The political adequacy of quantitative impact assessment in the social field by means of micro-simulation models (Vienna, 4-5 December 2014)[1]

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1. Introduction: background and context

Microsimulation models are one of several tools that may be used for ex ante quantitative social impact analysis (SIA) of policy changes. The 2008 Peer Review in The Slovak Republic considered the use of SIA in broad terms[2] and also discussed the European Commission study on SIA, eventually published in 2010, which identified the lack of appropriate tools, models and data sources for assessing social impacts quantitatively as one of the main challenges to effective SIA.[3] Also in 2010, the Belgian Presidency actively promoted discussion of the Commission's own SIA, emphasising the importance of its visibility among all stakeholders including the general public.[4] The 2011 Peer Review in Belgium followed up by explicitly addressing the methodological challenges to effective SIA, considering microsimulation as one of a portfolio of approaches.[5] The aim of this 2014 Peer Review is to focus on microsimulation and in particular to examine how this type of modelling can best be used to inform policy development and public debate and engagement in the social field, with special reference to current practice in Austria.

Microsimulation models are traditionally categorised into those that are "static" (or cross-sectional), "dynamic" (or longitudinal) or "behavioural". However, much modern microsimulation analysis combines elements of each type, according to the question being addressed. In the context of this Peer Review the most relevant types of microsimulation model are static tax-benefit models which are used to calculate the immediate direct effect of policy changes, those that attempt to capture behavioural responses to policy change and models that incorporate some dynamic modelling of change in population characteristics. Considered out of scope are full dynamic microsimulation models that are used for addressing the impact and reform of policies where the effects take a long time to evolve, such as those related to pensions and long term care.[6] A static model that does not capture behaviour change or change in population characteristics is a necessary pre-cursor to one that does. Thus this type of model is most common and the main focus of much of this discussion paper.

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[1] Prepared for the Peer Review in Social Protection and Social Inclusion programme coordinated by ÖSB Consulting, the Institute for Employment Studies (IES) and Applica, and funded by the European Commission.

[2] http://ec.europa.eu/social/main.jsp?catId=1024&langId=en&newsId=1439&furtherNews=yes

[3] http://ec.europa.eu/social/main.jsp?catId=89&langId=en&newsId=935&furtherNews=yes

[4] http://www.socialsecurity.fgov.be/eu/docs/horizontal_social_clause.pdf. More information about the Commission's own impact assessment policy can be found at http://ec.europa.eu/smart-regulation/impact/index_en.htm

[5] http://ec.europa.eu/social/main.jsp?catId=1024&langId=en&newsId=1417&furtherNews=yes

[6] This is not to deny the importance of these issues; just to focus the Peer Review on a manageable set of questions.

The remainder of this paper is organised as follows. Section 2 explains how microsimulation modelling is relevant to the European policy context and explains the different types of microsimulation and how this paper mainly focusses on static modelling. It also introduces EUROMOD, the tax-benefit microsimulation model of the EU and more information is provided about this in Appendix 1. Section 3 considers the state of play concerning the use of microsimulation in social ministries and elsewhere in Member States, drawing on (incomplete) information that has been gathered about this, provided in Appendix 2. Section 4 explains how this Peer Review builds on the 2011 Peer Review held in Belgium and the 2008 Peer Review in The Slovak Republic and Section 5 list the main topics that this Review will consider. Section 6 provides an initial assessment of the Austrian approach and the issues that it raises including those related to the organisation of the construction and updating of the model, the trade-offs between user-friendliness and model flexibility, and the advantages and disadvantages of making a model publically available. It also considers a range of issues concerning model scope and ambition, including some analytical and technical challenges. Section 7 provides a short conclusion and section 8 poses some explicit questions for the Peer Review to address.

2. Microsimulation modelling and the European policy context

Policy context

As explained in the synthesis report of the 2011 Peer Review, and emphasised in the 2010 Belgian Presidency report on "Strengthening Social Mainstreaming in the EU",[7] the promotion of ex ante SIA is fully consistent with the aims and objectives of the EU's Open Method of Coordination (OMC) for social protection and social inclusion policy. These are that policies should be evidence based, policy-making should involve relevant stakeholders, and that concern for social protection and social inclusion should be mainstreamed throughout all policy areas. As part of the SIA toolbox, microsimulation can contribute to all of these objectives and one function of the Peer Review can be to establish under what circumstances it is highly relevant, and when it may be less so and other approaches must be found.

