An overview of EUROMOD based on the publication of Sutherland and Figari

Context

1. Abstract

This paper is part of the seminar *Macroeconomic Simulations*, which took place at the technical university of Vienna in the summer term of 2015 which can be found here (Hanappi, 2015). The topic of the course was all about the ways how to simulate models with micro data and its further behavior, which also included some practical examples. This paper introduces the unique European-wide micro simulation tool which idea was born more than 15 years ago → EUROMOD, a development with a large team of researchers and universities. The aim of this paper is more than an introduction, there should also be shown, how the idea was born of this consistent and nation-wide simulation tool, some theoretical background of these topics and a short overview about the future development goals.

2. History

The idea of a European-wide simulation tool is more than 15 years old. But before the idea was born, there were already some projects which were early applications in this area to compare multiple nations:

- In 1988 Atkinson et al. tried to apply the British tax system to the French population, but no common model could be found
- In 1997 Sutherland and Callan made a research project on the impact of the basic income schemes in UK and Ireland, but no any other European countries could be included in this research, because of the inconsistent ways of calculating these model assumptions. At this time, they began to think about a consistent way how to compare as many countries as possible within on application, which is now known as the EUROMOD tool.

The project started in 2007, the development of EUROMOD was initially started from the European Commission and involved a large group of different people from universities, research institutes and ministries from all over Europe. Holly Sutherland was granted with the leading position in this project. The project itself was first based at the University of Cambridge, but later on and now currently at the University of Essex.

3. Theoretical background

Before this paper starts into the EUROMOD tool, there will be a short introduction into theoretical background knowledge in this area. Therefore the introduction is separated into two parts, basic theory of micro simulation and afterwards basics about the application in tax-benefit models.

a. Micro simulation

First of all, this kind of simulation is for micro analytical research projects, that means that not a whole nation and it's e.g. GDP of different nations will be compared. The interesting outcomes of such a simulation is more like budget, taxes, incomes, savings or earnings of individuals and so on. Additionally this particular type of simulation is used to look on the behavior and interaction of these micro units (e.g. households or other defined individuals).

A simulation run is an imitation of a real world example or issue, for this reason the model requires equations, formulas, parameter and variables. But indeed there are also other constraints needed for model, because of specific interactions between multiple units of different kind. These are summarized as a set of rules operating on this micro-data set. There are also two different types of models:

- Static - there are no changes made to the system during runtime.
- Dynamic - the whole system changes over runtime, this affects to parameters and variables based on interactions and behavior of single units communicating and acting with others.

b. Tax-benefit models

This kind of models are used to analyze effects on tax-benefits of individuals, changes might take place on income, welfare, behavior and other things. This particular research field result out of policy changes of nations and it is used to recalculate whole systems, which affects in micro economic changes like employment rates, growth of wages and also characteristics of household and their earnings and savings.

This model analyzes mainly income taxes, social constraints, other benefits and also non-cash benefits:

- Gainers and losers of policy changes
- Results in
  - Risk of poverty
  - Income equality (rich – poor tax curves)
- Focus on impact of income for households
- Family Subsidies, rental subventions
- Direct – indirect taxes
  - Direct – properties, wages, etc.
  - Indirect – mineral oil taxes, value added taxes, etc.

4. Introduction to EUROMOD

This model is a unique European-wide simulation tool to compare policy changes and it's affects to tax-benefits (household tax liabilities and other benefit entitlements). The simulation runs are based on different policy rules of each European nation, with its main focus to build up a generic framework to maximize flexibility and also consistency across countries.

The idea of such a model came up 15 years ago when Sutherland tried to do research on basic income schemes in UK, Ireland and other European countries:

- Impossible to compare multi country assumptions, because of different national models.
- Need for a multi-country analyze and most of all consistent results.

The model was initially created for analyzing economic changes and effectiveness of current policies and future policy swaps. It's a big achievement that this tool is open for everyone and the access is gained for free (https://www.iser.essex.ac.uk/euromod).

