Microsimulation in Nordic Social Policy Analysis

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Preface

Microsimulation models have internationally become important tools for policy formation and evaluation within the welfare policy area. NOSOSCO is currently undertaking work on incorporating microsimulations as a part of its tasks. The articles published below are two aspects of this work.

The use of microsimulation models are currently an established practice in Denmark, Finland, Norway and Sweden. The first article, by Elina Pylkkänen, concerns a policy experiment conducted with the joint use of the microsimulation models in these four countries.

The second article is a report delivered by ProPublic Ldt. following workshops in Iceland and the Faroe Islands in November 2015, covering general ideas behind microsimulation models. One aim of these workshops was to explore the possibilities for Iceland and the Faroe Islands to establish similar models.

It is the hope of NOSOSCO that these articles would contribute to the further development of analytical tools within the Nordic cooperation on welfare statistics, the aim of which is to provide a still better comparative basis for policy decisions in our countries.

Microsimulation in Income Distribution Analyses

A Policy Experiment in the Nordic Countries

Elina Pylkkänen

1. Introduction

The Nordic countries have a large public sector with universal systems of social security and welfare of high quality. Generous welfare states are however also connected with high tax levels. Since the public sector transfers and re-distributes a great amount of resources between households as well as for one individual over time, these systems and their outcomes must continuously be followed.

Comparisons between the Nordic Countries are valuable since they provide crucial information on the outcomes of slightly different policies within a more or less similar framework. At the moment these comparisons are officially and regularly done within The Nordic Social Statistical Committee (NOSOSCO), set up by the Nordic Council of Ministers, which carries out social statistical policy analysis. Even though this collaboration provides a very important contribution to the knowledge and understanding of the conducted social policies, it could be developed considerably by a relatively small effort. In the Nordic countries we have the prerequisites for a more profound analysis of tax and benefit policies. We have rich, high quality individual level data and microsimulation models which include a detailed description of legislation and eligibility rules for economic analyses.

At the moment much of the comparative statistics are made on the basis of EU-Silc data which provide us with consistent data bases for analyses, but are nevertheless not as good as they could be. First, the data are inevitably a few years old since they are collected and prepared in a standard format for all EU countries. The fact is that more recent data are used on a national level for decision making and policy analyses. The data are projected for several years ahead to imitate the actual population structure and income formation in order increase the accuracy of budget assessment. Therefore, we could instead use up-to-date data in our analyses too. Second, the data in EU-Silc are based on survey interviews, which means that the sample size is relatively small, at least much smaller than the data we apply in our policy analyses at the national level. Bigger samples provide more variation in population subgroups and therefore provide a statistically more reliable basis for calculations at the population level. In fact, in the Nordic countries both surveys and administrative registers provide us with more comprehensive and reliable data bases than EU-Silc, as well as the most recent data. These larger data bases could be used more effectively in Nordic cross country comparisons.

Another way to improve the statistical inferences and social policy analyses is to start making use of the micro-level calculation method that has been developed for several years. The economic well-being of families can be analysed in detail by using microsimulation models. The demand for research and policy analyses has increased over the years which has advanced the development of models analysing household economic wellbeing and income distribution and, of course, the development of the data which are applied in the models. Despite the similarities in policies and condi-

tions, model and data development have occurred mostly independently in each country, even though we could have benefitted much more from co-operation.

NOSOSCO decided to explore the possibility of strengthening the co-operation in policy analysis between the Nordic countries in order to better utilize the Nordic superiority in the availability of newer and richer data and microsimulation method in the analyses of income distribution. The project started in June 2013 and gathered experts representing Denmark, Finland, Norway and Sweden. The products from this co-operation could form a basis for cross country comparisons of the economic well-being of households and could provide a new basis for NOSOSCO's publications.

In the project we discussed the possibilities of enriching our comparative social policy analyses by making better use of the data and the advanced microsimulation models which each country has. Attempting to prove that, we conducted a hypothetical policy experiment where we used our microsimulation models to compare the effects of a policy reform aiming at reducing income inequality in each country.

The performed experiment is a reform where the non-taxable universal child benefit was hypothetically set as a taxable benefit in progressive income taxation. To offset this so that the costs of the child benefit program remain the same, the benefit level was increased proportionally with the current rules of eligibility. Thus, the reform is budget neutral – that is, the same amount is spent on benefits – but since the taxation is progressive, lower-income families are expected to be taxed less, and therefore should receive more net benefit. The assumption was that a better targeting of the child benefit would equalize the income across families with children and between families with and without children. However, without calculations made on a household level we cannot presume beforehand the effects on income inequality or child poverty rate or how much we could achieve equality with the help of such policies. The results of the experiment were much alike across the countries. The performed experiment generally encourages more of this kind of co-operation in analysis methods and data cultivation.

This report summarizes the results of the co-operation project. In section 2 the method of microsimulation is explained and discussed more deeply since we recommend using these more sophisticated methods in the future publications on income distribution. It is both accessible and superior to the method which has been applied so far. It also increases the knowledge of the subject matter and gives an up-to-date insight into the issue. Section 3 describes the simulation experiment that was conducted with microsimulation models and national data by each country. The results of the experiment are illustrated in section 4. Part of the co-operation consisted of discussions on a common methodology and assumptions. In section 5 we describe the importance of using common concepts and definitions in comparative analyses. The results are sensitive to e.g. the applied definitions of disposable income or household. If variables differ in content between the countries the results will not be comparable. Another important thing is to define clearly the assumptions we apply when calculating different indicators describing the distribution of income. Finally, in section 6 some suggestions for future co-operation and policy analyses are given.

2. Background

Micro simulation models use data on individual or household level (micro data) and simulate the effects of changes in policies on each of these units. Difference in outcomes before and after a policy change can be analysed both at the micro level and at aggregate level to show the overall effect of the change.

Micro simulation is an outstanding method for analysing the impact of income transfer policies on the whole distribution of policy target variables. It gives wider insight on the effects of policies for the whole population or all households – not just for a representative person or household. Micro simulation method is thus primarily designed for studies of the distributional effects of social transfers and income taxation.

Since both social security and income tax systems are usually very complicated with many layers of legislation, it is not easy to see the effects of policy changes for all households without a tool for calculation. In most developed welfare states tax and benefit schedules are far from simple, not just because of the systems itself but through interactions between the systems. Micro simulation methodology is a framework where the legislation and eligibility rules are written as model codes in sequential and hierarchical functions[1] to be able to calculate for example disposable income with different policy parameters and for different types of households. Besides the many layers in tax and benefit programs, another complication is that usually the social benefits are targeted to families rather than individuals, while the subject of income taxation is individual. Moreover, most of the social transfers are taxable but there are some important benefits that are not taxed. Due to these kinds of exceptions and interdependencies in benefit and tax systems, it is necessary to be able to analyse the systems together in order to find out the economic effects of benefit and tax policies for households in different situations.

Simulation models are based on detailed rules in legislation and apply a random sample of the population, which is made representative through the use of statistical weights for the whole population. The models can be static or dynamic. Static models can only assess the direct and immediate effects of policy changes which determine the outcome of policies when individuals and families do not react to changes in tax or transfer schemes. These models can be used to simulate the first order effects of policy changes. There is, however, an increasing demand for dynamic models allowing for varying reactions to policies by individuals and families. This is important since individuals actually react and change their behaviour as a result of policy changes and this may have a substantial effect on the outcome. People in one subgroup may not necessarily behave as the average economic actor.

[1] In income taxation it is important to follow the sequential order in which for example the tax allowances and reductions are done. The eligibility rules of different social security transfers are interdependent and depend on other income as well. Also, the user fees for social services are defined according to a specific definition of household income.

The microsimulation method is widely used in the assessment and evaluation of policy reforms, in decision making as well as in research. Typically microsimulation models are quite comprehensive. Models use register-based micro-data with hundreds of variables and written functions of codes which incorporate the legislation in very great detail.

