

THE ESTIMATION OF IT-SILC GROSS INCOME

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OUTLINE

- 1. Provide a picture of the core methodological aspects of the estimation of IT-SILC gross income variables**
- 2. Describe the main features of Siena Microsimulation Model (SM2) for the net-gross conversion of income**
- 3. Focus on the joint use of microsimulation and administrative registers**

AN INNOVATIVE METHODOLOGY FOR THE ESTIMATION OF GROSS INCOME

The core methodological aspects:

- **Set up and use a microsimulation model when multiple integrated data sources are available**
- **Develop a mixed strategy of microsimulation and micro integration techniques**

THE GROSS INCOME TARGET VARIABLES

- **IT-SILC gross income became compulsory for Italy starting from survey year 2007**
- **Set off a Feasibility study in 2004**
- **For collecting data on tax and social insurance contributions is possible to use:**
 - **survey**
 - **register**
 - **microsimulation model**
- **In Istat the availability of administrative data has consented to use both microsimulation and registers in an innovative way**

SM2:

SIENA MICRO SIMULATION MODEL 1/3

- The SM2 was adopted as recommended procedure by the European Commission for the conversion of EU-SILC income variables
- Istat improved the University of Siena Micro-Simulation Model (SM2) to the non standard case of an integrated data set from multiple sources

SM2: SIENA MICRO SIMULATION MODEL 2/3

- **SM2 is appropriate for multi-country application. The model system includes:**
 - **Standardised set of routines, which can handle many type of input data**
 - **Country-specific routines, that are able to convert the input data into standardised forms and to specify parameters of the national tax system**

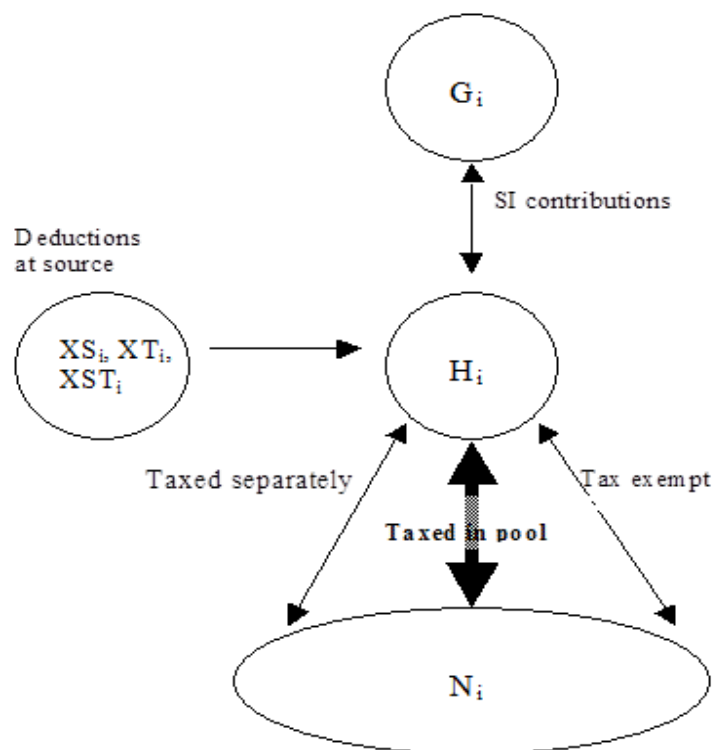
SM2: SIENA MICRO SIMULATION MODEL 3/3

- SM2 is fully "data based"
- All the information on income components have to be collected, compiled or imputed in some form in the model
- SM2 does not incorporate simulation of benefits or any other income components

BASIC RELATIONSHIP BETWEEN NET AND GROSS AMOUNTS

- To estimate the tax due: all taxable income is pooled together over components and over persons in the tax units
- Going from known gross taxable income (H_i) to net income (N_i) is quite simple since the tax rules are a function of the former
- Going from given N_i to H_i required iterative solutions

GROSS TO NET RELATIONSHIP



The relationships between gross taxable income for a particular component, H_i , and quantities like gross income G_i and income after retentions at source X_{ST_i} are usually simple, dependent only on i

The same applies to the relationship between H_i and net N_i for components which are taxed separately at a flat rate or are taxed exempt

GROSS-TO-NET ALGORITHM

	Income measure	total	by component ⁽¹⁾
1	GROSS(2)	$G = \sum G_i \leftarrow$	G_i
2	Social Insurance contribution		$S_i = S_i(G_i)$
3	GROSS TAXABLE	$H = \sum H_i \leftarrow$	$H_i = G_i - S_i$
4	Component-specific deductions		$D_i = D_i(H_i)$
Aggregation over components and individuals in tax unit			
5	TAXABLE INCOME	$Y = \sum Y_i \leftarrow$	$Y_i = H_i - D_i$
6	Common deductions	$D_0 = D_0(H)$	
7	Taxable income(0)	$Y_0 = Y - D_0$	
8	Tax due(0)	$W_0 = W_0(Y_0)$	
9	Common tax credits	$C_0 = C_0(Y_0)$	
10	TAX DUE	$W = W_0 - C_0$	
11	Component-specific tax credits	$C = \sum C_i \leftarrow$	$C_i = C_i(Y_i)$
12	TAX PAID	$X = W - C$	
13	TOTAL NET	$N = H - X$	
14	Tax rate(0)	$R_0 = X/H$	
15	TAX RATE = TAX DUE/ TAXABLE INCOME	$R = W/Y$	
Disaggregation – personal income by component			
16	Proportionate tax by component		$X_i = R * Y_i - C_i$
17	NET BY COMPONENT		$N_i = H_i - X_i$

