more exactly and confidently recognise different benefits. Of course, in miCROmodA such procedure is not necessary because the variables are already separated.

### 4. VALIDATION

In the process of "macrovalidation" the aggregate numbers of beneficiaries and aggregate amounts are compared to administrative figures. miCROmodA is based on a sample of individuals, but each of them has a personal sample weight, which says how many individuals in actual population are represented by this sample unit. Total number of sample weights is about 4.2 million, which corresponds to the size of Croatian population.

Macrovalidation is performed in the same way as in EUROMOD. The detailed results for EMHR can be found in EUROMOD Country Report (Urban et al., 2018). In this report we will focus our attention to the differences between miCROmodA and EMHR. The results for miCROmodA are presented in Annex 1. Each table contains the column with the corresponding EMHR figures for 2015, and the column with ratios between miCROmodA and EMHR figures.

Regarding the number of employed and unemployed (Table 6.1) the figures in miCROmodA and EMHR are identical. Also, there are no differences concerning the total employment income (Table 6.2 and Table 6.3). However, miCROmodA offers more details on taxable and non-taxable components of employment income. In section 3.4 we have already discussed large differences concerning income from contractual work and income of self-employed persons.

Because miCROmodA takes into account non-taxable employment income, the PIT base is somewhat smaller than in EMHR; correspondingly, the total amount of PIT is by 6% lower in miCROmodA than in EMHR (Table 6.7). Similar discrepancy also exists for SICs on employment income. PIT and SICs on income from contractual work are also lower than in EMHR, while the opposite is true for taxes on income of self-employed persons.

In macrovalidation of LSG social benefits we do not use the whole sample of income units (Table 3.2), but the subsample of individuals who reported to live in densely populated areas.<sup>12</sup> We do not know from the sample data in which city a person exactly lives. Therefore, for each of the four cities – Zagreb, Split, Rijeka and Osijek – we simulate the tax-benefit system

<sup>&</sup>lt;sup>12</sup> This information is based on the EU-SILC variable "Degree of urbanisation" (db100). Municipalities are classified into "densely populated", "intermediate" and "thinly populated". To be considered as the densely populated" municipality, besides a high population density, a municipality must also have a population of at least 50 thousand. Among densely populated are the following cities: Osijek, Pula, Rijeka, Slavonski Brod, Split, Zadar and Zagreb.

for the whole subsample. In calculation of aggregate figures (numbers of beneficiaries and amounts of benefits), we adapt the population weights to reflect the share of each city in the total population of densely populated areas (see footnote 12).

miCROmodA overestimates the number of recipients and total amount of compensations for housing costs, especially in Zagreb and Rijeka. For Zagreb, this can be explained by the fact that, according to administrative data,<sup>13</sup> only 40% of Subsistence benefit recipients in this city are the beneficiaries of the Compensation for housing costs. On the contrary, our model assumes full take up of the Compensation for housing costs: all households receiving Subsistence benefit are eligible and receive the benefit.

			Recipients		Amount (in HRK mil				
		miCROm	External	Ratio	miCROm	External	Ratio		
		odA			odA				
		1	2	3=1/2	4	5	6=4/5		
bho5101	GZG Compensation for housing costs	6,956	2,860	2.43	39.5	15.3	2.58		
bho5201	GST Compensation for housing costs	1,568	1,551	1.01	8.9	4.9	1.81		
bho5301	GRI Compensation for housing costs	5,614	2,137	2.63	18.3	5.6	3.28		
bho5401	GOS Compensation for housing costs	951	785	1.21	5.4	4.2	1.28		
bfa5101	GZG Grant for a newborn child	11,217	22,030	0.51	67.5	78.6	0.86		
bfa5201	GST Grant for a newborn child	1,584	1,397	1.13	2.9	3.9	0.74		
bfa5301	GRI Grant for a newborn child	804	910	0.88	1.9	1.8	1.09		
bfa5401	GOS Grant for a newborn child	676	800	0.84	2.1	2.4	0.86		
bfa5102	GZG Subsidy of kindergarten	20,295	N/A	N/A	481.9	N/A	N/A		
bfa5202	GST Subsidy of kindergarten	4,575	N/A	N/A	109.9	N/A	N/A		
bfa5302	GRI Subsidy of kindergarten	3,304	N/A	N/A	80.6	N/A	N/A		
bfa5402	GRI Subsidy of kindergarten	2,776	N/A	N/A	49.1	N/A	N/A		
boa5101	GZG Old-age income supplement	30,102	11,691	2.57	39.7	45.0	0.88		
boa5201	GST Old-age income supplement	7,487	8,080	0.93	12.8	11.0	1.17		
boa5301	GRI Old-age income supplement	1,709	970	1.76	4.8	2.4	1.96		
boa5401	GOS Old-age income supplement	4,542	6,905	0.66	1.4	2.8	0.52		
btt5101	GZG City transport subsidy	304,222	N/A	N/A	736.5	N/A	N/A		
btt5201	GST City transport subsidy	63,935	N/A	N/A	133.4	N/A	N/A		
btt5301	GRI City transport subsidy	41,217	N/A	N/A	100.5	N/A	N/A		
btt5401	GOS City transport subsidy	44,602	N/A	N/A	98.7	N/A	N/A		