More specifically, the Europe 2020 Strategy[8] has set five headline EU-level targets for achieving smart, sustainable and inclusive growth. These have been translated into national targets, and policy proposals that might have an impact on movement toward the targets can in principle be assessed in these terms using microsimulation. On the one hand these might be policies that are intended to move outcomes towards their target values and in the social sphere these would relate the employment target and/or the poverty and social inclusion target. On the other hand they might be policies that are intended to meet other targets with possible negative (or positive) effects on the social target outcomes. Or indeed they may be policies with other goals that nevertheless have an impact on movement towards or away from the social targets. Improving policy coordination across different domains, identifying situations where compensating social policies are needed to protect the vulnerable, and mainstreaming the social dimension, are all aspects emphasised by the European Platform against Poverty and Social Exclusion.[9] This perspective has recently been given further impetus by the President-elect of the European Commission Jean-Claude Junker in his July 2014 statement to the European Parliament where he proposed that "… in the future, any support and reform programme [should go] not only through a fiscal sustainability

[7] http://www.socialsecurity.fgov.be/eu/docs/horizontal_social_clause.pdf
[8] http://ec.europa.eu/europe2020/index_en.htm
[9] http://ec.europa.eu/social/main.jsp?catId=961&langId=en

assessment; but through a social impact assessment as well. The social effects of structural reforms need to be discussed in public."[10] Again, understanding what can, and cannot, be achieved with microsimulation modelling will be a contribution of this Peer Review, since its limitations as well as its potential need to be clear if results are to inform public discussion as well as policy making.

The Social Investment Package (SIP)[11] established in 2013 is a policy framework which takes account of the social, economic and budgetary differences between Member States and is monitored through the process of the European Semester. It is a strategy which combines a strengthening of policies designed to help people take-up and retain paid work (such as affordable high quality childcare and job-search assistance) with improvements in the efficiency and effectiveness of social protection provision. Ex ante analysis of policy changes in line with the SIP can be analysed with microsimulation, although it should be noted that the long term benefits of some forms of social investment (perhaps particularly in relation to early years investment in children) may be challenging to quantify. Short-term costs may be easier to estimate, making it all the more important that the limitations of microsimulation are well-understood, to avoid the situation where costs are seen to outweigh benefits, just because they can more easily be quantified.

Static tax-benefit microsimulation

The main focus of static tax-benefit microsimulation modelling is on household income and its components. It can be used to estimate the effects of a policy reform on household income across the income distribution and according to household and personal characteristics, the budgetary cost of the reform and the effects of it on individual incentives to work. The scope of policies covered typically includes personal taxes, social insurance contributions and cash benefits. Importantly it captures the net effects of policy changes, once interactions with the rest of the tax-benefit system are taken into account. In addition, it estimates in a consistent way, the budgetary effect of the change consistently with its distributional implications. This is particularly relevant in times of budgetary retrenchment (and perhaps similarly in times of budgetary expansion).

This kind of modelling can be used to assess the first round effects of policy changes that have a direct effect on any of the taxes and benefits that are modelled. It can also be used to assess the implications for the operation and effectiveness of the tax-benefit system of changes in the characteristics of the population or the level and distribution of market incomes. Or, combining the two, it can be used to "nowcast" or forecast the income distribution.

Adding behavioural effects

Clearly, on its own, a static model is not suitable for a comprehensive assessment of the effect of policies that are intended to change individual behaviour such as certain "making work pay" or active inclusion policies. In such circumstances, the microsimulation model must be linked to a labour supply model that has been estimated econometrically. In the absence of such an addition, the calculation of work incentive indicators using the static model can provide an indication of the scale and direction of the change in incentives; as well as an estimate of the static effect of the change (if nobody changed their behaviour), which can also be informative.

[10] http://ec.europa.eu/about/juncker-commission/docs/pg_en.pdf
[11] http://ec.europa.eu/social/main.jsp?langId=en&catId=1044&newsId=1807&furtherNews=yes

Most policy changes have some behavioural effects, even if changing behaviour is not a goal. Not capturing them in an assessment of the impact on income distribution, for example, may in principle bias results. In practice the issue is how large this bias is, and whether the extra effort and additional uncertainty introduced by econometric estimation are outweighed by the importance of the effect.

Labour supply models are becoming more widespread but do not always apply to the whole relevant population at once (much of the early academic literature focussed on modelling the labour supply behaviour of married women as it is more responsive to policy changes than that of men or single women) or to all types of policy change (e.g. only to small changes). Taking account of labour demand constraints is also relevant and challenging. Behaviour in other dimensions, perhaps with the exception of retirement behaviour, is less well-studied or modelled. Relevant dimensions include savings, fertility, household formation and splits, migration decisions and compliance (e.g. tax evasion and the take-up of means-tested benefits).

