WEALTH EFFECTS ON CONSUMPTION:
MICROECONOMETRIC ESTIMATES FROM A NEW SURVEY OF HOUSEHOLD FINANCES

Olympia Bover*

RESEARCH DIVISION, BANCO DE ESPAÑA

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Abstract

This paper presents estimates of wealth effects on consumer spending using the first wave of a new survey of household finances (EFF 2002) that contains direct measures of asset holdings and consumption. A distinguishing feature of the EFF is the availability of such information from a representative sample subject to stratification by wealth. Furthermore we believe we are able to measure wealth effects due to precautionary motives only. This is confirmed by the estimated pattern of wealth effects across age groups. To control for the potential endogeneity of housing wealth, we exploit geographical house price variation and inheritance information in the EFF as instrumental variables. We focus on the effects of housing wealth, distinguishing between main and secondary housing, but also report OLS estimates of financial wealth effects. We find large and statistically significant housing wealth effects for prime age households. Overall, the largest wealth effects are for owner occupied housing, followed by secondary housing, with financial wealth effects being smaller and insignificant.

Keywords: wealth effects, precautionary savings, house prices, two-stage least squares matching

JEL Classification: D91

1 Introduction

Estimating wealth effects at the micro level is difficult because of lack of household survey data that contain at the same time direct measures of asset holdings and consumption. However obtaining micro estimates is important because of heterogeneity, as the effects are expected to vary not only with household age, but also with the quantity and composition of household wealth. The effect of the revaluation of stock market wealth, for example, can only be observed in the consumption patterns of households that own corporate stocks while in aggregate studies its effect may be confounded with confidence in income and job security.

Even more difficult than estimating wealth effects at the micro level, but very policy relevant as well, is disentangling the importance of the different components behind estimated wealth effects. In particular, we would like to know how large a wealth effect is when due to precautionary savings alone. Similarly, we would like to know how much of the wealth effects found in the empirical literature is due to the existence of reverse mortgages or, more generally, to access to improved credit conditions following revaluation of equity.

In this paper we use a new dataset, the Spanish Survey of Household Finances (EFF 2002) whose distinguishing feature is the availability of information on consumption and wealth from a representative sample subject to stratification and over-sampling by wealth, which ensures a sufficient number of households with high net worth and positive holdings in a wide variety of asset types. Furthermore, these new data correspond to an economy in a period where there are a priori reasons to believe that the estimated housing wealth effects are essentially due to precautionary savings motives alone. Households in Spain hold widely large amounts of real estate wealth that have been intensely revaluated by house price increases since 1994 but reverse mortgages or opportunities for borrowing on increased housing equity were virtually non-existent financial products for households in 2002.

Therefore in this paper we estimate housing wealth effects which we believe give a measure of the precautionary savings motives behind an overall notional wealth effect. Furthermore, the age pattern of the wealth effects we are able to identify and estimate with micro data are consistent with the interpretation of wealth effects driven by precautionary savings.

We focus on the effects of housing wealth, distinguishing between main and secondary housing, but also report estimates of financial wealth effects. We aim to estimate a causal effect of wealth on consumption that is a useful input for policy. In our case exogenous or predetermined variation in wealth data comes from house price variation by locality and inheritance indicators. We also include a rich set of controls. Relative to an intertemporal model, this kind of effects of wealth on consumption are not structural but reduced form causal effects [see Carroll (2004) and Hayashi (1985), for related discussion], which capture medium run responses. In a cross-sectional setting like ours we cannot hope to capture the timing of the effects.

The paper is organized as follows. Section 2 contains theoretical considerations related to the effect of different types of wealth on consumption and reports existing empirical results. In Section 3 the data are presented and some descriptive statistics of wealth, consumption, and their association are reported. A brief description of the wealth and credit position of households in Spain is also included. Section 4 discusses the instruments used. In Section 5 non-parametric Wald instrumental variables estimates of total housing wealth effects are provided (for selected cells) using local house prices as a dummy variable instrument. Section 6 presents linear instrumental variable estimates using local house prices and detailed inheritance information as instruments for total real estate wealth, also distinguishing between owner occupied housing and other properties. Some OLS financial wealth effects are also reported. In Section 7 two-stage least squares matching estimates are presented that allow for observed heterogeneity in wealth effects in a flexible way. Finally, Section 8 concludes.

2 Theoretical considerations and existing empirical results

Theoretical considerations

In a consumption model without uncertainty, constant relative risk aversion, constant interest rate and a fixed horizon, the wealth effect or marginal propensity to consume out of wealth is a simple function of the rate of interest, the rate of time preference, the utility parameter, and age [see for example Dynan and Maki (2001)]. However, if we consider separate effects of different types of wealth (e.g. stocks and real estate) under more realistic assumptions, consumption theory does not produce unambiguous predictions on the relative magnitudes of the effects even at the micro level.

The theoretical basis behind the effect of stock price fluctuations on consumption are clearer than those of house prices[1]. Indeed, increases in stock prices due to expected increases in productivity and expected profits would lead to higher wealth and true increases in spending power of this highly liquid wealth. In contrast, even in a model without bequests, house price fluctuations may have no effects on consumption if moving costs are large and the borrowing possibilities for the liquidity constrained are limited [housing wealth effect predictions from the life-cycle model under these different scenarios are discussed in Skinner (1996)].

The user cost of living in one's own house rises with house prices; thus, if homeowners plan to live forever in their current home (or just moving to a similar one in a similarly expensive neighbourhood), no accrue spending will occur unless perfect reverse mortgages are undertaken. However, if households consider downsizing when older (i.e. moving to a smaller house when housing consumption needs are generally lower), increases in house prices will increase non-housing consumption. In the context of the life-cycle model, households will borrow on the accrue value of their home, spend this equity increase over the remaining years of their life, and cash out their equity when old by downsizing. Alternatively, in the presence of reverse mortgages, even without ever moving, households could still increase their spending as a result of housing equity increase[2].

Actual downsizing by the elder is not widely observed (nor are reverse mortgages). However, the possibility of downsizing in the future, should necessity arise, may be sufficient for middle-aged homeowners to increase non-housing spending following house price increases if housing windfalls reduce the need for other types of precautionary savings [Skinner (1996)]. Since not many households experience a bad outcome when old, downsizing among the elder is not generally observed.

Moreover, household perceptions about how permanent changes in the value of equity are may also affect its impact on consumption, with house price increases often considered more permanent than increases in stock market values.

Therefore, as the previous summary arguments make clear, the relevance of housing wealth effects is largely considered an empirical matter.

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[1] For a discussion on these issues see Carroll (2004).

