

# Application of microsimulation models in the analysis of taxes and social benefits in Croatia

## PROJECT RESULTS

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## 1. Introduction

The research project “Application of microsimulation models in the analysis of taxes and social benefits in Croatia” (AMMATSBC) begun in September 2015.<sup>1</sup> In Urban (2016a) we described the basic concepts in tax-benefit microsimulation modelling and discussed the motivation underlying the project AMMATSBC. The project ended in December 2018, and this paper reports on the main results and findings of our research. More specifically, we discuss how the project fulfilled its three main goals:

- develop a microsimulation model of Croatian taxes and benefits – the *miCROmod*,
- apply microsimulation models in the analysis of several segments of the tax-benefit system (child benefits, personal income tax, make-work-pay instruments and local government social benefits), and
- present the advantages of microsimulation models to academic researchers and public administration leaders.

## 2. miCROmod

miCROmod is the microsimulation model of Croatian taxes and benefits. It simulates the following groups of tax-benefit instruments:

- social insurance contributions (SICs), paid by: employers, employees, self-employed persons, contractual workers, and pensioners,
- personal income tax (PIT) and local surtax,
- cash social benefits of the central government: subsistence benefit, child benefit, unemployment benefit, parental benefits, and lump-sum grant for a newborn child,
- social benefits of the four major Croatian cities (Zagreb, Split, Rijeka and Osijek): compensations for housing costs, grants for a newborn child, old-age income supplements, subsidies of kindergarten and city transport subsidies.

miCROmod consists of two modules: *arithmetic* (called miCROmodA) and *behavioural* (miCROmodB). miCROmodA assumes that tax-benefit changes do not affect the economic behaviour of individuals and families. On the contrary, miCROmodB enables the prediction of how tax-benefit changes influence the labour supply of couples and individuals.

miCROmodA is described in the report by Urban, Bezeredi and Pezer (2018). During the project miCROmodA was used in the analyses of child benefits, labour tax burden and local government social benefits. The detailed description of miCROmodB can be found in Bezeredi, Ledić, Rubil and Urban (2018). This model was employed for the analysis of make-work-pay instruments.

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<sup>1</sup> The project team consisted of Ivica Urban (project leader), Slavko Bezeredi, Martina Pezer, Holly Sutherland, Chrysa Leventi and Saša Jakšić. Ivica Rubil and Marko Ledić were our collaborators in certain parts of the project. Detailed information about the project can be found on the web page <https://www.ijf.hr/eng/research/croatian-science-foundation-projects/1053/ammatsbc/1062/>.

### **3. Analysis of taxes and benefits**

We have performed the analysis in several areas of tax-benefit system. Our favourite topic was the benefits that provide support for households with children. Several research papers were devoted to these benefits. Before we started our own research, Urban and Pezer (2018b) had reviewed the studies using microsimulation models in the analysis of child support. This review helped us to learn about the best research practices and about EU countries' experience in the child benefit design. In Urban and Pezer (2018a) we scrutinised the support for households with children in Croatia in 2017 (from child benefits, PIT reliefs, subsistence and housing benefits), comparing it to Slovenia and Austria. Unlike in the latter two countries, the support in Croatia was shown to be very uneven – with insufficient amounts for middle income decile groups, and steeply rising amounts for higher income groups.

During the project period the changes had occurred in the Croatian child benefit, which improved the situation for middle decile groups. Urban and Pezer (2018a) analyse these changes too, but conclude that “importing” of the Slovenian or Austrian system of child support into Croatian tax-benefit system would achieve even better results in terms of compensating of costs of children and inequality reduction. High income families in Croatia can obtain larger child support than the low income ones, which is due to generous child PIT allowance. Using the model, which embodies different “income inequality views”, Urban (2017) explains how such system of child PIT allowance can be deemed unfair for some viewers and fair for others. He also simulates a hypothetical reform that introduces a flat-rate PIT and a non-income-tested child benefit, to conclude that such system would not deteriorate income inequality.

