# WEALTH EFFECTS ON CONSUMPTION IN PORTUGAL: A MICROECONOMETRIC APPROACH\*

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## 1. INTRODUCTION

The topic of wealth effects on consumption has recently been subject to renewed research and policy interest. Sharp increases in global stock prices were recorded during the 90s, followed by strong and persistent rises in house prices in the US, the UK and some euro area economies. Over the same period, saving rates kept a falling trend. The practice of borrowing against home equity to finance consumption was largely to be found in some economies such as the US, the UK and the Netherlands. This practice was supported by historically low levels of interest rates and innovations in financial and mortgage markets and it is likely that it played a critical role in sustaining consumer expenditures. These developments enhanced the interest in studying the effect of both financial and housing wealth on consumption. More recently, in the context of the financial crisis, the sharp reverse in both stock and house price trends raised concerns that these developments could contribute to depress consumption and exacerbate the economic slowdown, reinforcing the interest in these issues.

In Portugal, unlike in the US and many other countries, there is evidence that house prices changed only slightly above the consumer price index during the period 1996-2007. The increase in the level of households' gross housing wealth, coupled with a declining trend in the savings rate, was mainly explained by the easier access to credit as the decline in nominal interest rates lowered the incidence of liquidity constraints. More recently, the conditions of access to credit have changed with the purpose of mitigating the effect of rising interest rates on debt service, thereby improving households' ability to service debt through, for example, the widening of loan maturities.<sup>1</sup> In Portugal equity withdrawals from housing are still limited and the average loan to value ratio is not as high as in the countries referred above. Moreover there is no evidence of a speculative bubble in house prices. However, the significant weight of housing wealth in Portuguese household portfolios makes households, in particular specific types of households, dependent on developments in the housing market. In fact, there are reasons to expect heterogeneity in the relation between housing and consumption across different types of households. The potentially different reaction of households with different characteristics to shocks in this market is therefore a relevant issue in studying wealth effects in the Portuguese economy.

The literature has long established a positive relation between consumption and wealth. Theoretical models basically predict that unexpected wealth shocks change households' permanent income, thereby affecting their life-cycle pattern of savings and consumption. Empirical studies have generally supported this prediction. As a matter of fact, empirical research on the link between wealth and consumption has generally found evidence of a positive and significant relationship connecting the two variables. In studies that make use of macro level data for the US, where the issue has been most extensively studied, the estimated marginal propensity to consume (*mpc*) out of wealth typically ranges

(1) See Farinha (2008).

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between 0.02 and 0.05. The results of individual and cross-country studies suggest that the estimated *mpc* out of wealth tends to be larger in the US or the UK than in continental European countries.

Empirical studies of wealth effects on consumption in the Portuguese economy are scarce, mainly due to the lack of appropriate data. Recently, Castro (2007) estimated the effect of both financial and housing wealth on consumption using time-series aggregate data and found a significant impact, estimating an *mpc* out of wealth of 0.03, with similar magnitudes for both types of wealth.<sup>2</sup>

Household micro data allow the assessment of wealth effects to be enriched by providing the possibility of estimating differential responses according to the type of household. The insights brought about by micro data may be helpful to understand which theories of the wealth effect are more consistent with individual behaviour. With household micro data it is possible to study separately the behaviour of holders and non-holders of specified assets. This is particularly useful to differentiate direct effects of wealth on consumption (that is, the effect of an asset price rise on the consumption of the asset holders, because their wealth increases) from indirect effects (that is, the effect of the asset price rise on the consumption of non-asset holders). If there is mainly a direct effect, then the heterogeneity of household portfolios necessarily implies considerable heterogeneity in the response of household consumption to asset prices.

In this paper we present evidence on the effect of total and housing wealth for the case of Portuguese consumers using data from the Household Wealth and Indebtedness Survey.<sup>3</sup> With micro-level data we are able to estimate different effects according to household characteristics, hence providing further insights on the relation between wealth and consumption with policy relevance. This type of data may be very helpful in providing new insights on the potential explanations underlying the relationship between wealth and consumption. This may be so, for instance, on the precautionary savings explanation (rising wealth can alleviate the need for savings for precautionary motives). Another policy relevant hypothesis that can be assessed with micro data is the effect of wealth on consumption through the relaxation of borrowing constraints.

Though panel data are not available, we can take advantage from the availability of three cross-sections corresponding to the three waves of the *IPEF* that were carried out in 1994, 2000 and 2006. Therefore, some comparisons of results in different points of the economic and credit cycles can be made.

By taking into account the potential reverse causality between wealth and consumption, we complement the results of the linear regression with the results obtained with an instrumental variables estimator, which globally reinforce the results of the former.

The remainder of the paper is organised as follows. Section 2 briefly presents the theoretical background and reviews existing empirical literature. Section 3 briefly describes the econometric methodology and presents the data. Section 4 discusses the results and section 5 presents some concluding remarks.

<sup>(2)</sup> Note that these results are not exactly comparable with results for other countries. In fact, despite a relatively high weight of shares and other equity in Portuguese household portfolios by European standards (36 per cent compared with 31 per cent in the euro area) this is largely dominated by unquoted shares and other equity (see Cardoso et al, 2008).

