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A PILOT SOCIAL ACCOUNTING MATRIX FOR ITALY WITH A FOCUS ON HOUSEHOLDS

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Introduction[1]

In this paper we describe the methodology used to construct a social accounting matrix with households grouped according to the geographic area of residence.

The relevance of this kind of analysis is twofold. First, the users can be interested in it since the differences among the regional economic performances, particularly evident in the Italian case, have engendered a great deal of theoretical and empirical debate and research. Therefore, any increase in the supply of regional data is strongly welcome. Second, the Italian national accounts department already produces regional statistics which represent an important benchmark for our SAM.

The construction of the SAM presented in this paper is based on the so called top-down method: the *top* is given by national accounts aggregates organised in a matrix format (NAM); the *down* is obtained by subdividing the Households' entries and outlays according to the household geographical area of residence.

In the first section we concisely describe the Italian 1990 national accounts matrix.

In the second section we use regional accounts data in order to fill the cells generated by the NAM disaggregation. In this way we get an almost complete SAM except for a few cells. The use of other data sources as censuses, sample surveys or administrative data sets allow us to get a complete SAM.

The data used to construct the section 2 SAM are not useful in building other kinds of SAMs. This is due to the fact that most of the data are *not* directly collected on households but on institutional units that are engaged in monetary transactions with households. As a consequence, if we focus our attention on characteristics *other* than the household geographical area of residence, official macro data sources do not support us anymore. We necessarily have to rely on micro data supplied by sample surveys on households budgets. Unfortunately, each survey by itself does not collect all the information required to subdivide each NAM cell. Furthermore the simultaneous use of different data sources does not necessarily lead to coherent estimates; for example disposable income estimated on the basis of a specific data source might not be coherent with the consumption estimated on the basis of another independent data source. For this reason we have to integrate data coming from different data sources in *one* consistent data set, the *integrated archive*. The third section is devoted to a synthetic description of the method used to build the bulk of it. Such archive originates from the matching of two data sources, the Bank of Italy survey on households income and wealth (SHIW) and the ISTAT households expenditure survey (SHB). It contains the main variables from both surveys, harmonised with national accounts definitions.

The SHIW-SHB archive also records the households geographic residence. This allows us to compare the archive figures with the results obtained in the second section. This helps us to validate the goodness of the archive and entitles us to use it for the construction of alternative SAMs.

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[1] The views expressed in this paper are those of the authors and do not necessarily reflect the views of the Italian National Institute of Statistics.

1.The top-down and bottom-up methods

The social accounting matrix is an exhaustive way of presenting a country *social accounting*[2], i.e. a way of recording all monetary transactions among all agents in each phase of the economic circuit. It is a squared matrix in which each row-column couple represents a phase of the circuit. Entries can be read by row and outlays by column . Each cell displays a monetary flow, whose placement in the matrix provides information about its nature (production, value added etc) and about the characteristics of the agents involved in the transaction.

The direct method to construct a SAM (bottom-up method) consists in computing the value of each cell as a sum of elementary data, i.e. the *single monetary transactions.* Provided we know the kind of the transaction and the subjects involved, we can group single monetary transactions according to many different criteria. These figures are coherent with national accounts aggregates only when the national accounts themselves are obtained aggregating the same elementary data. As it is well known, this does not correspond to the actual method of estimating national accounts. As a consequence the System of National Accounts suggests to apply an indirect method to build a SAM, the so-called top-down method. The *top* is given by the national accounts figures, which represent our constraint; these are driven *down* to the disaggregated amounts of the SAM through some proper indicators.

In order to apply the top-down method we first need to assess the possibility of organising national accounts data in a matrix format. The result is the national accounts matrix (NAM), which offers a synthetic view on the macro-economic variables of a system, and on their inter-relations. Rows record receipts by origins, columns present payments by destination. Each row-column couple contains the information of a T-account and therefore the row total must be equal to the corresponding column total. Table 1 shows a 1990 NAM for Italy. The sequence of accounts corresponds approximately to the SEC79 one. The most relevant difference is the splitting of Income account into two distinct accounts: the allocation of primary income account and the secondary distribution of income account. The purpose is to better trace the distribution of income, from value added to disposable income.

Available data do not allow filling some of the cells. For example it is not possible to subdivide VAT according to the domestic or foreign origin of goods, or to identify the agents associated to particular current or capital transfers. In these cases "dummy" accounts are introduced in order to transfer the flow from the sector of origin to the final destination. Moreover, there are row-column *discrepancies* which reflect national accounts statistical discrepancies.

The main sources used for the compilation of the matrix are the I/O table and the economic and financial accounts of the Institutional Sectors. The aggregates are estimated according to ESA79.

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[2] "*Social accounting*… is nothing else but the accounting of the whole community or nation, just as private accounting is the accounting of the individual firm" (cfr. J.R. Hicks 1942).