The development of microsimulation models for social and economic policy preparation in the Nordic countries dates back to the 1980's, the time when computers come into wide use. The first models were static in their structure and did not model responses from individuals or families to policy changes. Now it is more common that models are partly static and partly dynamic, in the sense that they allow for active reactions of individuals to policy changes. This means that the characteristics of a decision maker, including her past experiences and expectations about the future, influence her decisions. These models are applied in policy experiments where in particular economic incentives to work in the labour market are altered. There are also purely dynamic models which include mechanisms that age the population and allow some individuals to leave the population and new members to join in. Dynamic models however require an access to longitudinal data when they are used in analyses of long term impacts of economic and social policies.

In this study we only use static microsimulation models in order to just analyse the direct effects of hypothetical policy changes. The models that we use are LOV (Denmark), LOTTE (Norway), FASIT (Sweden) and SISU (Finland). When child benefits are both increased in level and set as taxable income, it will most likely affect household decisions, since the policy adjustment causes changes in labour supply incentives. The reform increases the marginal effective tax rate2 due to crowding out other income-tested benefits and due to progressive income tax scales. Taxation of child benefit increases disincentives to participating in the labour market and increasing hours of work for those who already work. Thus the net revenue from working in the labour market decreases. We calculate the effect of the policy reform on the participation tax rate3 in a case of an unemployed single mother and also the increase in the marginal effective tax rate when she already works in the labour market but increases her hours of work. However, we do not calculate the effects of the hypothetical reform on the overall employment when the incentives are weakened.

In the Nordic countries, we have very rich micro data with many and various descriptive variables over individuals. The data can also be considered very reliable since we have a long tradition in collecting administrative register data. We also have an opportunity to use quite large samples of population. It is common that model populations represent 10 – 20 per cent of the population. Thus, the analyses are not limited to certain pre-selected subgroups or averages, but can take a broader view of the whole population at the same time.

[2] The marginal effective tax rate is the proportion of an extra unit of wage income retained in the tax and benefit system. This includes all employer taxes and contributions as well as all taxes, fees and benefits the wage earner faces.

[3] The participation tax rate is the net loss of earnings when being in work relative to being out of work.

3. Simulation experiment

When the social security systems do not differ much across the countries, it is easier to set up a common experiment and compare the outcomes of the policy reform. One example of the parallel systems in the Nordic framework is the child benefit. The benefit is universal and the level of the benefit is the same for all families regardless of their income. The aim of the benefit is to equalize the economic burden between families with and without children and in some cases promote fertility. The child benefit is a non-taxable benefit without income-testing against wage income meaning that it is given irrespective of the income of parents. This means that it does not cause disincentives to work. Furthermore, the benefit increases with the number of children and it is higher for single parents (though not any longer in Sweden). Therefore, the benefit becomes better as a measure to decrease the risk of child poverty. The benefit is also administratively very cost-efficient.

Lately, there have been discussions about the need to make the child benefit more targeted, i.e. taxable or under income testing. In Finland, there were suggestions that the benefit should only be given to families in need or at least it should be a taxable benefit in the progressive income taxation as an austerity measure to balance the state budget. A step towards cuts in the benefit was the freezing of the indexation of the child benefit for 2013 – 2016, which means that the benefit level is kept constant even though the consumer prices or average income level increases. There was also a cut in the levels of benefit by 8 per cent in 2015. However, the cut was later compensated for parents with low and medium income by a tax allowance in personal income taxation. In Sweden and Norway there have been discussions about how to better target the benefit in a budget neutral manner in order to equalize incomes more effectively. That way the benefit could better support families with low incomes and help equalize income more effectively without breaking up the idea and the characteristics of a universal benefit.

Inspired by the ongoing discussion about the child benefit programs, we decided to make our first microsimulation experiment on child benefit reform simulation. This gives us a good opportunity to compare our benefit systems in more detail allowing us to exchange experiences in measuring income inequality and poverty risks by using different equivalence scales[4] and definitions of household income[5]. This also gives us

[4] The income attributed to each person is adjusted for household size based on a common equivalence elasticity that distinguishes adults and children, which implies that a household's economic needs increase less than proportionally with its size.

[5] Household income refers to cash income of a household as the unit within which income sources are pooled and equally shared, Data refer to disposable income (after income taxes) and its components, such as earnings, income from self-employment, capital income, public transfers and income taxes (excluding items such as the imputed rents of home-owners).

an opportunity to test the compatibility and commensurability of our models, data and simulation results. This pilot study can furthermore contribute to future work.

3.1 Descriptive statistics

International studies show that poverty rates are low in the Nordic countries. According to the latest EU-Silc study, for the whole population the poverty rates[6] (60 per cent of the median income) range from 10.9 (in Denmark) to 13.1 (in Sweden), while child poverty rates range from 11.2 (in Norway) to 13.3 (in Denmark). Even though child poverty does not differ much from the poverty rate of the whole population, child poverty has increased in all Nordic countries during the last two decades. For example in Finland, child poverty has increased by 8 percentage points from 1994.

Tax and benefit systems have a big effect on the economic well-being of children in all countries. Gornic and Jäntti (2012) find that although taxes and transfers reduce child poverty systematically, the reduction in poverty varies sharply across countries when measuring the relationship between gross market income and income after taxes and transfers. The relatively low poverty rates in the Nordic countries are explained partly by higher employment rates of the parents of young children and partly by social security programs (both public transfers and services) for families with children, which amount to about 3.5 per cent of BNP.

Empirical results show that children living with a single adult have a higher probability of being at risk of poverty than those living with two adults. Also, children whose parents are employed have much lower poverty than those in jobless households. Younger children are more at risk than older children. And children having less educated parents are more likely to be poor than children whose parents are more highly educated. Also, the children of single mothers are more likely to be poor than children of single fathers.

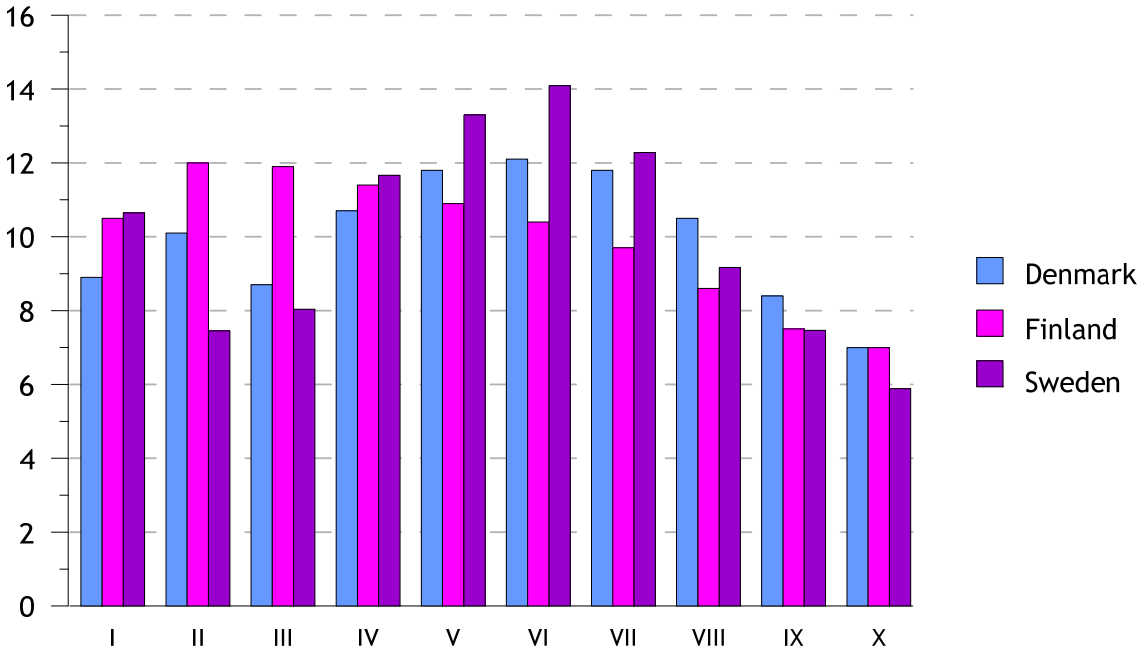
The risk of falling into poverty also depends on the number of children in the household. Poverty rates generally increase with the number of children. Of course, the rate of poverty depends on the method and assumptions we use in calculations and the chosen income threshold of poverty. The rate of poverty depends on the equivalence scales[7] we use when measuring incomes. Equivalence scales describe how the household size is taken into account since it matters for individual well-being as households contribute to the standard of living of their members by allowing them to co-operate in household production and to enjoy economies of scale in consumption. Therefore it is important to use various methods for sensitivity analyses and to understand how much the chosen method affects the results.