<sup>(3)</sup> This is the Inquérito ao Património e Endividamento das Famílias (IPEF), which has been carried out by Statistics Portugal and Banco de Portugal. For further details on the characteristics of the IPEF, see Farinha (2008).

## 2. LITERATURE REVIEW

The life-cycle/permanent income hypothesis supports most efforts to model the effect of changes in wealth on consumption. According to the life-cycle hypothesis, consumers try to smooth consumption over their life span on the basis of their intertemporal budget constraint. Smoothing is achieved by borrowing when young against expected future income, repaying debt when income actually rises and consuming out of accumulated wealth when retired. In this framework consumption depends on permanent income, initial wealth, life expectancy and time preference.

Researchers have extended the basic model accommodating deviations from the basic predictions and have obtained a more realistic explanation of consumer decisions. Allowing for capital market imperfections and information asymmetries, some authors have relaxed the assumption that households are able to borrow as much as they want at a given interest rate. In other cases, models have been extended so that they allow for the possibility that households may want to keep some assets for precautionary or bequest motives.

Some researchers have also recognised that not all types of wealth matter the same for consumption. They argue, for instance, that it makes sense to distinguish between financial assets and housing wealth, because of different consumer preferences, different asset characteristics in terms of their liquidity, measurability, tax treatment, use for bequest motives, etc.<sup>4</sup>

Two broad types of approaches have been used for the empirical assessment of wealth effects on consumption. One relies on aggregate time-series data and the other is based on household micro data. The time-series approach makes it possible to distinguish between the short-run and the long-run relationships, identifying which variables adjust to restore the long-run equilibrium in the case of a shock and to determine the time taken by the adjustment process. The existing empirical literature has generally found evidence of a positive and significant long-run relationship between wealth and consumption. However, estimates of wealth effects on consumption vary greatly across countries. Davis and Palumbo (2001), using US aggregate data, estimate a non-negligible long run *mpc* out of wealth in the range 0.03-0.06, which is somewhat higher than it is typically found for the US. In international comparisons, the estimated *mpc* out of wealth tends to be larger in the US or the UK than in continental European countries. The exact measurement of the magnitude of the wealth effects on consumption and its driving forces remain controversial.

The time-series approach is not very informative about the nature of the relationship between consumption and wealth and does not make it possible to distinguish between the alternative hypotheses that have been pointed out in the literature: the existence of a direct causality between wealth and consumption, the existence of common factors driving the two, the importance of wealth for the incidence of borrowing constraints, etc. Above all, reliance on aggregated data to estimate the effect of asset price changes on consumption fails to assess potential heterogeneous responses of different types of households that may cancel each other out in the aggregate and may therefore result in a weak estimated response of aggregate consumption to changes in wealth.

Evidence on wealth effects based on micro data is relatively more recent. By taking into account individual heterogeneity, micro data may be helpful to distinguish the relative roles of alternative hypotheses in explaining the aggregate relationship. However, evidence based on this type of data is scarce as

<sup>(4)</sup> For reviews of existing literature covering both theoretical and empirical issues, see for instance Poterba (2000) and Carrol (2004). The first paper discusses mainly the effect of stock prices on consumption and the second is more focused on the house prices impact. Paiella (2007) updates research carried out in both directions.

compared with evidence based on aggregated data. As a matter of fact, estimating wealth effects at the micro level is difficult because of a shortage of household micro data including at the same time information about consumption, wealth and socio-economic and demographic household characteristics. The ideal data set should also provide data at frequent intervals and over a sufficiently long period of time to explore the effect of asset price movements. Data sets combining all these characteristics are very rare or simply do not exist.

Most studies using micro level data present evidence for the US. Maki and Palumbo (2001), using data on the Survey of Consumer Finances (SCF), and Dynan and Maki (2001), using data from the Consumer Expenditure Survey (CES), find a direct effect of wealth on consumption which is globally compatible with the decline in aggregate savings in the US during the 90s.

Bostic *et al* (2005) match SCF and CES data and find an important role for both financial wealth and housing wealth in the determination of household consumption patterns. They also find that despite elasticities with respect to financial wealth being highly significant throughout the period of analysis (1989-2001), they are smaller than elasticities with respect to housing wealth and show a downward trend.

The evidence with European data is scarcer. There are, however, a few remarkable exceptions. Paiella (2003) and Guiso *et al* (2004) present evidence for Italy which in many respects is similar to US evidence, though the estimated size of the wealth effects tends to be smaller in Italy. Bover (2005) presents estimates of wealth effects on consumer spending using the first wave of a new survey of Spanish households. She focuses on the effects of housing wealth and finds large and statistically significant effects for Spanish households as evidence of a precautionary savings motive, as housing equity withdrawals, reverse mortgages<sup>5</sup> and moving to a smaller house when older (downsizing) are not frequently observed in Spain.

Campbell and Cocco (2007) use household data for the UK to estimate the response of consumption to house prices. They distinguish "direct" housing wealth effects from other explanations by separating the behaviour of asset holders and non-asset holders (homeowners and renters). They argue that most young households plan to increase the size of their house later in life, and they can be thought of as "short" in housing. On the other hand, many old households plan to move to a smaller house later in life, so they are "long" in housing. Without instruments that allow households to insure these short and long positions, there is a redistributive wealth effect when unexpected shocks to house prices occur. They estimate the largest house price elasticity for older homeowners and the smallest for younger renters, which are respectively the households that are expected to gain and lose from house price increases. They also find that controlling for regional heterogeneity is important when estimating the effect of house prices on consumption.