Table 4.1. Macrovalidation of LSG benefits for policy year 2017

Notes: miCROmodA results are obtained for the systems HRZG\_2017, HRST\_2017, HRRI\_2017 and HROS\_2017, and are based on the reduced data sample, which includes only persons living in urban (densely populated) areas.

<sup>&</sup>lt;sup>13</sup> Ministry of Demography, Family, Youth and Social Policy: the yearly report for 2017.

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# 6. ANNEX 1: Validation tables

# Table 6.1. Number of employed and unemployed

	miCROmodA	External			Ratio			EMHR	Ratio
	1	2	3	4	5=1/2	6=1/3	7=1/4	8	9=1/8
	2015	2015	2016	2017	2015	2016	2017	2015	2015
Number of employed	1,420,817	1,566,000	1,585,000	1,590,000	0.91	0.90	0.89	1,420,817	1.00
Number of unemployed	528,638	327,000	306,000	240,000	1.62	1.73	2.20	528,638	1.00

Notes: miCROmodA results are obtained for the system HR\_2015 and the overall data sample.

 Table 6.2. Market income in miCROmodA, number of recipients

		miCROmodA	External			Ratio			EMHR	Ratio
		1	2	3	4	5=1/2	6=1/3	7=1/4	8	9=1/8
		2015	2015	2016	2017	2015			2015	2015
yemkfb	employment income	1,417,599	1,539,874	1,561,582	1,590,563	0.92	0.91	0.89	1,417,599	1.00
yemkfb01	empl. income: below 25% of AGW2	135,888	130,310	121,372	120,077	1.04	1.12	1.13	135,888	1.00
yemkfb02	empl. income: 25% to 50% of AGW2	236,813	367,522	374,005	357,767	0.64	0.63	0.66	236,813	1.00
yemkfb03	empl. income: 50% to 75% of AGW2	429,471	372,577	385,359	420,263	1.15	1.11	1.02	429,471	1.00
yemkfb04	empl. income: 75% to 100% of AGW2	231,602	236,780	244,852	256,040	0.98	0.95	0.90	231,602	1.00
yemkfb05	empl. income: 100% to 150% of AGW2	273,047	284,392	284,899	287,039	0.96	0.96	0.95	273,047	1.00
yemkfb06	empl. income: 150% to 200% of AGW2	58,083	75,082	77,348	78,652	0.77	0.75	0.74	58,083	1.00
yemkfb07	empl. income: 200% to 300% of AGW2	41,150	45,640	46,387	44,967	0.90	0.89	0.92	41,150	1.00
yemkfb08	empl. income: above 300% of AGW2	11,545	27,571	27,361	25,759	0.42	0.42	0.45	11,545	1.00
yemkfbtx	taxable employment income	1,417,599	1,539,874	1,561,582	1,590,563	0.92	0.91	0.89	N/A	N/A
yemkfbnt	non-taxable employment income	724,008	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
yemtx	taxable cash employment income	1,416,988	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
yemnt	non-taxable cash employment income	720,171	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
kfbtx	taxable in-kind employment income	180,372	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
kfbnt	non-taxable in-kind employment income	13,147	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
ysecw00	income from contractual work (regular)	70,028	293,671	263,122	264,904	0.24	0.27	0.26	N/A	N/A
ysecw01	income from contractual work (honoraria)	7,070	68,297	70,115	65,588	0.10	0.10	0.11	N/A	N/A
ysecw02	income from contractual work (unofficial)	73,985	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
ysebstx	s.e. income of small entrepreneurs: taxable	108,410	112,638	106,992	109,046	0.96	1.01	0.99	N/A	N/A
yseagtx	s.e. income in agriculture: taxable	129,983	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
ysebsnt	s.e. income of small entrepreneurs: not taxable	26,112	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
yseagnt	s.e. income in agriculture: not taxable	130,517	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
ysv	severance payments	15,254	36,465	28,334	29,054	0.42	0.54	0.53	15,254	1.00
yot	income of children under 16	177,793	N/A	N/A	N/A	N/A	N/A	N/A	177,793	1.00
урр	private pensions	1,766	N/A	N/A	N/A	N/A	N/A	N/A	1,766	1.00
ypr	property income	146,146	N/A	N/A	N/A	N/A	N/A	N/A	130,685	1.12

