

## HOUSEHOLDS' DEBT BURDEN: AN ANALYSIS BASED ON MICROECONOMIC DATA\*

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### 1. INTRODUCTION

The rapid growth in Portuguese households' indebtedness in the past few years increased the concerns that debt could become excessively burdensome to households. The increase in the aggregate-level debt burden ratio, which occurred during the second half of the 1990s, despite the downward trend of interest rates, reinforced such concerns. As a matter of fact, this ratio grew significantly during the second half of the 90s, mainly reflecting rising households' indebtedness, and stabilised after 2000.

The changes in the aggregate debt burden ratio provide some useful information on changes in consumption and households' investment as a whole. However, it should be stressed that those changes do not necessarily imply movements in a particular direction in the financial restraint of individual households. The aggregate debt burden ratio, in period  $t$ , which is defined as the estimate of interest plus capital repayments by households in that period divided by the estimate of aggregate disposable income, i.e.:

$$\frac{\sum_i^{ND} Debt\ service\ payments_{it}}{\sum_i^{NT} Disposable\ income_{it}}$$

( $ND$  being the number of indebted households and  $NT$  the total number of households) depends both on the average ratio of indebted households

and, to a large extent, on the number of indebted households. Thus, an increase in the aggregate indicator is consistent with the stability of the individual debt burden if the increase in the number of indebted households is sufficiently strong.

It should be noted that the aggregate ratio may also be read as a weighted average of individual debt burden ratios (in which weights correspond to the ratios of each household's disposable income on total disposable income):

$$\sum_i^{ND} \left[ \frac{Debt\ service\ payments_{it}}{Disposable\ income_{it}} \left( \frac{Disposable\ income_{it}}{\sum_i^{NT} Disposable\ income_{it}} \right) \right]$$

Thus, a single value of the aggregate-level measure is consistent with several combinations of individual debt burden and income across households. From the point of view of the stability of the financial system, it is reasonable to assume that the impact of an increase in the interest rates in the case of a relatively homogeneous debt burden across households will differ from the case where, for instance, the higher burden concentrates in the lower-income classes.

These initial considerations show the importance of using micro level data in the analysis of these issues. Only with this type of data it is possible to characterise in detail the distribution of the households' debt burden ratio. Therefore, the usual measures of central tendency (e.g. the mean) must be complemented with measures that capture the position of households in the tails of the distribution (e.g. the higher percentiles), where it

\* The views expressed are those of the author and not necessarily those of the Banco de Portugal.

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is likely to find the more relevant situations from the point of view of financial stability.

The analysis presented in this article used the micro level data extracted from the results of the Survey on Households' Wealth and Indebtedness conducted in 1994 and in 2000. Data stemming from this survey should, however, be used with caution because, according to the results of the Census, there is strong evidence that some households, in particular the younger, are underrepresented, mainly in the 2000 sample. As economic theory (e.g. the life cycle hypothesis) suggests that younger households may be highly indebted and have a high debt-service burden, their weak representativity in the sample would bias downward the average debt burden ratio. Furthermore, it would increase the uncertainty about the conclusions on the behaviour of the ratio in that particular age class. However, despite the mentioned limitations, it is possible to conclude that, on average, there was not a significant increase in the debt burden ratio at the level of individual households.

Section 2 briefly presents the data and methodology. Section 3 analyses the results and section 4 concludes.

## 2. DATA AND METHODOLOGY

The analysis presented in this article is based on the micro data from the Survey on Households' Wealth and Indebtedness (*IPEF*), conducted by the *INE* with the support of the Banco de Portugal in 1994 and 2000. The unit of analysis of the *IPEF* is the household. The survey includes detailed information on wealth, indebtedness, income and expenditure (in particular payments associated with debts) of a sample of Portuguese households. This information is complemented by other aspects, such as age, level of education and labour market situation of the head of household.<sup>(1)</sup>

It was mentioned above that developments in the aggregate debt burden ratio depend both on the change in the number of indebted households and on the individual ratios of these households. The analysis presented in this article focuses mainly on the second aspect, using two different

approaches: descriptive analysis and regression analysis.

