HOUSEHOLD SAVING IN PORTUGAL: MICRO AND MACROECONOMIC EVIDENCE*

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1. INTRODUCTION

The evolution of the household saving rate has attracted a growing interest in the debate on the Portuguese economy. This interest is based on the persistence of various macroeconomic imbalances, in particular the high external borrowing requirements of the economy. Additionally, it is well known that the households saving rate declined sharply in the convergence period to the euro area and stood afterwards at relatively low levels in the European context, amounting to about 10 percent of disposable income in 2009 (Charts 1 and 2). However, despite the importance of the evolution of household savings in Portugal - as well as those of the other institutional sectors - the applied literature in this area is still rather scarce.

Chart 1

HOUSEHOLD SAVING RATE IN PORTUGAL

As a percentage of disposable income
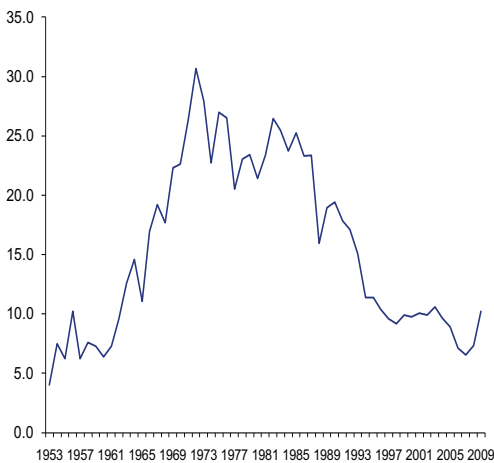
Sources: *INE* and Banco de Portugal.

Notes: Before 1995, the data are based on the long series of Banco de Portugal; after 1995 they are base on INE's national accounts. Savings are not adjusted by the participation of households in pension funds.

Chart 2

HOUSEHOLD SAVING RATE: INTERNATIONAL COMPARISON - 2009

As a percentage of disposable income
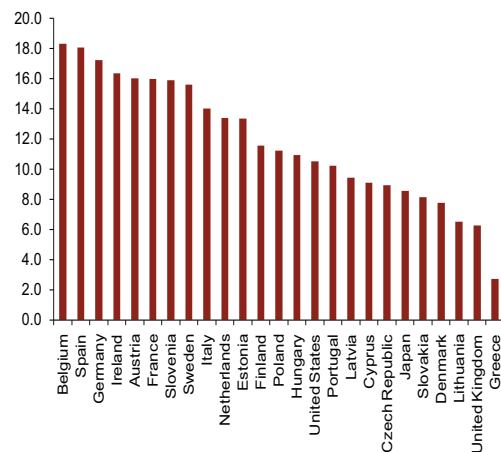
Source: AMECO.

This article aims to contribute to the debate on the evolution of the household saving rate in Portugal. One novelty of the paper is the joint presentation of micro and macroeconomic evidence. These two dimensions are clearly complementary, given that individual decisions are not always consistent with the aggregate effects at the level of the economy as a whole. A good example of these composition effects is the "paradox of thrift," popularized by Keynes (where individual families decide to increase savings but, given the contractionary impact of these decisions on demand and disposable income, aggregate saving ends up declining). Thus, we will analyse both the saving decisions of households at a microeconomic level and the evolution of the saving rate at an aggregate level.

A thorough analysis of the saving behaviour of households implies a combination of a wide range of interrelated decisions with an inter-temporal nature. Thus, it is not surprising that the study of saving requires the combination of economic fields such as economic growth, labour supply, government policy or consumption decisions. This complexity – in a theoretical framework that additionally requires the inclusion of issues such as uncertainty and risk – justifies some restraint on the theoretical interpretation of the empirical results presented in this paper and represents an open opportunity for future research.

The paper is structured as follows. In Section 2 the saving decisions of households in Portugal is characterized, based on a cross-section sample for 2005/06. In Section 3, the evolution of the aggregate household saving rate is modelled for the period 1985-2009, based on time series regressions. Section 4 presents the main conclusions.

2. WHO SAVES IN PORTUGAL?

The analysis of the saving decisions of households[1] at a micro level is typically absent from studies on the saving rate in Portugal. This section aims to fill this gap, by characterizing the heterogeneity prevailing in the household saving behaviour in Portugal. This characterization is potentially important not only to interpret developments observed at the macro level but also in defining policies aiming to influence the saving decisions of households (see Kotlikoff, 1989). This section begins by presenting the data used in the analysis (subsection 2.1). Next, it explores some evidence on the distribution of saving in Portugal and on the evolution of saving over the life cycle of agents (subsections 2.2 and 2.3). Finally, it presents a multivariate analysis of the factors associated with the saving decisions at a microeconomic level (subsection 2.4).

2.1. Description of data and conceptual issues

The analysis is based on the latest Household Expenditure Survey (IDEF), conducted by the National Statistics Institute (INE) in 2005/06.[2] 10403 households participated in this survey. The saving of each household was defined as the difference between total income and total expenditure.[3] These

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[1] In this section we will refer to households in a strict sense, while in section 3 this concept will include non-profit institutions serving households. Throughout the article, we will only report data on gross savings (and the gross saving rate).

[2] For a detailed presentation of the survey and its design see INE (2008).

[3] The survey data do not allow identifying the income generated by each household member. In addition, it should be noted that expenditures refer to the main year of the survey (2006) while the income aggregates concern the previous year (2005). Thus the computation of savings includes, on average, a slightly downward bias, which should not significantly affect the reported results.

variables include non-monetary components, namely owner-occupied housing, self-consumption, wages paid in goods and other non-monetary transfers. Income includes social transfers and is net of taxes and contributions to social security regimes. The surveys also provide household weights that allow extrapolating the results to the whole population (INE, 2008). These weights were used in all computations.