[6] The poverty rate is the ratio of the number of people whose income falls below the poverty line, which is defined as 60 per cent of the median individual income of the total population. However, two countries with the same poverty rates may differ in terms of the relative income-level of the poor.

[7] With the help of equivalence scales each household type in the population is assigned a value in proportion to its needs. The factors to assign these values are the size of the household and the age of its members (adults or children).

Figure 3.1.1 illustrates the distribution of families with children who are entitled to child benefit in income deciles in Finland, Sweden and Denmark. If we then measure the share of child benefit of the total gross income within an income decile, we can see that the child benefit is an important source of income for families with the lowest economic standard. For the lowest decile the benefit is about 13 per cent of the gross income while it is only about 1 per cent for the highest decile. Of the disposable income the difference is much smaller, ranging from 3.2 per cent in the lowest decile to 0.5 per cent in the highest decile.

Figure 3.1.1 The distribution of families with children in income deciles in Finland, Sweden and Denmark in 2012



How much redistribution do we achieve in the Nordic countries with the child benefit system? To answer this question we use one the most commonly used summary measure for income inequality, the so called Gini coefficient[8]. The values of the Gini indicator can range between 0 in the case of perfect equality (everybody gets an equal share of income) and 100 in the case of perfect inequality (all income goes to the individual with the highest income).

Using microsimulation models with a sample population from year 2012 for each country we calculate the Gini coefficient first with the child benefit system and then calculate the value of the indicator if the benefit was abolished (all the other things unchanged). The results are shown in Table 3.1.1. We can see that the contribution

[8] The Gini coefficient is defined as the area between the Lorenz curve (which plots cumulative shares of the population – from the poorest to the richest – against the cumulative share of income that they receive) and the 45° line, taken as a ratio of the whole triangle.

of the child benefit system to equality of income measured by the Gini coefficient is about one percentage point. The effect is biggest in Finland, where the decrease in income dispersion is almost one percentage point due to the system.

Table 3.1.1 Income inequality measured by the Gini coefficient for the whole population with the child benefit system in 2012 (second column) and without the child benefit system

	With the child benefit system	Without the child benefit system
Denmark	25.51	26.38
Finland	27.73	28.70
Norway	25.14	..
Sweden	28.96	29.57

If income inequality was the main concern we could achieve more equality with the same size of spending. The child benefit amounts to 1.5 billion euro in Finland and about 2.9 billion euro in Sweden. There are many other ways to re-distribute exactly the same amount of benefits for parents of children such that it will be better targeted to low income families and thus equalizing income more.

3.2 Policy experiment

In our policy experiment the non-taxable universal child benefit was set as a taxable benefit, with a proportional increase in the benefit level to maintain budget-neutrality, keeping the current country specific rules of eligibility and income taxation. Both the level of benefit as well as the age limits for entitlement differ across the countries as well as the details in the progressive income scales, but the experiment maintains comparability due to the similar principles of the systems.

The countries reach budget neutrality at different points in benefit increases for the reform. In Finland the level of the child benefit has to be increased by 69.0 per cent for the excess in tax revenue (3.3 per cent) to equal the increase in spending. In Sweden the level of the child benefit must be increased by 53.3 per cent and in Denmark by 68.5 per cent to achieve neutrality in the budget.

It is the increase in the benefit coupled with progressive taxation which redistributes the benefits more to low income families. However, while all of the Nordic countries apply progressive tax scales in personal income, the distributional effect of taxation is reduced if social transfers are taxed more heavily than labour income, as is the case in Finland and Sweden. The idea of the new tax incentives for labour supply (such as earned income tax credit, EITC) is to make working relatively more profitable by taxing income from other sources more heavily than labour market income. The difference in tax rates between the transfer and wage income can be more than 10 per cent at lower income levels. Thus, the tax rules also play a role in this experiment.

3.3 Assumptions and rules for calculation

In order to be able to get comparable results from the experiment we need to be clear about the assumptions and policy rules we make in model calculations. It helps that the systems and the data are alike. We decided to use 2012 as a base year for all computations since it was the latest year of outcome for data.

We also have to use a common definition for household equivalent income. For household income we sum up the disposable income of each member in the household. For social benefits the unit of entitlement is a family while the unit of taxation is an individual. The child benefit is taxed as other taxable social transfer schemes and for that person who has received it in the observed data. This means that the calculations are static. We do not take into account the possible income maximizing solutions between the parents where the tax rate for the benefit would be the lowest for that parent who earns the least.

In the calculations we applied the modified OECD equivalence scale (see section 5 below), although the conventions between the countries differ also here. With a uniform definition we can guarantee that when interpreting the simulation results the differences in the results are not due to deviating assumptions made in calculations.

Another assumption was that the household equivalent income was calculated at the individual level so that the deciles are formed according to individuals, – not by households. It means that the analysis refers to the distribution among individuals, while keeping the household as the unit within which income sources (after taxes) are pooled and equally shared. This implies that the income of the household is attributed to each of its members irrespectively of who in the household receives that income. For the risk of poverty we assume the limit of 60 per cent of median income which is the most commonly used threshold also internationally.

4. Results

Results from the policy simulations are interpreted in this study as changes in income inequality which is measured by the Gini coefficient. Since we change the child benefit system it is reasonable to judge the policy experiment from the perspective of poverty risk for children. In section 4.1 we present results from microsimulation model calculations measured as changes in income inequality for each country. In 4.2 we present the simulation results on the child poverty calculations.

4.1 Changes in income inequality

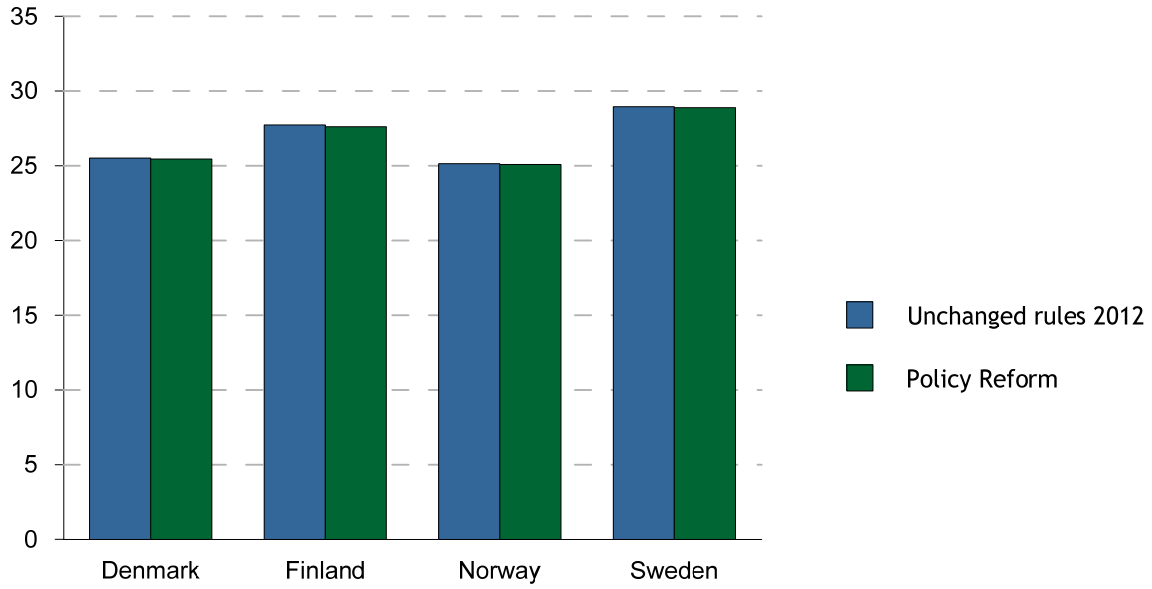
It is not surprising that the results do not deviate very much across the countries. However it is noteworthy how modestly this reform reduces income inequality even though the reform works through both re-distributive systems: the social security system and progressive income taxation. The effect is small at least when measuring the change in income inequality by the Gini coefficient. The results of the reform estimation are shown in Table 4.1.1.