Relevance of tax-benefit modelling

Tax benefit modelling is an appropriate assessment method to apply to the following types of analysis that are relevant in the European policy context (a non-exhaustive list; additions from Peer Review participants would be welcome):

- Comparing the effects of alternative reform proposals in the field of direct taxes and cash benefits on household incomes and income-based social indicators (AROP, income inequality etc) (improving the evidence base);
- Measuring the ex ante effects (budgetary and distributional) of policy reforms intended to reduce poverty and social exclusion and/or to improve the efficiency and effectiveness of social protection (as input into discussions as part of the European Semester, for example);
- Measuring the effects on income-based social indicators of tax-benefit policy reforms with other goals, in particular budgetary consolidation;
- Estimating the current income distribution ("nowcasting");
- Measuring the contribution made by policy changes to changes in risk of poverty and income inequality over time. This is not ex ante analysis as such but provides useful evidence – and hence lessons from the past – about the role of tax-benefit policy changes in meeting social objectives, or in failing to meet them.[12]

Microsimulation is also relevant because it can focus on population groups of interest (subject to sample sizes in the input data being large enough and the groups being represented in household survey data: people living in institutions, homeless people and other "hard to reach" groups cannot be analysed in this way). For example, results can be analysed for the Europe 2020 social target group or for particular household types. In addition they can focus on children which is particularly relevant for the agenda to "Provide adequate living standards" as part of the Commission Recommendation against Child Poverty within the SIP. Understanding the effects of policy changes on gender equality requires that they are evaluated at the individual level. This raises the question whether using household income to measure the economic situation of all household members is adequate. This is a question to which we return below.

The primary interest of Social Ministries is naturally in the effectiveness of social policies at national level. However comparisons with other countries or analysis which puts their country in the perspective of the EU as a whole may also be relevant, particularly in terms of the Europe 2020 strategy. Results from national

[12] See for example Hills et al (2014).

microsimulation models are not necessarily comparable since there are many details and assumptions that need to be aligned and made consistent. In addition, organising such collaborations across countries would be onerous in practical terms. EUROMOD offers a framework for making consistent comparisons across countries or analysis at the EU (or EMU) level. Its flexibility means that it is also able to carry out analysis for one country using nationally-specific conventions and assumptions and with the particular national policy concerns as the main focus.

Finally, because of its conceptual simplicity relative to many other types of SIA methodology, tax-benefit microsimulation has the potential to be presented accessibly to a wide range of stakeholders, including the general public. This offers enormous potential to improve the transparency and governance of the policy-making process, as well as raising the profile of social issues, promoting popular interest in policy formation and evaluation, and widening participation in it. It also poses challenges, to which we return below.

3. The use of microsimulation modelling for social impact analysis in European countries

Microsimulation modelling is made use of in many social ministries of the EU. However there is great variation in a number of dimensions about how this is done.[13] First, the type of modelling (static, behavioural, dynamic) varies, although static modelling is the most common. Secondly, ministries may commission analysis from independent modellers in some cases. Doing their own hands-on modelling is more common (because of the wish to keep the results out of the public domain in some contexts) but the models may have been built and may be maintained independently of the ministry. Sometimes this is done by other ministries, who share the resource, and often in collaboration with the National Statistical Institute (NSI). Sometimes it is done in collaboration with an independent modeller. A recent special case has been the adoption of the national component of EUROMOD, which is especially relevant in countries without microsimulation capacity since it already covers all EU-27 member States (with Croatia currently in the process of being added).

There is also variation in who may access the models that exist. In most cases they are kept private within the ministry. In some they are shared with other ministries and perhaps regional administrations. The notable exception to the "private" approach is the Austrian SORESI model which is made available on the web in an unrestricted way, using a special version of EUROMOD for Austria as the engine.

In some countries there are many similar models, often kept private to their developers and without details being published. Collaboration can happen and an example of what good practice might look like comes from the UK where there are 6 similar models including EUROMOD, the independent Institute for Fiscal Studies' TAXBEN model, two government models (one belonging to the social ministry and the other a cross-ministry model operated by the NSI and the Finance Ministry) and two models maintained or operated by independent consultants, usually working for think tanks and NGOs. Over the years there have been a number of initiatives to compare results and methodologies of the more long-standing models, to participate in seminars together and generally to be open about how the models work, without usually providing access to each other.

[13] Appendix 2 contains some preliminary information about the use of microsimulation by social ministries in the EU, obtained from members of EUROMOD national teams. Hopefully the Peer Review can contribute to correcting and extending this information.

As in the UK, in countries where national models exist EUROMOD is complementary at the national level, and in some cases there is some local collaboration between the EUROMOD national teams and social ministry modellers. In Sweden the national team consists of combined expertise from the Ministry and the NSI.

At the EU level EUROMOD is financially supported by DG-EMPL through the PROGRESS programme and analysis using it is made use of extensively in EMPL reports. Hands-on use by Commission officials is starting to happen, currently under the aegis of the joint task force on tax analysis (ECFIN, TAXUD, JRC and EMPL). There are both challenges and potential synergies from having more than one set of results on the table in discussions between Member States and the Commission in the European Semester process and in other contexts. The potential risk is that discussions about policy turn into arguments about competing modelling approaches. But looked at positively, there is scope for collaboration in validating results, in making sure the models use the state of the art techniques and in understanding the sensitivity of results (and conclusions) to varying assumptions and analytical choices.