Studies on saving at a microeconomic level are inevitably confronted with the quality of data used. In the case of IDEF, the saving rate is considerably higher than the one calculated in the National Accounts by INE. This feature is consistent with numerous international studies (see for example Moreno-Badía, 2006). In fact, the average (weighted) saving rate in the IDEF 2005/06 amounts to about 20 percent, while the official saving rate stood at 8.9 per cent in 2005 and 7.1 percent in 2006. This discrepancy requires two observations. First, it is known that both income and expenditure are calculated with significant measurement errors in household surveys. Typically, both income and expenditure are under-reported. These errors are transmitted directly to the estimates of savings. However, it should be noted that the microeconomic evidence reported below will not be significantly affected by these measurement errors if they do not differ systematically among the various population segments. Second, there are significant methodological differences between the official national accounts statistics and the saving computations based on the IDEF. A relevant example relates to the interest payments, which are not available in IDEF. According to the national accounts, these payments amounted to about 6 percent of disposable income in 2005 and to about 7 percent in 2006.
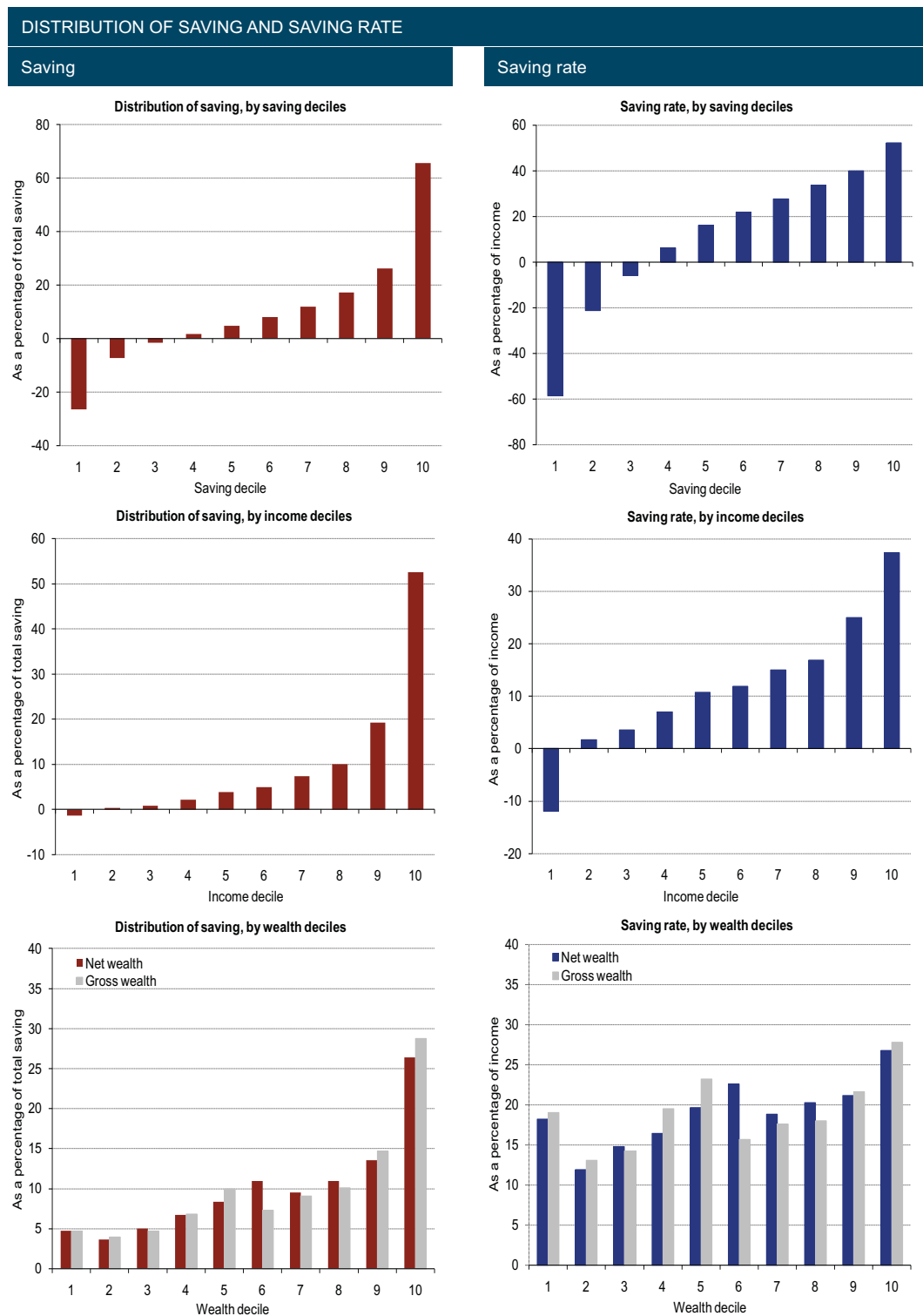
2.2. Some facts on the distribution of saving in Portugal

Chart 3 characterizes the distribution of saving and the saving rate of households in Portugal, according respectively to the deciles of saving, income and wealth.[4] The figure highlights some important features of the distribution of household saving in Portugal. Firstly, there is a high inequality in the distribution of saving. Over 90 percent of total saving is generated by only 20 percent of households (the decile of households with higher levels of saving accounts for approximately two thirds of total saving). In turn, there are many households who report negative levels of saving. In fact, the first three deciles of the distribution of saving display negative average saving rates. It is interesting to compare this result with the answers to the *Inquérito à Literacia Financeira da População Portuguesa* ("Survey on Financial Literacy of the Portuguese Population", (Banco de Portugal, 2010)), in which about half of the respondents reported no savings.

Secondly, the figure allows concluding that the majority of savings is undertaken by households with higher levels of income or wealth (net or gross). In terms of distribution by income deciles, one can conclude that the two deciles of the population with the highest incomes account for about 70 percent of total saving (this value may be biased upwards due to the presence of measurement error).

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(4) The measure of net wealth was computed using the latest Survey on Households Wealth (*Inquérito à Riqueza e Património das Famílias* (IPEF)), conducted by INE and Banco de Portugal in the latest quarter of 2006 and in the first quarter of 2007. The sample of households in the IPEF is a sub-sample of the IDEF 2005/06, being composed of around 8500 households. For a detailed presentation of the characteristics of the IPEF, see Farinha (2008).

Chart 3

DISTRIBUTION OF SAVING AND SAVING RATE

Saving	Saving rate

Distribution of saving, by saving deciles

Saving rate, by saving deciles

Distribution of saving, by income deciles

Saving rate, by income deciles

Distribution of saving, by wealth deciles

Saving rate, by wealth deciles

Source: IDEF 2005/06.

In the case of the wealth distribution, the asymmetry in the distribution of savings is lower, with the two deciles with highest wealth representing about 40 percent of total savings.

Thirdly, it is interesting to note that the conclusions in terms of saving match those obtained with the saving rate. In particular, the saving rate is increasing in household income and wealth. The fact that the saving rate increases with wealth is contrary to models where saving is simply proportional to permanent income. This result is in line with the one obtained by Dynan *et al.* (2004) for the United States. Note, however, that the dispersion of the saving rate is clearly higher among the various income distribution deciles compared to the wealth distribution deciles.

2.3. The behaviour of the saving rate over the life cycle

The theory that structures the analysis of the behaviour of saving rate is the life-cycle theory, originally proposed by Modigliani and Brumberg (1954). This conceptual framework formed the basis for many subsequent developments, in particular the introduction of uncertainty, liquidity constraints and intergenerational transfers (Attanasio and Weber, 2010). In general terms, the theory suggests that individuals smooth consumption decisions throughout life and in face of unanticipated and temporary shocks affecting current and future income. Thus, individuals tend to save less when their incomes are lower - including the beginning of active life, periods of unemployment or after the retirement age - and when their spending needs are higher - especially in the case of child-birth or the purchase of durable goods (Blundell, 2010).

