

The *under-reporting* of households' financial assets in Italy

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Abstract

The Italian households' financial assets are evaluated mainly through the Financial Accounts (quarterly revised and updated) and by the Survey on Household Income and Wealth (SHIW), carried out every two years. The Bank of Italy is responsible for both sources. The sample estimates are uniformly below those of the Financial Accounts, even after harmonising all the definitions and the evaluation criteria. Differences between values declared by the interviewee and the corresponding actual value are a major source of this gap. Such a problem can stem either from the interviewee's unwillingness to disclose the ownership of an asset (non-reporting) or from a wrong declared value, generally lower than the actual one (under-reporting). The paper presents a method to correct this potential source of bias in order to improve SHIW financial assets. We use a sample survey of customers of a leading Italian bank group, coupled with administrative data on the assets actually owned, as external sources of information. The adjustment procedure enables to account for a large share of the gap between the figures derived from the sample and from the Financial accounts, significantly increasing the average value of the financial assets for the Italian households (inflating the unadjusted figure of 22.000 euros to 59.000 euros, amounting to about 85 percent of the Financial account estimates).

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1. Introduction

The main sources of information about Italian households' financial wealth are the quarterly National Financial Accounts (NFA) and the biannual Survey on Household Income and Wealth (SHIW), both produced by the Bank of Italy. Only the second source allows data analysis by household social and demographic characteristics. The two independent sources are different, since the first one is aggregate, whereas the second one is based on micro data, collected on a representative sample of the Italian households. Consequently they do not provide consistent information, even after accounting for differences in definitions and evaluation criteria (Bonci *et al*, 2004).

As shown by previous studies (Brandolini *et al.*, 2004), the SHIW tends to under-estimate real assets and, even more, financial assets: in 2002, for instance, households' total financial assets from the SHIW amounted to about a third of the NFA estimate. The low propensity of wealthy individuals to participate in the survey (D'Alessio and Faiella, 2002) and the under-reporting behaviour of participants are the likeliest factors of this under-estimation (Cannari and D'Alessio, 1990).

The paper focuses on this latter issue. Previous studies have shown that respondents might be unwilling or unable to recollect data correctly. In the case of financial assets, mis-reporting refers both to incorrect statements about the ownership of a specific asset (non-reporting) and to errors in the declared amount owned (under-reporting)¹.

We use data from a survey conducted by a leading Italian bank group on its customers as a supplemental source of information. The survey data were then matched to administrative records detailing the amounts effectively held in the various banks of the group ("extending" the amount of information of the survey). The statistical links between amounts declared in the survey and amounts actually owned are estimated using the Extended Supplemental Sample (ESS) and then extrapolated on all the Italian families who are bank customers using SHIW data. The following section provides further details about the ESS.

¹ Generally, respondents tend to be reticent when asked to provide accurate data on their financial wealth and under-report their assets, either for personal security reasons or fearing that the information provided might be used by the fiscal authority. Over-reporting, i.e. declaring the possession of an asset not owned or declaring an amount bigger to that effectively held, is a much less frequent behaviour, largely attributable to recollection problems.

2. The extended supplemental sample (ESS)

The “extended” supplemental sample (ESS) was carried out in 2003 by a primary Italian bank group. In order to maximise data comparability, the survey design and implementation were planned to be as similar as possible to those of the SHIW². The reference population is represented by customers who authorised the disclosure of their data for research purposes, as required by the Italian law³. The population is stratified according to geographical area of residence, municipality size, and more important, to the financial wealth held within the Bank. The survey collects data on 1,834 households⁴.

The outstanding feature of this sample is that data were linked with the bank administrative databases with an exact matching procedure, “extending” the information collected. Each respondent answers for his or her financial assets held in the bank and therefore the self-reported wealth is comparable with that resulting from administrative records. Financial data were available at the level of six aggregate financial assets (deposits and repos, government bonds, private bonds, quoted shares, mutual funds and managed savings) and for financial liabilities.

Tables 1 and 2 summarise the evidence about under-reporting in the ESS. The respondents’ reticence, measured by the percentage of sample units not declaring the ownership but actually possessing it, varies according to the financial instrument: it ranges from a minimum of 5-6 per cent per cent for Managed Savings and Government Bonds to a maximum of 22-27 per cent for Mutual Funds or Private Bonds. As to the under-reporting on amounts, reported values tend to be 50 per cent of the corresponding administrative ones. This percentage drops significantly for Private Bonds (16.8 per cent), whereas it ranges from 40 to 60 per cent for Mutual Funds, Managed Savings and Government Bonds.