(1) The functional relationship may be more complex or varied

(2) Including workers' social insurance contribution

NET-TO-GROSS ALGORITHM: TAX RATE R

- The conversion process involves a double iterative loop
- Tax rate R has two functions:
 - It is a parameter in the iterative procedure. Starting from a net value, the system finds a gross value which must return the given net value
 - It provides a means for the disaggregation of total tax by income components and the decomposition of total net into components
- The model converges to the solution in a number of fixed iterations

A DEVICE TO TREAT DIVERSITY

- An important feature of SM2 is that by defining certain ‘special deductions’ and tax credits, many complexities of different tax regimes can be incorporated into the standardized procedures
- Deductions refer to the part of gross taxable income which is tax exempt
- Tax liability is normally reduced by tax credits
- In addition to these ‘common’ deductions and tax credits, you can define ‘special’ component-specific deductions and tax credits to accommodate variations in the form in which the component is taxed without altering any other aspect of the model

Examples of special deductions and tax credits

	Form of taxation of component i	Special deduction	Special tax credit
1	Tax exempt	$D_i=H_i$	-
2	Taxed at flat rate f_i	$D_i=H_i$	$C_i = -f_i * H_i$
3	Tax-exempt at flat rate f_i	-	$C_i = +f_i * H_i$
4	Deductions for expenses	+common deductions	-
5	Tax credit for expenses	-	+common tax credits
6	Special tax not related to income	-	-common tax credits
7	Double taxation at flat rate f_i	-	$C_i = -f_i * H_i$
8	Part ΔS_i of social insurance contributions subject to tax	$-\Delta S_i$	-

IT-SILC GROSS INCOME: THREE STEPS

- 1. Development of the model SM2-EU-SILC starting from SM2**
- 2. Integration of survey and Admin data used in conjunction with microsimulation**
- 3. Construction of the final data set on gross income target variables**

1 – THE MODEL SM2-EU-SILC (a)

- **A First version of SM2-Eu-Silc for years 2004-2006**
- **SM2 was based on ECHP data and on 2003 year tax rules**
- **Transition to EU-SILC survey**
- **Adjustment of some conversion routines of SM2:**
 - i) estimation of self-employment income and the CoCoCo (temporary subcontractors) income
 - ii) calculation of IRAP tax (regional tax on productive activities)
 - iii) inclusion of the tax reform of year 2005

1 – THE MODEL SM2-EU-SILC (b)

- **Main features of the Italian SM2-Eu-Silc 2004-2006:**
- **Better quality of input data**
- **Integration of fiscal data in the input file of the model**
- **Use of Tax returns for the calculation of tax credits and income deductions instead of regression techniques**

1 – THE MODEL SM2-EU-SILC (c)

- **Final model of SM2-Eu-Silc for survey year 2007**
- **Inclusion of 2007 tax reform**
- **Massive use of fiscal data: Registers related to employee income, self-employment income, pensions and unemployment benefits are exploited for calculating:**
 - **income taxes**
 - **deductions, tax credits**
 - **net and gross amounts**

1 – THE MODEL SM2-EU-SILC (d)

The Italian tax system as integrated in the model (year 2015)

N	Income components	Social Insurance Contributions (Si)	Tax	Included in common pool	Component specific	
					Deduction (Di)	Tax Credits (Ci)
1	Employee income	Employer's $S_0(G_1)$ Employee's $S_1(G_1)$	IRPEF	X		$C_1(Y_1)$
2	Self-employment income	S_2	IRPEF	X		$C_2(Y_2)$ $-f_2(H_2)$ "IRAP" (a)
3	Pensions		IRPEF	X		$C_3(Y_3)$
4	Property (rental and cadastral) income		IRPEF (b)	X		
5	Financial Capital income		Taxed at source (flat rate K_5)		H_5	$-K_5 \times H_5$
6	Education related benefits, Unemployment benefits		IRPEF	X		
7	Family benefits, Sickness invalidity benefits (c), Housing allowances, Any other personal benefits.		Tax exempt		H_7	
8	Property value		IMU (on value of real estate)			$-f_8(\text{value})$

(a) Irapp: tax on income from production activities. $f(..)$ stands for 'a function of'

(b) On total cadastral and on 85% of the rental income, if not subject to the rental income flat rate "cedolare secca"

(c) Part of the benefits are taxable

A MIXED STRATEGY 1/3

■ ADMIN DATA AND MICROSIMULATION

- Incomplete coverage of tax data
- Under-reporting of survey data

■ Linkage with tax records for imputing the missing values and/or minimizing the under-estimation of survey data