4. Building on previous Peer Reviews

The 2008 Peer Review in The Slovak Republic considered the challenges to effective SIA, one of which was identified to be the lack of established tools and data, and their un-even take-up across member states. The 2011 Peer Review in Belgium examined the methodology, tools and data for Social Impact Assessment in broad terms, and included some discussion of microsimulation models (MSMs) as one type of relevant tool to address several different types of policy question. It made three key points that are followed up in this Peer Review:

- The size of the investment needed to build and maintain MSMs is a barrier to their use. But administrations looking to develop their own MSMs should explore using existing models [EUROMOD] (p. 30 of the synthesis report);
- The potential value of MSMs may be under-appreciated because, within government bodies they are hidden from view. Owners and users of MSMs should be encouraged to publish details of their models and results, and to feed such results into the debate (p. 26 of the synthesis report);
- Both internal (to government) and external expertise is needed for good quality SIA.

The purpose of this 2014 Peer Review is to consider in more depth the most effective way of providing microsimulation modelling capacity as well as promoting its use, and to examine how this type of modelling can best be used to inform policy development and debate in the social field.

In particular, since the 2011 Peer Review, the initiative of the Austrian Federal Ministry of Labour, Social Affairs and Consumer Protection (the host of the 2014 Peer Review) to make use of EUROMOD and other pre-developed software to create their own SORESI model available on the web provides a practical example of all three points above. This Peer Review will consider the benefits of the approach taken and the challenges it faces in order to better understand its potential for others and for further development in the future.

In addition this Peer Review will consider some particular technical and analytical challenges that such models face with reference to the approach taken by SORESI, or the approach it may take in the future.

As a by-product it could also aim to provide a mapping of the current (and planned) use of microsimulation by Social Ministries by updating and elaborating the information in Appendix 2. The European Commission 2010 Study on Social Impact

Assessment remains the most comprehensive mapping of SIA activities across the EU. But providing an updated, focussed catalogue of use of this particular type of analytical tool could be a useful first step in establishing mechanisms for sharing good practice in the future.

5. Summary of the main features under review

The Austrian Social Reform Microsimulation Model (SORESI) was developed in response to a new legal requirement in Austria to provide impact assessments across a range of policy areas. One of these in the social area is the impact of policy changes on the Europe 2020 social target group. SORESI was designed to offer not only government officials but also the public at large the ability to calculate the effect policy changes (in a limited set of dimensions – see below) on the incomes of the population at risk of poverty or social exclusion (as defined in Europe 2020). In addition, SORESI can estimate the effects of policy changes on a set of particular other aspects of poverty, income distribution and fiscal impacts. For more information see the model itself (in both German and English)[14] or a paper by some of the collaborators which includes an example of an application (Fuchs and Gasior, 2014).

The main features under review are considered below under the following headings.

- **Organisation**, in terms of both the construction and maintenance, and the updating of policies and data;
- **Access and accessibility**, in terms of the trade-off between flexibility and scope on the one hand and user-friendliness on the other; and in terms of the advantages and disadvantages of public access;
- **Model scope and ambition**.

6. Assessment

Organisation of construction and maintenance

SORESI was first built as a collaboration between a number of institutions, on the initiative and under the direction of the Ministry. It makes use of:

- Micro-data from the Austrian version of the European Union Statistics on Income and Living Conditions (EU-SILC), including some special variables with the cooperation of Statistics Austria;
- EUROMOD as the tax-benefit model calculator ("engine"), with the cooperation of the University of Essex;
- Adaptations to the policy rules and SILC data (relative to the standard EUROMOD for Austria) to comply with specific requirements of the Ministry, with the cooperation of the European Centre for Social Welfare Policy and Research, Vienna;
- Software to link the EUROMOD "engine" to the web interface, and support to do so, with the cooperation of the K.U.Leuven (the originators of the system, for Flanders) and makingChoices (a private software developer company) as well as Austrian government IT specialists;
- Adaptations to the software for the specific Austrian context and Ministry requirements, with the cooperation of K.U.Leuven and makingChoices.

It involved a significant degree of collaboration to establish, and continues to require cooperation between a number of institutions to be maintained, updated

[14] http://soresi.bmask.gv.at

and developed. Such collaboration has many advantages including efficient use of resources, exploitation of existing expertise and capacity building, as well as encouragement to all the participants to be stakeholders in each others' activities. It may also have disadvantages and it would be interesting to hear the host country's own assessment of the experience and whether they would recommend other countries to take the same path. If, with hindsight, they can envisage improvements in this collaborative approach these would be especially useful to know.

Organisation of updating

SORESI benefits directly from the regular updating of policy rules in EUROMOD and from the exercise carried out to validate outputs each year. However, the updates to input data in SORESI take place before those in EUROMOD because the Ministry makes use of the national SILC as soon as it is made available. In addition, the SORESI team does its own validation against statistics provided by Statistics Austria which in principle at least could feed back into improving EUROMOD. Thus there are synergies and efficiencies in running SORESI from EUROMOD, potentially in both directions.

However, as time goes by the Ministry is likely to want to adapt the selected policy options and model outputs available from the SORESI interface, as the policy debate moves on. Ideally, this is something the Ministry officials could do for themselves with open source software (or similar).