Under-reporting is higher for elderly, retired and low-educated heads of household in particular for Government and Private Bonds and for Mutual Funds. Self-employed show an higher degree of reticence in declaring Shares and Private Bonds. Less educated people under-report primarily Government Bonds, while well-educated mis-declare Shares. Furthermore, under-

² The survey design was developed together with the Bank of Italy’s Research Department responsible of the SHIW. The same market research firm managed the survey, using, as far as possible, the same interviewers of the SHIW. A Computer Assisted Personal Interviewing (CAPI) methodology was used for data collection and, as in the SHIW, only family members self-reportedly well informed about the household’s financial situation were eligible to answer the survey questions.

³ The target population excludes customers aged less than 20 and more than 80 and those holding less than 1,000 or more than 2.5 million euros.

⁴ The overall response rate was low (about 18 per cent), but the presence of financial wealth brackets as stratification variable enables an appropriate re-weighting for each observation to control for selection bias.

reporting is higher for households living in the northern regions or located in the upper tails of the distributions of income and non financial wealth.

If we assume that ESS respondents are representative of customers of other banks, such information can be extrapolated to the SHIW data. In order to control for the different demographic features of the two samples, the sampling weights were post-stratified so as to reproduce the distribution of the Italian population of banks' customers.

3. The adjustment method

The econometric framework used is based on the *hurdle models* (Wooldridge, 2002). The approach consists in separately modelling the decision of whether or not to invest and the decision about the amount to invest and represents an alternative to regression with censored variables, typically carried out with tobit models (see Maddala, 1983 and Gourieroux, 2003). We prefer the hurdle models because censored regression is not robust when data depart from the usual assumptions of homoskedasticity, normality and correct specification of the censoring mechanism. Another reason that makes the *hurdle models* appealing is that they enable the same regressor to produce opposite effects in the causal modelling of the two decisions of whether to invest in an asset and how much to invest in it: this degree of flexibility is not permitted in tobit modelling.

The adjustment procedure is composed of three steps:

- (1) estimation of mis-reporting on the ownership (non-reporting);
- (2) estimation of mis-reporting on the amount held (under-reporting);
- (3) adjustment of the SHIW data, applying the relations estimated in the previous two steps.

The probabilities of mis-reporting on the ownership are estimated in the first step with logistic modelling on the ESS data, separately for the six financial assets and the financial liabilities.

The response variable, obtained from the administrative records, is a dummy T for the effective possession of an asset at the household level. The probability of mis reporting (generally in the form of under-reporting and much less frequently of over-reporting) is estimated by including among the covariates a dummy D for the declared asset ownership in the interview. We define the probability of mis-reporting as:

$$\lambda_{ij}(Z) = \Pr(T = i | D = j, Z), \quad i, j \in \{0,1\}$$

The probability of holding an asset conditional on not reporting it is $\lambda_{10}(Z) = \Pr(T = 1 | D = 0, Z)$, while $\lambda_{01}(Z) = \Pr(T = 0 | D = 1, Z)$ is the probability of reporting a

false ownership conditional on not possessing it. The probabilities also depend on a vector of individual and household characteristics (Z)⁵.

Step 2 models the mis-reporting on the amount held. Formally, let be R_j the ratio between the actual and the reported amount for the asset j . This ratio is computed at individual level and is assumed to be a proxy for the reticence at the household level. The log of R_j is regressed on the household declared amount (D_j), its square and a set of social and demographical characteristics (Z):

$$\ln R_j = \alpha_j + \beta_j Z + \delta_j \ln D_j + \varphi_j \ln D_j^2 + \varepsilon \quad j = 1, \dots, 7.$$

The third and last step fits the preceding estimates to the SHIW data. We assume that the models estimated in the previous steps hold for all the Italian households⁶.

For each financial instrument, the estimated probability of holding a given assets is fitted at the household level. A random experiment is then used to impute ownership to households who are likely to possess an asset⁷, regardless they declare it or not.