[2] Housing wealth effects in the presence of moving constraints with reverse mortgages are expected to be smaller than in the absence of moving costs since in that case there is no adjustment in housing consumption.

Existing empirical results

Among other sources, wealth effects have been estimated from aggregate quarterly time series data, from household-level data, and from income and education cohort data. Poterba (2000) and Carroll (2004) review the evidence based on aggregate data which on balance conveys a marginal propensity to consume (mpc) out of housing wealth between 0.05 and 0.1, not different than the corresponding results for stock wealth. However, as both authors point out, the studies based on aggregate data do not identify convincingly the effect of exogenous increases in wealth on consumption and Poterba suggests a figure of 0.03/0.05 in the medium run as more reasonable. Furthermore, the estimated relationship may not be stable over long periods in the face, for example, of changes in credit markets.

These considerations also apply to Case, Quigley, and Shiller (2003) who estimate an mpc out of housing wealth of 0.03/0.04 for U.S. states and four times this figure for a panel of countries, though they fail to find any significant effect of stock wealth. Their larger estimate from the panel of countries is hard to reconcile with the fact that credit markets in the U.S. are known to work better than in most of the other countries considered. Moreover, some strong assumptions for data construction are made since a relevant amount of fundamental information is missing (e.g. consumption and financial wealth data at the state level).

Catte *et al.* (2004) estimate separate mpc out of housing and financial wealth for OECD countries. They find that the long run mpc out of housing wealth is in the range of 0.05 and 0.08 for Australia, Canada, the Netherlands, the UK and the US while it is between 0.01 and 0.02 for Italy, Japan, Spain, and not statistically significant for France and Germany. For most countries they estimate housing wealth effects that are larger than financial wealth effects.

Finally, Maki and Palumbo (2001) combine the aggregate net worth level information in the Flow of Funds with the households asset distribution information from the Survey of Consumer Finances to construct savings and net worth series for different education and income cohorts. They estimate an overall wealth effect of 0.03 to 0.05, very much in line with the long run mpc out of total wealth between 0.03 and 0.06 estimated by Davis and Palumbo (2001) from aggregate data.

Recently, Palumbo, Rudd, and Whelan (2006) have argued that previous time series estimates are downward biased due to the inappropriate use of the aggregate consumption deflator. They estimate a mpc of 0.07 using as a deflator the price index for non-durables and services. Muellbauer (2006) presents a detailed critique of the international empirical evidence and argues that most studies are flawed due to the lack of relevant controls.

Skepticism about macro results due to potential endogeneity has turned attention towards household level studies. However, the literature based on household data reflects the lack of datasets that contain at the same time information on wealth and its components and comprehensive measures of consumption.

In the U.S., the only studies that actually estimate an equation for consumption are Skinner (1989) and Parker (1999). They both use the parameters of a total consumption equation estimated in the Consumer Expenditure Survey (CES) from food consumption, demographics, and, in the case of Skinner (1989), heat and utilities consumption and number of automobiles, to infer a total consumption measure in the PSID. This imputed consumption measure is used together with the wealth information available in the PSID every five years, in particular self-reported housing values in Skinner. The estimated housing wealth effects are significant but small and disappear when fixed effects are considered, possibly in part due to the magnified measurement error that occurs when transforming the equation to remove fixed effects.

The dissatisfaction with extrapolating consumption from few components has prompted many authors to rely instead on measures of "active savings" provided in the PSID. Skinner (1996) and Engelhardt (1996) regress active financial savings on the change in self-reported housing values. The estimated effect of changes in housing wealth on savings obtained in both cases is around minus 0.03 over the five year PSID interval; this is annualized in Skinner (1996) to 0.01 assuming that the housing value change occurs in the middle of the five year period. Juster *et al*. (2006) include active housing savings as well in their dependent variable; they find no effect of housing capital gains. Finally, some authors have studied financial saving measures that include non-active as well as active financial savings and in those cases no effects of housing changes are found [Hoynes and McFadden (1997), Engelhardt (1996)]. For the UK, Disney, Henley, and Jevons (2003) also use active financial savings, which are available in the BHPS, but their estimated effects are not directly comparable to others in the literature because they refer to the effect of house price surprises.

Grant and Peltonen (2005) exploit the consumption and wealth information in the panel part of the Italian SHIW by regressing changes in non-durable consumption on changes in housing wealth, in value of shares, in income, and demographics. Estimated housing wealth effects are small and not significant in general, while they find a small role for the change in the value of shares.

Overall the household based estimates of the mpc out of housing wealth are estimated to be either small and insignificant or ranging between 0.01 and 0.03, depending on the length of the period considered. However, most of these estimates may be slightly downward biased. Household wealth is measured with error and since most of the previous studies consider changes in housing wealth as their explanatory variable, they may suffer from the classical downward bias problem which amplifies measurement errors in the levels of the variable when taking first differences. Furthermore, none of the previous data sets includes the very wealthy households whose response to capital gains is a fundamental piece of the prevailing wealth effect.

A recent attempt to directly use consumption data is Dynan and Maki (2001). With CES data they focus on the effect of stock wealth on consumption trying to overcome the limitations on stock holding information in this data set. Their estimated mpc out of stock wealth is 0.05 (or slightly higher at the most) over two years. This contrasts with the 0.17 estimate over a five year period in Juster *et al.* (2006).

3 Consumption and Wealth in the EFF

The Data

This sub-section describes the data, and presents descriptive statistics of the association between wealth and consumption in the EFF.

The data used come from the 2002 EFF conducted by the Bank of Spain to 5143 households[3]. Based on the wealth tax, there is over-sampling of wealthy households. Eight wealth strata are defined which are over-sampled progressively at higher rates. Around 40% of the sample corresponds to households liable to the wealth tax (5% of the population). The EFF contains rich information on assets, debts, incomes, spending, and socioeconomic variables relating to the households and their members.

All the calculations reported in this paper make use of the five multiple imputed data sets provided by the Bank of Spain as a way of overcoming item-non-response taking into account imputation uncertainty and facilitating a correct use of the data [for details on the EFF imputations see Bover (2004)][4].

The wealth variables used in this paper are the values of the main residence, other real estate properties, financial wealth (and various components of it), and total wealth (the latter only in Table 1 for description purposes). We consider these variables both gross and net of their associated debts. The debt variables used are: outstanding debt for the purchase of the main residence, debt for the purchase of other real estate properties, other debts outstanding, and their overall sum. It is becoming increasingly difficult to associate liabilities to particular assets, e.g. mortgages are often borrowed for something else and there is an increasing use of lines of credit which are difficult to categorize. In this paper in general we use gross values of the assets considered but we also report some results for net wealth values, particularly in the case of total real estate wealth, including in either case a large number of controls relating to the household socio-demographic characteristics.