User friendliness vs. flexibility

In contrast to EUROMOD itself (see Appendix 1) SORESI offers a limited range of policy parameters to change. This is a consequence of requiring the model to be accessible to all and easy to use, as well as having a clear idea of which policy reforms are most relevant in the national context. The range of possible policy changes that can be implemented using the EUROMOD interface is huge, and indeed, new policy instruments can be designed from scratch. This is a consequence of the requirement that the model operates across many policy systems and that it may be used in many institutional contexts (e.g. by Ministry analysts, PhD students etc). EUROMOD requires some training and/or expertise to use simply because of the wide range of options. SORESI can be used by anyone, with a little trial and error.

Similarly, EUROMOD offers some standard tables as preliminary output but most users analyse the micro-output using their own preferred statistical software such as Stata. SORESI on the other hand offers a fixed selection of output tables, requiring no particular skills to obtain and with the advantage of having been checked for errors.

It would be useful to know how SORESI has been used in its short life (by whom and for what), whether the limited selection of policy parameters and output statistics has prevented users from doing what they want, and whether there has been demand for other options to be provided. The same question could also be asked of other models that provide a limited menu of options (e.g. Mefisto).

Public vs. private

Openness around methods and uses of microsimulation models by Ministries and sharing of expertise and modelling capacity across Ministries has obvious advantages over being secretive about these matters. Of course it is only possible if there is political will to do this. Similarly, involving external institutions as collaborators also has advantages in terms of a greater range of expertise, greater

capacity and a more efficient use of resources. Sharing access to the same model has further, specific advantages in terms of quality assurance (users from different contexts will apply a wider range of criteria to assessing results) and as a justification for the resources used, also reducing the risk that financial support will be withdrawn. However, the governance of the development of shared models then becomes a matter of importance, requiring its own resources.

SORESI is a pioneer, in terms of a Ministry initiative, in providing entirely unrestricted access via the web. This has the potential to improve public understanding of policy making and the political process, and the effects of policies and to provide capacity for social partners and citizens' organisations to make use of microsimulation in formulating their views on policy initiatives, or developing their own ideas and proposals. It raises a set of further issues, in addition.

First, it highlights the importance of quality assurance since there is no possibility of hiding problematic results. Secondly it raises expectations in a more widespread way that the model will continue to be available and updated. Thirdly it requires very clear explanations, documentation and perhaps other forms of support so that users understand the results and do not misinterpret them. All of these points are of course positive. At the same time they can pose challenges. In particular there are limits to how much can be done to ensure that results are not misinterpreted. It is also not possible to guarantee that a model contains no errors.

In particular, the statistical reliability of results may be an issue that is not necessarily understood by the general user. It is possible, through filtering results that are output, to prevent users from seeing results based on small samples. But it is difficult to provide general guidance about how results may be used (e.g. comparing across simulations) in this respect.

It should be noted that open access via a web interface may not be possible if barriers to allowing input micro-data to be stored on a suitable server (with appropriate security in place) cannot be overcome. Such barriers may be legal, reflecting concerns about data confidentiality and/or security. In the Austrian case, Statistics Austria was able to give permission for their EU-SILC micro-data to be accessed in this way. Currently it is not possible to do this with micro-data from the Eurostat EU-SILC. It is likely that the situation with national versions of the SILC varies across countries in this respect, and may be changing.

Model scope and ambition

(a) Policy scope

The current (first) version of SORESI addresses the effects of policy changes on household income and indicators calculated using this variable. The policies for which changes can be made include: family benefits (7 separate instruments), unemployment benefits (2 separate instruments) statutory and civil service pensions (3 instruments) and a long term care benefit; plus social insurance and other contributions, and income tax including a number of tax credits. In some cases the instrument cannot be fully simulated because the necessary information is not available in the EU-SILC data (e.g. contribution history in the case of unemployment insurance). However, some options for change are offered to the user (in the case of unemployment insurance, the net replacement rate). Quite a lot of use is made of information on benefit receipt in the data (in the case of unemployment insurance only those recorded in the SILC data as receiving the benefit are assumed to be affected by a change in replacement rate).

As noted above the range of changes that can be made, and the scope of policies that can be changed at all is more limited than in EUROMOD itself. This is because

the Ministry wished to limit possibilities for change to those policy instruments that are measured well when simulated (compared with administrative statistics) and to limit the dimensions of change to those that are most relevant for reform (to keep the options simple). In EUROMOD as much as possible is simulated, limited only by the information available in the SILC data. The policy scope is broader but users need to be aware of aspects that are not captured well (which may or may not be relevant for a particular analysis), whether for data or other reasons.

As is typical with microsimulation model development, the aim of SORESI is to eventually extend its policy scope to cover e.g. child care facilities. Generally, extensions in scope require additional data (although in this case the requirement may be met by the SILC). Using more than one survey or other source of micro-data may be necessary, using imputations or statistical matching to combine them.

