# Consumption and Investment Motives in Housing Wealth Accumulation of Spanish Households[1]

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The dual motives of housing behavior, consumption and investment make the analysis of housing purchases quite difficult. As a matter of fact, while a larger literature, theoretical and empirical, deals with housing tenure choice by modeling housing consumption demand, few studies have tried to analyze housing demand simultaneously with demand for other assets according to the portfolio choice theory. Fewer still have tried to consider simultaneously the two-dimensional aspect of housing, consumption and investment. Henderson and Ioannides [1983] have built a model that is one of the first attempts to consider the two-dimensional aspect of housing. In the absence of institutional considerations, this model predicts that it is the difference between the investment demand for housing and the consumption demand that explains decisions to purchase dwellings for owner occupation and for renting out. We have tested the model on the Spanish Survey of Household Finances (EFF) conducted in 2002 by the Bank of Spain. One of the objectives of the paper is to determine the logic of primary residence purchase: investment or consumption. Results show that even if the effect of some of the explanatory variables are consistent with those predicted by the model, the difference between the two demands is not statistically significant and it cannot in itself explain housing purchases. It seems that housing purchase is more a question of portfolio choices than of consumption of durable goods. Interestingly, we observe that Spanish households behave in a different way than French (Arrondel and Lefebvre [2001a]) and US (Ioannides and Rosenthal [1994]) households: for them, the difference between the two demands for housing explains behavior and consumption (in the US case) or investment (in the French case) motives dominate primary residence purchase. These results lead us to conclude that there is a "Spanish case" that is completely different and need to be analyzed in details.

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## 1. INTRODUCTION

In developed countries, housing is a major investment in households' portfolios. In Spain, 9 households on 10 own, at least, one dwelling [61% in France (Arrondel and Lefebvre [2001a]) and 64% in US (Ioannides and Rosenthal [1994])]. It is one of the most popular assets, just after current accounts and saving deposits (98.48%), far ahead of other financial or capital assets. Moreover, housing accounts for nearly 69,1% of households' wealth (Table 1).

With this evidence, how can we explain this high proportion of the wealth that households invest in property?

Households' decisions about housing are the result of a twofold behavior logic that more generally affects all durable goods. As a generator of housing services, housing satisfies a consumption need. As a patrimonial asset, housing is taken into consideration in investment decision processes.

In Spain, 81,9% of households are owner-occupiers of their primary residence; 12,5% own a secondary residence and only 6,8% own a dwelling for renting out (Table 1). This great difference between owner-occupation and other terms of housing ownership suggests that households give priority to investment in housing that at the same time satisfies their housing needs. Moreover, ownership of a primary residence and of a secondary residence is more common than ownership of a secondary residence alone, and ownership of a primary residence and of a dwelling for renting out is more common than ownership only of a dwelling for renting out. These observations lead us to ask whether the high proportion of the wealth that households invest in property cannot better be explained in terms of consumption than in terms of investment.

As a matter of fact, while a larger literature, theoretical and empirical[3], deals with housing tenure choice by modeling housing consumption demand, few studies have tried to analyze housing demand simultaneously with demand for other assets according to the portfolio choice theory[4]. Fewer still have tried to consider simultaneously the two-dimensional aspect of housing, consumption and investment. Henderson and Ioannides [1983] have built a model that is one of the first attempts to consider the two-dimensional aspect of housing.

The Henderson-Ioannides model suggests that, in the absence of tax distortions, borrowing constraints and transactions costs, the decision to own a home is driven by the divergence between the investment and consumption demands for housing. Specifically, if investment demand exceeds consumption demand then families prefers to buy the primary residence.

This model has been tested by Ioannides and Rosenthal [1994] on US data and by Arrondel and Lefebvre [2001a] on French data. Ioannides and Rosenthal, for the US, show that the difference of demands explains the facts and that consumption motives prevail to determine primary residence value. Arrondel and Lefebvre show that in France, portfolio motives are predominant in explaining primary residence purchase but consumption and

[3] See the survey of Smith, Rosen and Fallis [1998] and of Megbolugbe and Linneman [1993].