■ Microsimulation for estimating taxes and social insurance contributions not covered by registers

A MIXED STRATEGY 2/3

- **All the available information (survey and registers) are used as input file of the model SM2-EU-SILC**
- **Fiscal data of net incomes, tax credits and deductions are employed with survey data in the model and as benchmark for microsimulation results**
- **SM2-EU-SILC outputs are compared with the available fiscal gross income at the micro level**

A MIXED STRATEGY 3/3

- **Tax data and microsimulation estimates are both applied for reciprocal comparison and validation**
- **The comparison is very useful for detecting some inconsistencies in fiscal data (i.e. self-employed contributions)**
- **The taxes estimated by the model are replaced by the registers' taxes, if available, since these are the taxes actually paid by the taxpayers**

THE FINAL IT-SILC GROSS INCOME 1/4

- **The final gross income variables are computed as net amounts plus taxes provided by registers or estimated by SM2-EU-SILC, for those individuals not present in the fiscal records**
- **The model provides all the social insurance contributions for a partial coverage of the available registers**
- **A stochastic component is added to fiscal taxes in order to anonymize the data**

THE FINAL IT-SILC GROSS INCOME 2/4

- **When the net administrative incomes are higher than the survey incomes**, the net and gross incomes and the taxes completely arise from registers; the final net and gross variables do not differ much from the fiscal data
- **When the survey incomes are higher than the register data**, the net incomes are those taken from the survey (collected or imputed), while the taxes derive from register data. The final gross variables are different from the fiscal data

THE FINAL IT-SILC GROSS INCOME 3/4

- **The difference between the surveyed data and the tax data could not be considered as a direct measure of illegal tax evasion**
- **It is not possible for us to discriminate between the legal tax avoidance and the tax evasion**

THE FINAL IT-SILC GROSS INCOME 4/4

- **As a result of our methodology the typical ‘adjustment factors’ used in any microsimulation model for correcting the disposable income and the gross income for taking into account the tax evasion are not applied**
- **IT-SILC disposable income partly includes income not reported to tax authorities, while the taxes for the most part derived from the tax returns and do not require any adjustments**

IT-SILC TARGET VARIABLES

Variables 2012 (income reference year 2011)	Ratio Net/Gross	Distribution	
		Gross	Net
INCOME FROM WORK	71.4	66.5	63.1
PY010 Employee cash or near cash income	72.1	47.6	45.6
PY050 Cash benefits or losses from self-employment	69.5	18.9	17.5
PROPERTY INCOME	73.0	4.0	3.9
HY090 Interest, dividends, profit from capital investments in unincorporated business	79.4	1.1	1.2
HY040 Income from rental of a property or land	70.4	2.9	2.7
TAXABLE SOCIAL BENEFITS	83.4	28.2	31.2
PY090 Unemployment benefits	86.0	2.1	2.5
PY100 Old-age benefits	82.5	24.1	26.4
PY110 Survivor' benefits	85.4	0.8	0.9
PY130 Disability benefits	96.4	1.1	1.4
TAX-EXEMPT SOCIAL TRANSFERS	100.0	1.3	1.8
PY140 Education-related allowances	100.0	0.1	0.2
HY050 Family related allowances	100.0	0.6	0.8
HY060 Social assistance	100.0	0.1	0.1
HY070 Housing allowances	100.0	0.0	0.0
HY080 Regular inter-household cash transfer received	100.0	0.4	0.6
TOTAL	75.2	100.0	100.0

The net/gross ratio varies by component for the differences in component-specific deductions and tax credits, and also in the social insurance contributions

COMPARISON WITH NATIONAL ACCOUNTS 1/2

	IT-SILC 2015 (euro per capita 2014)		Istat N.A. 2014	Difference (IT-SILC- NA)
Gross including SIC	21,758	100	100	
SI contributions	3,873	17.8	16.6	1.2
- Employers' contribution	2,676	12.3	11.4	0.9
- Employees' contribution	708	3.3	2.9	0.3
- Self -employment contribution	489	2.2	2.3	0.0
Gross taxable	17,884	82.2	82.7	-0.5
Personal income tax and financial tax	3,052	14.0	13.9	0.1
Net income	14,833	68.2	68.8	-0.6

COMPARISON WITH NATIONAL ACCOUNTS 2/2

- **NA use the administrative data sources which are integrated in SILC**
- **IT-SILC mean income is usually higher than the administrative one**
- **IT-SILC under-estimates financial capital incomes (e.g. dividends of shareholders)**
- **NA estimates are adjusted to account for the grey economy**
- **The grey economy is partially covered in IT-SILC**

FINAL REMARKS

ADVANTAGES OF THE MIXED STRATEGY

- **Useful for reciprocal comparison and validation**
- **Able to detect some inconsistencies in Admin data**
- **Allow to study the profiles of potential tax evaders with discrepancies between fiscal and survey data**
- **Enhance the pros of the two techniques, improving the quality of the final estimates**

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