The theoretical relationship between house price changes and consumption at both aggregated and household level has been recently investigated by Li and Yao (2007) in the context of a stochastic life-cycle economy.

Cross country evidence is even scarcer given the lack of harmonised micro level data. Sierminska and Takhtamanova (2006) use data from the Luxembourg Wealth Study<sup>6</sup> to investigate whether there are

<sup>(5)</sup> A reverse mortgage (or lifetime mortgage) is a loan that may be understood as the inverse of what is usually named a mortgage. In a reverse mortgage, home owners receive in monthly payments (or a bulk payment) a fraction of the available equity in their houses, where they can live until death. At that moment the heirs pay the loan or the bank executes the mortgage.

<sup>(6)</sup> The Luxembourg Wealth Study, together with the Luxembourg Income Study, assembles a group of databases containing harmonised information at the microeconomic level on households in different countries. Their ultimate goal is to enable cross-national research on diverse topics related to household finance.

differences in direct wealth effects on consumption out of different types of wealth and across age groups in three countries: Canada, Italy and Finland. Overall, they find that the effects from housing wealth are stronger than the effects from financial wealth. Moreover, their results suggest that housing wealth effects are lower for younger households. They find differences in wealth effects across countries, detected by statistically significant differences in the magnitude of the estimated elasticities.

## 3. METHODOLOGY AND DATA

## 3.1. Method

The basic specification for the consumption model may be written as:

$$C_i = f(W_i, Z_i) \tag{1}$$

It relates, at the household level, consumption,  $C_i$ , and wealth,  $W_i$ . Several economic and socio-demographic characteristics of households,  $Z_i$ , are also included as controls. The reason for including these variables is to capture the effect of permanent income which relates to current income after demographics and human capital income are taken into consideration. These variables also capture the effect of preference heterogeneity across households.

A logarithmic transformation is used to linearize monetary variables, so that the basic estimated model is:

$$lnC_{i} = a_{0} + a_{l}lnW_{i} + \sum_{k=2}^{K} a_{k}Z_{ki} + u_{i}$$
<sup>(2)</sup>

Under this specification, the coefficient *a<sub>i</sub>* should be interpreted as the elasticity of consumption to changes in wealth, that is, the percentual change in consumption if wealth changes 1 per cent. Disaggregating wealth into its components is useful as there are both theoretical and empirical reasons to expect differential impacts. However, it also leaves us with the problem of a larger number of observations taking the value zero. These observations have to be discarded when the logarithmic transformation is used. Debt has also to be included in the model for a more comprehensive characterisation of households' overall financial position. However, the consideration of debt, which may be viewed as negative wealth, complicates matters somewhat more. The procedure that was taken was to define wealth as net worth, that is, the sum of financial and non-financial assets net of total debt.<sup>7</sup> Housing wealth refers to the value of the household's main residence and other real estate properties net of loans for housing purposes. Financial wealth is defined as the sum of deposits, mutual funds, stocks and bonds net of loans for other than housing purposes.

The baseline model can be extended by letting the regression coefficients vary according to several household characteristics  $D_{i}$ . This specification may be written, in its general form, as follows:

$$lnC_{i} = a_{0} + a_{l}lnW_{i} + \sum_{j=1}^{J} a_{wk}D_{ji}W_{i} + \sum_{j=1}^{J}\sum_{k=1}^{K} a_{jk}D_{jj}Z_{ki} + u_{i}$$
(3)

As argued above disaggregating the effects across households of different types can help interpreting wealth effects in distinguishing between alternative theoretical hypotheses.

(7) Taking logs forces dropping zero and negative values of net wealth. Bostic et al (2005) argue that the difference of two log-normal variables is normally distributed so they do not log-linearize measures of net wealth. In our case the visual inspection of estimated distributions for the various measures of wealth indicates that taking logs is more adequate. Though we do not have panel data, we can take advantage from the fact that the results of three waves of the *IPEF* are available. Equation 2 was also estimated by pooling pairs of samples corresponding to different cross-sections. With this exercise we can test the significance of the differences estimated in the effect of wealth on consumption in two different moments of the economic and credit cycles.

#### Instrumental variables estimation

One problem with household-level studies of wealth effects is that wealth changes are due to household saving or investment decisions in prior periods. This means that reverse causality is present and hence the assumptions of exogeneity of regressors needed to the consistency of OLS estimators fail to exist. Two other sources of endogeneity may also lead to correlation between the regressors and the residual: omitted variables and measurement errors. The attempt to solve the endogeneity problem involves the use of an instrumental variables estimator.<sup>8</sup>