Child support was further investigated in the context of local government units. Pezer, Urban and Leventi (2018) analyse the impact of local social benefits on the living standard of children in the cities of Zagreb, Split, Rijeka and Osijek. Most of the local child support is provided through two subsidies – for kindergartens and city transport. The total local support is generous and is of the similar level as the support from the central government cash social benefits. This means that it would be wrong to disregard local social benefits in any distributional and poverty analysis. Similar conclusion is reached by Pezer, Bezeredi and Leventi (2018), whose paper was the first application of miCROmodA in the analysis of local government social benefits.

The 2017 tax reform has considerably changed the PIT allowances and the rate schedule. The PIT is probably the most reformed fiscal instrument in Croatia and the situation is similar in other countries, too. Therefore, Urban, Čok and Verbič (2018) analysed the developments in labour income taxation during the period from 2011 to 2017 in Croatia, Slovenia and Slovakia. They use miCROmodA and EUROMOD to calculate average and marginal tax rates of labour taxes, namely, PIT and social insurance contributions. Croatia has the lowest tax wedge among the analysed countries during the whole period, but particularly in 2017, following the recent PIT reforms.

By lowering the tax burden on labour income, Croatian policy makers intended to improve financial incentives for work. However, the changes in the PIT – in the form of increased general personal allowance – could not improve the incentives for low-skilled and low-wage persons. To encourage participation of this group at the labour market special measures must be introduced, usually called the make-work-pay instruments.

Bezeredi (2018) measures the distribution of the “participation tax rate” (PTR) for Croatian working-age population in 2017, to reveal how many people are found in “inactivity traps”. Namely, when a person who is out of work gets employed, her income does not increase by the full amount of the gross wage. One part of income is paid to the government in the form of SICs and the PIT. Additionally, some social benefits obtained in non-employment may be reduced or ceased to be paid, when a person becomes employed and household market income increases. PTR measures which part of gross wage is “lost” when a person makes a transition from non-employment to employment. For certain groups of people (such as couples with two non-employed spouses, and non-employed lone parents), PTR is very high, exceeding 70%; it is said that “work does not pay” for these people.

In-work benefits for low-wage workers can reduce PTR and motivate the non-employed to find a job in the official economy. Bezeredi (2018) analyses the impact of several different income-tested tax credits for working people. Two types of these tax credits are taken into account: (a) “individual” – received by individual employee and considers only the income of this person; (b) “family” – received by a family if one or two spouses is employed and considers family income in the income test. Each type has its own advantages and disadvantages, which are well-known in the literature.

The analysis of tax credits for working people is extended in Bezeredi, Ledić, Rubil and Urban (2018), who calculate the labour supply effects of their implementation for couples, using miCROmodB. The results show that two types of tax credits have different effects on labour supply. Family based tax credit decreases the average probability of being employed at full time jobs, i.e., persons are more likely to choose less time intensive employment or to become non-employed. On the other side, individual based tax credit decreases the probability of non-participation.

As for the distributive impacts of family and individual based tax credits, Bezeredi, Ledić, Rubil and Urban (2018) illustrate that two types of tax credits have similar impact on the Gini coefficient and poverty headcount, when behavioural effects are taken into account. However, poverty gap and poverty severity are much more reduced by the family based tax credit than the individual based one.

#### **4. Popularising the tax-benefit microsimulation in Croatia**

During the project we have organised three round tables and one scientific workshop, which were attended by many public administration experts and academic researchers from Croatia. The topics covered on the first round table (February 2016) included the basics on tax-benefit microsimulation, EUROMOD and miCROmod. The second round table (November 2016) was devoted to Slovenian, Austrian, and Croatian experience with microsimulation. The scientific workshop (June 2017) gathered researchers from the whole EU, to speak about the use of microsimulation models in the analysis of family, make-work-pay, and other tax-benefit policies. At the final round table in December 2018, the results of the project were presented.

On several occasions during the project period we provided assistance to Croatian policy makers regarding tax-benefit reforms. Using miCROmodA we simulated the reform scenarios concerning the child benefit, parental benefits and personal income tax. This analysis provided information on expected impact of reforms on government expenditure and revenue, and on distribution of population income. Through this cooperation we demonstrated to policy makers, in practice, the usefulness of microsimulation models in reform and budget planning.

#### **5. Conclusion**

In our project introduction paper (Urban, 2016a), it was said: “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 so far.” As this report has indicated, the project AMMATSBC has changed that picture. There now exist microsimulation models of taxes and benefits in Croatia, and they were successfully used both in academic and policy purposes.