Table 1: A National Accounts Matrix for Italy - 1990 - billion lire -

ACCOUNT		1a	1b	1c	1d	1e	1f	1g	1h	1i	1j	1k	2a	2b	2c	2d	2e	2f	2g	2h	2i	2j	2k	3a	3b	3c	3d	4
Good and services	**1**																											
Agriculture, hunting, forestry and fishing	1a												12.056	1	570	95	41.552	50	5.799	89	12	0	857					
Electricity, gas, water	1b												2.062	29.631	12.930	4.448	8.893	2.036	12.522	13.846	2.526	631	7.733					
Mining and extraction	1c												3.714	1.071	79.639	43.502	34.649	35.336	3.712	424	759	103	8.786					
Metal manifacture	1d												328	2.201	4.463	79.876	5.710	16.269	16.897	4.310	1.743	472	9.778					
Other manifacture	1e												7.604	360	9.562	15.311	111.307	7.398	35.837	4.609	4.412	266	11.248					
Construction	1f												32	1.301	1.189	976	772	4.676	1.559	2.806	1.267	7.319	7.105					
Trade, hotels, restaurants, cafes and repairs of consumer goods	1g												147	417	14.517	13.286	13.075	1.423	16.191	5.668	3.725	1.157	3.631					
Transport and communication	1h												146	1.646	6.378	7.148	5.369	1.971	10.395	16.113	4.209	17	4.827					
Credit and insurance services; services to enterprises	1i												1.311	1.230	9.395	14.330	14.584	8.007	21.263	8.048	86.193	5.177	16.599					
Location	1j												6	157	513	801	684	484	8.988	1.125	3.411	0	4.346					
Government and other private and public services	1k												109	470	2.105	3.028	1.768	183	5.294	1.356	1.774	1.170	7.331					
Trade and transport margins	*1l*	34.856	9.909	37.050	48.381	139.197	0	-227.980	-41.283	0	0	-130																
Production	**2**																											
Agriculture, hunting, forestry and fishing	2a	73.782																										
Electricity, gas, water	2b		69.637																									
Mining and extraction	2c			201.586																								
Metal manifacture	2d				290.220																							
Other manifacture	2e					360.178																						
Construction	2f						154.161																					
Trade, hotels, restaurants, cafes and repairs of consumer goods	2g							378.050																				
Transport and communication	2h								151.281																			
Credit and insurance services; services to enterprises	2i									181.533																		
Location	2j										106.275																	
Government and other private and public services	2k											342.693																
Generation of income	**3**																											
Wages and salaries	3a												12.543	8.145	23.001	45.215	43.301	24.731	43.562	35.257	41.796	0	144.496					
Employer's social contributions	3b												1.395	4.475	10.939	21.176	19.248	8.765	17.373	12.394	21.954	0	52.625					
Gross operating surplus	3c												32.331	18.533	26.385	41.029	59.266	42.832	178.659	45.235	68.472	89.964	63.331					
Indirectely paid financial intermediation services	*3d*																				-60.721							
Taxes less subsidies on production and imports	**4**	-2.248	43.659	4.033	13.642	22.079	6.824	21.262	-16.538	15.964	99	4.177																
Allocation of primary income	**5**																											
Enterprises	5a																									570.116	*-60.721*	
Households	5b																							422.183	170.344	86.735		
General government	5c																									9.186		109.888
Other property income	**6**																											
Secondary distribution of income	**7**																											
Enterprises	7a																											
Households	7b																											
General government	7c																											
Other current transfers	**8**																											
Use of income	**8**																											
Enterprises	8a																											
Households	8b																											
General government	8c																											
Gross capital formation	**9**																											
Capital	**10**																											
Enterprises	10a																											
Households	10b																											
General government	10c																											
Discrepancies	10d																											
Other capital transfers	**11**																											
Financial account	**12**																											
Rest of the world	**13**	14.425	26.844	52.255	77.105	49.896	335	15.987	7.888	14.536	75	2.846												4.371				3.064
Total outlays		120.815	150.047	294.923	429.348	571.350	161.320	187.319	101.348	212.032	106.449	349.587	73.782	69.637	201.586	290.221	360.179	154.161	378.050	151.280	181.532	106.276	342.694	426.554	170.344	666.037	*-60.721*	112.952

ACCOUNT | **Good and services** (1a–1k) | **Production** (2a–2k) | **Generation of income** (3a, 3b, 3c, *3d*) | **Taxes less subsidies on production and imports** (4)

Coloured cells are furtherly subdivided in the Annex tables

Table 1: A National Accounts Matrix for Italy - 1990 - billion lire - (cont)