If we treat wealth as an endogenous regressor, we must have one or more additional variables available that are correlated with wealth but uncorrelated with the residual  $u_i$ . Moreover, these excluded exogenous variables must not affect consumption directly. In our case, we use gender and age dummies, and the resulting interactive variables as instruments for total net wealth. Given the relatively comprehensive set of household characteristics that are included as controls in the equation for consumption, age dummies can be excluded from that equation and can be used as valid instruments. In the case of housing wealth we used two additional variables as instruments, as explained in section 4. Equation 2 is estimated using 2SLS.<sup>9</sup> First stage regression results are used as a first assessment of the validity of the instruments in order to test that the instrumental variables are correlated with the endogenous regressor. In addition, a test of overidentifying restrictions tests whether the instruments are uncorrelated with the error term of the structural model.<sup>10</sup>

## 3.2. Data

The analysis presented in this paper is based on household-level data from the Household Wealth and Indebtedness Survey (*IPEF*). The main results of the paper were obtained with data from the most recent wave of the survey.<sup>11</sup> By making use of data from the two previous waves of the *IPEF*, which were carried out in 2000 and 1994, some comparative results were also obtained and are presented at the end of the regression analysis section. As the structure of the questionnaire and the sample design are similar for the three editions of the survey, the relevant variables for the analysis of wealth effects on consumption may be derived from the three databases. The fact that we cannot benefit from the existence of a panel does not preclude the possibility of some comparisons being carried out.<sup>12</sup>

The *IPEF* collects data on Portuguese household expenditure, income and wealth. This is an important feature of this database. In the case of real estate wealth, which accounts for the largest share of Portuguese households, there is detailed information including year and value of acquisition, house size, whether it is the household's main residence, etc. For each household the database also provides in-

<sup>(8)</sup> A different attempt to solve this endogeneity problem involves studying the effect of winning a lottery on household behaviour. Lottery evidence analysed by Imbens, Rubin and Sacerdote (1999) suggests that only relatively large winnings have discernable effects on household behaviour.

<sup>(9)</sup> The equation was also estimated with LIML with broadly similar results (not shown in the paper).

<sup>(10)</sup> For a general discussion of instrumental variables estimation, see for example Wooldridge (2002).

<sup>(11)</sup> The last wave of the IPEF was carried out during the last quarter of 2006 and the first quarter of 2007.

<sup>(12)</sup> Some problems associated with sample design and representativeness mean that comparisons based on descriptive statistics alone should be avoided. However, the results of a regression analysis, whose purpose is to identify economic relations among certain variables at the household level, remain valid as they are potentially less affected by those problems.

formation on socio-demographic characteristics such as age, education, labour market status or region of residence.

#### Summary statistics

To illustrate both real estate and financial wealth patterns implicit in *IPEF* 2006 sample data according to the type of household, Table 1 presents some summary statistics. Households are split according to the age, level of education and labour market situation of the household head and also according to household's income and wealth quartiles. Table 1 presents the percentage of asset holders in each household class. The assets considered are those with a market valuation, that is, housing wealth and risky financial assets (shares and other securities). These figures show that most households hold housing wealth, which is consequently more evenly distributed than risky financial assets.

#### Table 1

### SUMMARY STATISTICS

	Fraction of households	Fraction of househo	olds holding the assets	Fraction of housing
	Total	Real estate owners	Risky financial assets holders	wealth (average)
All	1.0000	0.7564	0.1777	0.7049
Age 20-30	0.0340	0.5417	0.0928	0.8225
Age 30-40	0.1768	0.7427	0.1913	0.7570
Age 40-50	0.2292	0.7557	0.1861	0.7203
Age 50-65	0.2782	0.7969	0.2356	0.6878
Age >65	0.2818	0.7516	0.1153	0.6785
Education 1 <sup>st</sup> cycle	0.5295	0.7320	0.1001	0.6977
Education 2 <sup>nd</sup> cycle	0.2680	0.7557	0.1747	0.7314
Education 3 <sup>rd</sup> cycle	0.1026	0.7868	0.2968	0.7314
Education high school or college	0.0999	0.8569	0.4744	0.6715
Self-employed	0.1322	0.8140	0.3102	0.5667
Employee	0.4404	0.7612	0.1858	0.7554
Unemployed	0.0537	0.6119	0.1375	0.7437
Retired	0.3268	0.7612	0.1278	0.7068
Other	0.0468	0.6823	0.1211	0.7727
Income 1st quintile	0.2000	0.7088	0.0570	0.7418
Income 2nd quintile	0.2000	0.6755	0.0825	0.7103
Income 3rd quintile	0.2000	0.7364	0.1059	0.7446
Income 4th quintile	0.2000	0.7755	0.2033	0.6982
Income 5th quintile	0.2000	0.8807	0.4425	0.6755
Net wealth 1st quintile	0.2000	0.1108	0.0452	0.5507
Net wealth 2nd quintile	0.2000	0.7872	0.1161	0.7716
Net wealth 3rd quintile	0.2000	0.9628	0.1351	0.8132
Net wealth 4th quintile	0.2000	0.9822	0.2011	0.7927
Net wealth 5th quintile	0.2000	0.9834	0.4065	0.6406

Sources: INE and Banco de Portugal (IPEF 2006).

## 4. REGRESSION RESULTS

Table 2 presents the results of the estimation of the basic specification, given by equation 2 in Section 3.1. This equation relates consumption and wealth, controlling for a set of demographic and socio-economic household characteristics. These control variables are included to capture the effect of permanent income/human capital on consumption. Thus, among the control variables we also enter household labour income earned in the past twelve months.