The descriptive analysis characterises the distribution of the debt burden ratio of indebted households, using both the sample average and the 75<sup>th</sup> percentile. These statistics were calculated for several sub-samples defined according to pairs of households' characteristics that are particularly relevant in the analysis of indebtedness, such as the household's income and age and the level of education of its head. The pairs of variables selected were, on the one hand, income and age and, on the other hand, income and education. With this procedure, the effect of one of the variables on the debt burden ratio was isolated from the effect of the other.

In turn, the regression analysis provides an estimate of the effect of each one of the characteristics, simultaneously controlling for the effect of all the other explicitly included in the model. Given that the variable to be explained – households' debt burden – takes the value zero with a non-zero probability and is continuous for values above zero, the tobit methodology was used in this analysis. The following explanatory variables were included in the model: income, age, gender, marital status, level of education, labour market situation and household's number of elements. To facilitate the interpretation of results, "household's number of elements", "income" and "age" were measured as the difference between the value of the variable in the household and its value in a reference household, i.e., a household with two elements, earning the average wage and whose head is 40 years old. The remaining attributes were defined through dummy variables, which take the value 1 in a certain status and 0 otherwise. As usual, the dummy variables characterising the status of the reference household were not included in the model (head married, male, with the 3rd cycle of basic schooling and employee). To capture potential nonlinearities in the effect of income and age on the debt burden, the income squared and the interactive variable obtained from the product between income and age were also included as explanatory variables.<sup>(2)</sup> The inclusion of interactive variables resulting from multiplying each explana-

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(1) For further details on *IPEF*, see the article "The effect of demographic and socio-economic factors on households' indebtedness", June 2003 issue of the *Economic bulletin*.

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(2) A specification including the age squared was also estimated, in which the effect of this variable was not significant.

Table 1

## SUMMARY CHARACTERIZATION OF THE 2000 SAMPLE , BY CLASSES OF INCOME AND AGE

Income		Age				Total
		Up to 30 years old	31 to 40	41 to 50	51 to 60	
Below 500 €	Indebted households ( in percentage).....	10.0	17.7	14.3	10.2	12.2
	Average of the debt burden .....	0.1875	0.2452	0.3199	0.1085	0.1877
	75th percentile of the debt burden .....	0.3735	0.3778	0.3922	0.1242	0.2879
	Relative frequency ( in percentage).....	0.17	0.91	0.74	1.90	3.71
From 500 to 1000 €	Indebted households ( in percentage).....	32.9	30.5	25.6	15.8	22.7
	Average of the debt burden .....	0.1875	0.1990	0.1861	0.1428	0.1763
	75th percentile of the debt burden .....	0.2270	0.2958	0.2097	0.1712	0.2207
	Relative frequency ( in percentage).....	2.15	7.51	7.92	8.09	25.66
From 1000 to 1500 €	Indebted households ( in percentage).....	39.6	48.4	39.3	23.8	35.3
	Average of the debt burden .....	0.1547	0.1553	0.1366	0.1178	0.1381
	75th percentile of the debt burden .....	0.2157	0.2089	0.1864	0.1622	0.1887
	Relative frequency ( in percentage).....	1.73	8.66	11.88	7.84	30.12
From 1500 to 2500 €	Indebted households ( in percentage).....	57.1	62.3	46.2	38.3	46.4
	Average of the debt burden .....	0.1963	0.1195	0.1114	0.0946	0.1111
	75th percentile of the debt burden .....	0.2022	0.1781	0.1675	0.1266	0.1629
	Relative frequency ( in percentage).....	0.99	6.68	9.57	8.75	25.99
Above 2500 €	Indebted households ( in percentage).....	50.0	78.8	65.5	41.4	56.2
	Average of the debt burden .....	0.0939	0.0932	0.0842	0.0543	0.0763
	75th percentile of the debt burden .....	0.1616	0.1288	0.1022	0.0671	0.0993
	Relative frequency ( in percentage).....	0.25	3.38	5.94	4.95	14.52
Total	Indebted households ( in percentage).....	35.8	43.3	37.5	22.9	32.2
	Average of the debt burden .....	0.1740	0.1538	0.1359	0.1072	0.1338
	75th percentile of the debt burden .....	0.2222	0.2018	0.1736	0.1479	0.1825
	Relative frequency ( in percentage).....	5.28	27.15	36.06	31.52	100.00

Source: *Inquérito ao Património e Endividamento das Famílias do INE*.

tory variables by D1994 (a variable which takes value 1 if an observation relates to 1994 and 0 otherwise) makes it possible to check whether the effects of the relevant variables changed significantly between 1994 and 2000.