Unfortunately, information from the IDEF, given its cross-sectional nature - focusing on a single moment in time - does not allow testing the validity of the life cycle theory for the Portuguese case. The problem with observing only microeconomic data for a specific year is that the saving decisions of individuals in different age groups result from the sequence of shocks faced in the past, from expectations regarding future income in each moment of time, and from the respective preferences, which may not be comparable across generations. One cannot therefore assess the validity of the theory by simply observing the equilibrium behaviour at a given point in time. In fact, the test of the theory would ideally require panel data, in which households were followed over a relatively long time. Alternatively, the analysis could be developed based on a sequence of surveys of a cross-sectional nature, but sufficiently representative to allow the construction of synthetic cohorts at different points in time (see Browning and Crossley, 2001).[5]

Nevertheless, it is interesting - from a descriptive point of view - to observe the patterns of income, expenditure and saving for households in Portugal, according to the age groups of the respective representatives.[6] This evidence is reported in Chart 4a. The figure shows that household income follows a hump-shaped profile over the age gradient, with the highest levels being registered for the age group between 45 and 54 years. Particularly notable is the decline in yields observed in the retirement age. The household expenditure largely follows the same pattern of income, although

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[5] The combination of the previous surveys on household expenditures (for 1994/95 and 2000) with the IDEF 2005/06 could constitute a starting point for this analysis, but is beyond the aim of this article.

[6] In the IDEF, the household's representative is typically the male partner and usually displays the highest education level.

slightly flattened. Thus, saving increases until the age group 55-64 years and decrease thereafter, though remaining permanently at positive levels.

Although not allowing a direct assessment of the saving behaviour of individuals throughout their life cycle, the figure reveals two elements which are usually presented as contradictory to the life cycle theory. The first element refers to the fall in spending observed in older households, which contradicts the smoothed profile predicted by the theory. The literature states that this behaviour is associated with expenditures that are no longer held at retirement (prominent examples being the expenditure on transportation to work and the expenditure in restaurants), and with the fact that individuals tend not save enough for retirement, which requires - at that time – a permanent downward revision of consumption levels (Browning and Crossley, 2001). The fact that the saving rate remains positive until the end of the life cycle is usually justified on grounds of precaution - for example related to the possibility of occurrence of unexpected medical expenses - or the desire to leave inheritances to descendants.[7]
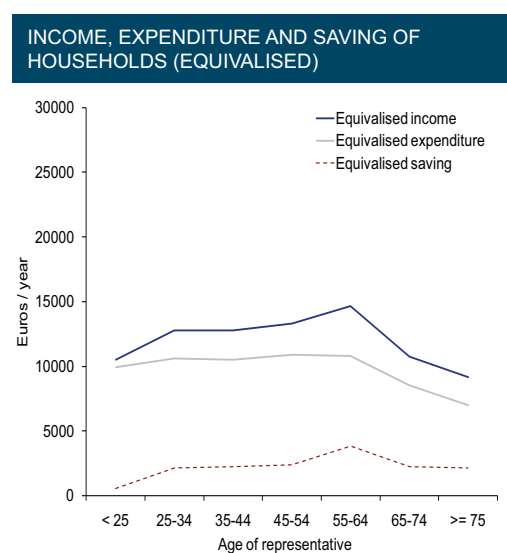
The second element apparently in conflict with the life cycle theory derives from the strong co-movement between consumption and income across age groups. This seems to contradict the ability of individuals to smoothen their expenditure levels, as predicted by theory. However, as pointed out by several authors, this evidence should be qualified with the changes in household composition observed during the life cycle (Attanasio and Weber, 2010). In fact, the hump-shaped profile of expenditure disappears when we re-scale income and expenditure with the OECD modified equivalence scale - which attributes a weight of 1.0 to the first adult in the household, 0.5 to other adults and 0.3 to each child (see Chart 4b).

Chart 4 a

INCOME, EXPENDITURE AND SAVING OF HOUSEHOLDS
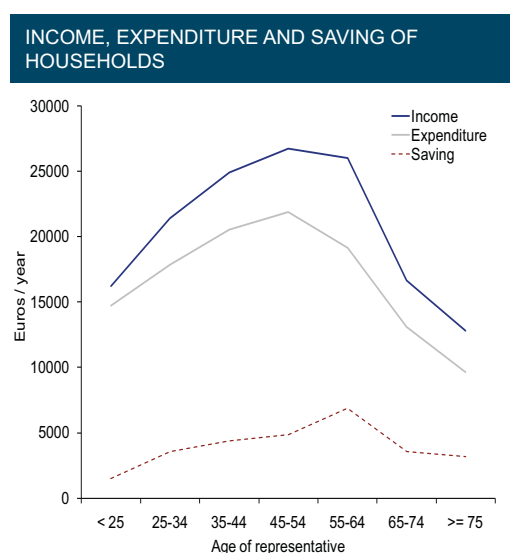
Source: IDEF 2005/06.

Chart 4 b

INCOME, EXPENDITURE AND SAVING OF HOUSEHOLDS (EQUIVALISED)

Source: IDEF 2005/06.

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(7) According to Jappelli e Modigliani (2003), saving during retirement is actually negative, if correctly measured. In particular, the transfers to pension funds should be accounted for as savings in the moment of the transfer. In this context, pensions at retirement should be understood as a decline in previously cumulated wealth and not as current income.

Thus, globally, the data in the IDEF 2005/06 emerge as consistent with several important dimensions of the life cycle theory.

2.4. Some multivariate evidence

To further understand the factors associated with the households' saving decisions in Portugal several regressions were estimated aiming to exploit the wealth of microeconomic information contained in the IDEF 2005/06. In order to analyse the information on the households in the highest percentiles of the distribution of savings several quantile regressions were estimated. In these regressions, the explained variable is the household level of saving - or the saving rate - and the explanatory variables include geographical data (region of the household and urban/rural breakdown), characteristics of the representative (age, working condition, education level and ownership of housing) and characteristics of the household (household size, number of members working beside the representative, existence of a spouse in the household).

Table 1 presents the regression results for the mean and for the percentiles 50 and 90. The estimated coefficients measure the impact of each variable on the mean or the percentiles of the (conditional) distribution of saving (or saving rate). The comparison between the least squares regressions and the quantile regressions highlights the importance of the higher percentiles in determining the mean results.[8]

We will now highlight some of the main results shown in Table 1, in order of presentation of the variables. The first set of variables assesses the impact of the representative's age. The results show that household saving increases over the life cycle, peaking before the age of retirement. This is visible in both the mean and the two percentiles. Thus, the non-conditional profiles presented in charts 4a and 4b are robust to the conditional estimation on a large number of additional variables.

Concerning the role of education, the results show that there is a monotonic positive relationship between the level of education and saving in Portugal. This relationship is particularly marked in the higher percentiles of the distribution of saving. This conclusion is directly related to the high returns to education in Portugal, which determine a strong relationship between educational attainment and income generated at the household level (see Alves *et al.*, 2010).