In this equation, consumption,  $C_i$ , is measured by household monetary expenditures on food, other non-durables and durables.  $W_i$ , net total wealth, is given by the sum of household real and financial assets net of household debts. As consumption, wealth and income are measured at the household level, they are "equivalised" using a procedure that is standard in income analysis though there is no such standard in wealth literature. All the monetary variables are then divided by the square root of household size, which means that an intermediate situation between no economies of scale and perfect economies of scale within the household is considered. Furthermore, a logarithmic transformation is used to linearize monetary variables, so that the estimated coefficients on these variables should be interpreted as elasticities. The other household characteristics are included in the form of 0/1 dummy variables capturing the level of education and labour market situation of the household head, the size of the household and its region of residence.<sup>13</sup>

The first two columns of Table 2 show the estimated coefficients and respective t-statistics that were obtained using linear regression (OLS).<sup>14</sup> These results suggest that consumption is positively related to both wealth and income at the usual significance levels. The estimated elasticity of consumption

WEALTH EFFECT ON CONSUMPTION IN 2006: OLS AND 2SLS ESTIMATES

	0	LS	25	SLS
	1	2	3	4
	Coef.	t	Coef.	t
let wealth	0.03650	9.92	0.04625	2.11
ncome	0.51316	34.58	0.50579	22.44
ducation 2 <sup>nd</sup> cycle	0.14316	8.84	0.14262	8.79
ducation 3 <sup>rd</sup> cycle	0.26425	9.58	0.26266	9.51
ducation high school or college	0.31982	10.45	0.31497	9.74
mployee	-0.07114	-3.48	-0.06211	-2.17
Inemployed	-0.10210	-2.93	-0.09271	-2.29
Retired or other inactive	-0.17605	-8.33	-0.17066	-6.94
Constant	3.65209	28.80	3.61479	24.43
lumber of observations		7631		7631
? squared		0.4132		0.4126

### Table 2

Sources: INE and Banco de Portugal (IPEF 2006).

Notes: t-ratios computed with robust standard errors. All regressions also include control variables for family size and region of residence. Instruments: gender and age dummies.

(14) In the paper we do not show the results that are obtained using sample weights in the estimation as their use does not, in general, alter the conclusions of the analysis.

<sup>(13)</sup> In the case of education, we have four 0/1 dummies defining respectively persons without any formal education, persons that completed the first cycle of basic education, persons with the second or third cycle and those that completed high school or college; in the case of the labour market situation, the dummies define the self-employed, the employees, the unemployed and the inactive; family size dummies distinguish households with one, two, three, four and five or more persons; regional dummies are defined according to NUTS2.

with respect to wealth is around 0.04, leading to an *mpc* that is in line with European figures and lower than what has been estimated in empirical research for the case of US consumers.<sup>15</sup>

Some interesting results also emerge from the effect of the other socio-demographic controls included as explanatory variables. Education, acting as a proxy for human capital, clearly matters for expenditure: more educated households consume significantly more than those that did not complete more than the first level of basic education (the omitted category). The labour market situation of the household head is also likely to have a significant effect on consumption. The results suggest that the consumption of the self-employed (the omitted category) is significantly higher than the consumption in the other labour market situations that are considered. Though not shown in the tables, note that family size still matters for consumption even when "equivalised" values of the monetary variables are considered. Regional variables, which are included in order to capture the potential effect of this source of heterogeneity on consumption, are globally significant.

In Section 3.1, we argue that there are reasons to expect reverse causality between consumption and wealth, that is, this variable is likely to be determined simultaneously along with consumption. Under this hypothesis, wealth would be correlated with the residual term in equation 2, thus violating one of the conditions for the consistency of OLS. These considerations led us to also estimate equation 2 with an instrumental variables (2SLS – Two Stages Least Squares) estimator. Recognising this problem leaves us with another important difficulty – the task of finding an adequate set of instruments. In fact, the exact quantitative magnitude of the wealth effect on consumption depends on the choice of instruments. Yet, the main results of the paper on the heterogeneity of this effect across households at various stages of the life cycle and with different socio-economic characteristics remain robust to various combinations of instrumental variables.

The third and fourth columns of Table 2 present 2SLS estimates, which basically corresponds to apply least squares in two steps. Age dummies and a dummy for gender are used as instruments, that is, the source of pre-determined variation of wealth at the household level. In first stage estimations an F-test for the excluded instruments rejects the hypothesis that they do not have explanatory power.

The elasticity of consumption with respect to wealth that is estimated with IV is similar to the one obtained by OLS and similar conclusions may be also derived for the effect of the control variables on consumption.

### Wealth effects according to household characteristics

More interesting results can be obtained when the models allow for differential wealth effects across households of different characteristics. As a matter of fact, with household-level data we can take advantage of the cross-sectional heterogeneity that is present in this type of data. This can be very help-ful in several ways. In particular, it can help to discriminate among different theoretical hypotheses for the wealth effect on consumption.