		miCROmodA	External			Ratio			EMHR	Ratio
		1	2	3	4	5=1/2	6=1/3	7=1/4	8	9=1/8
		2015	2015	2016	2017	2015			2015	2015
yiy	investment income	129,224	N/A	N/A	N/A	N/A	N/A	N/A	172,052	0.75
yiyit	interest income	93,327	232,937	232,777	236,017	0.40	0.40	0.40	N/A	N/A
yiydv	dividends	53,006	1,137,268	1,134,490	1,075,111	0.05	0.05	0.05	N/A	N/A
ypt	private transfers received	101,971	N/A	N/A	N/A	N/A	N/A	N/A	101,971	1.00
xmp	maintenance payments	85,183	N/A	N/A	N/A	N/A	N/A	N/A	85,183	1.00

miCROmodA External Ratio EMHR Ratio 1 2 3 4 5 6 7=1/4 8=2/5 9=3/6 10 11=1/10 2015 2016 2017 2015 2016 2017 2015 2016 2017 2015 2015 employment income vemkfb 105.234 107.202 111.390 118.774 123.704 129.892 0.89 0.87 0.86 105.234 1.00 empl. income: below 25% of AGW2 1,832 1,866 1,373 1,382 1.33 1.35 1.27 1,832 1.00 vemkfb01 1,776 1,403 empl. income: 25% to 50% of AGW2 8,608 8,741 8,483 12,948 0.70 0.66 0.66 8,608 1.00 vemkfb02 12,384 13,153 vemkfb03 empl. income: 50% to 75% of AGW2 24,139 24,592 25,205 20,788 21,996 24,826 1.16 1.12 1.02 24,139 1.00 0.92 0.90 yemkfb04 empl. income: 75% to 100% of AGW2 18,276 18,603 19,640 18,991 20,187 21,776 0.96 18,276 1.00 vemkfb05 empl. income: 100% to 150% of AGW2 30,587 31,814 32,519 33,983 0.94 0.94 0.94 29,985 1.00 29,985 31,870 vemkfb06 empl. income: 150% to 200% of AGW2 9,082 9,252 9,950 11,890 12,464 13,037 0.76 0.74 0.76 9,082 1.00 empl. income: 200% to 300% of AGW2 vemkfb07 8,772 8,936 9,206 9,963 10,316 10,442 0.88 0.87 0.88 8,772 1.00 vemkfb08 empl. income: above 300% of AGW2 1.00 4,539 4,624 5,260 11,572 11,688 11,476 0.39 0.40 0.46 4,539 N/A vemkfbtx taxable employment income 101,966 103,872 107,931 110,739 115,006 120,929 0.92 0.90 0.89 N/A non-taxable employment income 3,268 3,329 8,698 0.38 0.39 vemkfbnt 3,459 8,035 8,963 0.41 N/A N/A yemtx taxable cash employment income 100,790 102,675 106,686 N/A N/A N/A N/A N/A N/A N/A N/A yemnt non-taxable cash employment income 3,218 3,278 3,406 N/A N/A N/A N/A N/A N/A N/A N/A N/A kfbtx taxable in-kind employment income 1.176 1,198 1,244 N/A N/A N/A N/A N/A N/A N/A kfbnt non-taxable in-kind employment income 50 51 53 N/A N/A N/A N/A N/A N/A N/A N/A ysecw00 income from contractual work (regular) 715 728 757 2,514 2,570 2,682 0.28 0.28 0.28 N/A N/A income from contractual work (honoraria) 127 129 1,373 1,135 0.09 0.12 ysecw01 134 1,246 0.10 N/A N/A income from contractual work (unofficial) 673 685 N/A N/A ysecw02 712 N/A N/A N/A N/A N/A N/A ysebstx s.e. income of small entrepreneurs: taxable 8,820 8,985 9,336 6,147 6,288 6,349 1.43 1.43 1.47 N/A N/A s.e. income in agriculture: taxable 1.836 1.871 N/A N/A N/A N/A N/A N/A N/A N/A yseagtx 1,944 98 100 N/A N/A N/A N/A N/A s.e. income of small entrepreneurs: not taxable 103 N/A N/A N/A ysebsnt yseagnt s.e. income in agriculture: not taxable 963 981 1,019 N/A N/A N/A N/A N/A N/A N/A N/A severance payments 536 550 575 1,165 990 840 0.46 0.56 0.68 536 1.00 ysv income of children under 16 177 180 N/A 177 1.00 186 N/A N/A N/A N/A N/A yot private pensions 8 8 8 N/A N/A N/A N/A N/A N/A 8 1.00 урр 2,053 2,109 2,202 N/A N/A N/A N/A N/A N/A 1,763 1.16 property income ypr yiy investment income 243 249 260 5,930 7,850 8,506 0.04 0.03 0.03 267 0.91