Table 4.1.1 Gini coefficient calculated with current rules of tax and benefit policies and with reformed child benefit system in 2012

	Unchanged rules 2012	Policy Reform
Denmark	25.51	25.44
Finland	27.73	27.62
Norway	25.14	25.08
Sweden	28.96	28.89

The simulation results are illustrated also in Figure 4.1.1. For all countries the decrease in Gini coefficient is about 0.1 percentage points.

Figure 4.1.1 The change in Gini coefficient after the policy reform for Denmark, Finland, Norway and Sweden



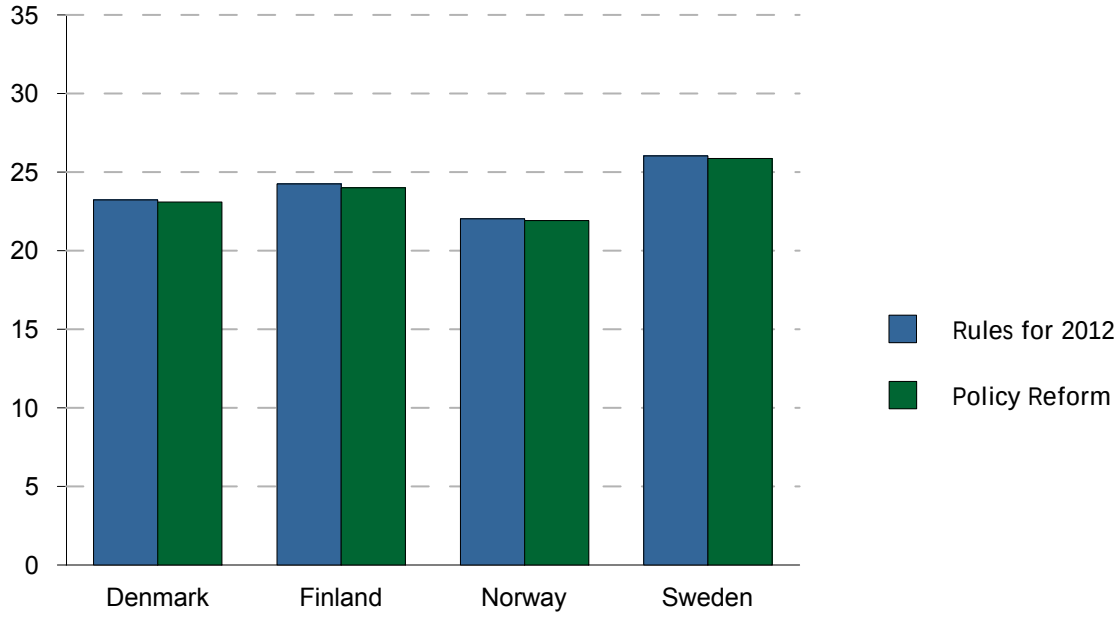
In table 4.1.2 the same policy reform is calculated for families with children only. The dispersion of disposable equivalent income is less than for the whole population which can be seen by comparing the Gini coefficients for the whole population and for families with children. And when applying the reform we get stronger effects within the target group. The Gini coefficients are lower to begin with and income inequality decreases more in each country compared with the effects among the whole population.

Table 4.1.2 Gini coefficient among families with children with current tax and benefit rules in 2012 and after the policy reform in the child benefit system

	Unchanged rules 2012	Policy Reform
Denmark	23.23	23.09
Finland	24.24	24.00
Norway	22.03	21.91
Sweden	26.03	25.86

The simulation results are illustrated also in Figure 4.2.1. For all countries the decrease in the Gini coefficient is about 0.1 - 0.2 percentage points.

Figure 4.1.2 The change in Gini coefficient after the policy reform for Denmark, Finland, Norway and Sweden



4.2 Child poverty

Child poverty is measured here as a share of children living in households whose equivalent income is below 60 per cent of the median equivalent household income. The poverty measures are received by microsimulation model calculations when applying the data and rules for 2012 in each country and when the child benefit system is changed in the way described above.

Table 4.2.1 shows the results from the policy experiment using the 2012 rules as a benchmark. When calculated with tax and benefit rules for 2012, the child poverty ranges from 10.2 in Norway to 17.6 in Sweden. The assumption is that a more progressive child benefit system would decrease poverty rates for children in each country.

Sweden seem to be the extremes in our comparisons. Sweden has relatively high child poverty to begin with and it hardly decreases after applying a more progressive system of child benefit. There is only a slight decrease of 0.1 percentage points in poverty rate. For Denmark, Finland and Norway the reduction in child poverty rate is 0.3, 0.8 and 0.2 percentage points, respectively.

Table 4.2.1 Child Poverty measured as a share of children living in households who have less than 60 per cent of median household income in 2012 and after the child benefit reform

	Rules for 2012	Policy Reform
Denmark	12.03	11.73
Finland	13.10	12.33
Norway	10.17	9.93
Sweden	17.60	17.50

As with the results in income inequality measured as changes in the Gini indicator, the changes in child poverty are small.

The results indicate that we need to do more analysis when the child benefit system is reformed, if the intention is an equalization of income. If the benefit is just set as taxable income without increasing the level, it actually increases the income inequality. The outcome is not that obvious. The child benefit contributes more to household gross income at the lowest deciles, partly because they have less income from other sources and partly because the average number of children is higher in the lower deciles. When the benefit is taxed, it reduces income relatively more at the lower end of the income distribution compared with households at the higher end of the distribution. The effect is amplified due to different taxation rules for social transfers and market income.

These results, which are not that intuitive, also underline the necessity of using microsimulation models which contain detailed legislation of both benefit and tax systems and can use representative data covering all kinds of household groups.

4.3 Participation tax rate

The reformed child benefit system would also cause disincentive effects for labour supply. If the child benefit is taxed by a progressive scale, the reformed system will both increase the participation tax rate in the extensive margin[1] and marginal tax rates in the intensive margin. This is also the case when the benefit level is increased. This means that the incentives to work are reduced, since the monetary benefit of an extra effort in the labour market is smaller than before.

To calculate the economic gain from employment or from an increase in hours of work, we use different measures to capture the economic incentives to work. One of the most common measures is the participation tax rate (PTR), which is a measure of the net loss (through taxes, fees and benefits) of earnings in work relative to being out of work. The higher the PTR, the more the tax and benefit system reduces the financial gain of starting to work in the labour market. Another measure is the effective marginal tax rate (EMTR), which is the percentage of an extra unit of income that the recipient loses due to income taxes, the withdrawal of means-tested benefits and user fee increases. The higher the EMTR, the more the tax and benefit system reduces the financial gain of an extra work effort in the labour market. Both, the PTR and EMTR are typically very dependent on family circumstances and involve welfare withdrawal rules, marginal income taxes, declines in tax allowances and tax credits, and increases in child day care fees or other user fees.

We calculated also these incentive effects of the reform for the Finnish tax and benefit system, applying an example case of a single mother household with two or three children. If a single parent is unemployed, her participation tax rate (the net loss of earnings in work relative to being out of work) increases about one percentage point at a mean wage level when the child benefit is taxed. If her wage is two

[1] In empirical research the effects of policies on labour supply is evaluated usually by splitting the overall level of work activity into the number of individuals in work and the hours of work by those who are employed. The former is referred to as the extensive margin and the latter as the intensive margin of labour supply.

thirds of the mean wage, the disincentive effect will be bigger. In this case, the participation tax rate increases about four percentage points. This means that when starting to work full-time at the labour market at the wage level of two thirds of the mean wage (2 190 €/month), she gets net 16 per cent (after the reform) of the gross wage instead of 20 per cent (before the reform) compared with when staying unemployed. This means that the change in the child benefit system decreases her net earnings when entering the labour market by about 25 per cent. The results are shown in table 4.3.1.