Table 3 presents the results of the estimation of equation 3, where the coefficients on wealth are allowed to vary with household age, income and wealth classes. In this table we show the results obtained with OLS. In this case it is more difficult to find an adequate set of instruments. Using, as in the models presented in Table 2, only gender and age dummies as instruments, the 2SLS estimated elasticities in respect to net wealth tend to be larger than those obtained with OLS, in particular when they are allowed to vary with the household age class or wealth percentile. In the latter case a loss in the

(15) Note that the relation between the elasticity and the *mpc* may be given by:  $\varepsilon_i = \frac{dC_i / C_i}{dW_i / W_i} = mpc / (C_i / W_i)$  and consider, for example, the sample median of  $C_i / W_i$  which is approximately 0.15.

#### Table 3

WEALTH EFFECT ON CONSUMPTION BY AGE, INCOME AND NET WEALTH CLASSES IN 2006: OLS **ESTIMATES** 1 2 3 4 5 6 Coef. t Coef. t Coef. t 0.04546 7 15 Net wealth \* age 20-30 Net wealth \* age 30-40 0.03625 8 50 Net wealth \* age 40-50 0.04198 10.65 Net wealth \* age 50-65 0.04389 11.68 Net wealth \* age >65 0.02851 7.31 Net wealth \* income 1st quintile 0.03494 7.39 Net wealth \* income 2nd quintile 0.03044 7.56 Net wealth \* income 3rd quintile 0.03421 8.89 Net wealth \* income 4th quintile 0.04025 9.95 Net wealth \* income 5th quintile 0.04458 9.38 Net wealth \* net wealth 1st quintile 0.05485 4.82 Net wealth \* net wealth 2nd guintile 0.04052 4.88 0.03608 Net wealth \* net wealth 3rd quintile 4.79 Net wealth \* net wealth 4th quintile 0.04155 5.80 Net wealth \* net wealth 5th quintile 0.05060 7.52 Income 0.50154 33.00 0.44931 12.76 0.49713 33.55 Education 2<sup>nd</sup> cycle 0 13996 0 14460 8 30 0 13735 8 4 9 8 68 Education 3rd cycle 0.26083 8.93 0.25140 9.13 0.26075 9.46 0.32348 Education high school or college 10.26 0.30886 0.30272 9.89 9.65 Employee -0.06758 -3.28 -0.07140 -3.49 -0.04492 -2.18 Unemployed -0.10939 -3.15 -0.10367 -2.99 -0.08837 -2.54 Retired or other inactive -0.09777 -4.14 -0.17834-8.43 -0.16349-7.77 3.72425 28.56 4.22754 3.69291 25.38 Constant 13.54 7631 7631 Number of observations 7631 0.4187 0.4152 0.4202 R squared

Sources: INE and Banco de Portugal (IPEF 2006).

Notes: t-ratios computed with robust standard errors. All regressions also include control variables for family size and region of residence.

precision of the estimates is also obtained when we use the instrumental variables estimator.<sup>16</sup> However, it should be stressed that the pattern of the wealth effect on consumption according to the household age, income or wealth class of the household obtained with 2SLS is, in broad terms, similar to the pattern obtained with OLS.

Columns 1 and 2 show the results when the wealth effect is allowed to vary with age. These results suggest that wealth matters for consumption in all age classes. The elasticity is larger in the case of the youngest. In the second age class a hump-shaped pattern starts, peaking at an intermediate age class and decreasing afterwards. Wealth is likely to be less important for the oldest consumers. These results are consistent with the results obtained by Bover (2006) who finds a similar age pattern in the housing wealth effect for the case of Spanish households. She interprets her results as evidence of a precautionary savings motive in the effect of wealth on consumption. A similar interpretation can also be made in the case of our results, that is, these results also suggest that an increase in the value of households' wealth decreases their need for other savings (for precautionary reasons) when their life-cycle consumption needs are the largest and at an age when savings could be otherwise occurring (for instance to buy a larger house in the future). This is a plausible explanation given that equity with-drawals from housing are still limited, reverse mortgages are not used and moving to a smaller house when older (downsizing) is constrained by high transaction costs. Note that this is not inconsistent with the view that, in Portugal, easier access to credit contributed to the decline in the savings ratio.

<sup>(16)</sup> These results are available from the author upon request.

In columns 3-4 and 5-6 of Table 3 the regression coefficients on wealth are allowed to differ according to the income and the wealth class of the household, respectively. These results suggest that the effect of wealth on consumption decreases with income up to a certain level but after that level is reached the opposite relation comes up. A similar pattern also arises when the coefficients are allowed to vary with the wealth class of the household.

#### Homeowners and the housing wealth effects for households of different characteristics

In the rest of the paper we focus the analysis on the effect of housing wealth on consumption. As we documented above, there are reasons to expect that different types of wealth impact differently on consumption. Furthermore, housing wealth is the main component of Portuguese households' wealth and it is more evenly distributed than financial wealth. In particular, risky financial assets, the tiny component of financial wealth that would be relevant for this analysis, is concentrated in a small fraction of households. Another reason for focusing on housing wealth effects is that in this case a richer set of instruments is available, which may be helpful in checking the robustness of the results.

Table 4 presents the results obtained by restricting the sample to homeowners and focusing on the effect of housing wealth on consumption. Net housing wealth, which we also refer as home equity, is considered. This is given by the sum of the value of the household main residence and the value of other residences owned by the household net of debts obtained for housing purposes.