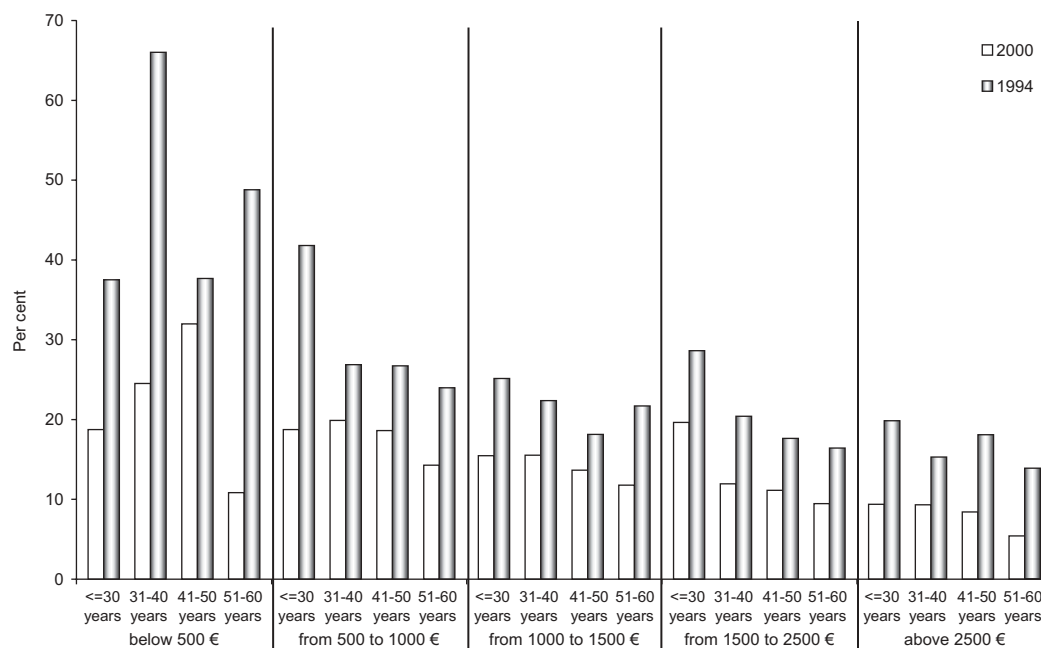
### 3. RESULTS

Table 1 presents the sample average and the 75<sup>th</sup> percentile of the debt burden ratio of sub-samples defined according to income and age in the 2000 survey. The frequency of households and the share of those indebted in 2000 in each sub-sample are also shown. As can be seen from this table, households in the lowest-income class (below 500€ per month) and in the lowest age class (up to 30 years old) are underrepresented in the sample. In most of these cases, the number of

households is very small. Therefore the figures calculated for these sub-samples are very inaccurate in statistical terms. Thus, a greater emphasis is put on the remaining sub-classes, presented in the shaded area of Table 1. The results should be interpreted with caution, since, as mentioned, there is evidence that some households, especially the younger, are underrepresented in the sample. As representativity is not ensured, summary statistics for the total sample may not be reflecting the Portuguese reality. Additionally, the results obtained may underestimate the actual change in the average debt burden, if loans more recently taken out are underrepresented (chiefly admitting that they