Table 4.3.1 The participation tax rate and effective marginal tax rate for an unemployed single parent with 2 or 3 children receiving mean wage or 2/3 of the mean wage in Finland

	Participation Tax Rate	After the reform	Effective Marginal Tax Rate	After the reform
Mean wage				
Single parent with 2 children	80.6	81.3	43.2	47.1
Single parent with 3 children	81.5	82.8	46.2	47.4
2/3 of the mean wage				
Single parent with 2 children	78.6	81.3	64.1	..
Single parent with 3 children	80.2	84.1	71.1	..

Source: Calculations with the SISU model and the Finnish data and tax-benefit rules by Maria Valaste, Kela

For a single mother who is employed earning mean wage, who would like to increase her hours of work such that the gross wage increases by 500 euro per month, the effective marginal tax rate increases due to the child benefit reform by about 1.2 to 3.9 percentage points when she has two or three children, respectively. The increases in the EMTR are the bigger the smaller her wage is initially and the more children she has. So, the results emphasize the need to capture the complete picture of taxes and benefits when policy changes are prepared. It is not very encouraging to increase the effort in the labour market if the greater part of the earnings is lost by taxes and withdrawal of benefits.

Usually, all tax and benefit programs have aspects of equality and efficiency. Gaining one leads usually to the loss of the other. If we want to equalize income, we worsen the labour market incentives. And when we want to improve incentives to work, we have to cut benefits or lower the taxation of labour income relative to taxation of income transfers. Therefore all policy reform analyses must contain an assessment of labour supply incentives alongside with income distribution aspects. It is a well-established result that, within most industrialized countries, children's likelihood of being poor depends on their parents' attachment to the labour market.

5. Robustness of the results

When measuring income inequality and risk of poverty it is important to discern the equivalence scale that is applied in the calculations. The choice of equivalence scale is very important especially when we make international comparisons of poverty and income inequality, and also when examining the evolution of inequality in a particular country over time. Family arrangements and demographic development can differ markedly across countries. For example, the ranking of a particular country in poverty rate or income inequality in international comparisons can deviate a lot depending on the equivalence scale adopted in calculations, although the data used are the same. Different equivalence scales may lead to different estimates of poverty rates, and often to different poverty rankings between countries, regions and groups of people (Burniax et al. 1998).

There is, however, less concern about the choice of equivalence scale when we make comparisons across the Nordic countries since population trends, employment patterns and family arrangements do not differ that much. But it becomes more important when we compare the Nordics with, for example, the countries in Southern or Eastern Europe. For example, the share of single households is higher in the Nordic countries. This puts us in a more unfavourable position in comparisons of the living standard. On the other hand, the effect is reciprocal. Income levels affect individuals' choices of living arrangements. Individuals with lower incomes are more likely to form a household with other people (Aassve et al. 2005). However, young adults may delay marriage or cohabitation and couples may delay having children until their incomes are high enough.

In OECD studies the convention for equivalence scale is the square root of a number of persons in household. In this study we applied the so called modified OECD equivalence scale which is most commonly used in contemporary income and poverty studies (see e.g. Eurostat, 2013). This scale assumes that the second and subsequent adults in a household have needs equal to 0.5 of the needs of the first adult, while children have needs of 0.3 times the needs of the first adult (OECD 1982). The Nordic countries use different equivalence scales in their national calculations. The modified OECD scale is used in Finland while in Sweden and Denmark other types of equivalence scales are used.

The Gini coefficient is a widely used indicator for describing income dispersion, but it is not the only nor perhaps the best way to describe the distribution of economic welfare. We should in future work use a variety of other more illustrative indicators in our policy analyses.

6. Conclusions

This study shows that it is extremely valuable to be able to compare the possible social policies and their outcomes between countries. This may help to evaluate national politics and to obtain an important analytical perspective when examining national systems.

The comparative descriptive statistics show that child benefit systems in the Nordic countries are very similar. The conducted simulation experiments indicate that changes in the system give rise to similar effects. The child benefit redistributes income on the one hand between families with children and other types of families, and on the other hand among families with children. When measured by the Gini-coefficient, the income inequality decreases by about -1 and -0.5 percent points, respectively.

The study implies also that the child benefit is perhaps not the most effective way to reduce or eliminate child poverty – perhaps it wasn't the intention of the system either. One needs to double or triple the benefit in order to halve child poverty. It is far more cost-effective to use more targeted measures than to increase the universal benefit. The redistributive accuracy is better if benefits were targeted to the most vulnerable families with children. However, with taxable or means-tested benefits it is important to notice that with high benefit levels the drawback is that they create strong disincentives to work. The universal non-taxed child benefit does not create disincentives in that respect.

It is of great advantage that the Nordic countries can share their experiences and knowledge about data and microsimulation models. In this way we are able to develop both data and models further in co-operation. The microsimulation method is both an accurate and a fast tool in policy analysis. This first collaborative step encourages us to continue working together with the method of microsimulation.

This report is the document of the first collaboration project with microsimulation methodology applied to tax and benefit policies and income distribution examination within NOSOSCO. This kind of co-operation provides us with a framework to analyse more accurately the economical standard of families in the Nordic countries, as well as the family and employment policies and their effects on the distribution of income. We are aware that the results of distribution analyses are sensitive to the assumptions applied in the calculations, for example the choice of equivalence scale and the way the household income is defined. We cannot make any comparisons between the countries if the assumptions for calculations differ. The lessons we learnt in this project were that in our comparative analyses we should also use more recent data since they are available to all of us. At the national level we always use data that are projected for the year the planned reforms will take place. The annual data are projected forward according to e.g. demographic prognoses and development in employment and income. Another lesson is that we can improve the quality of policy analyses by using our administrative registers to utilize the possibility of applying larger data bases. It becomes essential when examining smaller groups of people.

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Report from workshop on microsimulation in Reykjavik and Torshavn 24 and 26 of November 2015

ProPublic Ltd, 26 April 2016

Introduction

On the commission of NOSOSCO[1], Pro Public Ltd consultants Belinda Wu and Bengt Eklind carried out two workshops on microsimulation in Reykjavik and Torshavn respectively. A range of topics concerning microsimulation have been covered in the workshop, including different types of microsimulation, application examples, demonstration of the data and programming language R, explorations for data availability and potential projects in Iceland/Faroe Islands, desired quality of a model, stable model administration and recommendations on documentation. This is covered in part one of the present report. In the second part of the report there is a memo about microsimulation in Sweden and some experiences from that. It discusses not only microsimulation itself, but also provides a discussion about some analytical methods to compare the economic conditions for different groups.

[1] Nordic Social Statistic Committee

The workshops

Belinda started the workshop by introducing the definition and describing different types of microsimulation. Generally speaking, a microsimulation starts with a baseline population with micro units that have a rich set of attributes. Then we can apply different rules to simulate the changes in the micro units and the results can be seen and assessed after each step of simulation. In a tax-benefit microsimulation model, typically we have a database with individuals/households and apply taxes/benefits, change the taxes/benefits and tabulate what distributional effects it can have on different groups or what the public costs will be for a certain reform. *Micro units* here refers to individuals or households, but they could also be firms or municipalities. That depends on the nature of the microsimulation.

There are many different types of microsimulation, but *Static microsimulation* and *Dynamic microsimulation* are the two major types. Static simulation typically assesses the immediate effects or short term effects. As behaviours/trends of the micro units normally change after some time, dynamic microsimulation attempts to take into account such changes using estimated equations or other features which try to reflect the changed behaviour/trend. However, the dynamic models are very complex and require much more resources and skills to build. While static models are widely used and tested in tax-benefit fields of study, one recommendation is to start with static simulation and then do scenarios with some well thought out behavioural/trend changes.

Other useful types of models include spatial microsimulations, whose purpose is to bring spatial elements into the model and use them for location based policy making and planning, for instance location based public service provisions, e.g. the public transport network design and optimal location choice for hospitals.

In the second session Bengt talked about the principal steps in a static microsimulation model and then gave an example of a complex simulation, the Swedish tax reform in the beginning of the 90s. The tax reform included about 50 changes of rules, where some could be modelled rather exact and some had to built on second best information. The analyses were carried out 3 times, under the proposal, government bill and evaluation scenario. The database used was the Swedish income distribution survey. The SAS coding language was used.