The following variables measure the impact of the employment status of the representative on the level of saving (and on the saving rate). This impact is one of the most robust and consistent across regressions. In particular, households in which the representative was unemployed displayed significantly lower levels of saving relative to those in which the representative worked. In terms of the saving level, the impact is not significantly different along the upper half of the distribution of saving. In turn, the negative relationship between unemployment and the saving rate is not significantly different from zero for the higher percentiles of the respective distribution. With regard to households in which the representative was retired, the level of savings did not differ significantly from the one

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(8) It should be noted that the coefficients for the lowest percentiles of the savings distribution have typically the same signs as those for the highest percentiles, but are in general non-significant.

Table 1

OLS ESTIMATES AND QUANTILE REGRESSIONS (50TH AND 90TH PERCENTILES) Dependent variable: saving (euros/year) and saving rate (in percentage)						
	Saving			**Saving rate**		
Mean and percentiles 50 and 90	**Mean**	**p(50)**	**p(90)**	**Mean**	**p(50)**	**p(90)**
Age of representative (relative to age group between 25 and 34 years)						
Less than 25	-863.9	52.2	2528.2	-14.433	-6.119	-6.697
	(1461.4)	(818.8)	(1889.7)	(5.201)	(7.218)	(5.036)
35-44	1393.0	836.0	1212.0	0.363	0.616	-1.608
	(488.4)	(284.6)	(686.3)	(1.738)	(2.497)	(1.837)
45-54	2695.4	1084.4	4039.1	-3.408	-0.922	0.855
	(513.2)	(285.3)	(698.5)	(1.826)	(2.504)	(1.815)
55-64	5808.3	1835.5	8042.9	-0.448	2.720	6.195
	(558.5)	(309.7)	(800.2)	(1.988)	(2.715)	(2.004)
65-74	4983.4	2001.3	5985.9	2.713	6.139	5.655
	(695.4)	(367.5)	(1034.0)	(2.475)	(3.226)	(2.371)
Equal or over 75	5450.1	2146.3	5552.7	8.301	10.567	6.505
	(757.2)	(394.3)	(1080.5)	(2.695)	(3.464)	(2.486)
Education of representative (relative to 0 completed years of education)						
4 years of education	-265.2	64.9	1342.4	-4.029	-3.572	-4.980
	(448.6)	(212.8)	(578.1)	(1.597)	(1.869)	(1.437)
6 years of education	973.6	772.2	3623.9	-3.617	-1.994	-4.797
	(569.0)	(284.1)	(768.9)	(2.025)	(2.495)	(1.877)
9 years of education	1483.0	1194.7	5040.1	-5.550	-0.521	-2.287
	(578.9)	(290.2)	(783.6)	(2.060)	(2.549)	(1.905)
12 years of education	4339.3	2912.5	8764.9	0.681	2.903	-1.575
	(609.5)	(314.7)	(835.3)	(2.169)	(2.764)	(2.062)
≥ 15 years of education	12182.9	8844.7	25374.0	9.573	9.241	5.245
	(592.0)	(306.7)	(815.1)	(2.107)	(2.693)	(2.060)
Employment statuts of representative (relative to working representative)						
Unemployed	-2870.6	-1949.5	-2492.1	-5.780	-7.573	-0.433
	(563.6)	(307.7)	(738.2)	(2.006)	(2.702)	(1.871)
Retired	-568.7	384.8	-639.6	2.765	1.444	0.182
	(479.4)	(236.9)	(703.3)	(1.706)	(2.076)	(1.537)
Other non-worker	-1561.9	-1350.7	-315.3	-8.980	-7.038	0.204
	(598.4)	(304.9)	(782.0)	(2.130)	(2.673)	(1.976)
Nº members working (besides representative)	2132.6	2565.0	2965.5	8.327	8.812	3.246
	(219.6)	(115.1)	(280.5)	(0.782)	(1.008)	(0.714)
Household size	-103.7	-282.9	930.2	-2.731	-3.136	-0.410
	(146.8)	(76.8)	(186.4)	(0.522)	(0.676)	(0.475)
Family with spouse/companion	1899.9	969.4	988.5	3.091	4.331	-0.582
	(337.9)	(174.1)	(452.1)	(1.202)	(1.532)	(1.140)
Owner-occupied housing	1226.5	1291.1	2134.1	8.918	5.360	1.220
	(303.6)	(161.2)	(395.8)	(1.081)	(1.413)	(1.011)
Constant	-5808.3	-2076.5	-4124.5	3.353	10.788	49.650
	(795.8)	(415.8)	(1179.1)	(2.832)	(3.650)	(2.766)
Number of observations	10403	10403	10403	10403	10403	10403
Pseudo R2	0.127	0.076	0.254	0.042	0.031	0.031

Source: IDEF 2005/06.
Notes: Standard errors in parenthesis. Observations were weighted with sample weights.

registered in households where the representative worked. This result is probably linked to the fact that, according to the tax and social security system rules in 2005/06, the entry into retirement did not involve a sizeable reduction in the individuals' net income. Finally, the presence of an additional working member in the household significantly increases the household saving level and rate.

Table 1 then presents the coefficients on some characteristics of the household.[9] Interestingly, the size of the household does not significantly affect either the level (except on the right tail of the distribution) or the saving rate. Thus, we conclude that the determination of household saving arises not so much through size but through the ability to generate income, which is mainly associated with the educational level and the degree of participation in the labour market. Interestingly, the presence of a spouse in the household significantly influences household saving, even controlling the impact of all other explanatory variables. This effect is particularly relevant for the lower percentiles of the saving distribution. This result should be related not only to insurance mechanisms existing within households but also to the existence of economies of scale which may not be properly captured in the analysis.[10]

Finally, the fact that households own the dwelling they live in is associated with a higher level of saving, more significantly for the highest percentiles of the saving distribution. This fact is probably associated with the role of wealth in the analysis. In fact, an alternative specification - for the sub-sample contained in the IPEF (the Household Survey on Wealth) - including the level of wealth (either gross or net) as an additional explanatory variable suggests that households with higher wealth have higher levels of saving. Note, however, that this relationship may reflect some endogeneity, given that households with higher saving rates throughout their life cycle tend to accumulate higher levels of wealth, everything else equal.

The evidence presented in this section may be important not only for a microeconomic characterization of saving decisions, but also in identifying the segments of the population most affected by policies aiming to condition those decisions. However, extrapolating decisions at the individual level to the macroeconomic level is particularly complex. The relationship between unemployment and savings is a good example of this difficulty. In fact, the microeconomic evidence suggests incontrovertibly that an unemployment spell tends to decrease the household saving rate. However, the shocks that determine the increase in unemployment - for example a surge in uncertainty at an aggregate level - may generate an increase in saving at a macroeconomic level. This complexity justifies the segmentation typically found in literature between micro and macro approaches. In this article, this segmentation will be unavoidable, also given the fact that the microeconomic evidence focuses on a single year, while the macroeconomic evidence presented in the following section refers to the period since Portugal joined the European Community.

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(9) The regressions also included regional dummies. In this context, it should be mentioned that the regions with the highest levels of saving – after controlling for all the remaining variables – are the Azores and Madeira. The regions with the lowest saving levels are the North and Centre.