[4] See King and Leape [1998] for the U.S., Arrondel and Masson [1996] and Arrondel and Lefebvre [2001a] for France, Hochguertel and van Soest [2001] for the Netherlands.

investment demand are statistically different. Both studies confirm the hypothesis that consumption and investment demand for housing are statistically different and then that the Henderson-Ioannides model perform pretty well in explaining the observed behavior.

An international comparison of the ownership rate of the first residence (Spain 84.48%, France 56%, US 55%) put clearly in evidence that Spanish households behave in a different way with respect to French and US households: they systematically hold their main residence. It seems then relevant to analyze the reasons of these differences, in particular the determinants of housing demand.

The main objective of this paper is to analyze consumption and investment motives in housing wealth accumulation in Spain. We do it by testing empirically the Henderson-Ioannides model. The exercise is performed on the Spanish Survey of Household Finances (EFF) that has been conducted by the Bank of Spain (Bover [2004]). This survey, referred to year 2002, is the only statistical source in Spain by which it is possible to link incomes, assets, debts and consumption at the household level.

The structure of the paper is the following. In the first part, we sum up the housing model. The second part is devoted to data description and to the econometric specifications, based on the work of Ioannides and Rosenthal [1994] on American data and on the work of Arrondel and Lefebvre [2001a] on French data. Lastly, we discuss the results and we compare the housing behavior of Spanish households with the French and US ones.

## 2. THEORY AND PREDICTIONS

### *2.1 The model*

A household chooses on the one hand its housing consumption $h_c$ and on the other its housing investment $h_i$ by maximizing a two-period utility function supposed to be temporally and additively separable. Housing stock is assumed to be homogeneous, whatever the kind of tenure. At the beginning of each period, the household receives an income $y_t$ (which includes labor income but also eventually intergenerational transfers). In period 1, he uses it to buy consumption goods, other than housing services, in an amount $x$ and savings $S$ on a safe asset at rate of return $r$. Moreover he rents $h_c$ housing units[5] at a price $R$. His housing consumption equals $\rho h_c$, where $\rho$ is the flow of service produced with one housing unit[6]. In period 1, the household invests in $h_i$ housing units at a price $P$ as well. To finance that investment, he borrows at the market interest rate $r$ an amount $L$ for each housing unit. He rents out the $h_i$ units at a price $R$. In period 2, he can resell housing units at a price $P(1+\theta)$. $\theta$ is uncertain, so housing is a risky asset while the financial one is not.

If the household is *tenant* of its primary residence, the maximization program under the above assumptions is:

[5] In this model, an owner-occupier rents $h_c$ to himself.

[6] To simplify the model we suppose that the parameter $\rho$ is fixed. Henderson and Ioannides assume that the flow of service produced with one housing unit is an increasing and concave function of the utilization rate of occupied housing units. Our assumption does not modify qualitatively the results.



$$\underset{h_c,h_i,S}{Max}\, U(x,\rho h_c) + \beta E(V(W)) \quad (1)$$

subject to:

$$y_1 + Rh_i = x + Rh_c + S + (P - L)h_i \quad (2)$$

$$W = y_2 + S(1+r) + h_i\left[P(1+\theta) - L(1+r)\right] \quad (3)$$

$$h_i \geq 0 \text{ and } h_c > 0 \quad (4)$$

where $V(.)$ is the indirect utility function of wealth remaining after the first period $W$ and $\beta$ a discount factor.

The first order conditions of that program lead to the optimal conditions that define respectively $h_c$ and $h_i$:

$$\frac{U_2}{U_1} = \frac{R}{\rho} \text{ with } U_1 = \frac{\partial U}{\partial x} \text{ and } U_2 = \frac{\partial U}{\partial(\rho h_c)} \quad (5)$$

$$\frac{rP}{1+r} = R + \frac{E\left[V'(.)P\theta\right]}{E\left[V'(.)\right](1+r)} \quad (6)[7]$$

Condition (5) shows that the number of rented housing units $h_c$ is such that the additional utility from renting an additional unit is equal to the additional expenditure induced by this additional unit. Condition (6) shows that $h_i$ is such that the rent from an additional unit increased by the premium for risk required to rent that additional unit, is equal to the additional return on the safe asset. Condition (6) is the optimal condition of the portfolio choice problem. We can see that housing consumption demand and housing investment demand are totally different. The two decisions are independent. Therefore, this specification is not very different from a standard intertemporal consumption portfolio choice model (Merton [1995]).