The questions on (i) food expenditure, (ii) total non-durable expenditure, (iii) value of equipment, and (iv) value of the stock of vehicles are combined to obtain various annual consumption measures. The rates of depreciation in Fraumeni (1997), mostly based on the Hulten and Wykoff (1981) rates, are used to derive consumption measures from the household's stock of equipment and vehicles[5].

The actual sample size is 5060 households, after having dropped a small number of observations for which non-durable expenditure including food was smaller than food expenditure alone.

As a description of the data, Table 1 shows how average consumption varies for different percentiles of total net worth and housing wealth. Figures are reported for food and non-durables, and for two other measures of consumer spending, both including equipment and one including also vehicles.

The implied wealth effects from Table 1, measured as the change in average consumption relative to the change in average wealth, are always positive and fairly stable,

[3] For a full description of the making of this survey see Bover (2004).
[4] The first set of imputed data dated November 2004 are used in this paper.
[5] In particular, 0.15 for household equipment and 0.165 for vehicles.

ranging between 0.01 and 0.05, with an overall average of 0.02. This figure would imply that an increase in wealth of 100 euros would lead to a two euro increase in annual consumption. As could be expected, the effects become larger for the more comprehensive consumption measures and smaller for the more comprehensive wealth measures.

In the remaining sections we focus on the consumption measure that includes food, other non-durables, durables, and vehicles. Concerning wealth measures, our main focus is on the effect of real estate wealth, as a whole and distinguishing between main residence and other real estate properties when appropriate. We also consider briefly the separate effect of financial assets wealth.

The wealth and credit position of Spanish households

Aside from the distinguishing features of the EFF that make it particularly well suited for the estimation of wealth effects, there are economic considerations that make the estimation of housing wealth effects in Spain particularly relevant.

Most households hold substantial housing equity. In Table 2 we report some figures on the distribution of households' assets, by income and wealth. In particular, 79% of total household assets are made of housing and other real estate, 82% of households are home owners, almost 19% own a secondary residence, and 30% possess a secondary residence or other real estate properties. More strikingly, for the bottom 20% of households in the income distribution, 74% of them are owner occupiers and 18.5% have other real estate properties[6].

However, in 2002, there was still very limited use of re-mortgaging following housing equity windfalls and reverse annuities were non-existent. Spanish households have not traditionally resorted to credit for consumption. Only 20.5% have consumption debts, compared to 62% of U.S. households[7]. Mortgage equity withdrawal[8], intended to measure on aggregate how much secured borrowing is not invested in real estate, has never been positive in Spain [see Marqués and Nieto (2003)]. This situation coupled with the low propensity to move home (as illustrated later in Section 4) would predict no wealth effect on consumption in a perfect certainty model.

Therefore, a priori, Spain provides an ideal ground for measuring the importance of precautionary savings motives behind wealth effects. Disentangling the extent of the various factors explaining wealth effects is relevant to understand differences between countries, to improve our understanding of the mechanisms at work, and has implications for policy analysis. For example, if precautionary motives prove to be strong and households are saving significantly less for the uncertain future when experiencing long periods of house price increases, the consequences of housing equity losses will be not only drops in consumption but also not enough precautionary savings in the future for the generations that experienced years of housing windfalls at mid-life.

[6] These results are reported in detail in 'Survey of Household Finances (EFF): Description, Methods, and Preliminary Results', *Economic Bulletin*, Banco de España, January 2005. For some international comparison see Bover, Martinez-Carrascal, and Velilla (2005).
[7] See reference in previous note.
[8] Calculated as the difference between increase in housing finance and households' investment in housing.

4 Discussion of instruments: identification strategy

A problem with the wealth effects derived from Table 1 is lack of control for demographic characteristics and for other types of wealth (physical or human). Another problem is that, even if we calculate similar tables for observable homogeneous household cells, differences in wealth across households in the same cell may reflect unobserved differences in saving behaviour, hence leading to reverse causality.

We use house prices (lagged one year) as instruments for housing wealth[9]. Our basic identifying assumption is that local market house price differences are a source of predetermined variation in cross-sectional household-level real estate wealth.

House prices may not be totally free from endogenous contamination because of self-selection of households by area of residence, but in any event this would be an endogeneity concern of a lesser order of magnitude relative to the one created by household wealth. In this respect, the changes in house prices have been very different across households. On average, one year house price variation across the population according to our sample has been around 15.7% with a standard deviation of 3.8%[10]. The two year figures are 32% for the average and 6.6% for the corresponding standard deviation. These are substantial variations across households. Moreover, the fact that Spanish households do not very often move home is a relevant consideration for the predeterminedness of house prices. According to information in the EFF, less than 1.5% of homeowners acquired their main residence in the last 12 months, around 2.5% in the last 24 months, and 4.5% in the last three years, approximately.

Another potential concern is the possibility that house prices reflect general local demand conditions which may induce changes in expected income and as a consequence house prices might have an independent effect on consumption aside from their effect through wealth. However, for most of province capitals, the house prices we use as instruments are at the municipality district level. At the district level there is not much in the way of local demand conditions to be captured by house prices and influencing expected income. Work and housing are not generally in the same municipality district. Furthermore it is mainly supply conditions, and in particular scarcity of building plots, or change in local amenities, which are not correlated with the error term that are probably behind house price variations at this level. In the case of smaller municipalities we believe that controlling for size of the municipality and occupation of the head of household (and partner) should minimize this concern.

Aside from local house prices, in Sections 6 and 7 we use additionally the inheritance information available in the EFF as instruments. More precisely, we introduce five dummy variables indicating whether the following real estate assets have been inherited: main residence, each of the three most valuable other real estate properties, and the rest of real estate properties. Table 3 shows the expected positive association between having more real estate property and having inherited it.

[9] Local House Prices (source: Ministerio de Fomento).The main source for local house prices in this paper are the 2001 data on house prices per square metre (all housing) for capitals of provinces, municipalities above 100,000 inhabitants, homogeneous zones for the outskirts of Barcelona, Bilbao and Madrid. Additionally, we use house prices per square metre data for new housing to have house prices at the municipality district level for the majority of province capitals and for some municipalities for which only new housing prices are available. The splicing factors used are evaluated at the corresponding capital of province for the municipality districts and at the corresponding province for the municipalities. When none of these house prices are available we use house price data (all housing) by municipality size.

