How to generate macro data using survey micro data on household wealth

Carlos Coimbra,[1] Luísa Farinha[2] and Rita Lameira[3]

I.   Introduction

Information on the level, composition and distribution of wealth across households is an important element for both economic analysis and economic policy.

The lack of information on real assets and on the distribution of wealth across households is the reason for producing a survey conducted by the central bank in association with the National Statistical Institute (NSI) designed to study the wealth of Portuguese households. The survey is known as the *Inquérito ao Património e Endividamento das Famílias*, or IPEF.[4] This survey is the only statistical source that makes it possible to link information on household income, expenditure, financial assets, real assets and debt. The micro data obtained from the survey have been used to study the heterogeneity of households' behaviour in terms of the share of risky assets they have in their portfolios and the size of their debt, in relation to characteristics such as income, education level, age and region. The survey results were also useful in clarifying some puzzling issues in macroeconomic analysis, which will be discussed further on, and in making inferences as to the average size and structure of households' wealth.

The paper is organized as follows. The second section provides a brief look at the survey's benefits and shortcomings; the third section presents an example of how the survey results were important in understanding macroeconomic developments in the Portuguese economy; the fourth section comments on macro data from the survey regarding the average size and structure of household wealth; and the final section offers some concluding remarks.

II.   IPEF benefits and shortcomings

The IPEF has been conducted by the central bank and the NSI as an additional module in an existing survey.[5] The central bank provides financial support, collaborates in designing the questionnaire and offers technical training for the NSI interviewers. The NSI monitors all of the fieldwork and produces the database combining the wealth data with information from the

---

[1]   Banco de Portugal, Statistics Dpt. and ISCTE, Economics Dpt., Av. Almirante Reis, 71, 1150-012 Lisbon, Portugal. E-mail: cmcoimbra@bportugal.pt.

[2]   Banco de Portugal, Research Dpt., Av. Almirante Reis, 71, 1150-012 Lisbon, Portugal. E-mail: lfarinha@bportugal.pt.

[3]   Banco de Portugal, Statistics Dpt., Av. Almirante Reis, 71, 1150-012 Lisbon, Portugal. E-mail: rlameira@bportugal.pt.

[4]   The IPEF has been conducted three times to date: in 1994, 2000 (the results of this survey are the ones used in this paper) and 2006/2007 (the data from this survey were not yet available when this paper was written).

[5]   The IPEF was associated with the employment survey in 1994 and with the household budget survey in the other two cases.

associated survey. After being subjected to an anonymisation procedure, this database is then provided to the central bank.

Thus, the IPEF has not been an entirely independent statistical operation. The principal reasons for conducting it as a collaborative venture were (i) the opportunity to cross-reference information on wealth with information on other socio-economic characteristics provided by the other survey; (ii) the relatively large sample size (over 6,000 households in the 2000 survey, expected to increase to over 8,000 in the latest); and (iii) the fact that the survey is monitored by the NSI, thus ensuring greater credibility and integrity than if it were conducted by a private entity.

However, the survey does have one important drawback: the sample is not designed with the specifics of wealth surveys in mind. The resulting problems are well documented in the literature,[6] and include the following: (i) since wealthy households are a small fraction of the population, the probability of being selected in the survey sample will be drastically disproportionate to their share of total wealth; (ii) wealthy households are less likely to respond to surveys on wealth; and (iii) wealthy households are more likely to underreport the level of owned assets (particularly financial assets). Additionally, without adequate incentives, interviewers may not expend the extra effort needed for overcome these impediments. All of this would suggest a need to "over-sample" wealthy households.

However, the relatively large size of the sample and the availability of information on some benchmark variables tend to compensate for the above-mentioned problems. Moreover, the difficulties associated with the under representation of wealthy households do not seem to have the same impact for all types of assets and liabilities. In fact, some real assets, such as principal residence and related debt, appear to be less affected.[7]