Table 6.3. Market income in miCROmodA, annual amounts (in HRK million)

		miCROmod	4		External			Ratio			EMHR	Ratio
		1	2	3	4	5	6	7=1/4	8=2/5	9=3/6	10	11=1/10
		2015	2016	2017	2015	2016	2017	2015	2016	2017	2015	2015
yiyit	interest income	162	167	174	2,243	2,919	2,111	0.07	0.06	0.08	N/A	N/A
yiydv	dividends	80	83	86	3,687	4,931	6,396	0.02	0.02	0.01	N/A	N/A
ypt	private transfers received	1,207	1,237	1,291	N/A	N/A	N/A	N/A	N/A	N/A	1,207	1.00
xmp	maintenance payments	801	796	809	N/A	N/A	N/A	N/A	N/A	N/A	801	1.00

Notes: miCROmodA results are obtained for the systems HR\_2015, HR\_2016 and HR\_2017, and are based on the overall data sample.

		miCROmodA	External			Ratio			EMHR	Ratio
		1	2	3	4	5=1/2	6=1/3	7=1/4	8	9=1/8
		2015	2015	2016	2017	2015	2016	2017	2015	2015
	Benefits									
роа	Old-age pensions	744,233	752,807	782,158	791,854	0.99	0.95	0.94	744,233	1.00
pdi	Disability pensions	126,355	225,912	204,689	198,526	0.56	0.62	0.64	126,355	1.00
psu	Survivor's pensions	202,505	245,537	244,524	241,759	0.82	0.83	0.84	202,505	1.00
pen	Total public pensions	1,073,092	1,128,993	1,126,473	1,125,607	0.95	0.95	0.95	1,073,092	1.00
pen01	publ. pensions: below 25% of AGW2	356,972	418,536	425,549	439,313	0.85	0.84	0.81	356,972	1.00
pen02	publ. pensions: 25% to 50% of AGW2	560,183	522,911	522,769	521,326	1.07	1.07	1.07	560,183	1.00
pen03	publ. pensions: 50% to 75% of AGW2	109,320	142,780	135,705	121,978	0.77	0.81	0.90	109,320	1.00
pen04	publ. pensions: 75% to 100% of AGW2	31,092	30,946	30,236	30,668	1.00	1.03	1.01	31,092	1.00
pen05	publ. pensions: 100% to 150% of AGW2	14,140	12,183	11,134	11,244	1.16	1.27	1.26	14,140	1.00
pen06	publ. pensions: 150% to 200% of AGW2	1,258	1,122	782	741	1.12	1.61	1.70	1,258	1.00
pen07	publ. pensions: 200% to 300% of AGW2	127	326	167	213	0.39	0.76	0.60	127	1.00
pen08	publ. pensions: above 300% of AGW2	0	189	131	123	0.00	0.00	0.00	0	N/A
bsaot	Other social assistance benefits	11,947	N/A	N/A	N/A	N/A	N/A	N/A	25,961	0.46
bunot	Other unemployment benefits	2,125	N/A	N/A	N/A	N/A	N/A	N/A	2,125	1.00
boa	Old-age benefits	56,299	N/A	N/A	N/A	N/A	N/A	N/A	56,299	1.00
bsu	Survivors benefits	2,182	N/A	N/A	N/A	N/A	N/A	N/A	2,182	1.00
bed	Education allowances	25,438	N/A	N/A	N/A	N/A	N/A	N/A	25,438	1.00