[10] The previously described detailed level of new housing prices was not available in a comparable way to calculate the one and two year variations cited in the paper. These rates of change were constructed from the above mentioned house prices for all housing.

First stage regressions

Despite all the control variables included in Section 6, the house price and inheritance instruments remain relevant. First stage regressions are presented in Table 4. F-tests for the excluded instruments reject the hypothesis of them not having explanatory power. The partial R^2 for total housing wealth is 0.08.

For the case when we have separately wealth in main residence and in other real estate properties, we also calculate the partial R^2 suggested by Shea (1997), which takes into account inter-correlations among the instruments. These are 0.06 and 0.08 respectively, very similar to the value obtained with standard partial R^2 statistics. We are therefore able to identify the effect of our two endogenous wealth variables since we do not have a problem of some of the instruments being irrelevant.

The possibility of weak instruments was also considered. As an informal diagnostic we compared direct Two-stage-least-squares (TSLS) estimates with LIML and various indirect TSLS, that is, using alternative normalization restrictions in the consumption equation. We concluded that weak instruments was not a major concern in our case, because all estimates were very similar.

5 Non-parametric Instrumental Variable Estimates of Housing Wealth Effects

Cell-by-cell Wald estimation

In order to afford transparent calculations that can be reported in a simple table, we construct a binary house price indicator ($p=1$, if a household lives in a high house price area, and $p=0$, otherwise[11]). Also, we define among households with more than one member three age groups, two groups according to high or low fitted permanent income, and two groups by size of town (with a threshold at 100,000 inhabitants), which gives 12 different cells, representing among them 53% of the population[12].

Letting X denote the vector of cell characteristics, we estimate wealth effects in a given cell $X=x$ as the sample counterparts of

$$\beta(x) = \frac{E(C|X=x,\ p=1) - E(C|X=x,\ p=0)}{E(W|X=x,\ p=1) - E(W|X=x,\ p=0)}$$

Intuitively, we measure the effect of wealth on consumption through the effect of house prices on consumption, relative to the effect of house prices on wealth. The rationale for this is the presumption that house prices only affect consumption through wealth.

The quantity $\beta(x)$ is just a within-cell instrumental variable estimand when the instrument is a dummy variable (sometimes called a Wald estimand). The corresponding relationship between consumption and wealth can be written as

$$C=\beta(X)W+\alpha(X)+U \qquad (1)$$

Where $\alpha(X)$ is an unrestricted function of X and U is an error term such that $E(U \mid X,p) = 0$. The formula above follows from taking expectations in (1) given $(X=x,p=1)$ and $(X=x,p=0)$ and subtracting both expressions. Formulation (1) is useful for obtaining standard errors for $\beta(x)$.

The advantage of the cell-by-cell analysis, aside from its directness, is the avoidance of parametric restrictions and extrapolation across cells that may have unknown impacts on the estimated wealth effects. Its disadvantage is that, due to small sample sizes, we are limited to a small number of controls. Thus, the analysis in this section can be regarded as complementary to the conventional instrumental variable consumption equations estimated in the following section. In Section 7 we report two-stage least squares estimates in the spirit of matching methods, which combine the flexibility of Wald estimates with the ability to use a larger variation in controls and instruments.

In terms of an intertemporal consumption model, the wealth effect $\beta(x)$ will be a function of structural parameters of the model, which are not identified in a cross-section. Thus, $\beta(x)$ is a reduced form causal or policy effect, capturing steady state or medium run responses. Note that we are interested in the effect of wealth on the level of consumption as opposed to consumption growth. Thus the theoretical framework is not an Euler equation for

[11] High house prices areas are defined as those with house prices above the sample median.

[12] A permanent income equation is fitted from the whole sample. High (low) permanent income households are defined as those with above (less or equal than) the median fitted income in their age and size of town group.

consumption but a consumption function. Part of the literature has estimated equations in differences due to the absence of micro information on the level of consumption (as is the case with PSID data). Had we got panel data, we could have included household fixed effects in the equation, thus improving our ability to control for household heterogeneity. However, to do so we would rely on wealth changes for estimation. Therefore, sufficient variation in changes and not too much contamination from measurement error would be required for identification of fixed effects wealth effects.

Results

The analysis in this section only considers the effect of total real estate wealth. Distinguishing main residence from other real estate wealth requires using more than one endogenous explanatory variable and a richer set of instruments, which we do in the context of the more structured approach followed in the next section.

Table 5 reports Wald estimates. The two main results are as follows. First, for groups where the mpc out of housing wealth can be estimated with minimal precision, these range from 0.02 to 0.07. Second, wealth effects are best determined for prime age households with high permanent income, and are estimated to be between 0.02 and 0.04. Furthermore, effects seem to be larger in smaller towns, more significant for high permanent income households, and larger for older households although not well determined.

The results reported in Table 5 consider that within cells households are homogeneous and no use is made of the grossing-up weights, which may be misleading for such small specific groups. Nevertheless, we have also recalculated these estimates taking them into account. The results obtained are very much in line with those in the table although less well determined.

We carried out some further robustness checks. In particular, we estimated these effects for the net value of housing wealth and they remain unchanged. Furthermore, instead of using a fitted permanent income equation to obtain homogeneous groups we tried to define them in terms of education level (having achieved a University degree or not) but the results obtained were less precise. Finally, in an attempt to capture non-parametrically the effect of main residence wealth, we repeated the analysis considering only households with no real estate property aside from the potential ownership of their main residence. The results were very poorly determined, specially for households in large towns.

Note that the dependent variable is household expenditure in consumer goods and therefore it incorporates potential differences in the local prices of these goods. Insofar as these differences are large, the long run wealth effect on expenditure may differ from the one on consumption. To determine the former, local price levels would be needed but these are not in general readily available. Nevertheless, we expect the variation in the prices of consumer goods to be small in comparison to house prices variation, specially for a given municipality size, the level at which we calculate our estimates of wealth effects.

6 Linear IV Estimates of Wealth Effects

In this section we estimate linear instrumental variable equations relating consumption to measures of household wealth and socio-demographic characteristics using local house prices and inheritance indicators as instruments. All the results in this section and the next make use of the grossing-up weights provided, and are therefore representative of the population. Moreover, sample stratification and clustering are taken into account for the calculation of standard errors.

We present IV estimates of the effect on our most comprehensive measure of consumption (including food, other non-durables, equipment, and vehicles) of total real estate wealth and also of the separate effects of main residence and other real estate properties. IV estimates of the effects for different age groups are also reported and in that case local house prices interacted with age group variables are included in the instruments set. Financial assets are not explicitly considered in the IV estimations since we lack a plausible instrument for them but OLS estimates and some discussion of them will be provided later.