ACCOUNT		Allocation of primary income			Other property income	Secondary distribution			Other current transfers	Use of income			Gross capital formation	Capital			Dicrep.	Other capital transfers	Discrep.	Financial account	Discrep.	Rest of the world	Total entries
		5a	5b	5c	6	7a	7b	7c	8	8a	8b	8c	9	10a	10b	10c		11		12		13	
Good and services	1																						
Agriculture, hunting, forestry and fishing	1a										55.692		-1.546									5.589	120.815
Electricity, gas, water	1b										47.191		1.156									4.443	150.047
Mining and extraction	1c										44.027		6.135									33.064	294.923
Metal manifacture	1d										66.672		127.655									92.975	429.348
Other manifacture	1e										282.384		7.532									73.522	571.350
Construction	1f										1.590		130.141									587	161.320
Trade, hotels, restaurants, cafes and repairs of consumer goods	1g										93.777		380									19.925	187.319
Transport and communication	1h										24.291		0									18.838	101.348
Credit and insurance services; services to enterprises	1i										10.160		4.950									10.785	212.032
Location	1j										85.471		0									464	106.449
Government and other private and public services	1k										92.365	230.163	0									2.470	349.587
Trade and transport margins	*1l*																						*0*
Production	2																						
Agriculture, hunting, forestry and fishing	2a																						73.782
Electricity, gas, water	2b																						69.637
Mining and extraction	2c																						201.586
Metal manifacture	2d																						290.220
Other manifacture	2e																						360.178
Construction	2f																						154.161
Trade, hotels, restaurants, cafes and repairs of consumer goods	2g																						378.050
Transport and communication	2h																						151.281
Credit and insurance services; services to enterprises	2i																						181.533
Location	2j																						106.275
Government and other private and public services	2k																						342.693
Generation of income	3																						
Wages and salaries	3a																					4.507	426.554
Employer's social contributions	3b																						170.344
Gross operating surplus	3c																						666.037
Indirectely paid financial intermediation services	*3d*																						*-60.721*
Taxes less subsidies on production and imports	4																						112.952
Allocation of primary income	5																						
Enterprises	5a	134.120	16.789	0	8.631																	16.752	685.687
Households	5b	362.925	0	0	5.457																	1.860	1.049.504
General government	5c	6.650	404	0	875																	210	127.213
Other property income	6	14.435	489	40																			14.963
Secondary distribution of income	7																						0
Enterprises	7a	136.619	0	0		20.160	38.525	52.305	3.747													2.545	253.901
Households	7b	0	1.031.657	0		28.229	1.414	308.471	3.912													4.395	1.378.078
General government	7c	0	0	121.381		216	326.377	5.407	310.309													4.221	767.911
Other current transfers	8					62.491	9.287	246.190															317.968
Use of income	8																						8
Enterprises	8a					140.260				0	0	0											140.260
Households	8b						999.491			10.947	567	0											1.011.005
General government	8c							149.151		0	0	0											149.151
Gross capital formation	9													195.403	52.643	43.051		-14.696						276.401
Capital	10																						
Enterprises	10a									129.313				0	0	15.705		4.204		306.464	-33.924	591	422.353
Households	10b										206.819			0	0	1.890		134		22.045	24.512	0	255.400
General government	10c											-81.012		375	888	18.148		2.583		158.272	7.388	954	107.596
Discrepancies	10d																				125	2.024		
Other capital transfers	11													2.251	-1.378	6.048								6.921
Financial account	12													224.324	203.245	22.117	16.841						20.379	486.906
Rest of the world	13	30.938	165	5.792	0	2.545	2.984	6.387									638							319.077
Total outlays		685.687	1.049.504	127.213	14.963	253.901	1.378.078	767.911	317.968	140.260	1.011.006	149.151	276.401	422.353	255.398	107.597	16.841	6.921		486.906	0	319.078	14.096.242

Coloured cells are furtherly subdivided in the Annex tables

In the displayed NAM, the accounts have been split according to the national accounts classifications: goods and services and production accounts have been analysed by industry, the remaining accounts by Institutional Sectors[3]. When we furthermore subdivide all Pure Households sector figures, we get a SAM.

We can have a large set of subdivision criteria: social criteria as the householder education level; demographic criteria as the householder age group, economic criteria as household income class. The ESA 95 suggests subdividing the accounts by the household main source of income. The choice depends on the purpose of the research and on the availability of the data. In most cases, national accounts do not provide any support for this kind of analysis. The only exception we find in the Italian national accounts data is the subdivision of households economic accounts (but only from production to disposable income), by regional residence area. We decided therefore to organise this kind of information in a SAM as shown in paragraph 2. The exercise combines together the economic relevance of the issue and the data support for the analysis.

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[3] The NAM Household sector corresponds to the so called Pure Household sector. Since 1987, the Italian national accounts department has been building separate accounts for Pure Households and Productive Households. The former includes the following units: individuals or groups of individuals whose main function is consumption and for own final use production; persons living permanently in institutions for religious, health or other reasons (long-term patients in hospital, prisoners serving long sentences); non-profit institution serving households. The latter includes entrepreneurs whose economic behaviour cannot be separated from the economic behaviour of their households.