(10) This notwithstanding, it should be noted that, even re-scaling the level of saving with the OECD modified equivalence scale, all the above results would still hold.

3. MODELLING THE SAVING RATE BEHAVIOUR IN THE PERIOD 1985-2009

In the previous section we identified a set of stylized facts about the distribution of saving in Portugal, according to the characteristics of households included in the IDEF and the IPEF. However, the cross-section nature of those databases does not allow assessing the main factors underlying the behaviour of saving rate over time in Portugal. In this section we explore the intertemporal nature among the saving rate and a set of macroeconomic aggregates. This relationship will be quantified through an error correction mechanism model, in order to identify a set of empirical regularities on the saving rate behaviour. We start by briefly describing the type of relationship usually expected between the saving rate and a set of variables that potentially explain its behaviour (subsection 3.1). Then, we present the results of the estimation of an inter-temporal model for the Portuguese economy (subsection 3.2).

The estimation of an equation for the saving rate in Portugal faces the challenge of ensuring both a long sample period and the absence of substantial regime changes. In this context, the relationship was estimated using annual data for the period of integration of Portugal in the European Community. In fact, in the mid-80s, the financial liberalization started in Portugal, with increased competition across financial markets, associated with greater innovation and a wider access of households to new financial products (see DEE, 2009). The liberalization in the financial sector and the higher nominal stability translated into a broader access to credit by households, implying a reduction of liquidity constraints for some agents (see Castro, 2006). The transition to a liberalized financial system is bound to have changed the drivers of households saving decisions. This regime change thus justifies the exclusion in the estimation of the period before the integration in EEC.

3.1. Factors explaining the saving rate developments

Given the extent and variety of factors identified in literature as potentially being associated to the saving rate evolution, the assessment of variables to include in the long and short term relations usually arises from a study of the respective empirical properties. The variables that were more robust in explaining the saving rate in Portugal were the nominal interest rate (or, alternatively, the inflation rate), the government fiscal balance, the real GDP rate of growth and total wealth as a percentage of disposable income. The theoretical and empirical literature identifies several transmission channels among these variables and the saving rate, which we summarize before presenting the estimation results for the Portuguese case.

Inflation

Inflation is an important factor for the evolution of the saving rate, with a generally positive association emerging between these two variables. This stylised fact has been shown in a robust and consistent way in studies that assess saving developments in different countries and in different sampling periods. There are essentially two channels to explain that relationship. On the one hand, periods of high inflation generally reflect greater uncertainty, which tend to increase savings for pre-

cautionary reasons. On the other hand, higher inflation tends to erode the value of financial wealth of households, which promotes an increase in households saving in order to compensate for this effect (see Berry *et al.*, 2009). Likewise, on the side of liabilities (loans) the existence of high inflation forces households to pay a higher debt service, which is a forced saving, also suggesting a relationship in the same direction.

The relation between the inflation rate and the saving rate in Portugal is clearly shown in Chart 5. Given that inflation is a relevant phenomenon when analysing trends in the saving rate (especially in the long run), some authors calculate a saving rate adjusted for inflation, in which saving is adjusted for the effect of erosion in households wealth. As shown in Chart 6, the adjusted saving rate is rather more stable than the unadjusted rate since the early 90s.

Real interest rate

A rise in the real interest rate increases the opportunity cost of current over future consumption, encouraging households to postpone consumption expenditures, thus increasing the saving rate (substitution effect). However, the effect of increasing future income associated with higher earnings from accumulated savings can lead to an increase in current consumption (income effect). The sign of the relation between the saving rate and the real interest rate will depend on the relative importance of these effects of opposite sign, which are particularly dependent on the net financial position of households. Empirically, the results in the literature point to an ambiguous and/or not significant relationship between the real interest rate and the saving rate.
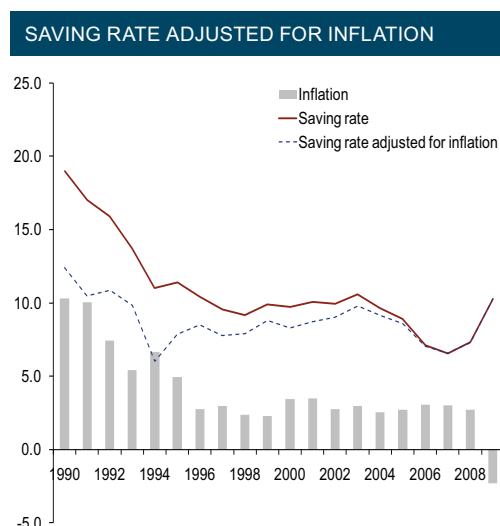
In the empirical application to Portugal we use a nominal interest rate, which comprises the joint

Chart 5

SAVING RATE AND INFLATION

Sources: *INE* and Banco de Portugal.
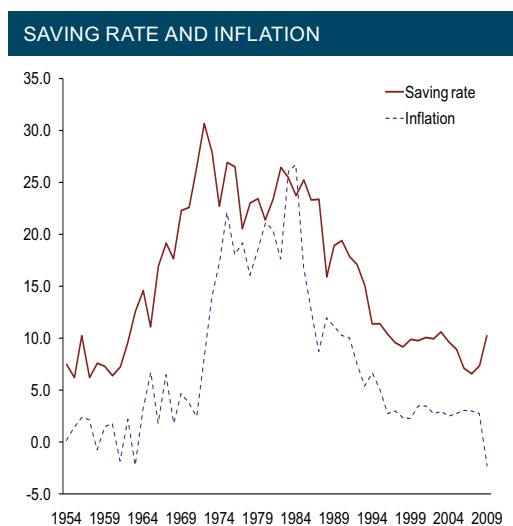
Chart 6

SAVING RATE ADJUSTED FOR INFLATION

Sources: *INE* and Banco de Portugal.

Notes: Saving rate not adjusted for the participation of households in pension funds. The saving rate adjusted and not adjusted for inflation is shown as a percentage of the respective disposable income. Inflation is defined as the annual rate of change of the private consumption deflator.

effect of the real interest rate and the inflation rate. According to the arguments above, the expected sign of the relationship between the nominal interest rate and inflation is positive. Moreover, the nominal interest rate may capture the evolution of credit access conditions. For example, a decline in the nominal interest rate – or an increase in financial intermediation – decreases the number of households with liquidity constraints and allows more smoothing in consumption decisions which, in turn, decreases the aggregate saving for precautionary reasons.

Fiscal policy

The households' decisions on saving and consumption are influenced by other economic agents' decisions, in particular, those of government. Economic theory suggests a negative relation between fiscal balances and the saving rate. Thus, a decrease in the fiscal balance, namely when associated with a reduction of taxes or spending with households (social security subsidies, expenditure in health and education,...) is likely to translate in an increase in the saving rate. On the one hand, there tends to be some substitution between public and private expenditure. On the other hand, if the imbalance of public accounts increase significantly, households are likely to increase, albeit partially, their savings, anticipating the possible need for future tax increases (an extreme version of this argument corresponds to the Ricardian equivalence theorem). It is worth mentioning that the degree of substitution between household´s saving and public saving should depend additionally on the fraction of households with liquidity constraints.