(b) Analytical scope

SORESI provides outputs that can be modified by the user (e.g. by choosing from a set of fixed categorical variables such as household type, income quintile group, nationality etc.) in terms of income shares, Gini coefficients, being at risk of poverty, fiscal impacts and also the numbers affected in the social target group. This is done for policies in 2013 (latest) using data from 2011 updated to 2013 levels. Incomes are measured at the household level and equivalised, in the conventional manner, and no change in behaviour as a result of the policy change is assumed; macro-economic feedback effects are also ignored. This raises four issues which suggest new directions in which the model could in principle be developed further, to extend its analytical scope. (There are other directions. These are examples that are particularly relevant in the current European policy context.) They are considered briefly in turn below

Behavioural change: the possibility of including the effect of changes in behaviour (such as labour supply) following a policy change is attractive, especially in the context of policies intended to change behaviour. However, as sketched in section 2 of this paper, it is not straightforward to find estimates to comprehensively cover all potential relevant behaviour. Making use of (e.g.) specific labour supply elasticities only where they are applicable could be a possibility in a model like SORESI, so long as they were fully explained.

Macro-economic effects: taking account of these due to labour supply, consumption or relative price changes following a policy change requires that the microsimulation model be linked to a macro-economic model of some kind. This would be challenging for a web application but such linkage was one of the main uses of microsimulation foreseen by the 2009 European Commission Study on Assessing Employment and Social Impacts of Selected Strategic Commission Policies.[15]

Nowcasting and forecasting: Timeliness of the at-risk-of-poverty rate indicator is critical for monitoring the effectiveness of policies. However, due in part to the complicated nature of the European Union Statistics on Income and Living Conditions (EU-SILC), estimates of the number of people at risk of poverty are published with a 2 to 3 year delay. Microsimulation can be used to estimate ('nowcast') the current distribution of income between households, including the at-risk-of-poverty rate, making use of relatively up-to-date macro-level statistics, or forecasts, particularly on the labour market.[16] Combining simulation of policy rules

[15] http://ec.europa.eu/social/main.jsp?catId=89&langId=en&newsId=485&furtherNews=yes

[16] The 2011 Peer Review discussed forecasting of poverty risk using similar techniques. See also Leventi et al (2014) for a nowcasting exercise using EUROMOD.

with data adjusted to account for changes in the labour market and/or demographic change is something that could be offered in SORESI. Again, the adjustments would need to be explained in full, to avoid confusing or misleading users.

Gender analysis: Considering effects of policy change on household income is standard practice but the question of how resources are allocated within the household and in particular by gender, should not be ignored. Considering income at the individual level is not straightforward because social transfers made to families or on behalf of children need to be allocated to individual adults in a systematic way and responsibility for children needs to somehow be accounted for. Nevertheless it is highly relevant to attempt this if differences in policy impact by gender are to be measured. However, this is very rare. Gendered analysis of policy changes can also take other forms, more straightforwardly, by using categories of household that are gender-meaningful in analysing the impact of policy changes. Examples include considering households with and without children broken down into couples, and singles by gender. Couple households can be broken down by who is earning (man only, woman only, neither, both; and in the last case by whether the man or the woman is earnings more). Indicators of work incentives, and changes to them, can also be useful, especially to show the differential impact of policy changes on the incentives to work of "first" and "second" earners in couples.[17]

Gender impact analysis using microsimulation is an area for development that could usefully be considered by the Peer Review.

(c) Quality assurance and technical challenges

A common concern for microsimulation models, which applies even more strongly in the case of a "public" model like SORESI, is that the outputs are consistent with other statistics in relevant areas. Two examples that are particularly relevant are the fiscal cost of policy instruments (and hence of changes in them) and measures of the At Risk of Poverty rate. There are really two issues. One is a desire for consistency with other statistics, such as those derived directing from the EU-SILC and/or administrative statistics, not least so that the microsimulation analysis is respected and accepted by all stakeholders. A second issue is relevant if the EU-SILC data do not in fact capture the full picture (e.g. because of survey under-reporting). In which case there is a need to combine quality assurance of the microsimulation with a discussion of data short-comings and development of ways to adjust for these.[18]

SORESI (like EUROMOD) undergoes a detailed validation of results. Typically such validation exercises come up with technical challenges to be addressed. Two are particularly common and in both cases there are no easy solutions.

The first challenge arises from **shortcomings in the input data** (in this case the EU-SILC). These may be general shortcomings related e.g. to the sample not capturing the right proportion of units entitled to, or liable for, particular policy instruments. Or it may be more specific in the sense that particular variables needed for the simulations of certain policies may not be present and may need to be imputed, involving approximations which have an effect on the precision and/or reliability of the microsimulation results. The effective approach to finding solutions or improvements in this area is to engage in dialogue with the NSI – which is what has happened in the case of SORESI – but this may be less feasible in other contexts.

[17] See for example Figari et al (2011).
[18] See for example Figari et al (2012).