We reconstruct for every asset the amount owned by the households to whom the experiment attributes the ownership, even if they did not declare it. A linear model is used for the purpose, in which the dependent variable is the logarithm of the amount, with the usual set of socio-demographic characteristics as covariates. The model is estimated over the set of units declaring the possession and successively fitted over the not declaring units⁸.

Finally, the estimated coefficients of mis-reporting on amounts are fitted to the SHIW data to obtain an inflation factor (less often a deflation factor) for the declared amount⁹.

⁵ This approach is simple to implement, but disregards the simultaneity of investment choices in the different assets: we were aware of the risk of such an omission and empirically investigated its consequences by comparing the model with a more complex one that was able to capture simultaneity. The alternative model assumed that household financial choices are determined by a hierarchical process in which the household first decides its own level of risk, then, conditionally on the first choice, takes on the suitable asset management strategy and only in the end selects the financial assets instrumental to the strategy. The approach closely resembles the hierarchical elimination-by-aspects model (Tversky e Sattath, 1979; McFadden, 1981; Maddala, 1983) and we implemented it through a sequence of multinomial and simple logits. This model neither showed superior forecasting capabilities nor provided less variable estimates of the probabilities of possessing the various assets, so we opted for more parsimonious one.

⁶ We refer more precisely to the households who are bank customers or use postal saving, which has become increasingly more sophisticated in the last few years: they represent 90 per cent of the total of all the households.

⁷ Symmetrically, the same mechanism attributes the status of non possession of an asset to households unlikely to possess it, even if they declare the contrary: this choice is justified by the fact that over-reporting, albeit negligible, is present in the ESS data.

⁸ We also add a residual attributed at random with a bootstrap mechanism to the fitted values, in order to preserve the original variance.

⁹ To insure consistency of the estimated coefficients, they are first multiplied by an adjustment factor derived from an auxiliary regression (see Wooldridge, 2003). This correction is necessary whenever predicted values are derived from a regression with a logarithmic transform as dependent, in order not to under-estimate the true value.

The adjustment of the liabilities follows the same lines. The only major difference consists in the ratio R_j being computed by a ratio estimator, because the smaller sample size available for liabilities in ESS would make the regression approach very unstable¹⁰.

4. The correction of the SHIW data.

The adjustment significantly increases Italian households' financial wealth and the complexity of their portfolios. The percentage of households owning at least one financial asset increases from about 74.3 per cent to 79.4 per cent (table 3). The share of those with private bonds jumps from 6.4 to 23.9 per cent. Similarly, the diffusion of mutual funds increases from 11.2 to 29.3 per cent. At the same time, the percentage of households with financial liabilities increases from 21.3 per cent to 25.9 per cent. The adjusted total financial wealth is about 2.7 times the original value, inflating the unadjusted values of 22.000 euros to 59.000 euros.

Looking at the distribution of the financial assets, the adjustment reduces the overall level of concentration: the Gini coefficient decreases from 0.790 to 0.721 and such a decrease is significant when sample variability is taken into account. A similar effect works for liabilities, even if on a lesser scale (the corresponding Gini coefficient drops from 0.925 to 0.914).

We can produce a synthetic vision of the effects of the adjustment by showing how the percentages of households with increasingly riskier portfolios vary (table 4): the quota with low-risk portfolio (only deposits and repos) decreases from 56 to 31 percent, whereas riskier assets become more widespread (from 19 to 42 percent).

The adjustment procedure enables to account for a large share of the gap between the SHIW and the NFA. As shown in table 5, the sample estimate for total financial assets increases from about 31 per cent to about 85 per cent of the NFA amount (the corresponding percentages for liabilities are 47 and 65 per cent).

¹⁰ The stability of the Bernoulli experiment used to assign the possession of an asset was evaluated using a stochastic simulation.

5. Conclusions

Under-reporting is an important source of non sampling error in surveys on households' wealth. We measure this behaviour in a survey, in which administrative records on the amounts actually held, coupled with survey data, reveal a high reticence in either non-reporting the financial assets or in under-reporting the actual amount. We assume that this measured under-reporting represents the behaviour of all the Italian bank customers, in order to set up a procedure to correct for the bias this phenomenon usually determines on sample estimates. The correction produces a large increase either in the diffusion of the riskier assets and in the average amount held. When estimates are compared with the corresponding figures from the NFA, some gaps still remain (especially for government bonds and shares). The comparison of the two sources is not always straightforward, particularly for the shares, which are not reliably estimated in the NFA (see Bonci et al. 2004). Further research is still necessary into the causes of the remaining differences: in particular the selection bias caused by richest households' non participation in the SHIW seems worth inquiring.