In our equation we include a large number of socio-demographic characteristics of the households. In doing so we control in a flexible non-linear way for permanent labour income or human wealth, outstanding debt, and other types of wealth not explicitly considered. Our focus is in the estimation of effects of components of housing wealth, which accounts for a very large fraction of total wealth of Spanish households, and for which we have instruments.

The household's characteristics included are the following 0/1 dummy variables:

(i) number of persons in the household (10)[13], number of children under 16 (7), municipality size (7);

(ii) head of household characteristics: gender, education (11), occupation (11), age (6), civil status (6), father's occupation (11), mother's occupation (11);

(iii) when applicable, partner's characteristics: education (11), occupation (11), age (6), father's occupation (11), mother's occupation (11).

Effects of total housing wealth

Table 6 presents results for the effect of total housing wealth. The IV overall estimate is 0.013 (column 1). Its OLS counterpart is very much the same (column 4), although the p-value for the Durbin-Wu-Hausman chi-square test is 4.2%. This similarity may be taken as an indication that there is no evidence of large measurement errors in levels or endogeneity in real estate wealth. Moreover, it would also counteract the possibility that the IV effect is spuriously driven by shocks influencing both local house prices and consumption.

In columns 2 and 5 a pattern by age emerges, with the wealth effect increasing up to the age of 35-44 and then decreasing, although this is less clear for the IV estimates than OLS due to lack of significance. More clear age effects are found below when considering separate effects for main residence. In column 3 we can see that the estimated effect when

[13] In brackets the number of categories considered.

considering real estate properties net of outstanding debts incurred for their purchase is not altered.

For some sensitivity analysis, we have estimated the specification for total housing wealth (in Table 6 column 1) using as instruments only the five inheritance indicators and the estimated effect is 0.010 (s.e. 0.0034). Finally, we have estimated an inverse IV regression, of total housing wealth on consumption, and the inverse of the estimated consumption effect is 0.019.

Separate effects of main residence and other real estate wealth

In Table 7 we provide separate estimates for the effect of owner occupied housing wealth and for the rest of real estate properties. The effect of owner occupied housing is larger (around 0.02 compared to 0.01, see column 1). We investigated whether this could be a reflection of a smaller marginal propensity to consume out of wealth of richer households, who mostly hold other properties. We attempted to ascertain whether the main residence effect could be different for owners of additional properties but the results were not significant.

The differences by age in the effect of owner occupied housing are interesting[14]. First, IV (column 2) and OLS (column 4) estimates are different mostly for the two younger groups. This would be coherent with main residence wealth being more endogenous for young homeowners that have acquired their home more recently and less so for older ones. The results of the Durbin-Wu-Hausman chi-square test point in this direction as well, with a p-value of 0.94%.

Interestingly, the estimated pattern by age in column 2 is revealing of household behaviour underlying the housing wealth effect. While there is no housing wealth effect for young homeowners, this effect is large (0.06) and biggest for prime age households aged between 35 and 44. Then it is much reduced for those aged 45 to 64 but still relevant (around 0.02) and becomes very small for the over 64.

We believe the precautionary model put forward by Skinner (1996) explains the pattern observed in our data. The idea is that increases in the value of their homes diminish the need of households for other savings at the age when many of those savings would otherwise occur and when life-cycle consumption needs are the highest (around the age of 35-44). The possibility of downsizing in the future, should the need arise, gives housing equity an insurance element preventing the need for other precautionary savings. This effect is still present until retirement age but to a lesser extent. Finally, at retirement, most households do not tap into their housing equity as reflected in the negligible wealth effect estimated for the eldest. This estimated pattern confirms our a priori considerations on the precautionary savings nature of the factors at work behind the wealth effects we estimate. Indeed in Spain, where most people expect to live in the same house for a long time and where in 2002 re-mortgages following an increase in housing equity were still rare, precautionary savings motives are the main consideration in understanding wealth effects.

[14] Differences in the effect of other real estate properties by age were investigated but none was found.

Financial wealth effects

The effects of owner occupied housing and other properties estimated by IV methods (Table 7, column 1) are very similar to their OLS counterparts presented in column 3, as was the case for the IV and OLS effects of total housing wealth in Table 6. This situation led us to tentatively estimate the effect of financial wealth by OLS (Table 7 column 5).

The estimated effect we obtain is economically and statistically non-significant. Alternatively, we defined two stock wealth variables, both including listed and unlisted shares and one including mutual funds and pension schemes as well. The results are completely unchanged respect to the ones reported in column 5. These estimates are potentially biased given the absence of adequate instruments. Moreover, the easier reshuffling of financial portfolios compared to housing makes them potentially less predetermined.

It is relevant to note here that only well-off families hold financial wealth (other than money in bank accounts). Even for them, its importance in their portfolios is not large (see Table 2).

7 A robustness check: Two-stage least squares matching estimates

Methodology

The evidence obtained in the previous sections suggests that different groups in the population (as defined for example by age) have different wealth effects. In this case, overall wealth effects estimated by linear IV methods like the ones obtained in Section 6 will be biased except under very stringent orthogonality conditions. In this section we pursue this issue further by considering a method of estimating an equation similar to (1) but with a larger set of controls, i.e.

$$C=\beta(X)W+\alpha(X)+U \quad (1)$$

$$E(U \mid X, Z) = 0 \quad (2)$$

where W is endogenous, Z are instrumental variables, and X are control variables.

The interest is in the estimation of the aggregate effect

$$\beta^*=E[\beta(X)]$$

but we wish to think of a $\alpha(X)$ and $\beta(X)$ as general functions of X to guard against misspecification.

It is well known that $\beta(X)$ coincides with the two-stage least squares estimand

$$\beta(X)=\frac{Cov(Y,\hat{W}|X)}{Var(\hat{W}|X)}=E\left(\frac{Y(\hat{W}-\mu(X))}{\omega(X)}|X\right) \quad (3)$$

where $\hat{W}=E(W \mid X,Z)$, $\mu(X)=E(\hat{W} \mid X)$, and $\omega(X)=Var(\hat{W} \mid X)$.

