Micromodelling Italian Taxes and Social Policies[1]

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Abstract

Microsimulation models are nowadays extensively used to estimate the effects of existing and planned welfare and tax policies. The paper summarises the microsimulation models recently built at the Italian National Institute of Statistics (Istat) for the analysis of the Italian tax-benefit system and for the evaluation of public policies. It summarises the extent of Istat microsimulation models, focusing on the techniques applied to the available survey and administrative microdata to estimate the incidence of income, property and consumption taxes and of social security contributions, and the allocation of cash benefits. These calculations, taken as a whole, permit to assess the ultimate effect of the tax-benefit system on the redistribution of incomes and on poverty. A wide set of legislative details have been included in the models, in order to account for all the interactions between different policy instruments.

Keywords: Microsimulation, Redistribution, Poverty, Inequality.
C54 Quantitative Policy Modeling
H24 Personal Income and Other Nonbusiness Taxes and Subsidies
H53 Government Expenditures and Welfare Program

1. Foreword

As an independent public research agency, the Italian National Statistical Institute (Istat) is continuously asked to display its data and to provide advice to institutions, governmental bodies, researchers, universities and to general public on a host of different social and economic issues. For what concerns the monitoring of the Italian economy, the Parliament ordinarily consults Istat on the yearly Budget Law and on other regulations issued by the Government during dedicated sessions.

Moreover, the Institute has a special commitment to continuously support and advice the Research Department of the House of Deputies, providing *ex ante* and *ex post* evaluations especially on the effects of policies on the Italian economy, including the impact on the distribution of household incomes. Finally, Istat publishes regularly its research results in the Yearly Report and in other publications, press conferences etc..

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To meet such demanding goals, Istat has devised in the last two years an entirely new set of microsimulation tools including a model of direct taxes, social security contributions and cash benefits, a special module to simulate the real estate tax and a model of value added and excise taxes. The following list includes the social policies that are present in the surveys for the year *T* and/or can be made available through microsimulation techniques for any desired year $T + j$ to provide *ex ante* and *ex post* assessments:

- Wage Integration Fund (*CIG*) allowances: ordinary and special
- Unemployment, mobility, early retirement indemnities
- Apprenticeship or employability allowances
- Scholarship allowances
- Lump sum related to unemployment
- Occupational pensions, that is, old age or seniority
- Disability allowances and pensions
- Pensions for occupational injuries or diseases
- Social pensions and welfare benefits for the low-income elderly
- War pensions (excluding those paid to survivors)
- Vouchers for disability to reimburse *in-kind* personal services (e.g . Taxi vouchers)
- Survivors pensions
- Supplementary pensions paid by private pension funds
- Value of the subsidized rent (when publicly owned and below the market price)
- Family allowances to employees and quasi-dependent self-employed
- Family allowances to retired
- Family allowances to laid-off workers and unemployed
- Maternity allowances, during the compulsory leave for employees
- Maternity allowances for women not entitled to the standard Maternity allowance
- Special allowances for families with at least three children
- Minimum Income provided by (some) local authorities to poor households
- Public contributions to housing costs (rent and/or interest payments on the mortgage)
- "Social Card" allowances for poor households (electricity and gas bills, food)
- Expenses deductible from the income tax (tax credits)
- Expenses deductible from the income tax base (tax allowances)
- Social security contributions on employers
- Social security contributions on employees and self-employed
- Personal Income Tax (Irpef), including local additional tax liabilities
- Tax expenditures (tax deductions and credits) related to Irpef
- Tax on Productive Activities (Irap) charged on the share of the labour income of the self-employed in the value added
- Municipal Real Estate Tax (IMU)
- Value Added Tax
- Excise taxes

Istat has built the new set of models on the basis of an established tradition in the use of microsimulation for policy evaluation, that has been enhanced by the merge with the Institute of Studies for Economic Analysis (Isae) in 2011. In the last three decades, both institutes had separately created their own micromodels. Isae pioneered microsimulation studies

of the Italian tax-benefit system with Itaxmod, a static model built in 1988 and partly reshaped in the following years[4]. A dynamic model, Midas, has also been developed at Isae in 2009 in order to simulate future developments in the adequacy of pensions [5]. On its turn, since 1997 Istat maintained Mastrict, a static micromodel for the evaluation of policies relating to taxes, transfers, and social security contributions[6].