The second challenge is posed by the phenomena **of non take-up of benefits and evasion of taxes**. In situations where not all of those entitled to benefits actually receive them, or where tax liabilities are not paid in full, ignoring this in simulations will (typically) result in estimates of risk of poverty rates and income inequality that are lower than those measured by surveys or administrative data directly. Modelling these two phenomena is naturally challenging, since almost by definition very little is known. However there have been some attempts[19] and there is ongoing scientific research in this area.[20]

Non take-up is a problem that is usually associated with non-contributory benefits and most particularly those that are means-tested, such as minimum income schemes. Reasons for not taking up entitlements can range from lack of information about the benefit on the part of the potential claimant, complex claiming procedures, mistakes by the authorities, and stigma. Measuring the prevalence of non take-up is fraught with problems of measurement error and survey mis-reporting but estimates from the literature can be as high as 50% or more (of those entitled not receiving). Assuming full take up in a microsimulation exercise can then not only underestimate risk of poverty but also make means-tested benefits seem more effective than they actually are, both in absolute terms and in relation to benefits that are not subject to a means-test. At the very least this should be made clear in any evaluation of policy effects that does not take account if non take-up. Ideally the knowledge base on the extent of non take-up and its causes should be improved, and methods deployed to make use of this knowledge in policy simulations.

Noting that even though non take-up (and tax evasion) are usually very institutionally specific (and hence country specific) in their scale, patterns and effects, it may still be useful to consider approaches to these technical challenges as part of the Peer Review.

7. Conclusions

Preliminary conclusions based on the review conducted in this paper include the following:

- Tax-benefit microsimulation analysis is highly relevant to the European policy context and to the requirements for SIA at national level. However, it is not suitable for addressing all questions of policy impact and it is important to be clear when it is, and is not appropriate, and what other methods, including other types of microsimulation should be used.
- Quality assurance is very important but not at all straightforward to accomplish since it depends on the quality and the suitability of the input micro-data as well as the model itself.
- The sharing of expertise and experience across countries is to be valued and encouraged. The same applies to such sharing within countries, between ministries and with external/academic modellers. Suitable fora (and possibly also institutional arrangements and resources) need to be identified to facilitate these exchanges on a regular basis.
- Providing capacity to use microsimulation on the web and to the public is an exciting development from many perspectives. However, its potential costs as well as its advantages need to be understood.

[19] For Austria see Fuchs (2007).
[20] There is also a current Eurofound project on access to benefits which aims to map the problem of non take-up across EU countries.
http://www.eurofound.europa.eu/publications/htmlfiles/ef1394.htm

8. Questions/issues for debate

Information

- With a view to establishing an up-to-date catalogue of information about whether and how Social Ministries use microsimulation, can the information in Appendix 2 be improved upon, in terms of (i) the type of information provided and (ii) the accuracy and completeness of responses per country?

Context and understanding

- Are the conditions under which tax-benefit microsimulation models can usefully be used for policy monitoring and to inform policy making well enough understood by policy-makers? And by the general public? What more can be done to improve the understanding of the potential and limitations of these models?

Organisation and access

- Did the SORESI collaboration result in effective outcomes? In retrospect were the barriers to building the model actually lower than they might have been starting from scratch? Is the collaboration sustainable? Is this type of arrangement recommended to others? Is it attractive to others?
- Who has used SORESI and for what?
- What are the advantages and disadvantages of public access? Does it have specific costs? If the advantages outweigh the disadvantages, what are the barriers?
- What are the advantages and disadvantages of sharing model development and access across institutions? Does it have specific costs? If the advantages outweigh the disadvantages, what are the barriers?

Model scope, ambition and quality

- Have the limited options offered by SORESI met the demand for tax-benefit microsimulation capacity in the Austrian context?
- Is there demand for gendered impact analysis using microsimulation? What are the best ways of achieving this?
- Is there demand for nowcast or forecast estimates of risk of poverty using microsimulation? Are these estimates and the methodology behind them generally available?
- Is there experience in relation to technical improvements, extensions in policy scope or quality assurance that can usefully be shared? For example in relation to:
  - Modelling behavioural response for routine purposes;
  - Combining micro data from several sources in order to extend policy scope;
  - Modelling non take-up of benefits or evasion of taxes.
- Are there deficiencies in the EU-SILC micro-data for microsimulation purposes that could be addressed by common improvements? (Not relevant in countries with more fit-for-purpose micro-data available.)

General

- What are the best ways of encouraging or facilitating the sharing of expertise and experience in this area across countries, and among institutions within countries?

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10. Appendix 1: EUROMOD – the EU tax-benefit microsimulation model

EUROMOD is the tax-benefit microsimulation model of the European Union. It simulates individual and household tax liabilities and cash benefit entitlements according to the policy rules in place, and reforms to them, in each member state. It has two main distinguishing features. First, it covers many countries within the same framework enabling a wide range of applications and comparability of results. Generally, EUROMOD is much more flexible than national microsimulation models in order to ensure consistency of results and transferability of tax-benefit system components across countries. Secondly, it is intended to be openly accessible: use is not restricted to the owners of the model.