Belinda continued with more application examples in public health and public transport planning, as well as another usage of the microsimulation: using microsimulation models to generate synthetic micro-datasets when there is an unavailability of data or there are disclosure irregularity issues.

In the third session Belinda demonstrated the language R with a simplified microsimulation model and synthetic microdata. The general principles and steps of a microsimulation model were demonstrated and some basic functions using statistical analysis and some typical outputs including flat data files, tables and diagrams were

demonstrated. Two different policy scenarios were developed and outcomes have been analysed briefly. Belinda also explained that as an open source object-oriented language, R is free to obtain and use. It has a comprehensive analysis package and visualisation package including mapping capacities that comes with good documentations and online community support. With its flexibility, transparency and ease of use features, it is a clear candidate for microsimulation.

In the fourth session feasible data and the possibilities for microsimulation in Iceland and on the Faroe Islands were discussed. Iceland had feasible databases for both taxes and benefits. However there could be some legal problems in connecting them. Also they could not in a sure way find the households among their registers. A census has been carried out, through which there might be a solution for the problem. They have technically capable personnel and a national microsimulation model can benefit different departments in government.

The Faroe Islands has connected a number of databases, so microsimulation could be the natural next step of their work already done. We had a good exploration of various potentials of the application of microsimulation.

In the fifth session different qualities of a model were discussed. Some of the most important qualities are listed below:

- The programming code should be simple to read
- Simple to introduce rule changes
- Use parameter sheets for common changes, and the code should be so simple that other changes should be possible to do for a non-expert on programming
- The database should be updated to the present. A prognosis of the economic environment some years ahead should be done. Typically in a model you have data a couple of years old, but mostly results are wanted for years to come.

The sixth session was focused how to get a stable model administration. We pointed out that it would be the best if an organisation has the task to support and develop the model has the necessary time and resources. We also emphasized that there should be a mechanism to keep effective communications between the developers and the users of the model to avoid unnecessary misunderstandings and waste of time and resources. It is also useful if both developers and users do their own calculations to validate the model from different aspects. By adopting the above suggestions, we can then have a better chance to find out the advantages and disadvantages of the model and ensure it is used appropriately to solve the intended problems.

The seventh and last session discussed the documentation of the model. This topic often can be a little underrated, but good documentation is of great value for the development of a large scale model that can be used by multiple organisations. It ensures the need to make the model easy to understand, easy maintain and extend, as well as easy to handover. Among others, some of our advice include: to keep manuals up-to-date with each new release documentation. Development documentation

produced at each stage of project needs to be signed off and used as input in the next stage, in both Reports and Coding.

Documentation can be done both in memos and in coding. If the programming is well designed and the code is clear to read, it is easier to understand both for a non-programming expert and for a programmer to replicate and extend the model. Many details in programming are important for documentation. For instance, the use of understandable names. Make your variable and function names as clear as possible. Sometimes it is useful to have a prefix for variables, e.g. if 'b' stands for 'background', the background gender could be called 'bgender'.

In summary for the workshops, we recommended starting with simple models and then gradually build in more complexities. However, strategic decisions such as the design of the system and choice of programming languages and software are important and must be considered carefully before any development is carried out. The wrong choice can bring forth considerable overheads and make the future development difficult or even impossible. Previous experience can provide invaluable insights in such practice.

Experiences from microsimulation in Sweden

What is microsimulation?

A model, which uses anonymised individual micro-unit based information about individuals/households. Such information is received from surveys and/or register or similar information about companies.

For instance, the information in an economic model is mostly about incomes, taxes, benefits, assets debts, etc. In medical microsimulation models the contents are obviously more medical and patient information. For economic microsimulation analysis solely the FASIT model is used in Sweden. The model is anonymised, which implies that separate individuals cannot be identified[2]. The aim of the model is to produce statistics or other comparable study about economic effects of changes in the area of taxes, benefits and social security system to see distributional effects in income and wealth. The information incudes confidential or private information, so the results must not be able to be used to trace back to a specific individual/household.

Why microsimulation and what is a good model?

From a good economic microsimulation model, it should be possible to obtain the knowledge of financial effects of different rule systems, and how they affect different types of individuals/households. It should also be possible to study and understand how different income sources, e.g. pensions, salaries and capital, affect economy in general. Microsimulation models provide such capacities to assist strategic decision and policy makings.

[2] Through combining several pieces of information such as income, age, sex, region, etc., there is of course a risk to be able to identify a specific individual if you back-engineer the process. As an established practice, the information shall always be presented for groups and the number of individuals/households in a separate group is not allowed to be too small. The normal practice with Statistics Sweden is that the smallest number should be at least 5, but at the parliament and the government offices the policy is at least 30.

In the following section, we will discuss a little about some characteristics of a good microsimulation model:

- With a good model, it is possible to make more tailor-made changes in rules, so that the desirable income distribution can be achieved in a specific given reform space, e.g. how a tax reform affects the income distribution, what is the marginal effect and compensation degree? How is the public sector, the financial savings of the households, and the equality between the sexes affected? Is there any age group which receives greater impact in particular, and are there regional impacts?
- In a good model it should also be possible to find out if political suggestions to rule changes are practically possible, or if they can create borderline problems. The question put is if the proposal is possible to introduce as a policy. An example could be an intention to lower social security charges for young people in the household domestic sector. Do the employers pay and report the social security fees per employee and is it possible to control the age of the employed in the calculations? What is the meaning of household domestic work? Other similar questions should also be addressed. Sometimes, certain proposals can be practically introduced as a policy, but may conflict with EU laws or other trade agreements. Either way, a good microsimulation should take all above factors into consideration prior and during model development.

Also the model ought to be simple and logical to follow for the user and it should contain current rules. If the rules cannot be reproduced in the programming code, it is time to look at the rule system again. In this case the map should correspond to the reality, and if that is not possible, the reality (the rules) should be re-investigated. It is an advantage if the model is simple and with many explaining comments. A model, which e.g. is written in C++ has probably a fast executing time, but to reprogram tax- and benefit rules certainly will be time consuming and demanding for an analyst. Therefore a specialist programmer rather than an analyst is needed. On the other hand, a programming specialist might have more difficulties than an analyst to understand if the outcome is reasonable and if more evaluation is needed. Hence the model must be commented, of course with sound judgement. In this case it is better to go over-elaborating than too little explanation. Drawing on previous experience, a useful model should be simple and easy to understand, rather than looking genius and complex.

Some qualities of a good model

- The model can be used to work with a database to get aggregated statistics for different groups
- The model can be used to analyse both individuals and households
- The model should include current legislation in programming code for rule analysis
- The model uses a relatively simple programming language, so rule analysis can be carried out with ease
- The model is simple and logical to follow
- The model shall be validated. In other words, the model can be used to calculate the financial savings for different sectors in society and changes in disposable income for individuals and household and the results should be consistent with the current period. It should be possible to produce the result by different factors such as sex, age groups, regions etc.
- The model might, but not necessarily, be able to produce the outcome with behavioural effects. A dynamic microsimulation model typically can provide such capacity, as well as also report the static effect. So in cases where behavioural effects are important, a dynamic microsimulation model is therefore more appropriate than the static microsimulation model. But the assumed dynamic should not be over-complicated and it should allow changes relatively easily in order to stress test the results of the dynamics.
- The model should be used to calculate uncertainty, such as confidence intervals if the microsimulation model is built on a sample of individuals or households. Furthermore in a projection, it should be able to revise the assumptions of the model in order to see the sensitivity of the projections. Certain central factors which are important for the analysis should be stress tested, to get an idea of the uncertainty of the results. And if it is dependent on a specific projection or a scenario, this should be made clear.

The model and financial effects for different sectors in society

The major sectors have been listed below:

- The households
- The state
- The municipalities
- The social insurance sector
- The enterprises
- Foreign countries

The households and the different parts of the public sector (state, municipalities and social insurance sector) are of interest for most tax-benefit studies. Also enterprises or different categories of enterprises can be of interest to study. Foreign countries are mostly ignored, but can sometimes be of interest. One example is pensions and earned rights to get pension for emigrants who in the future will fully or partly claim pension from Swedish welfare systems.