Thus $$E[\beta(X)|\mu(X),\omega(X)]=E\left(\frac{Y(\hat{W}-\mu(X)}{\omega(X)}|\mu(X),\omega(X)\right) \quad (4)$$

and

$$\beta^*=E\left(\frac{Y(\hat{W}-\mu(X))}{\omega(X)}\right) \quad (5)$$

If X are few and discrete we could estimate $\beta(X)$ from cell-specific sample counterparts of (3) and the aggregate effect β^* could be estimated in a second step as a sample average of cell-specific estimates. An illustration of cell-specific estimates is provided in Section 5, where Wald estimates were obtained for certain cells defined by discretized values of permanent income, municipality size, and age, using a dichotomized house price variable as instrument. Alternatively we could form cell-by-cell estimates $\hat{\mu}(X)$ and $\hat{\omega}(X)$, and estimate directly β^* using a sample counterpart of (5):

$$\tilde{\beta}* = \frac{1}{N}\sum_{i=1}^{N}\left(\frac{Y_i\left(\hat{\hat{W}}_i - \hat{\mu}(X_i)\right)}{\hat{\omega}(X_i)}\right). \qquad (6)$$

The estimates obtained in both cases would coincide, but only if a full set of cell-indicators were used.

If X is continuous, estimation could be based on nonparametric smoothing estimates of $\mu(X)$ and $\omega(X)$, but this approach is often unfeasible in practice due to a small sample size relative to the number of regressors.

One alternative is to use a flexible parametric approach to modelling $\alpha(X)$ and $\beta(X)$ in the instrumental variable equation. Another possibility is to model $\mu(X)$ and $\omega(X)$ to obtain estimates of the form of (6). The latter has the advantage that $\mu(X)$ and $\omega(X)$ are reduced-form objects for which standard measures of goodness of fit are available. A motivation for treating $\hat{Y}$ and $\hat{W}$ asymmetrically is that we are interested in the average effect of W on Y as opposed to the average effect of Y on W.

Under standard regularity conditions, the estimator (6) can be shown to be consistent and asymptotically normal [e.g. Newey and McFadden (1994)]. However, consistent estimation of their asymptotic variances may be cumbersome because of their dependence on the sampling properties of first-stage estimated parameters. Alternatively, asymptotically valid standard errors and confidence intervals can be calculated using bootstrap methods.

An estimator of the form of (6) is similar to propensity-score matching techniques when W is a binary exogenous variable[15]. To see this, note that if W is exogenous $\hat{W} = W$. Moreover, if W is binary $\omega(X) = \mu(X)[1-\mu(X)]$ and $\mu(X)$ is the propensity score. In such case we can condition on just one argument and we get the expressions

$$E(\beta(X) \mid \mu(X)) = E\left(\frac{Y(W-\mu(X))}{\omega(X)} \mid \mu(X)\right)$$

$$= E(Y \mid W=1, \mu(X)) - E(Y \mid W=0, \mu(X))$$

which are the basis for propensity-score matching approaches to estimation of β^* [Rosenbaum and Rubin (1983)]. A generalization of this situation to an endogenous binary variable was considered by Ichimura and Taber (2001), who discuss an expression similar to (4).

In a similar way, for two continuous endogenous explanatory variables, as is our case when estimating separately the effect of owner occupied housing and the effect of other real estate property, we have

[15] For this reason we refer to (6) as a "2SLS matching" estimate.

$$\tilde{\beta}_1^* = \frac{1}{N}\sum_{i=1}^{N} Y_i \left(\frac{\hat{\omega}_{22i}\hat{v}_{1i} - \hat{\omega}_{12i}\hat{v}_{2i}}{\hat{\omega}_{11i}\hat{\omega}_{22i} - \hat{\omega}_{12i}^2} \right)$$

$$\tilde{\beta}_2^* = \frac{1}{N}\sum_{i=1}^{N} Y_i \left(\frac{\hat{\omega}_{11i}\hat{v}_{2i} - \hat{\omega}_{12i}\hat{v}_{1i}}{\hat{\omega}_{11i}\hat{\omega}_{22i} - \hat{\omega}_{12i}^2} \right)$$

where $\hat{\Omega}(X_i) = \begin{pmatrix} \hat{\omega}_{11i} & \hat{\omega}_{12i} \\ & \hat{\omega}_{22i} \end{pmatrix}$ and $\hat{\hat{W}}_i - \hat{\mu}(X_i) = \begin{pmatrix} \hat{v}_{1i} \\ \hat{v}_{2i} \end{pmatrix}$.

Results

In our estimation $\hat{\mu}(X)$ are fitted values from a flexible parametric regression of the form

$$Z_i = \mu(X_i) + error_i$$

and $\hat{\omega}(X)$ are fitted values from

$$\hat{v}_i^2 = \omega(X_i) + error_i$$

where $\hat{v}_i^2 = \left[\hat{\hat{W}}_i - \hat{\mu}(X_i) \right]^2$ and $\omega(X)$ is assumed to be the exponential function.

In modelling $\hat{W}$ and $\mu(X)$ we use as X 's all the 0/1 dummy variables described at the beginning of Section 6. The Z 's for $\hat{W}$ are local house prices and inheritance indicators. In the case of the modelling of $\omega(X)$ (as well as ω_{11}, ω_{22} , and ω_{12}) fewer control variables were considered because their predictive power is much smaller. In particular the results we report include only age dummies.

Table 8 presents 2SLS matching estimates for the effect of the total real estate wealth as well as separate effects of main residence wealth and other real estate properties. These estimates provide an aggregate wealth effect robust to the presence of very general observable heterogeneity in the wealth effects. Reassuringly, they confirm the estimates obtained in the previous section.

In this paper three different IV estimation strategies have been presented, each with its own strengths and weaknesses, but all pointing to the same range of estimates. This gives us more confidence in our results. Aside from other differences already mentioned, i.e. differences in parametric assumptions and heterogeneity of the wealth effects, they also differ in the specification of the instruments. Wald estimates make use of a dichotomized local house price instrument. Linear IV rely on a unique prediction equation of W on local house prices and inheritance indicators, as well as a large set of controls. Moreover in this case some further sensitivity analysis were presented first using as instruments only the five inheritance dummies and second estimating an inverse IV equation of total housing wealth on consumption. Finally, with 2SLS matching estimates the prediction equation for W based on house prices and inheritance indicators is specific to each value of X .

8 Conclusion

In this paper we have estimated housing wealth effects using the new survey of Spanish Household Finances (EFF) which contains information on different types of wealth and expenditure, and oversamples wealthy households. Moreover, given the absence of reverse mortgages or re-mortgaging in Spain at the time we believe these reflect precautionary savings motives solely. This seems further confirmed by the age pattern of wealth effects we estimate with micro data. To identify a causal effect of housing wealth on consumption, we have used local house prices and inheritance information from the survey as instruments.