III. The use of micro data in macro-economic monitoring

In the second half of the 1990s in Portugal, there was a sudden and notable rise in household indebtedness, to unprecedented levels (from 36 percent of disposable income in 1995 to 85 percent in 2000). This reflected falling interest rates, as well as changes in the supply side of the credit market that allowed more households to obtain credit (see Ribeiro, 2007). This is an important factor in understanding why private consumption continued growing faster than GDP after Portugal's EMU accession. The results of the IPEF provide evidence of a significant lowering of liquidity constraints on households' expenditures in that period. Chart 1 presents the survey data broken down according to monthly household income and the age of the household member interviewed.[8] Comparing the 1994 and 2000 results for all age and income categories considered, there was a substantial decline in the average debt burden. Micro level survey data were very useful in distinguishing the growing number of indebted households from the increase in their average debt. According to the survey data, the rise in household indebtedness at the aggregate level was not achieved at the expense of increased debt at the individual level. Rather, they indicate that households were able to smooth out consumption across the business cycle. Since 2000, aggregate indebtedness has continued to rise steadily, so that a more recent picture of household debt at the micro level is of utmost importance.
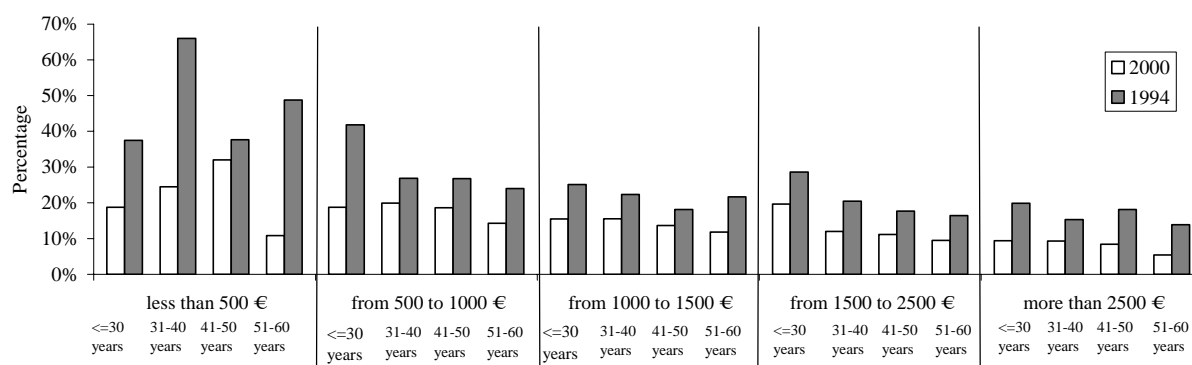
---

6   See, for example, Kennickell, 2005.

7   In Portugal most households own their residences and tend to have associated mortgages.

8   For details, see Farinha (2004).

Chart 1

**Average debt burden by IPEF sub-sample –
income and age**

Source: IPEF2000; Banco de Portugal/Statistics Portugal; authors' calculations.

IV. Macro data derived from the survey

The above example demonstrated the importance of distributional considerations (only possible with micro data) for understanding the behaviour of macroeconomic variables. Micro survey data may also be very useful in complementing the usual sources for compiling aggregated data. In this section, some estimates of population averages for some key variables are presented. The estimates were calculated from the 2000 survey results after adjusting the original sample data to reduce the consequences of under representation of wealthy households due to sample design and incidence of non-response. The sub-section below briefly describes the methodology followed.

IV.1 Methodology

The methodology used in this paper applies a special type of adjustment to the original micro data.[9] This special type refers to the class of generalised regression estimators (GREG). It makes use of known population values for some of the variables that are potentially correlated with non-coverage and non-response. The relation between each variable of interest and these auxiliary variables is parameterised using standard linear regression in a multivariate context. For each variable of interest, the proposed estimator for the population average is given by:

$$\overline{y}_{\text{GREG}} = \overline{y}_S + (X_P - \overline{X}_S)\hat{B}$$

where $\overline{y}_S$ is the sample average of the variable of interest, X_P and $\overline{X}_S$ are, respectively, the vectors of population and sample values of the auxiliary variables, and $\hat{B}$ is a vector of estimated coefficients obtained by the following regression model:

$$\widetilde{y}_i = \widetilde{X}_i B + \varepsilon_i \quad i = 1,...,N_S$$

---

[9] For a survey on these methods, see for example Kalton and Flores-Cervantes, 2003.

where, for household i, $\tilde{y}_i$ is the weighted level of the variable of interest, and $\tilde{X}_i$ is the vector of the weighted levels of the auxiliary variables. N_S is the number of sample elements.

To obtain the population reference values for the auxiliary variables, the following sources were used: (a) 2001 census data on age, educational level and number of persons per household, by geographical location; (b) national accounts data on disposable income; and (c) Banco de Portugal data on credit to households, with geographical breakdown.[10] The variables of interest correspond to the main groups of assets (real and financial) and liabilities.

IV.2   Results

Table 1 presents the results obtained for those variables, for 2000, before and after the adjustment. In addition, it includes the results for Italy reported by Brandolini et al. (2004), as a general frame of reference for our results.[11]

Table 1

Household net worth in 2000 – euro and percent

Wealth component	Portugal				Italy			
	Unadjusted survey data		Adjusted survey data		Unadjusted survey data		Adjusted survey data	
	Mean	**Share**	**Mean**	**Share**	**Mean**	**Share**	**Mean**	**Share**
Total tangible assets	99322	94,2	157076	90,3	164200	87,1	195500	72,5
Principal residence	62194	59,0	86055	49,5	94500	50,1	101600	37,7
Other real estate	23577	22,4	52405	30,1	30900	16,4	52400	19,4
Other tangible assets	13551	12,9	18615	10,7	38800	20,6	41500	15,4
Total financial assets	11479	10,9	25845	14,9	27800	14,7	77900	28,9
Transaction and savings accounts	8628	8,2	16661	9,6	13100	6,9	30600	11,3
Other financial assets	2851	2,7	9184	5,3	14700	7,8	47300	17,5
Total assets	110801	105,1	182921	105,1	192000	101,8	273400	101,4
Debt	5383	5,1	8902	5,1	3400	1,8	3700	1,4
Net worth	105417	100,0	174019	100,0	188600	100,0	269700	100,0

Source: IPEF2000; Banco de Portugal/Statistics Portugal; authors' calculations; Banca d´Italia.