EUROMOD is nevertheless a complex and powerful tool to analyze various policy changes and it's affect on employees and self-employed people and therefore other indicators (e.g. income inequality and poverty). But there are also several extensions available to look deeper into pension systems and non-cash benefits (e.g. unemployment support, etc.).

Currently more than 250 policy-data combinations are available and can be evaluated. The input data for the model is used from the "European Union Statistics On Income And Living Conditions" (EU-SILC) provided by Eurostat for easier comparing and consistent results. Additional data from national statistics is used if cross-country data are not available (e.g. Statistics Austria). The tool is programmed in C/C++ (which indicates a static model behavior) and uses Microsoft Access for internal database calculations.

An unwanted feature in this static context of EUROMOD is the fixed potential behavioral reactions of individuals and socio demographic characteristics, which will be discussed later. Finally these policy swaps in focus of analyzing the impact on:

- Income distributions (e.g. Upper-Middle-Lower classes)
- Work incentives (e.g. bonus rewards, etc.)
- Government budget and amount of social benefits

5. Critical review

This simulation tool provides a whole new perspective on micro simulation and the impacts on tax-benefits with consistent results all over Europe and these results in some major advantages:

- It is a unique multi-country model for the EU.
- Harmonized input data and policy simulations for all countries.
- Highly flexible policy settings
- Intuitive user interface
- Universal tax-benefit modeling language
- Extensive use of library policies
- Continually updated and developed

In the other case the model cannot satisfy all requirements because on the static behavior which is one of the major critics in this paper:

- Static model with predefined arithmetical calculations
- Unable to take behavioral response into the model at runtime (e.g. labor supply, savings and investments)
- Data limitations in non-cash benefits
    - Free power, school fees or even free or subsidized housing (which plays a major role in the housing policy in many countries: e.g. Austria)
    - Not all benefits are claimed by everyone (e.g. returning of wage taxes, etc.)

- Tax evasion is a serious issue (underrated and not considered at the beginning) – no adjustment to the data
- Indirect taxes are not considered

There are many problems which were highlighted at the beginning of the development process of the model or not even thought about by the project members at this early time of the project but are now serious issues

6. Actual projects

Some projects which are not published now, but build up some of the disadvantages which were listed above will be available soon. Additionally there are also extensions under development which try to analyze more than the EUROMOD tool itself is able to:

- Including indirect taxes into EUROMOD
- NEUJOBS
  - Collaborative research on implications on the labor market → socio-ecological, demographic changes, etc.
- Social Situation monitor
  - For comparing risk of poverty, inequality curves, etc.
- FLEMOSI
  - Build a state-of-the-art model to evaluate ex ante policy changes
- InGRID
  - Research on poverty and living conditions, working conditions and vulnerability

Many other projects can be found on the website of the EUROMOD project.

7. Conclusion

The model is under continuous development for many years with a large team and it's growing in the future. Researchers from all over Europe are working on this tool to maximize a consistent analyze of various impacts if policy swaps happen in different countries. The improvement of the quality of comparability is one of the main targets of the team and to use up-to-date data and policies which can be applied in the simulations and the defined settings.

Another feature of the next release will be the preparation of a common EU-2020 policy reform and the recovery of the recent financial crisis since 2008. Nowadays the European Union does not have the rights to apply changes on taxes European-wide, but it will be a focus to reach this goal in some years to create a common union like the United States.

Furthermore the already mentioned indirect taxes and their integration in simulations is pretty difficult, but will be considered in the next release and also the private non-cash benefits which do not influence current simulation runs (e.g. accommodations, own production – urban gardening, etc.) and the tax evasion problem should also not be forgotten, because it is manipulating the data. Other governmental

services are currently also mentioned in the next few release, like public services (health, education support, etc.) which are not considered now.

In conclusion EUROMOD is a very powerful tool with some restrictions due to the static context the model is running, but future dynamic models could use the arithmetical results of this tool as a starting point.

But even the implementations of the indirect taxes, tax evasion and considering non-cash benefits in the simulation will be a huge improvement of the tool, therefore it will be also a simplified web version with limitations in its application and setting for policy makers without technical knowledge and modeling theory.

References

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