Both Mastrict and Itaxmod were based on the Bank of Italy Survey of Household Incomes and Wealth, whilst Midas was built on the microdata from the Europanel Survey. Also, both institutes have built micromodels of the Value Added Tax on the basis of the Istat Household Budget survey. More recently, Istat has contributed to the setup of SM2, a multi-country model devised by the University of Siena to perform the gross-net conversion of the incomes of the EU-SILC (European Union Statistics on Incomes and Living Conditions) project[7].

FaMiMod, the new Istat tax/benefit model is based on the EU-SILC dataset, which is now considered the best available source for the building of microsimulation models in the European countries. EU-SILC is jointly managed by Eurostat and the National Statistical Institutes of the EU countries and follows the definitions and best practices recommended by the Canberra expert group of the United Nation Department of Statistics (Canberra Group, 2001). Istat is in charge of providing the Italian version of EU-SILC.

Istat micromodels permit to evaluate *ex ante* the impact of tax and social policies on households, encompassing in the estimations new social programs and taxes as well as reforms of the existing ones. A crucial preliminary task of any micromodel is the projection of the information collected in year T to a later year $T + j$ for which no data are already available. In principle, this allows to simulate the effects of a change in policy at any given future date.

The average changes in the income variables are taken from the latest years of National Accounts data available or are foreseen by Istat macroeconometric model MeMo. The projection also requires a re-weighting procedure to account for changes in the demographic structure and in the employment status of the population (*static ageing*)[8]. The distributions of the updated/simulated variables are validated against the actual original data and current National Account figures (Figure 1). Visualization of the data permits a quick assessment of the main characteristics of the simulated variables.

4 Whilst Di Biase *et al.* (1995) describe Itaxmod, Sutherland (1995) reviews the initial spread of microsimulation studies in Europe, including Italy. The reader should be alerted that at the time Isae was named Ispe (Institute of Studies for Economic Programming).

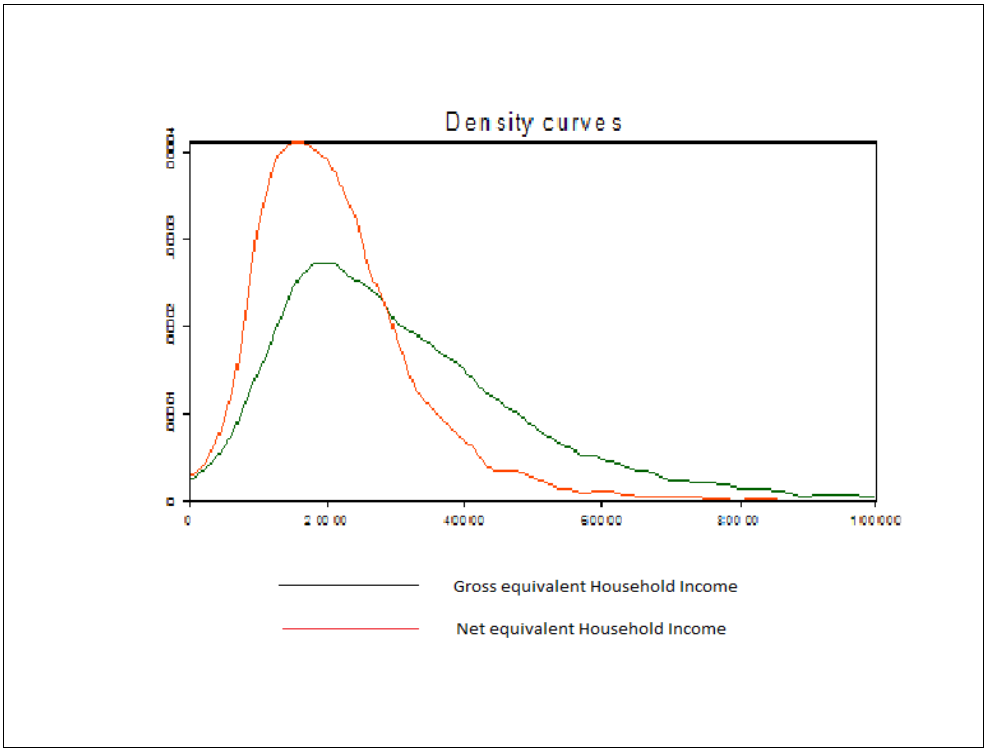
5 Dekkers *et al* (2010).