2. A SAM with households grouped by regional area

The construction of an Italian SAM with households grouped by regional area is possible because of the availability of regional data harmonised with national accounts. Actually, the Italian national accounts department supplies the following data at a regional level of detail.

- The resources and uses account and the distribution of value added account. Value added, compensation of employees, investments are furthermore analysed by industry; consumption is instead subdivided by function.
- The full time equivalent employment by industry.
- The General Government and Pure Households economic accounts. The General Government sequence of accounts is complete, from the production to the borrowing/lending; on the contrary the Pure Households accounts stop at disposable income.

Our SAM focuses on pure households only. This means that only the coloured cells in the table 1 NAM have to be further subdivided. The criterion is the household geographical macro-area of residence. The 20 administrative regions are traditionally grouped in three homogeneous macro areas: North, Centre, South.

By using the Pure Households accounts data and other statistics (census, administrative data, sample surveys data) we disaggregate the NAM cells till the disposable income one. The results are displayed in Annex.

In what follows we briefly describe the main data sources used to disaggregate the coloured cells of the NAM.

2.1 Distribution of primary income

The process from the generation of primary income to its allocation to Institutions is analysed in the Primary income and Property income cells.

Primary income. The matrix displays how the primary inputs remuneration (compensation of employee and operating surplus) moves to households living in the North, Centre, South of Italy (Table 1 in the Annex). Data are directly derived from Regional Pure Households Accounts (from now on RPHA).

Property income. It includes: self-employed income, interests, dividends, rents. Households receive and pay property income from and to resident and non-resident institutional units. For this reason the analysis is carried out in three distinct matrices: the inter-residents property income matrix (Table 2 in the Annex), the property income from the rest of the world matrix (Table 3 in the Annex), the property income to the rest of the world matrix (Table 4 in the Annex). Self-employed income and passive interests have been subdivided according to RPHA amounts. Active interests (except for treasury bonds interests) and dividends are subdivided according to RPHA and the Bank of Italy Survey of Households' Income and Wealth (SHIW)[4] data. Finally, rents are assigned to each geographical area on the basis of census data about the land ownership.

Gross national income. The matrix shows the gross primary income received by Enterprises, General Government, and Pure Households subdivided by geographical macro area of residence. Summing up the cell values we get the gross national income. (Table 5 in the Annex).

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[4] This is a particularly relevant data source. We are going to recall its main characteristics in the next section.

2.2 From Primary income to Disposable income

Primary incomes received by Institutional Sectors are increased/decreased by current transfers in the secondary distribution of income process. The SAM records current transfers in three matrices: the inter-residents current transfers matrix (Table 6 in the Annex), the current transfers from the rest of the world matrix (Table 7 in the Annex) and the current transfers to the rest of the world matrix (Table 8 in the Annex).

Current transfers. Households receive current transfers mainly as social security benefits and non-life insurance claims. Moreover they receive current transfers aimed at financing non-profit institutions serving households[5]. Finally, households receive treasury bonds interests. Actually, treasury bonds interests do not represent a productive factor compensation but a redistribution of resources[6].

Current transfers from Households consist mainly of social contributions, income taxes and insurance premiums.

In order to subdivide current transfers by geographical macro-area we have used several data sources: regional accounts data, the yearly report on pensions, insurance companies balance sheets data, the Bank of Italy sample survey data, census data. We have applied the same indicators to the current transfers from and towards the rest of the world.

Disposable gross income. The result of the secondary distribution of income process is disposable income (Table 9 in the Annex).

2.3 Use of income

The use of income phase is described by the consumption matrix and the savings matrix.

Consumption matrix In a SAM, households final expenditure is usually analysed according to the acquiring households group and according to the type of acquired goods. In our SAM the goods and services account is subdivided by industry and not by homogeneous group of products. For this reason the consumption matrix points out the final consumption of each households group by industries. The estimate of the households consumption matrix is based on the *SHIW-SHB archive* data (see section 3). The archive contains micro data derived from the ISTAT sample survey on households consumption. First we have calculated the Italian households consumption by geographical macro-area and by purpose. Then, we have applied a bridge matrix in order to get an industry by households groups matrix. This matrix supplies the indicators applied to the NAM households final expenditure. The result is the SAM consumption matrix (table 11 in the Annex).

Savings. Disposable income is adjusted for the change in net equity of households on pension funds (NAM cells 8a:8c; 8a:8c). Once subtracted consumption we get the Institutional Sectors saving (table 12 in the Annex).

2.4 Accumulation

The Institutional Sectors saving is increased/decreased through capital transfers from and to resident and non-resident institutional units. The final amount of resources is finalised to investments and to the acquisition of land and other intangible assets. Investments are recorded in the gross capital formation cell

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[5] ESA79 Italian accounts include non profit institutions serving households inside the Households sector.
[6] ESA95 suggests to consider treasury bonds interests as a property income. Following this directive we would alternatively record them in the property income cell.