The evidence presented in this paper suggests a marginal propensity to consume out of housing wealth of 0.015. When decomposed into main residence and other properties, we obtain a higher effect for main residence (0.02) and a lower one for other real estate properties (0.01). These estimates are confirmed by two-stage least squares matching results, which are robust to observed heterogeneity in wealth effects in a flexible way. In the case of the main residence, this estimate means that an exogenous increase in the value of the main residence of 100 euros would lead to a rise in the level of annual consumption of 2 euros. Note that these are partial equilibrium effects. Insofar as changes in house prices were associated with changes in employment or interest rates, the general equilibrium effect on consumption could be more pronounced.

However, these figures mask important differences across groups of households, as both our cell-by-cell IV results and linear regression IV estimates show. The IV regression estimate of the housing wealth effect for prime age households lies between 0.04 and 0.06, larger than for other age groups. For the various groups for which minimally precise non-parametric IV estimates were obtained the effects range from 0.02 to 0.07.

When owner occupied housing is widely spread, house price fluctuations may very significantly affect aggregate expenditure even with relatively low average mpc. Moreover, when these effects reflect changes in precautionary savings, severe busts in the housing market may seriously affect retirement plans and expectations of middle age households in so far as they are counting on housing equity gains in the face of personal negative shocks when old.

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Table 1. Consumption and wealth: descriptive statistics[1]

	Food and non durable consumption		Food, non durable and durable consumption		Food, non durable, durable and vehicles consumption	
Owner occupied housing	Mean	Wealth effect[2]	Mean	Wealth Effect	Mean	Wealth effect
Percentile of value • Less than 25 (mean 6.4)	8.7		9.9		10.5	
• Between 25 and 50 (mean 60.1)	8.7	0	10.3	0.01	11.2	0.01
• Between 50 and 75 (mean 106.4)	10.2	0.03	12.3	0.04	13.3	0.04
• Between 75 and 90 (mean 161.7)	12.4	0.04	14.9	0.05	16.2	0.05
• Between 90 and 100 (mean 300.1)	15.4	0.02	19.2	0.03	21.2	0.04
Other real estate properties	Mean	Wealth effect	Mean	Wealth effect	Mean	Wealth effect
Percentile of value • Less than 25 (mean 11.8)	8.4		9.5		10.0	
• Between 25 and 50 (mean 72.7)	8.9	0.01	10.5	0.02	11.3	0.02
• Between 50 and 75 (mean 128.2)	10.4	0.03	12.5	0.04	13.6	0.04
• Between 75 and 90 (mean 212.9)	12.1	0.02	14.8	0.03	16.2	0.03
• Between 90 and 100 (mean 479.1)	15.6	0.01	19.6	0.02	21.6	0.02
Net worth	Mean	Wealth effect	Mean	Wealth effect	Mean	Wealth effect
Percentile of value • Less than 25 (mean 12.7)	8.5		9.6		10.2	
• Between 25 and 50 (mean 68.3)	9.0	0.01	10.6	0.02	11.4	0.02
• Between 50 and 75 (mean 131.5)	10.1	0.02	12.1	0.02	13.1	0.03
• Between 75 and 90 (mean 239.2)	12.5	0.02	15.1	0.03	16.5	0.03
• Between 90 and 100 (mean 644.1)	15.2	0.01	19.3	0.01	21.6	0.01

[1] Mean values are in thousand euros
[2] Change in average consumption relative to change in average wealth

Table 2. Distribution of Spanish households' assets. By income and wealth

	Distribution of the value of households' assets (%)					Percentage of households owning asset (%)				Net worth (€)	
	Main residence	Other real estate	Business[1] and other real assets	Bank accounts	Other financial [2] assets	Main residence	Other real estate	Bank accounts	Other financial assets	Median	Mean
All households	58.3	21.0	8.2	5.0	7.6	81.9	30.1	98.2	35.2	96.3	153.4
Income percentile											
Less than 20	73.3	16.0	2.6	5.5	2.6	73.7	18.5	95.5	13.0	52.7	75.0
Between 20 and 40	71.7	15.4	3.9	5.7	3.2	79.0	22.9	97.8	24.0	77.9	99.5
Between 40 and 60	65.1	19.5	6.3	5.2	3.9	80.0	27.4	98.7	33.4	88.1	120.0
Between 60 and 80	58.9	22.4	7.9	5.2	5.7	85.1	33.5	99.3	43.4	115.7	165.8
Between 80 and 90	55.4	21.9	10.2	5.0	7.5	89.6	42.7	99.4	53.5	152.0	209.6
Between 90 and 100	42.8	24.9	12.7	4.3	15.3	92.3	53.7	99.8	70.7	247.0	402.9
Net wealth percentile											
Less than 25	71.2	9.3	3.0	13.0	3.6	38.5	6.8	96.0	13.8	7.7	12.7
Between 25 and 50	82.8	7.1	2.1	5.5	2.5	94.6	18.6	98.6	25.9	68.0	68.3
Between 50 and 75	77.3	11.4	3.0	4.8	3.5	97.6	31.2	99.0	38.2	126.8	131.7
Between 75 and 90	63.3	20.8	5.4	5.3	5.2	97.3	53.0	99.3	53.7	232.7	239.3
Between 90 and 100	36.2	31.7	15.0	4.1	13.0	96.4	78.4	99.3	76.5	476.7	642.0

Source: Survey of Household Finances (EFF) 2002.
[1] Business related to self employment.
[2] Includes: listed and unlisted shares and other equity, mutual funds, fixed income securities, pension schemes and unit-linked life insurance, and other financial assets.

Table 3. Housing wealth and inheritance

	Main Residence	Other real estate properties			
		One	Two	Three	Four or more
% of households owning the asset	82.0	29.9	8.4	4.5	2.6
% of households having inherited the asset among owners of the asset	12.5	28.5	38.7	42.4	66.4

Table 4. First stage regressions[1]

	Dependent variable		
	Total housing wealth	Main residence	Other real estate properties
Local house prices	80.17 (8.6)[2]	69.39 (9.6)	10.77 (2.2.)
Having inherited main residence	23458.00 (2.5)	12752.90 (2.6)	10705.11 (1.5)
Having inherited 1st of other real estate properties	41079.97 (4.3)	5228.27 (1.0)	35851.70 (4.7)
Having inherited 2nd of other real estate properties	44161.32 (1.9)	-9198.36 (1.0)	53359.68 (2.6)
Having inherited 3rd of other real estate properties	-16896.54 (0.4)	3197.44 (0.3)	-20093.97 (0.5)
Having inherited rest of real estate properties	188319.12 (4.4)	9948.16 (0.7)	178370.9 (4.4)

[1] All regressions include the following control dummy variables:
(i) number of persons in the household (10), number of children (7), municipality size (7)
(ii) head of household characteristics: education (11), occupation (11), age (6), civil status (6), gender, father occupation (11), mother occupation (11)
(iii) when applicable, partner's characteristics: education (11), occupation (11), age (6), father occupation (11), mother occupation (11).