GDP growth rate

The existence of a positive relation between the saving rate and economic growth has been widely documented in empirical terms.[11] According to lifecycle/ permanent income theory, households tend to smooth consumption as a function of their permanent income, that is, the income they expect to receive throughout their lifetime. Thus, unexpected and temporary fluctuations in their disposable income are likely to be reflected in saving fluctuations with the same direction. This argument points to a pro-cyclical behaviour of the saving rate. Additionally, even if households have the perception that their permanent income has changed, the adjustment in consumption occurs somehow gradually – given the importance of habits in consumption decisions – so that the relationship between income and saving is expected to be positive also in this case. Carrol *et al.* (2000) present a theoretical model, with habit formation, consistent with a positive relationship between GDP growth and the saving rate.

Wealth

Being wealth a potential source of present or future purchasing power, significant increases in its value and not seen as temporary by households (in particular resulting from price valuations in assets) may be seen by households as equivalent to increases in their permanent income, with a posi-

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(11) Typically, the debate in literature focuses on the causality direction between saving and economic growth and usually concludes on the existence of causality channels in both directions.

tive impact in consumption levels (and negative in savings). On the other hand, losses in the value of wealth resulting from the devaluation of their assets can induce households to increase savings in order to replace their wealth levels. Therefore, significant variations in wealth are expected to be reflected in opposite direction variations in the saving rate. In this section, we use the concept of net worth (net wealth), that is, total wealth minus debt. It should be noticed that the relation between debt and saving is ambiguous, depending namely on the type of indebtedness, the degree of liquidity constraints and the moment in the life cycle in which the debt is generated.

Other explanatory factors

The literature identifies a large set of additional variables which may influence the saving rate, such as the age structure of households, the share of working-age population or the degree of uncertainty in the economy.[12] These variables were not included in the estimation either due to implausible results – for example, the share of individuals with more than 65 years is able to capture, to a large extent, the evolution of the saving rate in the last 25 years, due to a strong negative correlation between the two variables – or non-significant results – such as in the case of volatility in stock market indices, which aimed to proxy the level of uncertainty.

3.2. Results of the model estimation

The long term equation estimated for the saving rate has the following form:

$$SvRate_t = \alpha_0 + \alpha_1\ Interest_t + \alpha_2\ BGov_t + \alpha_3\ GDPvrc_t + \varepsilon_t \tag{1}$$

where $SvRate$ is the household saving rate (as a percentage of disposable income), Interest is a representative interest rate of deposits (measured in terms of annual average),[13] $BGov$ is the government fiscal balance excluding temporary measures (as a percentage of GDP) and $GDPvrc$ is the volume rate of change of GDP. All these variables are integrated of order 1 in the sample period. Equation (1) configures a cointegration relationship. In fact, according to Johansen tests, the null hypothesis of no cointegration is rejected, even taking into account the critical values adjusted for small samples.[14]

In turn, the short term dynamics of the variation of the saving rate, resulting from a "general-to-specific" approach, has the following form:

$$\Delta SvRate_t = \beta_0 + \beta_1 \Delta SvRate_{t-1} + \gamma_1 \Delta BGov_t + \gamma_2 \Delta GDPvrc_t + \gamma_3 \Delta Wealth_t + \theta Dummy94 - \tau ECM_{t-1} + u_t \tag{2}$$

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(12) Another factor which may have some impact in saving is the evolution of emigrants/immigrants remittances, as they influence directly the households´ disposable income. Assuming that at least part of the emigrants´ remittances is not translated in expenditures of resident households, increases in those remittances will imply increases in savings. Equivalently, an increase in immigrants' remittances is likely to contribute to a decrease in saving in Portugal. It should be referred that the share of net remittances of emigrants in household disposable income has gradually decreased between 1995 and 2009, which may have contributed ceteris paribus to a decrease in saving rate.

(13) The results of estimation would be very similar if we had considered a reference rate in banking markets (Euribor), due to the strong association between the two rates.

(14) The unit root and cointegration tests are available upon request from the authors.

where Δ represents the first difference of the respective variable, $Wealth$ is the value of total net worth of households (measured as the value of financial assets and housing minus debt) as a percentage of disposable income, $Dummy$94 is a dummy variable that takes the value 1 in 1994[15] and ECM is the error correction mechanism, that is, the vector of residuals from equation (1).

The equations were estimated for the period 1985 to 2009. The results of the estimation are shown in Table 2.[16] The variables are statistical significant and have the expected signs, in line with estimated relations in empirical studies for other countries.[17] It is also worth stressing that these parameters are stable over time, which was confirmed by a recursive estimation of parameters (available upon request).

There are five main ideas that can be highlighted from Table 2. First, the nominal interest rate has a positive relationship with the saving rate in the long term. An increase of 1 percentage point in the nominal interest rate is associated with an increase in 0.6 percentage points in the saving rate in long term. Note that, as noted above, the nominal interest rate captures not only the combination of income and substitution effects but also the impact of inflation rate developments. Additionally, it also reflects the impact of the regime transition to the euro area, during which liquidity constraints and nominal uncertainty significantly decreased. Therefore, special caution is needed in using this model to simulate the impact of a change in interest rate on the saving rate, since the model tens to overestimate this impact.

Table 2

ESTIMATION RESULTS Savings rate as a percentage of disposable income		
Explanatory variable	**Coefficient**	*t*-ratio
Long-term equation (dependent variable: SvRate)		
Constant	2.88	1.99
Nominal interest rate	0.59	5.94
Fiscal balance (% GDP)	-0.87	-3.08
GDP - rate of change in volume	0.64	3.20
Short-term dynamics (dependent variable: Δ SvRate)		
Constant	-0.55	-2.92
Lagged dependent variable	-0.35	-3.43
Fiscal balance (first differences)	-0.75	-7.18
GDP - rate of change in volume (first differences)	0.41	4.01
Net total wealth/ disposable income (first differences)	-0.06	-4.10
Error Correction Mechanism (lagged)	-0.48	-4.07
dummy (1994=1)	-3.80	-4.07
Standard deviation of residuals	0.82	
Standard deviation of dependent variable	2.02	
R2	0.88	
AR 1-2 test	0.26	
	(0.77)	

(15) It should be mentioned that the reported results are robust to the presence of this dummy variable, which aims to eliminate a strong forecasting error of the model for 1994.

(16) Alternative specifications were also tested, in which the long-term relationship was defined between the saving rate and the nominal interest rate or between the saving rate and inflation. It is worth noting that the properties of these alternative long-term relationships as well as the corresponding specifications of the short-term dynamics do not show significant differences *vis-à-vis* the results reported in Table 1.