Financial effects refer usually to financial saving[3]. The national accounts often look to those who have the disposal of the income and bear the risk. The employees' pensions and premium pensions belong to the households according the national accounts. In Sweden the major interest in the context of microsimulation is disposable income. Changed pension rights are not included in disposable income, because these means are not available until the individuals become pensioners. A good model can capture such effects and indicate the future effects. Note that changed pension savings can affect the magnitude of the return in absolute amounts, which in turn can also cause some after-effects.

[3] The financial saving of a sector is defined as the remainder of the income after tax and benefits when expenses for consumption and real investments have been paid. The financial saving shows therewith how much the sector lends to other sectors, or if it is negative – how much it borrows from other sectors. The sum of the financial saving for the domestic sector equals the balance of current payments for the country which shows how much the country lends to or borrows from abroad.

Which period should be analysed

The Government Bill has been in place on each calendar year since 1996. It starts in July and ends in June the next year. However, the budget stretches to 3 years. That is the reason why the effects of a suggested change of rules are yearly, but applied throughout the 3 years. It makes sense as the model should report the financial effects for the 3 years forward, which the budget covers. The distributional effects is mostly of interest in the year that the reform is introduced, but often not the estimated effects in the future[4]. The experiences of measuring distributional effects will be discussed in later sections in this report.

Periodical or cash flow financial effects

After the financial crisis during the 90s in Sweden and with a rising state debt (increasing from nearly 40 to almost 74 per cent of GDP between 1990 and 1994), both cash flow and the periodic effect of different suggested changes of rules were calculated (e.g. financial effects with and without the time point when the incomes were collected). In the middle of 90s a new law about budget work was introduced. In short it meant better budget discipline regarding maximized expenses etc. At that point, cash flow effects were central, because the deficit had to be covered by borrowing with raised interest costs, and the target variable was lower state debts. Today the state budget is under control, so cash flow effects are not considered so much. However, it is relevant for big reforms. As a rule of thumb the cash flow effect is 11/12 of the periodical effect the year the reform is introduced.

The strength of microsimulation: the analyses of distributional effects

Often government analysis is about which groups will win or lose because of a policy reform, and also which groups have been affected over time, and microsimulation is particularly useful in this area.

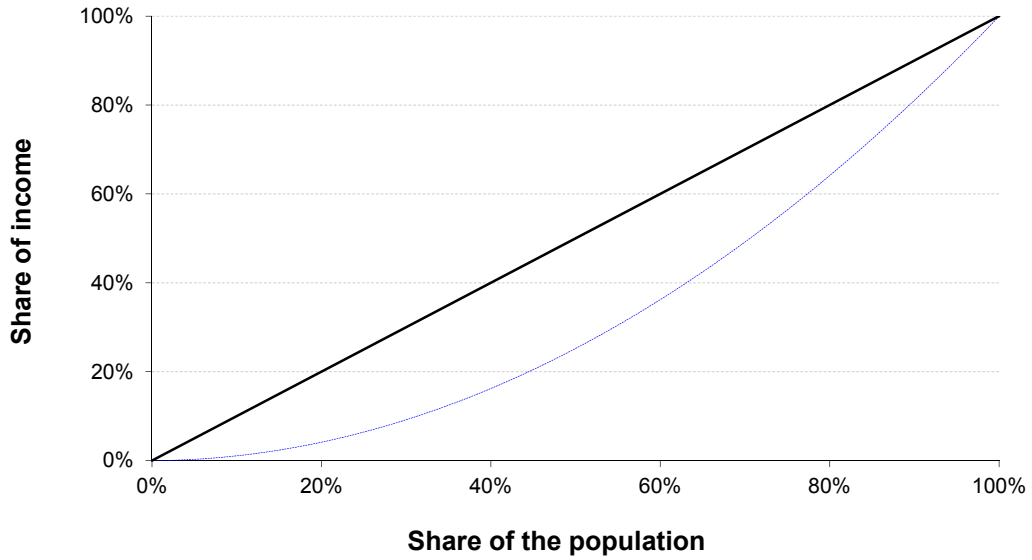
One example would be the financial crises in the beginning of the 90s. Budgets had been cut in the attempt to lower state debt during and after that period, and both the state savings and their distributional effects were analysed. The government wished for as large saving on the state budget as possible at the time so that the burden could be borne in a decent way. Savings were made on state expenses at the same time as revenues were raised to such an extent, that macroeconomic problems were not judged to happen. Macroeconomic problems can occur if private consumption is lowered on a disproportionate scale so the whole economy is jeopardized.

[4] If proposals might be introduced later, it could be an idea to analyse the distributional effects as if had been today.

Lorenz diagram and Gini coefficient

Below is an example for different households, in the form of a Lorentz diagram. In the diagram the incomes have been sorted in a rising order and the household shares of the total income have been illustrated.

Figure 1. Lorentz figure. The disposable income of households



In Figure 1 you can see that 40 per cent of the households have about 16 per cent of the total disposable income.

The income distributions in the figure are often summarized with the Gini coefficient. The coefficient in this case is 0.33. It is described as the area between the concave line (which demonstrates what proportions in the total income that different shares of the population/households take) and the 45 degree straight line (which demonstrates the distribution in the case where all households had equal incomes) in relation to the whole area under the straight line.

Income distribution is often studied with the Gini coefficient because it is useful to strategic decision makings. One disadvantage though, is that it is not possible to break down the coefficient into different population groups. However it is possible to break it down into different income sources. If breakdowns on different groups are desired, other indexes such as entropy index, Theils etc. may be of better use. The problem with these is that it is not easy for the decision makers to interpret the findings. The Gini coefficient has the advantage of clarity, where 0 means a total equalized income and 1 means total unequalised income (one person has all income). As pointed out above, the Gini cannot be broken down into different groups. However, it is of course possible to report the contribution to the Gini for different groups by eliminating the group members from the calculation and therefore on the marginal

we can see the effect on the total Gini coefficient. It is also worth pointing out that the marginal sum is not the same as the total Gini coefficient.

Economic standard and equivalence scales

To be able to compare disposable incomes between different households, the total number of people who are going to live on the income should all be considered. Public utilities and large-scale advantages for large families mean that the household total income divided by only the number of household members will be misleading. A measure of the economic standard is the disposable income taking into consideration the maintenance burden, which depends on how many adults and children are living in the household. To calculate the maintenance burden we use an equivalence scale. The equivalence scale gives every household a specific consumption weight and a number of consumption units. The number of consumption units or equivalence scale used can vary between different analyses. In international income distribution statistics, the OECD scale is often used. According to the OECD scale the first adult household member has the weight 1. Other household members aged at least 14 years are given the weight 0.5 and younger members are given 0.3

For example, the maintenance burden for a household with 2 adults and 1 child below 14 years is given 1.8 consumption units, and an elderly couple is given 1.5 consumption units.

To correct for large-scale advantages in Sweden, a national scale has been constructed by Statistics Sweden (SCB) and some definitions are demonstrated in Table 1.

Table 1. SCB- and OECD-scale and their weights

Person in the household	SCB	OECD
First adult individual	1.00	1.0
Second adult individual	0.60	0.5
Third individual at least 20 years	0.52	
Child 1 (0-19 years)	0.52	
child 2-3 (0-19 years)	0.42	
Individuals 14 years or older	-	0.5
Children below 14 years	-	0.3

The disposable income of the household is divided by the consumption weights, as a measure to create an equalized disposable income, which is more comparable between households of different size and structure. The correction maintenance burden is however not so straightforward. Different methods are adopted to decide if the weights are reasonable and justifiable. It should be noted that the method for deciding the weights has a great importance for e.g. the share in a population that is considered to have a low economic standard.

Poverty – low economic standard

Households in poverty or with low economic standard covers households that are of either absolute poverty (the lowest level) or relative poverty.

Low economic standard can be described as relatively lower standard in comparison with other groups or a certain given level. A household with low economic standard (relatively) is often defined, e.g. within the EU, as a household with a standard below 60 per cent of the median for the whole population. This limit is sometimes called relative poverty limit[5]. The level for relative poverty, 60 per cent of the median is not universal. As an example OECD normally use 50 per cent to define low economic standard relatively seen.