(table 13 in the Annex) while capital transfers and the acquisition less disposal of land and other intangible assets are recorded in the capital matrix (table 14 in the Annex).

Investments. On the basis of available data it is not possible to subdivide the Institutional Sector investment according to the industries producing the investment goods. For this reason it is necessary to introduce an undivided G*ross fixed capital formation account* which shows the Institutional Sectors outlays finalised to investments. The analysis of the Households investments by geographical area is based on the Bank of Italy sample survey data about the values of the dwellings owned by households.

Capital transfers. Households entries consist mainly of investment grants, which are subdivided by geographical macro area, on the basis of the investments subdivision. Households outlays consist mainly of succession duties. We assume that these taxes are proportional to the population living in each area.

Acquisition less disposal of land and other intangible assets. The Households monetary flow concerns the sale and purchase of lands. The Bank of Italy sample survey collects data on the values on the lands owned by the households. This information is used in order to subdivide the NAM value by geographical macro-area.

2.5 Financial Accounts

Assets and liabilities. The NAM values are disaggregated by using the Bank of Italy official statistics on bank deposits and loans and Insurance companies balance sheet data on insurance technical reserves.

Our estimates strongly rely on the methodology applied to compute Regional Pure Households Accounts, our main and more reliable source of information. The peculiarity of this methodology is the frequent use of micro data not directly surveyed on the household, but on the household's counterparts in the transactions. For example regional insurance premiums paid by households are estimated from insurance companies balance sheets.

As an alternative method we could disaggregate the NAM cells through indicators derived form micro data directly surveyed on households. In Italy there are three sample surveys collecting both monetary and non-monetary data on households: the Istat survey of households' budgets (SHB), the European Community Households Panel (ECHP) and the Bank of Italy survey of households' income and wealth (SHIW). The Italian national accounts department is carrying out studies for the matching of such data sources. The objective is the construction of an informative data set where households monetary variables are analysed by socio-economic group of households. For the time being we have integrated the SHB and SHIW data. The result is the *SHIW-SHB archive* described in the next section.

3. A micro data base for alternative SAMs

The direct approach to the construction of a SAM is the so-called bottom-up method. Its distinctive feature is that we obtain the SAM households figures by summing elementary data directly surveyed on households. Household is therefore the unit of analysis. Obviously, summing up micro data for all households (whose sum of weight equals the population) we do not get the national accounts aggregates. Since we are constrained to be coherent with national accounts we decompose the NAM figures using indicators derived from micro data. We can call this procedure a quasi bottom up method. This is how we obtained households consumption figures displayed in table 11 in the Appendix, as we already mentioned above.

We could have act for most of the NAM cells in the same way, but to do this it is necessary to use different data sources, which could not be coherent among each other and with national accounts.

In what follows we describe how we obtained the SHIW-SHB archive, containing data from two different surveys, harmonised with national accounts definition.

3.1 The SHIW-SHB archive

The crucial problem is how to link different data sources and how to assure the inner coherence of the resulting data set and its coherence with national accounts. The Italian National Accounts Department has so far integrated the micro data of the SHB and SHIW surveys. The result is the *SHIW-SHB archive*. The work is still in progress and the results require further validations. The next step is the incorporation of fiscal data whose contribution is essential in order to subdivide the Households' taxes and social security contributions, by socio-economic groups of households.

The SHB focuses on households' expenditure. Nevertheless it collects enough detailed information also on the social demographic and economic characteristics of the household (and/or of its components) as well as on the characteristics of the house where the family lives. Data on income and saving are collected in a specific section where households are asked to indicate their disposable income and saving classes[7]. The SHIW collects detailed information on income (especially on primary and capital income) and saving. It also contains questions on the demographic and socio-economic characters of the household's components and questions relating the house.

The SHIW and SHB surveys cover approximately all the economic issues analysed by the SAM. Nevertheless there is some consensus that SHIW supplies more reliable and detailed information on households' income while the SHB is more accurate in collecting data on households' expenditures. This is a consequence of the survey's specific objectives: the study of the distribution of income and wealth for SHIW and the analysis of households consumption's pattern for SHB. SHIW incomes, even if they are more accurate estimates compared to the ones supplied by SHB, suffer from underreporting and non-reporting problems. This is particularly true for income from financial assets. To overcome this problem some Bank of Italy researchers have estimated more reliable figures for financial assets possession and incomes, using other micro and macro data sources[8]. We use these amounts instead of the declared ones in computing total household income.

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[7] The SHB was strongly revised in 1997. In this paper we refer to the survey as it was before the revision.
[8] See Cannari and D'Alessio, 1993.

The necessity of using at once data collected by both the surveys is the reason why we have decided to integrate their micro data sets.