---

[10] Data from Banco de Portugal central credits register, which has information on all loans granted by credit institutions and includes several characteristics on each debtor, namely its location.

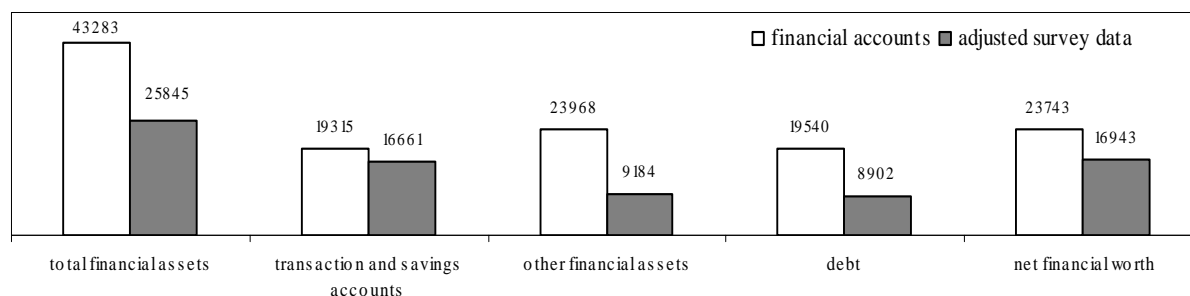[11] To facilitate this general comparison, the same terminology was adopted.

According to the adjusted figures, the average net worth of Portuguese households in 2000 was nearly 175,000 euros. In terms of its composition, tangible assets were clearly predominant, with the principal residence being by far the main asset. Financial assets consisted mainly of deposits. These results should be taken with caution, given the significant statistical limitations associated with the adjustment method. In particular, the experience with the IPEF suggests an underestimation of both "Other financial assets" and "Debt", even after the adjustment. On the other hand, "Other real estate" may be overestimated.

Chart 2 compares the adjusted survey data with financial accounts (FA).[12] As can be seen, the figures obtained from the survey are lower, in terms of both assets and liabilities. The main differences occur in "Other financial assets" (bonds, shares and other equity, investment trust units) and in "Debt", which could indicate that the adjustments made in the original IPEF data, although considerable, still underestimate the population values. The difference in net financial worth is less pronounced.

Unfortunately, there is no information on total real assets of households, unlike information on financial wealth. However, a recent study by Cardoso and Cunha (2005), using the perpetual inventory method, estimated housing wealth to be nearly 50,000 euros per household in 2000. Nevertheless, according to the survey, the unadjusted average value of principal residence alone is higher than that. This discrepancy may in part reflect different valuation criteria, but its magnitude suggests the need for further work in estimating the stock of capital attributed to households. This is an important insight from the survey, since the stock of capital is a key variable in most macroeconomic structural models.

Chart 2

**Average financial position of
households in 2000 (in euros)**

Source: IPEF2000; Banco de Portugal/Statistics Portugal; authors' calculations.

V.   Concluding remarks

In conclusion, it should be noted that: (i) the survey micro data, even without any type of extrapolation, are useful for macroeconomic analysis, as the example of households' debt burden has shown; (ii) although under representation of wealthy households is a problem, its impact can be moderated by using population benchmarks; (iii) the adjustment exercise

---

[12]   In order to render the comparison more accurate, some adjustments were made in FA (eg emigrants' deposits were excluded).

pointed to an average net worth of Portuguese households close to 175,000 euros in 2000, although this value should be taken with caution given the limitations of the methodology; (iv) despite the adjustment made, households' average financial wealth in fact remains downward biased in comparison with FA; (v) finally, in the case of real estate, the survey results point to a possible underestimation of Portuguese households' capital stock.

References

Brandolini, A., L. Cannari, G. D'Alessio and I. Faiella (2004): "Household Wealth Distribution in Italy in the 1990s", *Temmi di Discussione del Servizio Studi*, no. 530, Banca d' Italia.

Cardoso, F. and V. Cunha, (2005): "Household Wealth in Portugal: 1980–2004", *Banco de Portugal WP*, 4-05.

Farinha, L. (2004): "Households' Debt Burden: an Analysis Based on Micro Data", *Banco de Portugal EB*, Sept.

Kalton, G., and I. Flores-Cervantes (2003): "Weighting Methods", *Journal of Official Statistics*, 19, 81–97.

Kennickell, A. (2005): "The Good Shepherd: Sample Design and Control for Wealth Measurement in the Survey of Consumer Finances", paper presented at the *January 2005 Luxembourg Wealth Study Conference*, Perugia, Italy.

Ribeiro, N. (2007): "Debt Growth: Factors, Institutional Issues and Implications – the Portuguese Case", in *Rapid Credit Growth in Central and Eastern Europe*, Charles Enoch and Inci Ötker-Robe eds., IMF.