bhl	Sickness benefits	31,854	N/A	N/A	N/A	N/A	N/A	N/A	31,854	1.00
bdi	Disability benefits	110,437	N/A	N/A	N/A	N/A	N/A	N/A	110,437	1.00
	Taxes and social insurance contributions									
tpr	Property tax	355,291	N/A	N/A	N/A	N/A	N/A	N/A	355,291	1.00

*Table 6.4. Tax benefit instruments included but not simulated in miCROmodA, number of recipients/payers* 

		miCROmodA E>		External		Ratio			EMHR	Ratio		
		1	2	3	4	5	6	7=1/4	8=2/5	9=3/6	10	11=1/10
		2015	2016	2017	2015	2016	2017	2015	2016	2017	2015	2015
	Benefits											
роа	Old-age pensions	24,837	25,032	25,500	23,555	24,517	25,267	1.05	1.02	1.01	24,837	1.00
pdi	Disability pensions	4,344	4,378	4,460	6,368	5,760	5,792	0.68	0.76	0.77	4,344	1.00
psu	Survivor's pensions	5,257	5,298	5,398	6,387	6,339	6,371	0.82	0.84	0.85	5,257	1.00
pen	Total public pensions	34,438	34,709	35,358	32,907	33,224	33,948	1.05	1.04	1.04	34,438	1.00
pen01	publ. pensions: below 25% of AGW2	6,002	6,127	6,308	5,926	6,147	6,571	1.01	1.00	0.96	6,002	1.00
pen02	publ. pensions: 25% to 50% of AGW2	18,368	18,468	18,793	16,099	16,428	16,989	1.14	1.12	1.11	18,368	1.00
pen03	publ. pensions: 50% to 75% of AGW2	5,956	6,063	6,170	7,346	7,167	6,739	0.81	0.85	0.92	5,956	1.00
pen04	publ. pensions: 75% to 100% of AGW2	2,462	2,410	2,416	2,293	2,302	2,402	1.07	1.05	1.01	2,462	1.00
pen05	publ. pensions: 100% to 150% of AGW2	1,444	1,484	1,512	1,125	1,081	1,145	1.28	1.37	1.32	1,444	1.00
pen06	publ. pensions: 150% to 200% of AGW2	180	130	133	95	80	78	1.91	1.64	1.70	180	1.00
pen07	publ. pensions: 200% to 300% of AGW2	26	26	26	14	10	15	1.83	2.63	1.81	26	1.00
pen08	publ. pensions: above 300% of AGW2	0	0	0	9	9	10	0.00	0.00	0.00	0	N/A
bsaot	Other social assistance benefits	30	30	30	160	155	82	0.19	0.19	0.36	167	0.18
bunot	Other unemployment benefits	8	8	8	568	626	626	0.01	0.01	0.01	8	1.00
boa	Old-age benefits	67	68	69	180	168	155	0.37	0.40	0.44	67	1.00
bsu	Survivors benefits	23	23	23	412	385	377	0.05	0.06	0.06	23	1.00
bed	Education allowances	225	231	241	N/A	N/A	0	N/A	N/A	N/A	225	1.00
bhl	Sickness benefits	557	568	590	1,335	1,463	1,509	0.42	0.39	0.39	557	1.00
bdi	Disability benefits	717	717	717	1,485	1,493	1,542	0.48	0.48	0.46	717	1.00
	Taxes and social insurance contributions											
tpr	Property tax	174	174	174	N/A	N/A	N/A	N/A	N/A	N/A	174	1.00