The estimates presented in Table 4 were obtained with 2SLS, using gender and age dummies as well as two additional variables as instruments. The first of these variables is a measure of the annual average valuation of households' housing wealth computed from survey responses.<sup>17</sup> The second additional instrument is given by a measure of house prices in the location of the household main residence.<sup>18</sup> In the specifications where the wealth coefficient is allowed to differ across households of different characteristics, the instruments are the interactions between these variables and the dummies that identify the households of different types (according to the age of the household head, the income or the wealth percentile of the household). We also estimated these models with OLS, though we do not report here the results<sup>19</sup>. As it is found, in general, in existing empirical literature, 2SLS estimated coefficients tend to be larger than those obtained with OLS. However, the pattern of the housing wealth effect on consumption according to the household age, income or wealth class of the household is, in broad terms, similar using both estimation strategies.

The results in Table 4 suggest that consumption is likely to be more sensitive to home equity than to net financial assets. When the housing wealth effect is differentiated across households of different types, the results generally confirm the patterns identified above for the case of net total wealth. For a visual perception, the results that differentiate according to age, income and wealth are also presented graphically, in charts 1, 2 and 3 respectively.

#### Comparing 2006 with 2000 and 1994

The results obtained using the databases from the previous waves of the *IPEF* can provide an additional robustness check on the results presented above. Table 5 shows the results that were obtained using 2000 data. These results suggest that the effect of wealth on consumption was stronger in 2000

<sup>(17)</sup> It is obtained from the market value of houses at the time of interview and their respective value at the time acquisition.

<sup>(18)</sup> Local house prices are proxied by data on the evaluation that banks make for mortgage purposes. These data is collected by Statistics Portugal. These are values per square metre measured at the municipality level in the case of the Lisbon and Porto regions and the municipalities of medium size. For other locations, prices at the level of NUTS 3 were used. These prices are measured at the end of 2005, about one year prior the survey data.

<sup>(19)</sup> These results are available from the author upon request.

HOUSING EQUITY EFFECT ON CONSUMPTION BY	' AGE, INCOME AI	ND NET WEALTH (	21 ASSES IN 2006: 25	SLS ESTIMATES				
	-	2	œ	4	S	g	7	ω
	Coef.	t	Coef.	t	Coef.	t	Coef.	t
Housing equity	0.15650	5.44						
Housing equity * age 20-30			0.14276	3.51				
Housing equity * age 30-40			0.13823	3.73				
Housing equity * age 40-50			0.13897	3.88				
Housing equity * age 50-65			0.13897	4.05				
Housing equity * age >65			0.12449	3.53				
Housing equity * income 1st quintile					0.15081	5.45		
Housing equity * income 2nd quintile					0.14350	5.15		
Housing equity * income 3rd quintile					0.14568	5.21		
Housing equity * income 4th quintile					0.15221	5.37		
Housing equity * income 5th quintile					0.15797	5.51		
Housing equity * net wealth 1st quintile							0.23598	2.70
Housing equity * net wealth 2nd quintile							0.20890	2.89
Housing equity * net wealth 3rd quintile							0.19582	2.96
Housing equity * net wealth 4th quintile							0.19397	3.07
Housing equity * net wealth 5th quintile							0.19702	3.31
Income	0.47936	18.85	0.47627	18.54	0.42283	6.61	0.47809	20.32
Education 2 <sup>nd</sup> cycle	0.14666	6.20	0.13869	5.34	0.13942	5.91	0.13939	5.84
Education 3 <sup>rd</sup> cycle	0.26004	6.91	0.25795	6.46	0.24379	6.47	0.25562	6.79
Education high school or college	0.30797	6.94	0.31221	6.60	0.28977	6.24	0.29786	6.76
Employee	-0.02253	-0.73	-0.03402	-1.11	-0.02291	-0.75	-0.02434	-0.77
Unemployed	-0.02824	-0.56	-0.04540	-0.91	-0.02973	-0.60	-0.03563	-0.66
Retired or other inactive	-0.13105	4.22	-0.03966	-1.14	-0.13089	-4.21	-0.13374	-4.01
Constant	2.61492	9.10	2.86434	8.05	3.20200	5.56	2.17756	3.16
Number of observations		3155		3155		3155		3155
R squared		0.4576				0.4546		0.4525



Part II | Articles

Table 4



Chart 2







TOTAL AND HOUSING NET WEALTH EFF	ECTS ON CONSUMPTION	IN 2000: OLS AND	2SLS ESTIMATES					
	STO		5SLS		OLS		2SLS	
	-	2	£	4	۴	2	3	4
	Coef.	Ŧ	Coef.	t	Coef.	t	Coef.	t
Net wealth	0.07756	19.21	0.08706	3.93				
Housing equity					0.15877	15.58	0.17246	2.82
Income	0.40322	25.95	0.39704	18.70	0.38840	22.31	0.38424	15.10
Education 2 <sup>nd</sup> cycle	0.16719	8.72	0.16657	8.67	0.18466	8.20	0.18412	8.07
Education 3 <sup>rd</sup> cycle	0.31273	9.68	0.31107	9.54	0.29593	7.80	0.29197	6.95
Education high school or college	0.34853	9.19	0.34375	8.68	0.33160	7.55	0.32479	6.07
Employee	-0.04389	-2.10	-0.03509	-1.21	-0.05125	-2.18	-0.04627	-1.44
Unemployed	0.00989	0.19	0.01732	0.32	-0.00654	-0.11	-0.00710	-0.12
Retired or other inactive	-0.20131	-9.21	-0.19642	-8.00	-0.19465	-8.04	-0.19186	-7.01
Constant	4.59440	34.34	4.54897	27.31	3.79523	22.19	3.67717	6.74
Number of observations		5679		5679		4399		4399
R squared		0.4087		0.4081		0.4110		0.4107
Sources: INF and Barron de Portural (/PEF 2000)								

Sources: INE and Banco de Portugal (IPEF 2000). Notes: Fraticos computed with robust standard errors. All regressions also include control variables for family size and region of residence. Instruments: age, gender, indicator of house valuation.