The current model can be extended to include the in-kind benefits provided by the central government, such as health and education benefits. Furthermore, simulation of indirect taxes, such as VAT and excise duties, would also help to provide more complete analysis of budgetary and distributional impacts. Therefore, we will proceed with updating and upgrading of miCROmod, and continue to use the models in exploring different topics in the fiscal system.

#### **Acknowledgment**

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## The list of papers<sup>2</sup>

### (a) Academic papers

#### *Published:*

Pezer, M. (2018). Maternity support policies: a cluster analysis of 22 European Union countries. In K. Dumičić, N. Erjavec, M. Pejić Bach, and B. Žmuk (Eds.), *Proceedings of the ISCCRO - International Statistical Conference in Croatia (ISCCRO '18)* (pp. 117–124).

Pezer, M., Bezeredi, S., and Leventi, C. (2018). The distributional impact of local social benefits of Zagreb, Split, Rijeka and Osijek. *Proceedings of 7th International Scientific Symposium "Economy of eastern Croatia – vision and growth"* (pp. 582–590). Osijek: Ekonomski fakultet u Osijeku.

Bezeredi, S., and Urban, I. (2016). Predicting gross wages of non-employed persons in Croatia. *Financial Theory and Practice*, 40(1), 1–61. Institute of Public Finance. doi: 10.3326/fintp.40.1.1.

Erjavec, N., and Jakšić, S. (2016). Differences in Croatian Regional Labour Market Adjustment Mechanisms. *Proceedings of the ISCCRO – International Statistical Conference in Croatia* (pp. 118–122).

Urban, I. (2016b). Tax wedge on labour income in Croatia and the European Union. *Financial Theory and Practice Practice*, 40(2), 157–168.

#### *Under review:*

Pezer, M., Urban, I., and Leventi, C. (2018). Local social benefits in Croatia: how much do they address the risks and needs of families with children? *Manuscript (Institute of Public Finance, Zagreb)*.

Bezeredi, S. Ledić, M., Rubil, I., and Urban, I. (2018). Making work pay in Croatia: an ex-ante evaluation of two in-work benefits using miCROmod. *Manuscript (Institute of Public Finance, Zagreb)*.

Urban, I. (2017). Measuring income redistribution: beyond the proportionality standard. *EUROMOD Working Papers*, EUROMOD Working Papers, (EM1/17). Institute for Social and Economic Research.

Urban, I., and Pezer, M. (2018a). Compensation for households with children in Croatia, Slovenia and Austria. *Manuscript (Institute of Public Finance, Zagreb)*.

Urban, I., and Pezer, M. (2018b). Microsimulation of child benefits: a review of studies. *Manuscript (Institute of Public Finance, Zagreb)*.

Urban, I., Čok, M., and Verbič, M. (2018). The burden of labour taxation in Croatia, Slovenia and Slovakia in the period 2011-2017. *Manuscript (Institute of Public Finance, Zagreb)*.

#### *Other:*

Bezeredi, S. (2018). Mogu li politike za povećanje isplativosti rada ukloniti zamke neaktivnosti u Hrvatskoj? Analiza pomoću mikrosimulacijskog modela. *Manuscript (Institute of Public Finance, Zagreb)*.

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<sup>2</sup> The status of publication as of 31 December 2018. An updated list of papers is available on the project web pages.

## **(b) Reports**

Urban, I., Bezeredi, S., and Pezer, M. (2018). miCROmodA report 2014-2018. Zagreb: Institute of Public Finance.

Urban, I., Pezer, M., and Bezeredi, S. (2017). Pregled naknada socijalne zaštite u Hrvatskoj: Opis baze podataka. Zagreb: Institut za javne financije.

Pezer, M., and Urban, I. (2017). An Overview of Social Protection Benefits in Croatia. *Press Release, 92*. Institute of Public Finance, Zagreb.

Urban, I. (2017). Introduction to the special issue on social protection policies and microsimulation. *Public Sector Economics, 41*(3).

Urban, I. (2016a). Application of microsimulation models in the analysis of taxes and social benefits in Croatia. *Newsletter, 104*. Zagreb: Institute of Public Finance.