Statistical Tables

Table 1

Under-reporting of the possession of financial assets in the ESS (percentages)

	For every asset: percentage of not declaring households that actually own it.					
	Government Bonds	Private Bonds	Quoted Shares	Mutual Funds	Managed Savings	Financial Liabilities ^(*)
Gender^(*)						
Male	6.3	21.5	13.7	26.2	4.4	7.2
female	6.5	22.9	13.3	28.1	4.8	8.7
Age^(*)						
up to 30 years	3.5	6.8	20.6	8.5	1.9	7.8
31 to 40	4.2	13.6	17.5	16.7	3.1	6.7
41 to 50	4.4	18.3	14.3	25.1	4.1	8.9
51 to 65	6.9	26.3	11.3	32.5	5.0	7.0
over 65	11.4	32.9	10.1	35.2	6.4	6.9
Education^(*)						
up to elementary school	9.1	19.6	14.6	20.2	3.4	13.6
middle school	8.1	26.9	8.1	31.3	5.0	6.4
high school	4.8	18.2	11.0	25.9	3.8	8.0
university degree	6.8	22.4	18.8	25.0	4.8	7.1
Work status^(*)						
employee	5.3	18.6	16.3	24.4	3.5	7.5
self-employed	4.8	20.1	16.7	21.9	5.3	6.4
not employed.....	8.6	26.6	8.6	31.6	5.3	7.8
Household income						
1 quartile	5.3	19.2	9.0	23.1	4.2	8.1
2 quartile	7.2	23.1	13.7	29.2	4.0	6.3
3 quartile	6.8	23.3	15.2	28.1	3.8	7.1
4 quartile	6.2	21.3	17.5	26.3	6.0	8.0
Household tangible wealth						
1 quartile	8.2	20.8	9.9	25.2	4.0	8.3
2 quartile	4.0	19.0	12.3	24.8	3.4	6.6
3 quartile	4.4	20.3	14.2	26.8	3.8	6.7
4 quartile	9.0	27.4	19.3	30.1	6.9	8.1
Household size						
1 member	6.0	24.7	10.8	28.0	5.3	6.3
2 members	7.8	25.1	12.7	29.0	4.7	7.4
3 members and more	5.8	19.3	14.8	25.0	4.2	7.7
Town size						
up to 30,000 inhabitants	7.1	24.7	13.0	26.3	3.9	6.0
more than 30,000	5.5	18.3	14.3	26.9	5.1	8.8
Geographical area						
North	8.1	26.4	13.5	29.7	4.4	7.2
Centre	6.8	24.0	14.4	30.0	5.1	6.6
South and Islands	3.0	11.8	13.3	19.5	4.1	8.5
Total	6.4	21.7	13.6	26.6	4.5	7.4

(*) Individual characteristic referred to the head of household, who is defined as the member earning the highest income.

Table 2

Under-reporting of the amount of financial assets in the ESS
(declared value expressed as percentage of the actual amount)