6 Proto (1999).

7 Betti, Donatiello and Verma (2011) and Istat (2011).

8 Alternatively, one could account for demographic changes with dynamic ageing, that "extend the static model by allowing individuals to change their characteristics due to endogenous factors" (O'Donoghue, 2001).

Figure 1 - Density curves of gross and net equivalent household income (simulated)



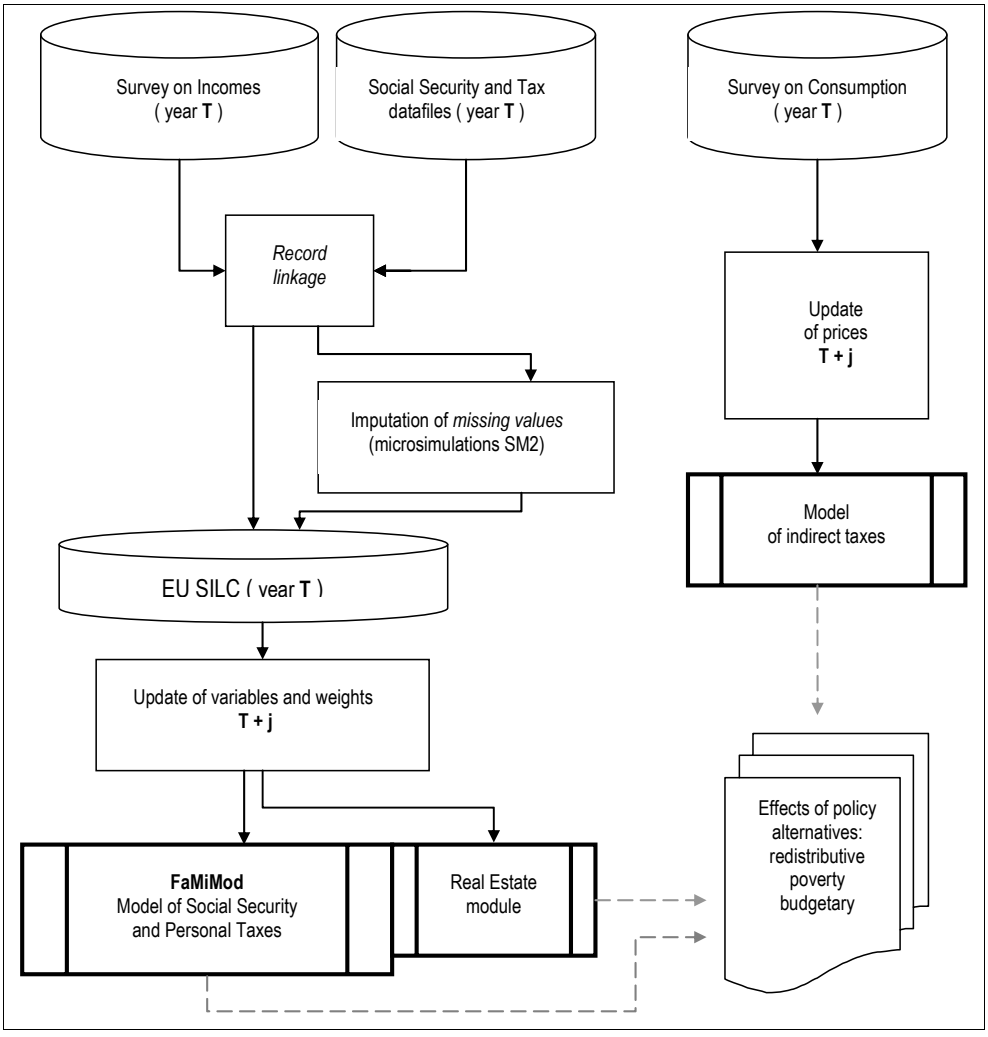
The Istat set of micromodels is based on two main sources of data: the EU-SILC (Income and Living Conditions) and the Household Budget surveys, both run by Istat (Figure 2). The EU-SILC survey is actually a blend of information collected directly from the households and of administrative data 'imported' from the tax and social security files through an exact matching (*record linkage*) at the individual level. Besides, the missing values of some variables are imputed through the Italian SM2, a microsimulation model specifically built for the EU SILC database. The characteristics of EU-SILC are described in depth in chapter 5 of this special issue of the *Rivista di Statistica Ufficiale*.