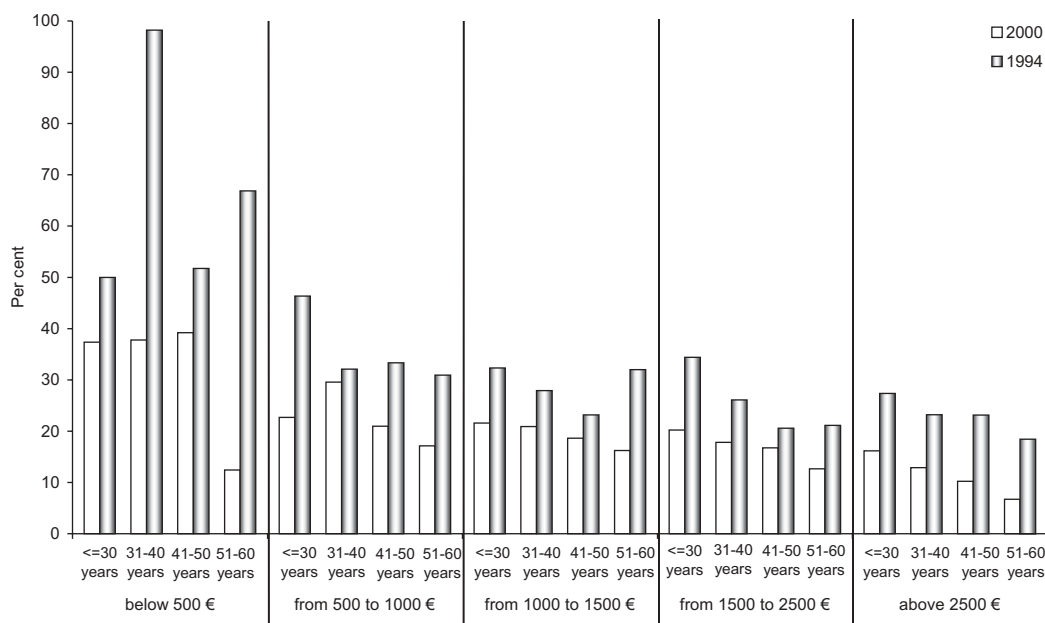
- (3) More recent loans are probably associated with higher ratios, since inflation has eroded the nominal value of payments on loans taken out in previous years.

Chart 1  
**AVERAGE DEBT BURDEN**  
**IN SUB-SAMPLES OF 1994 AND 2000 SURVEYS**  
 Income and age



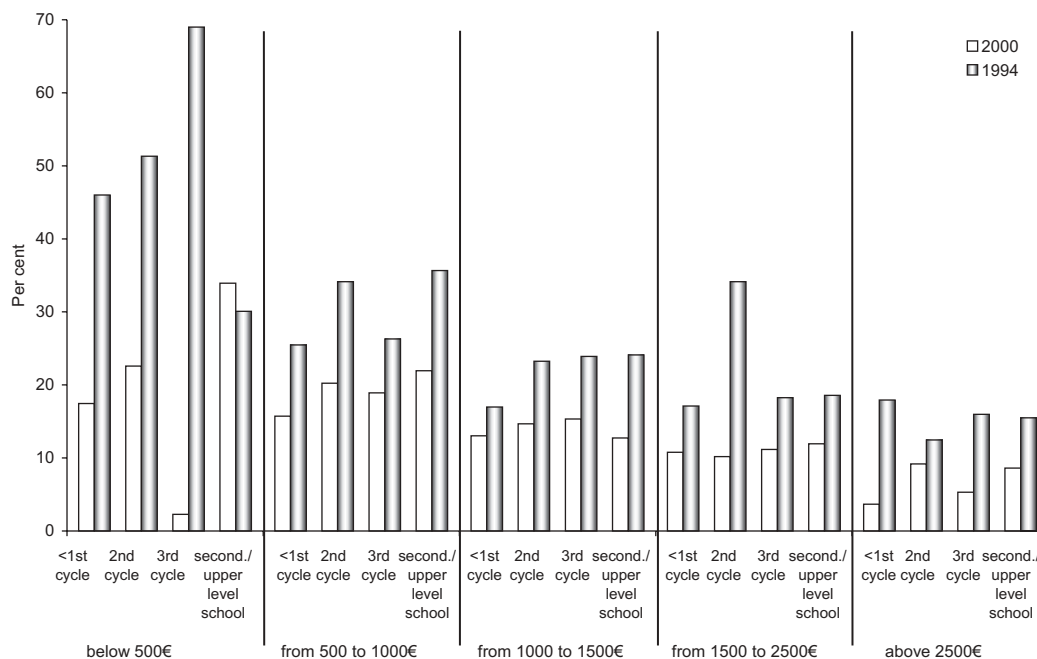
Source: INE, "Inquérito ao Património e Endividamento das Famílias".