EUROMOD combines information on policy rules with detailed and nationally representative micro-data on individual and household circumstances drawn from household income surveys and other data sources. The rules for each policy instrument are applied arithmetically to the characteristics of each individual, resulting in the amount of tax liability or benefit entitlement. Policies are simulated in the correct order so that interactions between them (e.g. the inclusion of some benefits in the income tax base; or the assessment of income for means-tests being based on after-tax income) are captured. The results of the calculations for each household are stored at the micro level and can be analysed with any statistical software. At their simplest they may be weighted to population level and the weighted change in income can be added up to provide an estimate of the budgetary effect of the policy change, or it can be analysed in relation to any characteristics provided in the data: for example to show the proportion of households gaining and losing by income quantile, region or household type. The micro-outputs from alternative policy or labour market scenarios can also be used as the basis for calculating indicators of work incentives or for modelling changes in labour supply or other behaviour.

EUROMOD aims to simulate as much as possible of the tax and benefit components of household disposable income and generally the following instruments are simulated: income taxes, social insurance contributions, family benefits, housing benefits, social assistance and other income-related benefits. Instruments which are not simulated are taken directly from the data. These include most contributory benefits and pensions (due to the lack of information on previous employment and contribution history) and disability benefits (because of the need to know the nature and severity of the disability, which is also not present in the data).

EUROMOD input data for most countries are derived from the European Union Statistics on Income and Living Conditions (EU-SILC). In common with most sources of micro-data used as input into microsimulation models, the EU-SILC was not designed for this purpose. A significant amount of preparation of the data, including imputing necessary information that is missing, needs to be done. For example, if gross income values are not directly recorded during the data collection operations and are imputed in an unsatisfactory way, a net-to-gross procedure is applied to the net income variables in order to derive the gross values used in the policy simulation.

EUROMOD includes some simple adjustments for the non take-up of some benefits and evasion of taxes in some countries. In common with other adjustments and assumptions (e.g. the updating of non-simulated incomes to a more recent point in time than the data income reference point) these can be changed or "switched off" by the user, depending on the analysis being done.

Baseline systems in EUROMOD have been validated and tested at micro level (i.e. case-by-case validation) and macro level. For each system simulated in EUROMOD Country Reports are available on the EUROMOD web pages with background information on the tax-benefit system(s), a detailed description of all tax-benefit components simulated, a general overview of the input data and an extended summary of the validation process.

For more information about EUROMOD and its applications, see the official website (https://www.iser.essex.ac.uk/euromod) and Sutherland and Figari (2013).

The extension of EUROMOD to EU28, and its updating, maintenance and development are supported through the PROGRESS Programme by the Directorate General of Employment, Social Affairs and Inclusion (DG-EMPL) of the European Commission.

11. Appendix 2: How is microsimulation currently used by EU social ministries?

The information in the following table has been collected from EUROMOD national teams and the Essex team of EUROMOD developers with whom they collaborate. Input was also provided by participants of the 2014 European meeting of the International Microsimulation Association in Maastricht in October 2014 and also in the Peer Countries' papers for the Peer Review. It is incomplete in that information for some countries is missing.

	Is msm used by the social ministry?	Which types?			Who built and maintains the most used model?			To whom is it made available?			
		Static	Dynamic	Behavioural	The ministry	Another ministry	Other	The social ministry	Other ministries	Other	Open use
Belgium	√	Mimosis			√		Consortium	√			
			MIDAS	√			FPB	√	√	FPB	
Bulgaria	x										
Czech Republic	√	√					√	√			
			√		√			√			
Denmark	√	LOV-model				√		√	√	Consultants	
Germany	√	IAB-STSM		IAB-STSM			IAB	commissioned		IAB	
Estonia	√	√					EUROMOD	commissioned			
Ireland	√	SWITCH					ESRI	√	√	ESRI	
Greece	x										
Spain											
France											
Croatia	x										
Italy	√	√	√	√	√	√		√			
Cyprus	√	√					√	√			
Latvia	x										
Lithuania	x										
Luxembourg											
Hungary	x										
Malta	x										
Netherlands	√	MIMOSI					CPB	√	√	CPB	
Austria	√	SORESI			√		EUROMOD	√	√	√	√
Poland	?										
Portugal											
Romania	x										
Slovenia	√	√	√				√				
Slovak Republic	√	√				√		√	√		
Finland	√	SISU			√	√	√	√	√	√	√ except data
Sweden	√	FASIT	√	√			SCB	√	√	Trade Unions Parliament	
UK	√	PSM		√	√			√	√ (some)		
			Pensim2		√			√			

CPB – Bureau of Economic Analysis (NL); ESRI – Economic and Social Research Institute (IE); FPB – Federal Planning Board (BE); IAB Institute for Employment Research (controlled by Ministry) (DE); SCB Statistics Sweden. *Information is missing for some countries not participating in the Peer Review: Spain, France, Luxembourg and Portugal.*