*Table 6.5. Tax benefit instruments included but not simulated in miCROmodA, annual amounts (in HRK million)* 

		miCROmodA E		External			Ratio			EMHR	Ratio	
		1	2	3	4	5	6	7=1/4	8=2/5	9=3/6	10	11=1/10
		2015	2016	2017	2015	2016	2017	2015	2016	2017	2015	2015
	CG benefits											
bsa	Subsistence benefit	60,527	64,041	62,592	50,974	48,701	45,099	1.19	1.31	1.39	54,874	1.10
bunct	Unemployment benefit	53,846	53,846	53,846	108,387	102,164	94,052	0.50	0.53	0.57	53,846	1.00
bch	Child benefit	171,478	165,002	155,928	188,236	174,576	153,258	0.91	0.95	1.02	174,156	0.98
	Lump-sum Grant for a newborn											
bfaba	children	29,434	29,434	29,434	37,784	37,616	37,616	0.78	0.78	0.78	29,434	1.00
bfama	Maternity leave benefit	27,931	27,931	27,931	32,525	32,887	32,887	0.86	0.85	0.85	27,931	1.00
bfapl	Parental leave benefit	31,309	31,309	31,309	43,927	42,672	42,672	0.71	0.73	0.73	31,309	1.00
bmanc	Support during the newborn child care	25,170	25,170	25,170	46,179	43,563	43,563	0.55	0.58	0.58	25,170	1.00
bfamh	All parental benefits	84,409	84,409	84,409	122,631	119,122	119,122	0.69	0.71	0.71	84,409	1.00
bhout	Compensation for electricity costs	N/A	69,299	67,958	N/A	61,043	59,888	N/A	1.14	1.13	N/A	N/A
	Taxes and SICs											
tin	Personal income tax	1,127,457	1,156,390	955,568	2,752,303	2,769,211	2,797,326	0.41	0.42	0.34	1,164,241	0.97
tmu	Surtax	1,127,457	1,156,040	955,568	2,752,303	2,769,211	2,797,326	0.41	0.42	0.34	1,164,241	0.97
tscsicer	Employers: all SIC	1,438,994	1,438,994	1,452,618	1,539,874	1,561,582	1,590,563	0.93	0.92	0.91	1,450,945	0.99
tsceepp	Employees: pension SIC	1,417,599	1,417,599	1,417,599	1,539,874	1,561,582	1,590,563	0.92	0.91	0.89	1,417,599	1.00
tscsicse00	Self-employed: all SIC	132,016	132,016	132,016	112,638	106,992	109,046	1.17	1.23	1.21	114,622	1.15
tscsicse01	"Other income" earners: all SIC	70,028	70,028	75,227	361,968	333,237	330,492	0.19	0.21	0.23	109,430	0.64
tscbesi	Pensioners: health SIC	47,278	47,278	47,278	1,128,993	1,126,473	1,125,607	0.04	0.04	0.04	47,278	1.00
tscsicct	Credited SIC	1,362,739	1,362,739	1,362,739	N/A	N/A	N/A	N/A	N/A	N/A	1,362,739	1.00