Let us suppose now that investment demand of the household is greater than its consumption demand ($h_i \geq h_c$). Hence, it can occupy $h_c$ (rented to it) units and rent out $(h_i - h_c)$. Thus, the constraints of the maximization program for *owner-occupiers* are equation (2) and:

$$h_i - h_c \geq 0 \quad (7)$$

So, the owner-occupier's problem, apart from constraint (7), is the same as in the renter's behavioral model. In particular, tenant and owner-occupier of their primary residence have the same budget constraint (2). Consequently, as Henderson and Ioannides [1983] argued, "...before the introduction of institutional considerations there is no reason for people to actually owner-occupy their consumption-investment demands, as opposed to being landlords of their asset holdings and renting their consumption demand from some other landlords".

### *2.2 The respective advantages of the two tenures of the primary residence*

Starting from the results of the two maximization programs, it is possible to conduct an analysis of the respective advantages of the two tenures of the primary residence.

[7] Equation (6) is obtained by consoldating the two first order conditions.

In the Henderson-Ioannides model, to be owner-occupier of one's primary residence can be better than to be a tenant. This possibility is induced by the fact that the landlord cannot collect the whole of the utilization costs of rented housing units (a moral hazard problem due to the principal-agent relationship between tenant and landlord). Then he tries to anticipate the utilization rate of the tenant and fixes a rent at a level that allows him to collect the difference between the real costs and the costs paid by the tenant, in an indirect way. If the tenant has a utilization rate lower than the one expected by the landlord, his housing expenditure is higher than the cost he has to bear if he is owner-occupier. Furthermore, if we consider the housing market imperfections, especially in the presence of imperfect information, we can show too that the honest tenant will have to bear an extra cost and a decrease in his utility because of the risk premium required by the landlord (Lefebvre and Legros [1996]). So it can be in his interest to buy his primary residence. Thus if his housing investment demand is lower than consumption demand, but relatively close, he can raise the first to the level of the second. However, if he profits from that decision, he has to bear a cost that is lower than the benefit, because he is buying a risky asset in a quantity greater than the one he likes.

It is possible to take into consideration credit market imperfections, by introducing into the two programs an additional constraint of non-negativity of net wealth. That means that households cannot borrow for their consumption if they want to invest in housing because they must offer collateral to borrow. So owner-occupation becomes less attractive because it is more expensive in terms of utility to raise the investment demand to the consumption one. Especially, impatient households with low $\beta$ will be less attracted by home ownership (Artle and Varaiya [1978], Brueckner [1986]).

Finally, the decision to buy housing depends only on the difference between the housing investment demand that expresses only portfolio motives, and the housing consumption demand that expresses only consumption motives. However, houses or flats are indivisible goods. So if housing investment demand is lower than that of consumption, the household cannot be owner-occupier of its primary residence. But, if the first one is large enough, it can be owner of a dwelling to rent out. Conversely if the housing investment demand is greater than the consumption one, the household can be owner-occupier of its primary residence, and if the difference is very large it can invest in housing for renting out as well. So it is possible to generate four subtenures according to the difference between the housing investment demand and the consumption one:

1/ *RENT1*: $(h_i - h_c) << 0$, the investment demand is very low; so the gap is negative and very high; the household owns no dwelling.

2/ *RENT2*: $(h_i - h_c) < 0$, the gap between the two demands is still negative but lower than before; the household rents the dwelling that it occupies but owns a dwelling to rent out.

3/ *OWN1*: $(h_i - h_c) \geq 0$, the gap between the two demands is positive or slightly negative; the household is a homeowner but does not own any dwelling to rent out;

4/ *OWN2*: $(h_i - h_c) >> 0$, the gap is highly positive; the household is an owner-occupier and owns a dwelling for renting out as well.

### *2.3 Comparative-static analysis*

From the first order conditions of the two maximization programs, we can investigate the comparative-static effect of some parameters on the difference between the two housing demands.



First, with no change in the tilt of the income path, an increase in household wealth raises housing investment demand since the absolute risk aversion decreases as wealth rises. This raises housing consumption demand as well because housing services are normal goods (Henderson and Ioannides [1983] and Fu [1991]). So the total effect on $(h_i - h_c)$ is indeterminate. It depends on the difference between the income elasticity of housing investment demand and the income elasticity of the consumption one. If the first one exceeds the second one, wealthier people are more likely to become owner-occupiers.