[2] t-ratios in brackets.

Table 5. Non-parametric IV estimates of housing wealth effects

	Age 35-44[1]		Age 45-54		Age 55-64	
	Large towns	Small towns	Large towns	Small towns	Large towns	Small towns
High fitted permanent income						
$\overline{C}_H$ [2]	23,7	19,4	30,9	27,9	30,7	25,7
$\overline{C}_L$ [3]	20,8	17,1	27,8	19,3	35,5	19,8
$\overline{HW}_H$ [4]	373,3	213,9	463,8	469,1	645,1	422,9
$\overline{HW}_L$ [5]	186,0	182,9	336,4	220,0	718,1	368,1
$\left(\overline{C}_H - \overline{C}_L\right) / \left(\overline{HW}_H - \overline{HW}_L\right)$	0.02*[6]	0.07	0.02**	0.04**	0.07	0.11
Low fitted permanent income						
$\overline{C}_H$	12,9	14,7	16,0	13,3	13,7	14,3
$\overline{C}_L$	13,1	12,6	14,9	13,7	16,5	11,8
$\overline{HW}_H$	111,3	126,1	185,8	138,8	184,8	164,3
$\overline{HW}_L$	135,0	84,4	148,1	134,8	170,4	129,0
$\left(\overline{C}_H - \overline{C}_L\right) / \left(\overline{HW}_H - \overline{HW}_L\right)$	-	0.05*	0.03	-	-	0.07*

[1] Age of household head. All households considered in this table have more than one member.
[2] $\overline{C}_H$ average consumption of the group considered that lives in areas with house prices higher than the sample median.
[3] $\overline{C}_L$ average consumption of the group considered that lives in areas with house prices lower or equal than the sample median.
[4] $\overline{HW}_H$ average housing wealth (includes main residence and other real estate properties) of the group considered that lives in areas with house prices higher than the sample median.
[5] $\overline{HW}_L$ average housing wealth (includes main residence and other real estate properties) of the group considered that lives in areas with house prices lower or equal than the sample median.
[6] * 1< t-ratio ≤ 2
** t-ratio > 2
estimates not reported when t-ratio ≤ 0.5. t-ratios are robust to heteroskedasticity in control variables.

Table 6. IV and OLS regression results[1]
Total real estate wealth
Dependent variable: total consumption[2]

	IV[3]			OLS	
	1	2	3	4	5
Total real estate wealth	0.013 (4.93)[4]	-	-	0.013 (9.67)	-
Total real estate wealth * Dummy household head age < 35	-	-0.040 (1.57)	-	-	0.012 (3.51)
Total real estate wealth * Dummy household head age 35-44	-	0.037 (1.79)	-	-	0.014 (6.24)
Total real estate wealth * Dummy household head age 45-54	-	0.015 (2.14)	-	-	0.019 (7.09)
Total real estate wealth * Dummy household head age 55-64	-	0.014 (2.18)	-	-	0.011 (4.53)
Total real estate wealth * Dummy household head age 65-74	-	0.013 (1.96)	-	-	0.008 (4.85)
Total real estate wealth * Dummy household head age > 74	-	0.005 (0.57)	-	-	0.010 (4.62)
Net total real estate wealth	-	-	0.013 (4.86)	-	-
R^2	-	-	-	0.48	0.48

[1] All regressions include the following control dummy variables:
(i) number of persons in the household (10), number of children (7), municipality size (7)
(ii) head of household characteristics: education (11), occupation (11), age (6), civil status (6), gender, father occupation (11), mother occupation (11)
(iii) when applicable, partner's characteristics: education (11), occupation (11), age (6), father occupation (11), mother occupation (11).

[2] Total consumption includes food, other non-durables, equipment, and vehicles.

[3] The instruments are local house prices and five dummies indicating whether the following assets were inherited: main residence, each of the three most valuable other real estate properties, and the rest of real estate properties. In column 2 local house prices are interacted with the age dummies.

[4] t-ratios in brackets take into account stratification and clustering.

Table 7. IV and OLS regression results[1]

Different wealth components: main residence, other real estate, financial assets

Dependent variable: total consumption[2]

	IV[3]		OLS		
	1	2	3	4	5
Main residence	0.018 (3.09)[4]	-	0.019 (9.26)	-	0.018 (9.28)
Other real estate properties	0.011 (2.86)	0.010 (2.67)	0.008 (5.93)	0.008 (5.99)	0.008 (5.33)
Financial assets	-	-	-	-	0.003 (1.71)
Main residence * Dummy household head age < 35		-0.037 (1.51)	-	0.014 (2.65)	-
Main residence * Dummy household head age 35-44		0.063 (2.13)	-	0.021 (5.25)	-
Main residence * Dummy household head age 45-54		0.020 (2.10)	-	0.024 (5.43)	-
Main residence * Dummy household head age 55-64		0.024 (2.86)	-	0.021 (4.19)	-
Main residence * Dummy household head age 65-74		0.020 (2.08)	-	0.013 (4.12)	-
Main residence * Dummy household head age > 74		0.009 (0.44)	-	0.013 (4.05)	-
R^2		-	0.48	0.48	0.49

[1] All regressions include the following control dummy variables:
(i) number of persons in the household (10), number of children (7), municipality size (7)
(ii) head of household characteristics: education (11), occupation (11), age (6), civil status (6), gender, father occupation (11), mother occupation (11)
(iii) when applicable, partner's characteristics: education (11), occupation (11), age (6), father occupation (11), mother occupation (11).

[2] Total consumption includes food, other non-durables, equipment, and vehicles.

[3] The instruments are local house prices and five dummies indicating whether the following assets were inherited: main residence, each of the three most valuable other real estate properties, and the rest of real estate properties. In column 2 local house prices are interacted with the age dummies.

[4] t-ratios in brackets take into account stratification and clustering.

Table 8. 2SLS Matching estimates of housing wealth effects on consumption

	$\hat{\beta}(X)$	R^2		
		$\hat{W}$	$\mu(x)$	$\omega(x)$
Total real estate wealth	.010 (3.06)[1]	.30	.80	.07
Main residence	.023 (3.20)	.29	.83	.16
Other real estate properties	.011 (1.55)	.21	.64	.04 .004[2]

[1] t-ratios in parentheses calculated from bootstrap standard errors.

[2] R^2 for ω_{12} specification.