Chapter 2 of this special issue focuses on the bulding of FaMiMod, a microsimulation model of household taxes and benefits. The model accounts for taxes, social security contributions and cash benefits taken from the EU-SILC database of year T, adjusted and updated to the current (or future) year $T + j$. Besides, the model may optionally include in the gross (self-employment) income the share of the tax on "productive activities" (Irap) charged on the labour income of the self-employed in the value added.

The model has been implemented through three main phases: i) the construction of the database adjusted to year $T + j$, including the update and reweighting; ii) the development of a set of computer programs to simulate cash benefits, taxes and social security contributions in two alternative scenarios to be compared: the first reflecting the actual legislation

and the second the modified rules; iii) the effects on the budget, on the distribution of incomes and on poverty are, simply, the differences in the available households incomes in the two alternative scenarios. Finally, to display the results the models include routines to compute statistics, indicators and graphics.

Figure 2 – Flow-chart of the Istat microsimulation models



Chapter 3 illustrates the special module setup to estimate the Municipal Real Estate Tax (IMU) for the main dwelling owned by sample households, using the rates and the tax abatements actually applied in 2,599 Italian Municipalities. When a taxpayer who lives in his/her own house has no revenues subject to the income tax, or only perceives an employment income and/or a pension and has no need to file a tax return, the tax file does not re-

port the taxable income from home-ownership. These missing values have been imputed through a regression on the responding home-owners who have to report the rental value of their main dwelling in the tax files.

Finally, chapter 4 describes the model on VAT and excise taxes used to measure the effects of changes in indirect taxes, assuming a complete translation onto consumer prices. The results provide: i) estimates of the impact of changes in the VAT rates on household expenditure, broken down by household types; ii) aggregated budgetary effects. A planned development is to match statistically the EU-SILC with the Household Budget surveys, to obtain an integrated income-expenditure set of microdata that will permit to assess the impact of indirect taxes with respect to household incomes.

2. Microsimulation models and the evaluation of public policies

Microsimulation models have come to be considered the most appropriate tools for the assessment of the redistributive effects of public policies, especially when these consists in the provision of cash transfers and other benefits or in the taxation of incomes, wealth or expenditures. Microsimulation is clearly more informative than the 'typical agent' approach, that is based on a few selected examples. Using information about thousands of individuals and households, microsimulation models permit to better identify who are the winners and losers of a policy and to estimate their number. Therefore, the overall effects (on equality, on poverty, on the budget etc.) can be assessed on the basis of a representative sample of the population. The policymaker concerns in the field of social benefits and tax policies should not be limited to a mere list of welfare indicators and accounting costs relating to each single policy instrument. Rather, the debate focuses, or should focus, on the efficiency and effectiveness of a single policy and/or of the tax/benefit system as a whole in preventing poverty and social exclusion. At this regard, one may note that even if a single policy is under evaluation, it is appropriate to account for all the interactions it has with all the other programs.

In the literature, efficiency and effectiveness issues are in fact addressed by analysing different questions:

Flaws in the design of policies

- **Leakage** is a typical symptom of the inefficient selection of the beneficiaries. It occurs when a part of the total expense for the benefit goes to people that the norm does not envisage as the 'needy', because of frauds as well as of mistakes in the design of the policy and/or in its actual administration (namely, of the access criteria). Leakage can be measured by the share of total expenditure that *does not* reach the "desired" target population.
- **Coverage**: how many of the 'needy' are actually entitled to a specific benefit? And, in case of under-coverage, how much money is needed to reach the whole target population? The so-called *take-up* problem (i.e. the self-selection of potential beneficiaries) explains part of the under-coverage and is usually due to lack of information and/or assistance to the applicants. However, under-coverage may arise because of an inadequate design of the policy, too. A pos-

sible measure is the percentage of percipients of a particular cash benefit on the total target population.

- **Sufficiency** of the measure with respect to the intensity of the percipients needs. For example, in the case of a cash subsidy for the poor, the extent to which it reduces the poverty gap (i.e. the difference between household income and the poverty line). The interesting measures here are the percentage of the gap covered by the policy and the amount of money needed to fill the gap completely.

All these aspects can be addressed to explore the effects of a single policy and of the whole tax-benefit system as well. However, the related measures can be estimated only if the researcher has sufficient and reliable administrative and/or survey microdata and a (set of) detailed microsimulation model(s).

Consistency between the general scopes and the effects of policies

A more general question is whether the set of all the taxes and benefits is consistent with the general scope of the system. The most explored issue, in this regard, is whether the system performs well in fighting poverty and social exclusion, usually measured with reference to an income threshold (i.e. a poverty line) or by other suitable welfare and well-being indicators. There is abundant literature on the pros and cons of the different definitions of poverty (relative and absolute) and of alternative measures of well-being.