Table 6.6. Tax benefit instruments simulated in miCROmodA, number of recipients/payers

miCROmodA External Ratio EMHR Ratio 2 7=1/4 8=2/5 10 1 3 4 5 6 9=3/6 11=1/10 2015 2016 2017 2015 2016 2017 2015 2016 2017 2015 2015 Benefits bsa Subsistence benefit 645 685 675 608 611 559 1.06 1.12 1.21 545 1.18 bunct Unemployment benefit 553 567 592 1.077 932 846 0.51 0.61 0.70 553 1.00 bch Child benefit 1,491 1,449 1,395 0.94 0.98 1.02 1,496 1.00 1,588 1,480 1,363 bfaba Lump-sum Grant for a newborn children 69 69 69 88 88 88 0.78 0.79 0.79 69 1.00 bfama Maternity leave benefit 615 625 652 790 803 843 0.78 0.78 0.77 629 0.98 bfapl Parental leave benefit 337 337 338 447 434 434 0.75 0.78 339 0.99 0.78 bmanc Maternity and parental allowance 386 386 386 384 368 368 1.00 1.05 1.05 386 1.00 bfamh All parental benefits 1,337 1,348 1,376 1,621 N/A N/A 0.82 N/A N/A 1,354 0.99 Compensation for electricity costs 0 bhout 164 160 N/A 127 123 N/A 1.29 1.30 N/A N/A Taxes and social insurance contributions tin Personal income tax 6,671 6,969 6,204 10,548 11,373 10,611 0.63 0.61 0.58 7,113 0.94 Surtax 828 864 1,234 1,331 1,241 0.67 0.65 0.62 879 0.94 tmu 776 tscsicer **Employers: all SIC** 17,611 17,940 18,633 19,116 19,964 21,028 0.92 0.90 0.89 18,361 0.96 **Employees: pension SIC** 20,320 20,698 21,497 21,818 22,654 23,858 0.93 0.91 0.90 20,969 0.97 tsceepp tscsicse00 Self-employed: all SIC 2,924 2,956 2,854 1,782 1,558 1,619 1.64 1.90 1.76 2,622 1.11 tscsicse01 "Other income" earners: all SIC 205 209 149 493 485 480 0.42 0.43 0.31 697 0.29 tscbesi 125 126 128 410 405 424 0.30 0.31 0.30 125 1.00 Pensioners: health SIC Credited SIC 1,214 N/A N/A N/A N/A N/A N/A 1.00 tscsicct 1,139 1,159 1,139

Table 6.7. Tax benefit instruments simulated in miCROmodA, annual amounts (in HRK million)

		miCROmod	A		External			Ratio			EMHR	Ratio
		1	2	3	4	5	6	7=1/4	8=2/5	9=3/6	10	11=1/10
		2015	2016	2017	2015	2016	2017	2015	2016	2017	2015	2015
tin	Personal income tax	6,671	6,969	6,204	10,548	11,373	10,611	0.63	0.61	0.58	7,113	0.94
tinpens	PIT - pensions	406	420	390	343	360	325	1.18	1.17	1.20	397	1.02
tinse00	PIT - income of self-employed persons	414	435	388	282	354	404	1.47	1.23	0.96	459	0.90
tinprop	PIT - rental of property income	116	122	167	333	361	415	0.35	0.34	0.40	105	1.11
tincapt	PIT - capital income	26	26	29	652	912	980	0.04	0.03	0.03	16	1.66
tinse01	PIT - "other income"	68	70	79	703	736	690	0.10	0.09	0.11	140	0.48
tinempl	PIT - employment income	5,582	5,836	5,091	8,235	8,650	7,796	0.68	0.67	0.65	5,997	0.93
tinempl01	PIT - empl. income: below 25% of AGW	1	1	1	5	5	8	0.11	0.12	0.16	1	0.89
tinempl02	PIT - empl. income: 25% to 50% of AGW	19	22	10	67	80	37	0.28	0.27	0.27	25	0.75
tinempl03	PIT - empl. income: 50% to 75% of AGW	379	409	123	442	486	337	0.86	0.84	0.36	441	0.86
tinempl04	PIT - empl. income: 75% to 100% of AGW	572	610	513	806	906	922	0.71	0.67	0.56	658	0.87
tinempl05	PIT - empl. income: 100% to 150% of AGW	1,787	1,876	1,692	2,086	2,190	2,125	0.86	0.86	0.80	1,950	0.92
tinempl06	PIT - empl. income: 150% to 200% of AGW	848	880	840	1,127	1,197	1,131	0.75	0.73	0.74	910	0.93
tinempl07	PIT - empl. income: 200% to 300% of AGW	1,049	1,085	1,002	1,243	1,298	1,170	0.84	0.84	0.86	1,080	0.97
tinempl08	PIT - empl. income: above 300% of AGW	926	953	910	2,458	2,486	2,066	0.38	0.38	0.44	934	0.99