The integration of the surveys' micro data must necessarily be based on the common variables acting as *linking variables*. Among the common variables only those providing similar frequency's distributions in the two surveys can be considered good candidates. The comparison must obviously be carried out once the variables have been harmonised with respect to definitions and classifications. The analysis so far developed shows that common non-monetary variables on households have similar frequency's distributions. This is true as far as the variables are collected directly by the surveys and through not-ambiguous questions. On the contrary, the monetary variables like income, expenditure, saving and rents have different frequency's distributions.

The non-comparability of the monetary variables is what has compelled us towards the integration of the surveys. Let us consider the example in table 2. The table presents the consumption propensities of households classified according to the households geographical area of residence. In the first column we have SHIW consumption propensities, while in the second SHB consumption propensities. The third column propensities are calculated combining the expenditure distribution given by the SHB with the income distribution given by SHIW. As we can notice the SHB propensities are systematically above the SHIW ones. Moreover the combination of the two data sets leads to not satisfactory results. As a consequence we cannot use simultaneously the SHB and SHIW information to decompose NAM consumption and NAM disposable income. To overcome the problem it is necessary to estimate the indicators once the SHIW and SHB data sets have been integrated in one coherent data set.

Table 2 Consumption propensities by household regional area.

	Consumption propensities (SHIW data)	Consumption propensities (SHB data)	Consumption propensities (SHB expenditure distribution on SHIW income distribution)
North-west	67,9%	91,2%	93,3%
North-east	68,2%	93,6%	72,4%
Centre	73,7%	93,2%	85,1%
South	75,1%	90,9%	90,24%
Islands	80,1%	95,8%	122,9%

3.2 The method used to link the SHIW and SHB data sets

The method used to link the surveys' micro data is based on the assumption that income and related variables are better collected by the SHIW survey while expenditure variables are better estimated by the SHB survey.

We consider the SHIW survey as an incomplete data set with missing values in correspondence of the *expenditure variables*. Our objective is to fill such *missing fields* with values drawn out from the SHB survey. In other words, for any SHIW household (8188) we have to identify one donor among the SHB households (32148). The donor is defined as the SHB household, which has expenditure behaviour similar to the one, performed by the receiver household.

We assume that two households have similar expenditure behaviours if they record an equivalent level of expenditure. In other words we assume that a connection exists between the level of expenditure and the

type of goods or services acquired by the household. This assumption allows us to choose a donor both for the total expenditure variable and for the expenditure by type of product variables.

Obviously we cannot identify the donor using expenditure: it would imply the comparability of the variable in the two surveys and as a consequence the integrating process would be superfluous. Actually, we identify a set of variables significantly connected with the level of expenditure. Subsequently we define a measure of "similarity" that takes into accounts the values assumed by such variables in the SHIW and SHB households. The basic assumption is that a SHIW household records nearly the same level of expenditure of a SHB household that presents approximately the same values for a set of significant variables.

In the following the main steps of the process are synthetically described.

Firs we select the common variables significantly connected with the level of expenditure: the connection is computed through the chi-square index. The head of the household's gender and the household's number of components are the most connected variables with the households expenditure levels. These variables, called *strata variables,* identify ten homogeneous subsets (strata) both in the SHIW and SHB data. The other selected common variables are called *matching variables*.

The donor for each SHIW household belonging to the *n-th* stratum must be found in the corresponding SHB *n-th* stratum. We do so on the basis of the similarity in term of expenditure behaviour. This similarity is expressed through a distance function: the more the distance function is close to zero, the more the similarity increases. The distance is a weighted sum of elementary distances: we compare the values assumed by a set of variables in each SHIW household to the values assumed by the same set of variables in each SHB household and for each variable we calculate the elementary distance, which is given by the absolute value of the difference. Subsequently, we multiply the elementary distances for a weight, which is proportional to the strength between the considered variable and the level of expenditure.

The result of the process is the *SHIW-SHB data set* reproduced in table 3. In the footnotes we listed the strata and matching variables.

The first column variable identifies univocally a SHIW households. As you can notice the same number can be repeated more times (in the table this happens for the 25 and 38 households). This means that for a SHIW household more than one donor has been identified: more precisely, the number of repeated records is equal to the number of *potential donors*. For this reason the number of the data set's records (over 60000 records) overcomes that of the largest survey (the SHB 32000 records).

Table 3 The framework of the SHIW-SHB micro data set – year 1991 -

ID variable for the SHIW household	SHIW variables	Matching variables (values recorded by the SHIW households) **									SHIW disposable income*	SHIW expenditure *	Distance	ID variable for SHB households	Households' expenditure from SHB survey *		
		S1	S2.	M3	M4	M5	M6	M7	M8	M9					Category1	....	Category40
25		1	5	3	4	1	2	4	2	4	55723	58800	0	2779	1859	....	2376
25		1	5	3	4	1	2	4	2	4	55723	58800	0	1707	931	....	0
25		1	5	3	4	1	2	4	2	4	55723	58800	0	1506	1764	....	0
25		1	5	3	4	1	2	4	2	4	55723	58800	0	3011	4320	....	360
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
38		1	2	6	2	4	2	2	1	1	23398	10800	68	5409	1105	....	1080
38		1	2	6	2	4	2	2	1	1	23398	10800	68	3673	768	....	338
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
323		1	1	6	3	4	1	2	2	3	31521	25400	102	1423	547	....	0
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....		....	
424		1	1	6	2	4	1	3	2	2	23880	16600	68	1423	547	....	0
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	
434		1	1	6	2	4	1	3	2	3	14389	12089	48	1423	547	....	0
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	
474		1	1	6	2	3	1	2	2	4	30559	26600	40	1423	547	..	0
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....