Table 6

HOUSING EQUITY EFFECT ON CONSUMPTION IN 2006, 2000 AND 1994: OLS ESTIMATES

							Test differe	nce of coefficients	(t-ratio)
	2006		2000		1994		2006 versus	2000 versus	2006 versus
	Coef.	t-ratio	Coef.	t-ratio	Coef.	t-ratio	2000	1994	1994
Housing equity	0.09410	11.88	0.16605	13.67	0.11747	14.27	4.96	-3.31	2.04
Income	0.50883	27.28	0.40464	16.86	0.44000	26.23	-3.43	1.21	-2.74
Education 2 <sup>nd</sup> or 3 <sup>rd</sup> cycle	0.13450	6.64	0.15242	5.83	0.09151	5.92	0.54	-2.01	-1.69
Education high school or college	0.26983	9.33	0.30699	8.23	0.16513	8.10	0.79	-3.34	-2.96
Employee	-0.04327	-1.77	-0.04321	-1.53	0.00598	0.38	0.00	1.52	1.69
Unemployed	-0.04999	-1.17	-0.02939	-0.42	-0.04899	-2.63	0.25	-0.27	0.02
Retired or other inactive	-0.15396	-6.22	-0.20191	-6.75	-0.09724	-2.89	-1.23	2.32	1.36
Constant	2.98024	18.32	3.50898	15.50	1.75742	16.46	1.90	-1.75	-1.22
Number of observations		4863		2691		4359			
R squared		0.4393		0.4233		0.5506			

Sources: I/IE and Banco de Portugal (I/EF 1994, 2000 and 2066). Notes: t-ratios computed with robust standard errors. All regressions also include control variables for family size and region of residence.

Table 5

than in 2006. By pooling data from pairs of different samples, we are able to test the significance of the difference between regression coefficients in the two years considered. In Table 6 we present the results of estimating equation 2 (using linear regression) considering separately the samples for the three available waves of the survey. The three last columns of Table 6 show the t-ratios for the difference of the coefficients test in two different years (the null hypothesis is the equality of coefficients). These results suggest that the effect of housing equity increased from 1994 to 2000 but decreased in 2006. Concerning the effect of income on consumption, it is apparent from the results that, in 2000, it was not significantly larger than in 1994 but increased from 2000 to 2006.

## 5. CONCLUDING REMARKS

In this paper we present evidence on the effect of total and housing wealth for the case of Portuguese consumers using micro-level data from the most recent wave of the Household Wealth and Indebtedness Survey (*IPEF*) carried out during the last quarter of 2006 and the first quarter of 2007. We focus the analysis on the potential differential responses from households with different characteristics. With micro-level data we are able to estimate differential effects according to the household characteristics, hence providing further insights on the relation between wealth and consumption, a feature which may have policy relevance. Given the availability of three cross-sections, corresponding to the three waves of the *IPEF*, some comparisons of the results obtained for different points in the economic and credit cycles can be made. We take into account the potential reverse causality between wealth and consumption and present the results obtained with an instrumental variables estimator reducing the chances of inconsistency of the estimators due to problems of endogeneity.

We obtain evidence of a positive and significant effect of wealth on consumption. The estimated elasticity of consumption with respect to wealth, around 0.04-0.05, leads to an *mpc* that is in line with European figures and, as expected, is lower than what has been estimated in empirical research for the case of the US.

The results of the *IPEF* confirm that housing wealth is the most important asset in the portfolios of households in all classes considered. This evidence reinforces the importance of focusing the analysis also on the effect of housing wealth on consumption. We obtain evidence that this effect is stronger for the case of homeowners and housing wealth, what is in accordance with many examples in the recent empirical literature.

The estimated age pattern of the elasticity of consumption seems consistent with the hypothesis of precautionary savings. The effect is the largest for the youngest consumers (who are likely to be saving to buy a first house) and it is followed by a hump-shaped pattern, that is, it is higher for the middle-aged classes when consumption needs are large and savings could be otherwise occurring (for instance to buy a larger house).

In the case of the models that differentiate the effects according to income and wealth percentiles, the pattern that appears seems consistent with the view that households in the lowest income and wealth classes are likely to be liquidity constrained.

The results obtained using the databases from the previous waves of the *IPEF* that were carried out in 2000 and 1994 confirm the positive and significant effect of wealth on consumption and reinforce the importance of housing wealth for Portuguese consumers. These results also suggest that the effect of housing equity on consumption increased from 1994 to 2000 but decreased again in 2006.

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