(17) Hüfner and Koste (2010) present an overview of empirical studies, including a list of the main determinants and the corresponding signs. The GDP (or income), the budget balance, and the interest rate present signs similar to those reported in table 1, in almost all the studies listed.
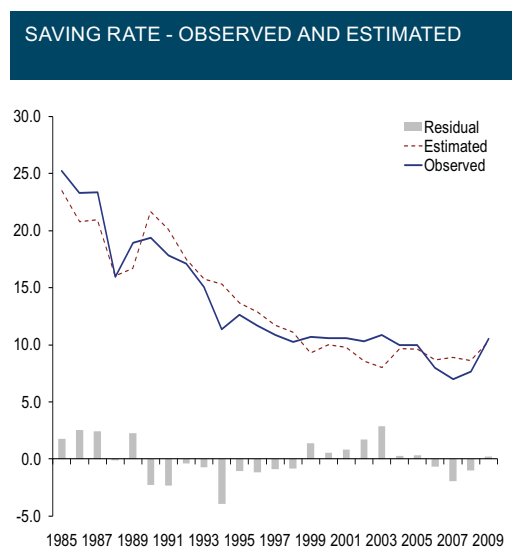
Second, Portuguese household saving decisions are influenced by the situation of public finances, with a significantly negative sign, both in the long and short term equations. According to the regression in levels, an increase of 1 percentage point in government balance (as a percentage of GDP) is associated with an increase of 0.9 percentage points in the long term household saving rate, in line with the results reported by Ferrucci and Mirales (2007). These results suggest the existence of a substitution between public expenditure (saving) and household expenditure (saving) over the long term.[18] This fact should be particularly relevant for households with liquidity constraints. Over the short term, a negative and significant coefficient between the change of the saving rate and the change of public balances also emerges.

Third, the data also seem to support the existence of a positive relation between the saving rate and GDP dynamics, both in the long and short term (the long term coefficient, on GDP growth, is 0.6, and the short term coefficient, on GDP acceleration, 0.4).

Fourth, the results also suggest a negative short-term relationship between the saving rate and total net wealth (as a percentage of disposable income), confirming that fluctuations in levels of wealth tend to affect consumption in the same direction, as suggested by Castro (2007) and Farinha (2009). These results are robust to the use of the aggregate total wealth, given the similarity of temporal profile of the two variables (see Appendix). Finally, the coefficient associated to the error correction mechanism, estimated at -0.5, indicates that about half of the deviations of the saving rate from its long run determinants observed in a given year is adjusted in the following year.

Chart 7 presents the series of observed values for the saving rate and the estimated ones according to the long term equation (1), while Chart 8 presents the observed values for the variation of the saving rate and the estimated values according to the short term dynamics equation (2). The estimated

Chart 7

SAVING RATE - OBSERVED AND ESTIMATED

Sources: *INE* and Banco de Portugal.

Chart 8

CHANGES IN SAVING RATE - OBSERVED AND ESTIMATED
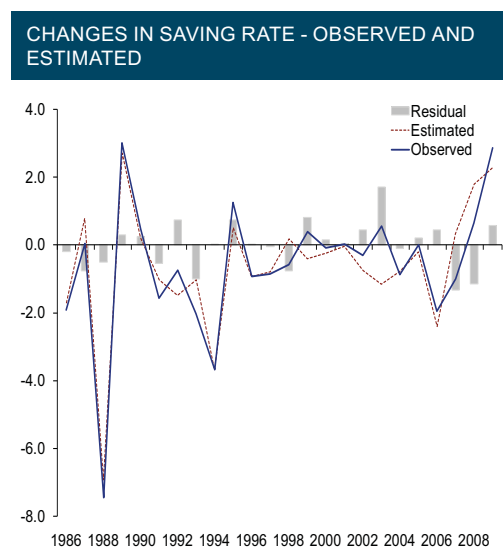
Sources: *INE* and Banco de Portugal.

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(18) Over the long run, this fact mitigates the impact of a reduction in the public deficit on the external deficit (as a percentage of GDP).

model shows a remarkable performance, capturing quite well the sign and magnitude of changes in household saving rate in Portugal over the last 25 years. This reinforces its potential usefulness in the interpretation of the main factors behind the developments of the saving rate in Portugal.

The downward trend in the saving rate observed since the mid 80s, and specially in the 90s, appears to be strongly associated with the process of disinflation and decline in nominal interest rates, namely in the context of nominal convergence to the euro. Simultaneously, a significant increase in household net wealth was observed over the 90s, despite the substantial increase in indebtedness (see Cardoso *et al.*, 2008). This also contributed to sustain higher levels of consumption and promote a decline in the saving rate. Note that, throughout the 90s, the saving rate is below the values implied by the long-run relation in most years.

After the introduction of the euro, the nominal interest rate stood at historically low levels. During this period, the evolution of household wealth (as a percentage of disposable income) interrupted the strong upward trend observed in the 90s, presenting a relative stabilization. In some years, the change in wealth was actually negative, partially reflecting significant declines in asset prices in financial markets, which affected the saving decisions of households with higher levels of wealth. This interruption of the contribution of the interest rate and household wealth to the reduction in the saving ratio, combined with a negative effect stemming from income developments, translated in a relative stability in the saving rate for the period 2000-2003. More recently, in 2006 and 2007, the saving rate decreased significantly, with a significant contribution from the fiscal consolidation process. In these years, the saving rate stood below what would be expected based on the long-term relationship (as well as on the short-term relation). This may be related to the ongoing process of financial innovation seen in this period - in a context of very favourable international financial conditions - in which households had access to new financial instruments and new modalities of financing that allowed accommodating an increase in indebtedness without a significant increase in the respective debt service.

The increase in the saving rate in 2009 seems to reflect, on the one hand, an adjustment from the minima observed in 2007 and 2008 and, on the other hand, the significant worsening of the public deficit. Note in particular that the public transfers to households increased strongly in 2009, contributing to stem the slowdown in disposable income, in a context of an unanticipated fall of prices. Additionally, the growing awareness on the fiscal situation and the uncertainty surrounding the measures necessary to correct the excessive fiscal deficit should also have contributed to an increase in savings for precautionary reasons.[19]

Finally, there are several factors not included in the model that may tend to gain prominence in the near future. In particular, given the current national economic and financial situation - with the coexistence of an active constraint to external financing and the need for a simultaneous deleveraging of the public and private sectors - a tightening in credit can hamper consumption smoothing by an

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[19] As mentioned above, the model does not include a variable that explicitly captures the evolution of uncertainty, since the available proxies - such as measures of volatility in financial markets (which only imperfectly capture the relevant uncertainty for household´s consumption and saving decisions) - were not significant. The non-incorporation of the direct impact of uncertainty may partially explain the underestimation by the model of the level and change in the saving rate in 2009.

increasing number of households thus changing the statistical properties of the saving rate identified above. The uncertainty associated with the adjustment process of the economy also tends to promote an increase in saving for precautionary reasons.