*. the monetary variables are expressed in thousand lire
** The matching variables are the following:
    S1 Sex of the head of the household
    S2 Household's number of components
    M3 Age of the head of the household
    M4 Education level of the head of the household
    M5 Professional status of the head of the household
    M6 Number of income perceivers
    M7 Geographical area of residence
    M8 The household is owner or renter of the house
    M9 House size

At this point we have again to operate a choice. Who is the best donor among the potential donors?

We have tried more than one solution and the work is still in progress.

The more immediate one is to consider the "average donor". Its monetary variables are the simple average of all the minimum distance donors.

On the other hand, since the purpose of this analysis is to analyse households by regional area, we tried to select the donors who live in the same (or adjacent) regional area of the recipient. This subset of donors' average expenditure (and its composition) is donated to the recipient household. Some households are left without any donor; this means that there are not minimum distance donors living in the same or adjacent regional area. Since this alters the regional composition of the sample (the 233 households who do not find any donor even in adjacent areas are all in the North and South of Italy), we had to find another criterion to select donors also for those households. Relying on the fact that the two surveys have not consistent levels of expenditure but the distribution is similar, we selected those donors belonging to the same (or adjacent) expenditure quintile.

Comparing the results obtained with the above-mentioned method, with the alternative ones obtained with the "average donor" we find similar results. This probably means that the matching procedure selected a not too heterogeneous subset of donors. We conclude this chapter with a table, which presents the consumption propensities, calculated using the "average donor" method. The results solicit us to continue with integration exercises: the consumption propensities calculated using the SHIW-SHB data set are more reasonable than the propensities calculated on not-integrated data. This is even more evident when we share the total National Accounts disposable income and consumption on the basis of the SHIW-SHB archive indicators (column 2 table 4). These data do not differ too much from SAM propensies (column 3 table 4).

Table 4 Consumption propensities by groups of households

	Consumption propensities (SHIW-SHB archive data)	National Accounts propensies with consumption and income subdivided according to the SHIW-SHB archive	Propensies calculated on the SAM consumption and disposable income
North-west	84,9%	75,0%	78,8%
North-east	90,5%	79,9%	
Centre	87,8%	77,5%	78,9%
South	99,1%	87,5%	84,6%
Islands	102,0%	90,1%	

Concluding remarks

The building of a SAM is an elaborate process. First because of the amount of detailed data necessary to fill each cell: national accounts do not often fit our needs because of the lack of data or the insufficient level of detail. Second because, once the bulk of all the necessary information has been acquired, it is essential to integrate it in one coherent data set. Following this approach we started to build a *social accounting system,* i.e. a table whose columns identify homogeneous groups of households and whose rows record the economic categories included in the national accounts. The social accounting system is the final step of a process that moves from the identification of useful data sources to their integration in a data set where the monetary variables are made coherent with the national accounts' definitions. Once built such a data set (we refer to it as the i*ntegrated data set*) the passage to the social accounting system is straightforward: it simply requires the aggregation of micro data by socio-economic characteristics of the household and the computation of the percentages. The bulk of the integrated data set is the SHIW-SHB archive described in section 3.

From a practical point of view a SAM builder has to exploit as much as possible the data already integrated with the national accounts framework. This is what led us to choose the geographical area of residence as classification criterion. Actually the Italian national accounts department produces quite detailed and complete regional accounts. The SAM supplies a complete overview on the monetary flows concerning the households living in the North, Centre and South of Italy. It enriches the set of information already available since it shows the interrelations among agents. It is also worth stressing the relevance of the expenditure analysis. The SAM approach allows to study consumption by households group *and* industry.

Obviously we can build a SAM with North, Centre and South households relying almost entirely on the SHIW-SHB archive: the distribution by geographical area of disposable income is quite alike in the SAM and in the SHIW-SHB archive. These results validate the goodness of the archive and support us to use it also for alternative households grouping, for which we haven't got suitable official statistics.