The Swedish National Board of health and Welfare also has a more absolute limit for economic assistance, an absolute level for poverty.

Disposable income and the limit for a low economic standard principally only considers the incomes, while on the consumption side only the maintenance burden is considered. No necessity expenses such as housing costs are considered here. In contrast, housing costs can affect housing benefits for families with children and pensioners. Such necessary expenses can be used to determine if a household belongs to the group with a low economic standard or not in affluent societies.

A critique against the measure or descriptions of low economic standard is that wealth is not considered. In Sweden certain types of wealth have effects on housing benefit. Those with a wealth of at least 100000 SEK can only get reduced housing benefit or no benefit at all. Therefore they can get a lower economic standard according to this measure, while groups that have wealth from other sources are not affected at all no matter if they have wealth assets or not.

The relative limit for low economic standard

The usage of 60 percent as a standard for lower economic standard means that it always will be those who are considered to live under relatively poorer living conditions even in affluent societies. The measure can therefore be seen as an indicator of income inequality, and is particularly useful for studying changes in income distribution over time. By definition half of households has an income lower than the median. If household incomes are distributed with 1,2,3… 100 units, by definition 30 % of the households will be classified poor or households with low economic standard. However, in an extreme scenario, if half of the households have precisely the median income (and the other half has higher income), then no household would have low economic standard according to the definition). Given the median income, the income dispersion on the lower half of the income scale concludes how many households or individuals live under the relative low economic standard. Low income dispersion in the lower part of the income distribution, a compressed income structure, will as a matter of fact generate fewer “relatively poor households” even if the income differences in other respects are big in society.

[5] In EU statistics households living under this limit are living in the ”risk of poverty”

Poverty indicates the lack of economic resources to maintain basic consumption of nutritional intake, good health and dwellings. Lack of economic resources can also lead to other consequences, such as social exclusion and other problems. How many resources is needed to be positioned above the level for "relative poverty" is not constant, and it can vary between societies and over time. The 60 percent of the median has however become the prevalent method to measure relative poverty within the EU.

The equalized median income or in this case the median standard, is influenced by several factors. The incomes of the wage-earning population with a maintenance burden has the biggest impact on the median value – of course households with more children will be considered as of lower economic standard in an equalized measure, even with specific income benefits included. However, pensioners' incomes also have an impact. The median standard determinates the relative "low economic standard", and the development of the share of individuals with a standard below this level is affected by changes both inside and outside the group.

The equivalence scale is of importance for the relatively poor. Of the 2 scales mentioned the SCB scale gives a bigger weight, a smaller large-scale advantage, than the OECD-scale for households with more than one member. The implication of less large-scale advantages is a lower median income and therefore a lower limit for low economic standard. For example, the elderly, who on average will have fewer household members than younger households, have a raised risk to be classified as relatively poor. With the SCB scale instead of the OECD scale, the share of pensioners with a low economic standard is expected to be a little lower.

The two different scales, the SCB and the OECD scale, will show different levels of the share with low economic standard. Over a period of several years, they will however present similar patterns. When broken down by different groups, where the number of household members differ, the scales can result in differences for the relative levels of economic standard.

To summarize, it can be said that through adjusting disposable income accounting for the maintenance burden, a measure is created which is more comparable between households with different sizes and compositions. The adjustment however uses different methods to determine if the weights are reasonable and are justifiable. At the same time there are other aspects worth attention, e.g., the method to calculate the weights is of significant importance, e.g. to calculate the share in a population that is supposed to have a low economic standard.

The "absolute level" for low economic standard

The concept of relative low economic standard (poverty) has been discussed above. In this section, we will discuss the "absolute level" for low economic standard a little. In Sweden there is a politically decided limit, which is supposed to be a fair level of living and is defined as the norm for economic assistance (social assistance). This limit in Swedish studies is seen as the absolute limit for low economic standard. Such

a norm or judgement is affected by the general standard level in society, but in a different way. The limit e.g. does not fluctuate automatically with changes in rules for taxes or benefits, even if VAT or other indirect taxes can have effects on the norm. In 2014 the Swedish national norm was 3880 SEK per month for singles and 6360 SEK per month for couples without children. Some costs for residence and costs such as medicine are not included in the norm.

Regional distribution analyses

In regional analyses the total disposable income of a region is analysed. That means the total household disposable incomes plus the regional tax incomes, minus their expenses amount to the disposable income for the region. As the tax collection by municipalities can be seen as a reflection of the desires of the citizens concerning the regional level of public activities and care, these analyses are often of interest for local politicians, who may want to assess if their region is treated fairly by the current rule system.

Marginal effects

Microsimulation models are instrumental for distribution analyses. They are also valuable for analysing the economic incentives to work, marginal taxes, marginal effects, threshold effects etc. Microsimulation is a valuable method, because it not only gives better estimation of the means, but can also reveal the whole distribution of effects.

Secondary effects of changing rules

The distribution analysis and the financial effects can be calculated using a microsimulation model. In a static model, the direct effects without behavioural effects are analysed. Certain rule changes are however meant to diminish/raise the tax base because of negative/positive external effects. One example is the alcohol and tobacco tax. In this case the analyses should consider the changed consumption of imported goods as well as illegal consumption. For instance, at the end of 90s the tobacco tax was raised so much that total tobacco tax revenue diminished drastically, due to the rapid rise of illegal import of tobacco. The tobacco tax was lowered half a year later, in order to not to put the whole tax base in jeopardy.

Proposals may also influence certain other economic aspects. For instance, raised indirect taxes will probably influence prices and in turn, inflation. Certain public benefits are directly connected to the development of prices. These indirect effects should also be taken into account.

Rule changes can have a delayed effect on prices. For example, profits or rolled over effects on employees by lower/higher wage corrections at wage negotiations are only observable after some time. These effects are normally not observable in

the model. The model user should therefore reflect on whether the proposed rule change has an obvious risk of that and if that is the case present possible effects[6].

The juridical effects of proposals

The juridical effects have already been mentioned but are worth a repeated brief discussion. Some important questions should be asked in terms of juridical effects. Is it legally possible to implement the propositions? Are there actual foundations and delimitation problems? Which incentives does the proposal create? And what are the political consequences? One example from 2007 was that the wealth tax was abolished, which created problems related to housing benefit for people with normal pension or early retirement pension. It meant higher costs had to be allowed for the housing benefits because wealth had to be complemented[7], as it had an impact on the housing benefit. Also hoarding effects can occur[8] Suppose a medicine is subsidized and the government wants to withdraw the subsidy to strengthen the public budget. If people are aware of the proposition in advance, the effect can be that more of the subsidized medicine is bought before the new rule takes effect. Therefore, it can initially mean higher expenses for the public sector.

Microsimulation and some "checkpoints" for the model user

For certain problems in distribution analyses, microsimulation is the only practical way to provide a meaningful answer. Microsimulation is probably the most powerful way to calculate financial effects of rule changes. Below are some questions which should be addressed before the outcome from a microsimulation model is analysed:

- What characteristics does the model have? Is it representative, statistically unsure, more suited for prognosis or for evaluating scenarios etc.? What is analysed and how is the variable of interest defined, e.g. how is household disposable income defined?
- What population groups do the results express information about?
- Do the proposals impact on marginal effects etc., which will change incentives to work? Can the proposed changes have effect on other quantities like inflation etc.?

[6] Even models which regard effects on prices, profits and wages, the analyst should reflect over what assumptions are behind these roll over effects, and indicate what effect they might have.

[7] It was no longer possible to get wealth information from the tax authority.

[8] A similar case appeared at the end of 1989. Shortly before the turn of the year, many people get married, because new pension rules would take marital statues into consideration. To qualify for pension according to the old rules, the future widow had to be married before 1989-12-31.

- Are the proposals compulsory or voluntary? In other words, can it cause a situation where the utility is negative, but the financial effect is positive for the households. One example of this is the option of not taking up parental leave. More work will give higher income in the long run, but earlier the person gave up the possibility of leave.

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