Chart 2  
**DEBT BURDEN IN THE 75<sup>th</sup> PERCENTILE**  
**IN SUB-SAMPLES OF THE 1994 AND 2000 SURVEYS**  
 Income and age



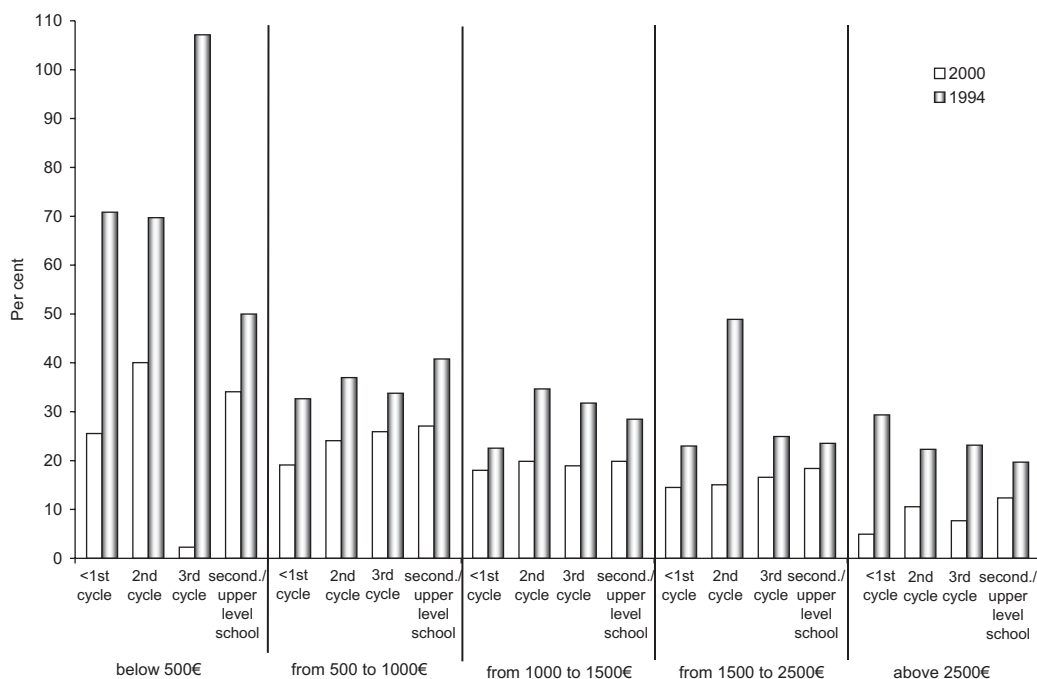
Source: INE, "Inquérito ao Património e Endividamento das Famílias".

Chart 3  
**AVERAGE DEBT BURDEN**  
**IN SUB-SAMPLES OF THE 1994 AND 2000 SURVEYS**  
 Income and education



Source: INE, "Inquérito ao Património e Endividamento das Famílias".

Chart 4  
**DEBT BURDEN IN THE 75<sup>th</sup> PERCENTILE**  
**IN SUB-SAMPLES OF THE 1994 AND 2000 SURVEYS**  
 Income and education



Source: INE, "Inquérito ao Património e Endividamento das Famílias".

Table 2

## SUMMARY RESULTS OF THE TOBIT MODEL FOR THE DEBT BURDEN

Marginal effects in 2000 and differences from 1994

	Effect in 2000	Effect in 1994 minus effect in 2000	
		Value	t-statistics
Constant . . . . .	-2.4	0.30	0.30
Households monthly income . . . . .	2.4	-0.99	-1.70
Households monthly income squared . . . . .	-0.3	0.20	1.94
Age of the head (years) . . . . .	-0.2	-0.03	-0.83
Head is single . . . . .	-4.7	1.23	0.70
Head has no formal education . . . . .	-5.3	-0.62	-0.44
Head has Basic schooling (1st cycle) . . . . .	-3.4	-0.82	-0.93
Head has Basic schooling (2nd cycle) . . . . .	-1.0	-0.90	-0.87

Source: *Inquérito ao Património e Endividamento das Famílias* of INE.

Notes:

(a) Only results for significant variables.

(b) The marginal effects, measured in percentage points, are defined against a benchmark that is a household comprising two elements, earning monthly €1230 (equal to the sample average at 2000 prices); whose head is male, 40 years old, married, has completed the 3rd cycle of schooling and is employee.

are usually associated with higher debt burden ratios).<sup>(3)</sup> In the second half of the 1990s, the youngest households were the main contributors to the increase in aggregate indebtedness. As they are underrepresented, in particular in 2000, it is expected that loans taken out more recently are also underrepresented.