Annex

Disaggregation of the NAM cells referred to the Households sector

Table 1 Primary income distribution (NAM cells 5b; 3a:3c)

		Wages and salaries	Employer social contributions	Gross operating surplus
Enterprises				570.116
Households	North	216.005,6	96.295,9	47.829,0
	Centre	89.651,3	36.762,2	19.334,5
	South	116.526,1	37.285,9	19.571,5
General Government				9.186
Total		422.183	170.344	95.921

Table 2 Property income (NAM cells 5a:6; 5a:6)

		Enterprises	Households			General Government	Other property income
			North	Centre	South		
Enterprises		134.120	7.538	4.533	4.718		8.631
Households	North	196.574					3.542
	Centre	73.615					947
	South	92.735					968
General Government		6.650	181	109	114		875
Other property income		14.435	184	97	208	40	

Table 3 Property income from the ROW (NAM cells 5a:5c;13)

		Rest of the world
Enterprises		16.752
Households	North	1.048
	Centre	348
	South	464
General Government		210
Total		18.822

Table 4 Property income to the ROW (NAM cells 13; 5a:5c)

	Enterprises	Households			General Government	Total
		North	Centre	South		
Rest of the world	30.938	62	33	70	5.792	36.895

Table 5 Gross national income (NAM cells 7a:7c; 5a:5c)

		Enterprises	Households			General Government
			North	Centre	South	
Enterprises		136.619				
Households	North		553.329			
	Centre			215.886		
	South				262.442	
General Government						121.381

Table 6 Current transfers among residents (NAM cells 7a:8; 7a:8)

		Enterprises	Households			General Government	Other current
			North	Centre	South		
Enterprises		20.160	23.553	7.926	7.046	52.305	3.747
Households	North	11.740,6	672			165.716	1.647
	Centre	5.306,4		378		59.894	794
	South	11.182,0			364	82.861	1.471
General Government		216	183.804	69.762	72.812	5.407	310.309
Other current transfers		62.491	5.323	2.210	1.754	246.190	

Table 7 Current transfers from the ROW (NAM cells 7a:7c;13)

		Rest of the world
Enterprises		2.545,0
Households	North	1.762
	Centre	1.731
	South	902
General Government		4.221,0
Total		11.161

Table 8 Current transfers to the ROW (NAM cells 13; 7a:7c)

	Enterprises	Households			General Government
		North	Centre	South	
Rest of the world	2.545	1.623	750	611	6.387

Table 9 Disposable gross income (NAM cells 7a:7c; 5a:5c)

		Enterprises	Households			General Government
			North	Centre	South	
Enterprises		140.260				
Households	North		519.892			
	Centre			202.964		
	South				276.635	
General Government						149.151

Table 10 Adjustment for the change in net equity of households on pension funds (NAM cell 8a:8c; 8a:8c)

		Enterprises	Households			General Government
			North	Centre	South	
Enterprises						
Households	North	5.431,9	280			
	Centre	2.212,2		187		
	South	3.302,9			100	
General Government						

Table 11 Consumption (NAM cells 1a:1k;8b)

		Enterprises	Households			General Government	Total
			North	Centre	South		
Agriculture, hunting, forestry and fishing	1a		25.674	11.377	18.640		55.692
Energy, gas, water	1b		25.701	9.098	12.392		47.191
Industry estrattive	1c		21.375	9.136	13.516		44.027
Metal manifactury	1d		36.155	13.765	16.752		66.672
Other manifactury	1e		136.514	55.541	90.329		282.384
Construction	1f		795	329	466		1.590
Trade, hotels, restaurants, cafes and repairs of consumer goods	1g		53.126	18.143	22.508		93.777
Transport and communication	1h		12.422	4.833	7.035		24.291
Credit and insurance services; services to enterprises	1i		5.298	2.026	2.836		10.160
Location	1j		42.734	17.670	25.067		85.471
Government and other private and public services	1k		49.655	18.149	24.560	230.163	322.528

Table 12 Gross saving (NAM cells 10a:10c; 8a:8c)

		Enterprises	Households			General Government
			North	Centre	South	
Enterprises		129.313				
Households	North		115.874			
	Centre			45.109		
	South				45.834	
General Government						-81.012

Table 13 Gross capital formation (NAM cells 9; 10a:10c)

	Enterprises	Households			General Government
		North	Centre	South	
Gross capital formation	195.403	26.206	12.263	14.174	43.051

Table 14 Capital transfers and acquisition less disposal of land and other intangible assets (NAM cells 10a:11; 10a:11)

		Enterprises	Households			General Government	Other capital tranfers
			North	Centre	South		
Enterprises						15.705	4.204,0
Households	North					941	60,9
	Centre					440	25,6
	South					509	47,5
General Government		375	404	170	315	18.148	2.583,0
Other capital transfers		2.251,0	-423,2	-144,5	-810,3	6.048,0	

Table 15 Changes in financial liabilities (NAM cells 10a:10c;12)

		Financial account
Enterprises		306.464
Households	North	9.470
	Centre	6.042
	South	4.533
General Government		158.272
Discrepancies		125

Table 16

Changes in financial assets (NAM cells 12; 10a:10c)

	Enterprises	Households			General Government
		North	Centre	South	
Financial account	224.324	131.480	36.136	35.629	22.117

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