 Table 6.8. Personal income tax in detail, annual amounts (in HRK million)

	miCROmodA	<b>\</b>		External		Ratio		EMHR	Ratio
	1	2	3	4	5	6=1/4	7=2/5	8	9=1/8
	2015	2016	2017	2015	2016	2015	2016	2015	2015
D1	2.89	2.96	2.89	2.70	2.70	1.07	1.09	2.97	0.97
D2	4.85	4.86	4.77	4.70	4.70	1.03	1.03	4.92	0.99
D3	6.19	6.18	6.11	6.10	6.10	1.02	1.01	6.29	0.98
D4	7.40	7.39	7.28	7.30	7.30	1.01	1.01	7.47	0.99
D5	8.51	8.45	8.39	8.40	8.50	1.01	0.99	8.48	1.00
D6	9.62	9.63	9.62	9.70	9.70	0.99	0.99	9.64	1.00
D7	11.13	11.11	11.12	11.10	11.10	1.00	1.00	11.13	1.00
D8	12.71	12.75	12.81	12.60	12.70	1.01	1.00	12.63	1.01
D9	15.02	14.99	15.08	15.20	15.10	0.99	0.99	14.95	1.00
D10	21.67	21.68	21.94	22.10	22.20	0.98	0.98	21.51	1.01
Median	44,000	44,522	46,317	43,593	46,783	1.01	0.95	43,354	1.01
Mean	48,697	49,454	51,643	48,249	51,610	1.01	0.96	47,955	1.02
Gini	29.06	29.00	29.55	29.80	29.90	0.98	0.97	28.64	1.01
S80/S20	4.74	4.69	4.84	5.00	5.00	0.95	0.94	4.62	1.03

*Table 6.9. Distribution of equivalised disposable income (not including LSG benefits)* 

	miCROmodA			External		Ratio		EMHR	Ratio
	1	2	3	4	5	6=1/4	7=2/5	8	9=1/8
	2015	2016	2017	2015	2016	2015	2016	2015	2015
40% median HDI									
Total	7.63	7.53	7.80	8.50	8.10	0.90	0.93	7.30	1.04
Males	7.78	7.73	7.85	8.50	7.80	0.92	0.99	7.45	1.04
Females	7.49	7.34	7.75	8.40	8.50	0.89	0.86	7.17	1.05
50% median HDI									
Total	12.53	12.31	12.79	13.50	13.40	0.93	0.92	12.28	1.02
Males	12.30	12.09	12.48	13.00	12.80	0.95	0.94	11.88	1.03
Females	12.75	12.52	13.09	13.90	14.00	0.92	0.89	12.65	1.01
60% median HDI									
Total	19.10	19.12	19.44	19.50	20.00	0.98	0.96	18.69	1.02
Males	18.27	18.33	18.60	18.60	18.90	0.98	0.97	17.86	1.02
Females	19.88	19.86	20.23	20.40	20.90	0.97	0.95	19.46	1.02
70% median HDI									
Total	25.90	25.64	26.34	26.90	27.40	0.96	0.94	25.28	1.02
Males	24.56	24.30	25.01	25.70	26.10	0.96	0.93	23.92	1.03
Females	27.15	26.90	27.58	28.10	28.50	0.97	0.94	26.56	1.02
60% median HDI									
0-15 years	18.34	18.14	18.37	19.40	21.20	0.95	0.86	17.67	1.04
16-24 years	20.13	19.82	19.95	21.40	18.90	0.94	1.05	20.38	0.99
25-49 years	15.02	14.86	15.13	15.60	15.00	0.96	0.99	14.65	1.02
50-64 years	18.60	18.70	18.91	18.80	19.40	0.99	0.96	18.33	1.01
65+ years	27.01	27.60	28.32	26.50	28.60	1.02	0.97	26.17	1.03

*Table 6.10. Poverty rates by gender and age (not including LSG benefits)*