Table 2 presents the most relevant results of the regression estimates, namely the cross-section marginal effects statistically significant in 2000 and the differences between those effects in 1994 and in 2000. Charts 1 to 4 show the average and the 75<sup>th</sup> percentile in sub-samples defined according to income-age and income-education pairs. The joint reading of the various pieces of information point to the following conclusions:

- the percentage of indebted households increased between 1994 and 2000, although the actual increase in the number of indebted households is insufficiently reflected in data in Table 1, given the weak representativity of some subclasses, in particular the youngest;
- the heuristic observation of averages of the distribution of the debt burden ratios in the sub-samples built according to the above mentioned pairs of variables (age and in-

come; education and income) points to a reduction in the debt burden ratio between 1994 and 2000 in most sub-samples (Charts 1 and 3); in turn, the results of the regression suggest that the reduction in the average debt burden, reflected in the constant of the model, is not statistically significant;

- extreme situations of the debt-burden ratio are more likely to be found in lower-income subclasses, which show relatively higher average ratios, both in 1994 and in 2000; this conclusion is suggested by the reading of 75<sup>th</sup> percentile of the distribution (Charts 2 and 4);
- moreover, controlling for age, the average debt burden ratio (and 75<sup>th</sup> percentile) seems to decrease with household's income, both in 2000 and 1994; this conclusion is not confirmed by the econometric analysis, where the non-linear specification suggests that the debt burden ratio increases for lower-income households but decreases from a higher level of income onwards (Table 2);
- considering only classes with income above 500€, due to the fact that the class up to 500€ is represented by a small number of households, the average ratio and the 75<sup>th</sup> percentile in each class of income, in most cases,



decrease with age (Table 1 and Charts 1 and 2); the regression results are consistent with the previous ones, suggesting that increasing the age of the household's head by one year leads to a reduction of around 0.2 percentage points in the debt burden ratio; the conclusion is valid for the 1994 and 2000 samples;

- according to the descriptive statistics, there is less evidence about the effect of the level of education on the debt burden than that of income and age; the indicator seems to grow with the level of education, more clearly from the second subclass onwards (whose elements completed the second cycle) both in 2000 and 1994; in turn, the econometric analysis points to a systematic and monotonous effect of the level of education on the debt burden up to the 3rd cycle of schooling; in particular, households whose head has no formal education show a lower average debt burden (of around 5.3 percentage points) than that of the reference household (i.e. the household whose head completed the 3rd cycle);
- the households whose head is single have a debt burden significantly lower than those whose head is married, both in 2000 and in 1994;
- finally, the marginal effects of age, education and marital status of the household's head in 2000 are not significantly different from the effects in 1994.

#### 4. CONCLUSION

The aggregate level estimates of Portuguese households' debt burden ratio usually referred to in the publications of the Banco de Portugal – defined as the estimate of households' debt burden divided by the estimate of disposable income – point to a strong increase in this indicator in the second half of the 1990s (it has doubled from 1995 to 2000). In turn, the empirical evidence obtained on the basis of the micro level data stemming from the *IPEF* in 1994 and in 2000 suggests that, on average, individual level debt burden ratios have not increased significantly. How is it possible to reconcile these two results? The explanation is probably associated with the strong increase in the accessibility of households to credit during the second half of the 1990s. It can therefore be concluded that the increased accessibility of households to bank financing was not achieved at the expense of the creation of highly critical situations in terms of the fulfilment of debt service commitments. The decrease in interest rates over this period allowed access to credit for a growing number of households, without implying the acceptance by credit institutions of extreme situations in terms of debt burden ratios. However, the fact that the increase in access to credit was stronger for the younger and for those with lower levels of formal education (see the article published in the June 2003 issue of the *Economic bulletin*) introduces elements of vulnerability, in aggregate terms, to an increase in unemployment. It is plausible to assume that these are the fringes of the population that, in the former case, show less permanent labour ties or, in the latter case, lower capacity to overcome an unemployment episode. The usual requirement, by banks, of personal guarantees in addition to the mortgage collateral in credit granted to younger people allows a mitigation of risks in this segment. However, the necessary data to assess the importance of these situations are not available.