4. CONCLUSIONS

This article aimed to contribute to the understanding of the household saving decisions in Portugal. One of the main novelties of the analysis was the joint inclusion of micro and macroeconomic evidence. This evidence, of a segmented but complementary nature, allows having a comprehensive view on the individual and aggregate saving decisions in Portugal.

The main conclusions from the analysis were as follows.

1. There is high inequality in the distribution of saving, with a small percentage of households accounting for most of the saving generated in Portugal. These households are those with higher levels of income and wealth. Additionally, there is a significant fraction of households that report negative levels of saving. The saving rate is increasing in household income and, albeit less markedly, in wealth.

2. The microeconomic evidence suggests that there is a strong co-movement between expenditure and income throughout the life cycle, with a marked decrease of these aggregates at the retirement age. This co-movement is significantly attenuated when changes in the households' composition are taken into account. In turn, saving increases monotonically until the age group between 55-64 years and decreases thereafter, though it remains permanently at positive levels. This evolution is broadly reconcilable with the predictions of the life cycle theory.

3. The determination of saving at a microeconomic level is strongly associated with the income-generating capacity of households, which is a function of the educational level of spouses and the respective level of participation in the labour market. In fact, a multivariate analysis of the determinants of savings in Portugal uncovers a positive relationship between the level of education and saving, as well as between the level of saving and the number of household members working. These relationships are particularly marked in the higher percentiles of the distribution of saving, i.e., the segments that contribute most to saving in Portugal.

4. The household saving rate is relatively low in Portugal, compared to other European Union countries. The saving rate displayed a sharp downward trend in the convergence period to the euro and remained relatively stable over the last decade, with the exception of the period between 2005 and 2009, where a hump-shaped behaviour was recorded.

5. This evolution of the household saving rate is captured quite well by an error correction mechanism model estimated for the period 1985-2009. In this model, the saving rate is positively related in the long-run with the nominal interest rate and GDP growth, and negatively with the budget balance. In the short-run, the change in the saving rate is determined by the fluctuations of the latter two variables, by the deviations *vis-à-vis* the long-run relation, and (with negative sign) by fluctuations in the

value of household wealth.

6. Future developments in the saving rate will be influenced inter alia by the behaviour of the explanatory factors described above. However, the current economic and financial situation and prospects of significant structural changes in dimensions such as the financing conditions of economic agents and the conduct of fiscal policy may be reflected in structural breaks of the estimated relationships. Their use in projecting the future evolution of saving rates must be thus undertaken with due caution.

Understanding the factors that determine the evolution of household saving is an economic field where open questions still abound. This gap is partly related to the fact that micro and macroeconomic evidence are not directly combinable. This article attests to this conclusion. Moreover, the factors that help explaining the evolution of saving over time and differences in saving rates across countries have a markedly multidisciplinary nature - including cultural, demographic and psychological issues. The integration of these fields of knowledge is a vast and complex research agenda which should be pursued in the future.

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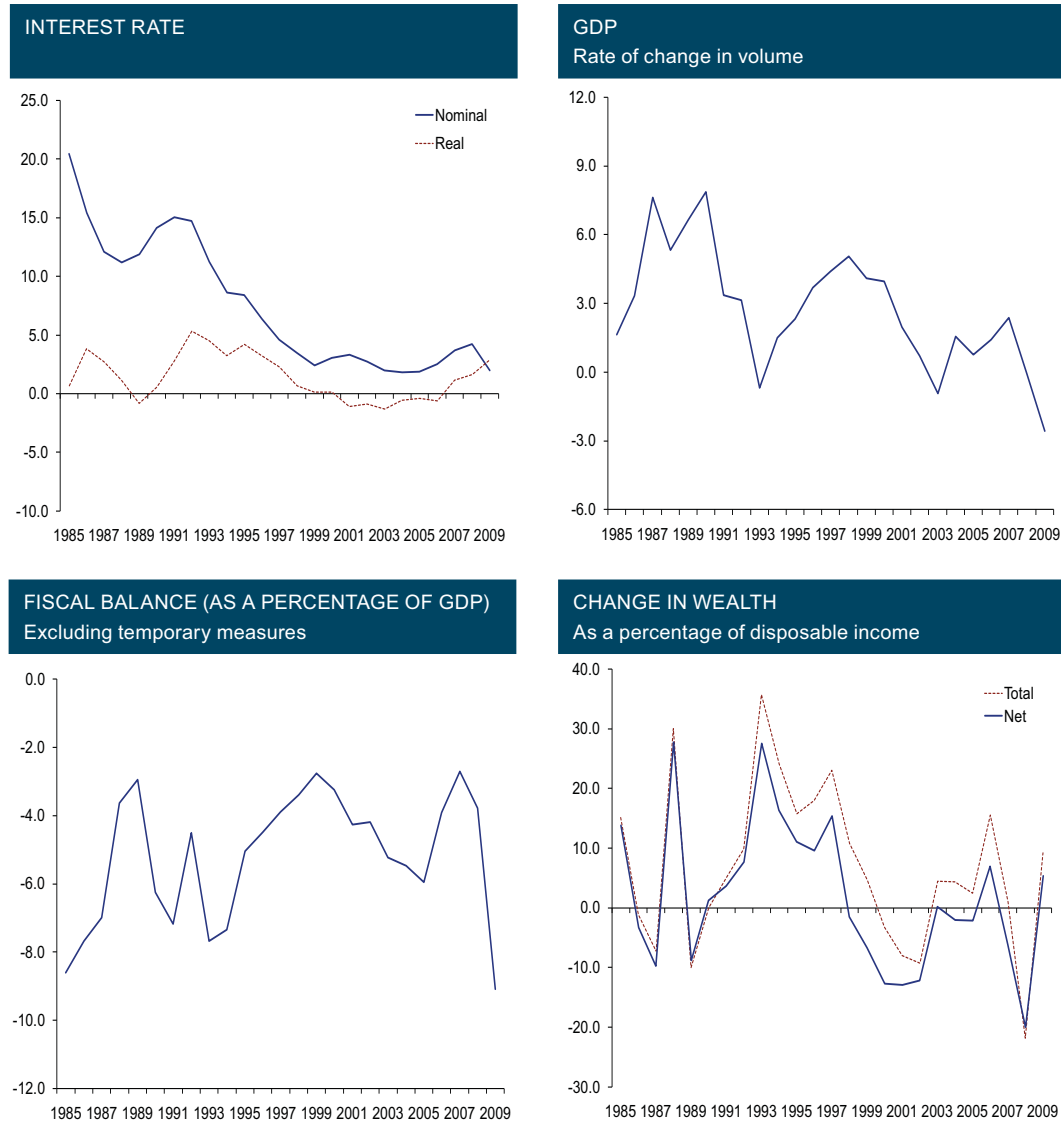
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APPENDIX

Observed variables

INTEREST RATE

GDP
Rate of change in volume

FISCAL BALANCE (AS A PERCENTAGE OF GDP)
Excluding temporary measures

CHANGE IN WEALTH
As a percentage of disposable income

Sources: *INE* and Banco de Portugal.