	Deposits and Repos	Government Bonds	Private Bonds	Quoted Shares	Mutual Funds	Managed Savings	Financial Liabilities ^(*)
Gender ^(*)							
Male	83.4	50.6	16.4	64.2	41.3	47.7	68.5
female	90.2	49.1	18.0	32.6	27.5	53.0	102.8
Age ^(*)							
Up to 30 years	81.9	74.8	46.7	42.5	82.2	50.1	103.7
31 to 40	87.7	67.6	22.6	28.0	58.8	50.7	63.3
41 to 50	89.3	46.7	13.2	65.1	37.2	41.8	76.2
51 to 65	78.5	58.1	14.8	61.2	37.0	50.5	76.8
over 65	87.5	40.9	19.2	78.4	30.5	54.2	43.8
Education ^(*)							
up to elementary school	62.6	0.0	3.0	163.1	59.4	0.0	50.0
middle school	75.7	56.1	14.9	82.5	27.9	69.5	82.7
high school	90.6	58.0	13.0	59.0	38.4	50.1	69.1
university degree	85.2	43.9	20.9	47.5	41.6	44.9	71.1
Work status ^(*)							
Employee	87.2	42.5	14.5	49.7	46.0	42.5	79.1
self-employed	74.4	65.5	18.6	40.8	31.8	49.7	47.1
not employed	88.6	50.4	17.8	73.2	37.0	55.9	72.8
Household income							
1 quartile	88.5	50.4	12.8	46.0	34.6	53.6	56.6
2 quartile	91.1	28.3	10.8	68.4	36.7	27.4	79.7
3 quartile	83.3	73.1	13.9	33.8	39.8	50.3	80.5
4 quartile	79.8	54.8	24.1	70.9	40.9	58.5	60.4
Household tangible wealth							
1 quartile	83.7	28.5	14.9	48.6	41.4	70.1	100.3
2 quartile	79.0	62.6	12.9	57.8	45.0	23.4	78.1
3 quartile	90.2	52.5	12.2	60.3	32.5	42.4	63.4
4 quartile	85.7	54.2	21.0	52.6	38.1	50.9	52.8
Household size							
1 member	101.0	62.1	14.7	91.6	35.1	69.2	62.2
2 members	83.1	49.1	18.5	53.8	34.4	55.3	57.5
3 members and more	80.9	47.7	15.9	48.1	43.2	37.2	78.8
Town size							
up to 30,000 inhabitants	86.9	53.3	13.6	60.0	39.0	54.3	75.7
more than 30,000	82.8	47.0	21.0	51.3	38.4	45.8	65.5
Geographical area							
North	81.9	50.3	15.0	59.1	40.4	51.2	81.9
Centre	88.8	53.0	26.4	48.5	44.5	51.1	57.9
South and Islands	87.0	45.7	15.5	50.8	21.1	36.8	60.3
Total	84.7	50.2	16.8	54.3	38.7	49.2	71.0

(*) Individual characteristic referred to the head of household, who is defined as the member earning the highest income.

Table 3

SHIW: effects of the adjustment on the estimates

Assets	Starting values	Step 1	Final Step
	<i>(percentage of owner households)</i>		
Deposits and repos	73.4	73.4	73.4
Government bonds	9.4	12.2	12.2
Private bonds	6.4	23.9	23.9
Shares	10.1	17.3	17.3
Mutual funds	11.2	29.3	29.3
Managed savings	2.0	4.5	4.5
Total financial assets	74.3	79.4	79.4
Financial liabilities	21.3	25.9	25.9
Average amount	<i>(euros)</i>		
Deposits and repos	11,115	11,115	15,316
Government bonds	2,426	3,166	5,810
Private bonds	1,836	6,979	18,736
Shares	1,844	3,183	3,703
Mutual funds	3,071	7,883	10,715
Managed savings	1,395	2,868	4,221
Total financial assets	21,687	35,194	58,502
Financial liabilities	6,428	6,666	8,941
Gini coefficient (total financial assets)	0.790	0.727	0.721
Indice di Gini (financial liabilities)	0.925	0.914	0.914

Step 1: adjustment for non-reporting; Final step: adjustment for mis-reporting on amounts.

Table 4

SHIW: households' portfolios sorted by increasing levels of risk
(percentages)

	Starting values	Final Step
Deposits and repos only	56.2	31.2
Deposits and repos + Government bonds	5.9	2.4
Deposits and repos + Government bonds + Other risky assets	4.7	10.4
Deposits and repos + Other risky assets	18.9	41.6

Table 5

Comparison between the SHIW and the Italian National Financial accounts: 2002

Assets ^(*)	Starting values	Step 1	Final Step	National Financial accounts ^(**)
Average amount	<i>(index. Financial accounts=100)</i>			<i>Billions of Euro</i>
Deposits and repos	55.5	55.5	76.5	421
Government bonds	28.7	31.3	57.4	213
Private bonds	11.2	38.4	103.1	382
Shares	31.1	51.2	59.6	131
Mutual funds	25.5	54.3	73.8	306
Total financial assets	31.4	51.0	84.7	1.453
Financial liabilities	46.6	61.0	64.9	290

(*) Financial accounts do not produce a separate figure for managed savings. The relative sample estimate has been accordingly attributed to the other assets, using external information on the portfolio composition of financial intermediaries (published in the Statistical Bulletin of the Bank of Italy). (**) The following assets are not included: Currencies. Insurance technical reserves and Postal deposits.

Step 1: adjustment for non-reporting; Final Step: adjustment for mis-reporting on amounts.

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