The set of indicators chosen by the EU for the program Europe 2020 includes the (risk of) *relative* poverty, a measure of severe material deprivation due to the lack of some basic necessities and a low employment level of the household labour force. It is interesting to note that all these indicators are measured at the micro level, so that the *ex-ante* and *ex-post* assessment of the national policies is bound to rely upon measures of the effects at the micro level with collected data and/or micromodelling.

Usually, only few social policies meet all the requirements entailed by the many possible indicators of welfare, well-being and poverty. Moreover, it is very difficult to define commonly accepted measures of equality: each available welfare index, according to its mathematical properties, implies a different degree of aversion to inequality and weights differently the gains and losses of the rich and the poor. In principle, micromodels can provide a full set of indicators and thus indicate whether a policy change improves welfare according to each of the different measures available.

Another complex technical issue is the selection of a suitable benchmark for the comparison, that is the counterfactual scenario describing what might have happened had the policy under evaluation *not* been in force. The *coeteris paribus* clause is standard practice, provided that the possible interactions with other measures are taken into account in the simulations. Also, it is sometimes desirable to insert appropriate behavioural parameters in order to assess the individual reactions to the policy.

Comprehensiveness of the assessment of the effects

In principle, the evaluation of a social policy should not disregard externalities and non-monetary benefits. For example, child allowances for poor households may have positive effects on the human capital of the future cohorts of the labour force through higher educa-

tion expenses that could bring about higher future increases in productivity of the economic system.

Similarly, it would be of paramount importance to understand whether countercyclical social policies concur to stabilize the macroeconomic fluctuations of the output. The standard practice in microsimulation exercises is to ignore all the potential macroeconomic effects of social policies and of tax policies, except for the *coeteris paribus* impact on the public budget. This limitation could only be avoided by integrating macro and micro models.

Finally, in light of the debate that goes under the title "beyond GDP", it is necessary to discuss on a case by case basis whether the evaluation of a policy should be conducted solely in terms of its *monetary* effects, including the exit from monetary poverty, or it is more appropriate to refer to the quality of life in its broadest sense (e.g. to non-monetary indicators of health, empowerment, quality of social capital etc). Again, this calls for further improvements of the microsimulation techniques. Namely, it would be necessary to encompass the correlations between the income levels, the extent of social policies and the observed non-monetary indicators of well-being at the individual level.

Estimating welfare effects with "arithmetical" microsimulation models

Most microsimulation models ignore the behavioural responses of the individuals to the change in the tax and/or benefit policies. These "arithmetical" models substantially compute the change in the disposable incomes at the individual or household level by comparing their budget before and after the new policy. This is equivalent to ignore any possible behavioural reaction (of the labour supply, of the household composition etc.) induced by the policy.

The assumption of constant behaviour is not too naive when it is important to measure the impact of a policy change in terms of its welfare effect. Applying the theory of consumer behaviour, the effect of a change in the budget constraint can be assessed on the basis of a money metric utility measure that evaluates the change in welfare as an "equivalent" variation of income. The tax-benefit policies change the price of the goods that a household consumes, of the services it sells on the market and/or its exogenous income. The assessments provided by "arithmetical" microsimulation models corresponds to the measurement of the equivalent variation that is obtained by applying the new prices and the new budget constraint to the initial consumption bundle and labour supply of the household[9]. This argument, however, does not overcome the problem of incentive compatibility. Effectively, in designing public policies aimed at changing individual behaviours to improve welfare (e.g., higher employment) , the incentives of individuals should be consistent with those of public and private agencies managing the public programs. Besides, when the expected effects of planned reforms are hardly attributable to marginal variations, microsimulation analyses need to go a step beyond a mere arithmetical perspective.A microsimulation model permits to identify the individuals and households who gain or lose money because of a policy and the monetary effect as well. A typical display of the results is the average gain or loss broken down by deciles of income, by socio-demographic characteristics, geographical area,

[9] For an algebraic proof of this equivalence see Bourguignon and Spadaro (2006)

specific target groups etc. A host of social welfare indicators can be computed to assess the inequality of the distribution of incomes before and after (with or without) the policy as well as the impact on poverty. Finally, one may calculate measures of progressivity and of polarisation/discrimination.

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