Second, if the utility function is such that absolute risk aversion decreases as wealth rises, housing investment demand increases as the income path becomes to be more tilted to the present. Conversely, it decreases as the income path becomes more tilted to the future. On the other hand, housing consumption does not change as the income path changes if household wealth remains unchanged. For example, people that come into an inheritance during the first period, or people that are less qualified, are more likely owner-occupiers because the tilt of their income path is more favorable. Conversely, people that expect to inherit in the second period, or people that are more educated, are less likely owner-occupiers.

Third, if the time preference increases (a fall in the discount factor $\beta$) the housing consumption demand increases as the investment one falls in the first period. Thus the difference $(h_i - h_c)$ decreases (Brueckner [1997]) and people are less likely to become owner-occupiers.

### *2.4 Criticism of the model*

All the results of the model of Henderson and Ioannides are based on the assumption that renters and owner-occupiers have the same budget constraints and investment opportunities. In fact, the tax system and some transaction costs or borrowing restrictions can distort this assumption (Ioannides and Rosenthal, [1994]). Because of these factors, the rates of return on housing investment are not the same in the two cases and so the budget constraint is not the same for tenant and owner-occupier of their primary residence[8].

First, in Spain, as in U.S and France, imputed rents of the owner-occupiers are not taxable while rental incomes of the landlords are.

Second, the Spanish personal income tax deals differently with owners and tenants, being more favorable for the first. In 2002, owners were not forced to impute any income as in previous periods. Deductions for acquisition were so implemented of tax credits instead of allowances. This policy corrects in a way the regressiveness of the measure, but remains regressive since the more income in the household, the more expensive the acquired dwelling. The allowed percentage of deduction was instrumented in two intervals, and varied depending if it was the first two years of the purchase of the third and following. It included all the amounts paid by owner occupied dwelling (interest and mortgage) with a maximum base of tax deduction of 9.015,18 €. The first two years the percentage were 16.75% on the first 4,507.59 € and the 10.05% in excess till 9,015.18 euros. The percentages were 13.4% and 10.05% respectively for the third and subsequent years. Nevertheless there was not a deduction for alleviating the cost of those who rented the dwelling. In the United States the tax makes owner occupying cheaper than renting. If the income tax is proportional,

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[8] See for example Artle and Variaya [1978], Brueckner [1986], Follain and Ling [1988], Linneman and Wachter [1989].

households can raise their housing investment demand to the level of consumption. If the income tax is progressive, the wealthier have an interest to buy the dwelling they occupy because the fiscal allowance raises as the number of housing units occupied and owned increases. In France, the tax system makes also owner occupying cheaper than renting because the tax treatment of interest is more favorable for owner-occupiers than for landlords.

Third, except for the wealthiest, the first dwelling bought by a household is its primary residence, because mortgage payments can be substituted for rent in the family budget, making the mobilization of resources acceptable for both it and the credit institution. And in credit scoring, to be owner occupier of one's primary residence is often better if one wants a mortgage loan to buy a dwelling for renting out. Thus, the budget constraints of the household and investment opportunities are not the same for renters and owners of their primary residence.

In consequence, the divergence between investment and consumption demand may be a bad indicator for the housing behavior of renters. In this case, Ioannides and Rosenthal [1994] show that it is more convenient to consider only three housing subtenures in the empirical analysis: *RENT*, *OWN1* and *OWN2*.

## 3. THE ECONOMETRIC MODEL

### *3.1 The econometric specification*

Following Ioannides and Rosenthal [1994], we consider that, for a household $k$, the choice of housing subtenure is determined by an index $J^k$ equal to the excess of the investment demand over the consumption demand for housing. $\alpha_1$, $\alpha_2$ and $\alpha_3$ are the set of critical values for $J^k$ which determine transition from *RENT1* to *RENT2*, *RENT2* to *OWN1*, and *OWN1* to *OWN2*. These critical values are such that $\alpha_1 < \alpha_2 < 0 < \alpha_3$. Consumption and investment demand functions for housing are supposed to be log-linear :

$$h_i^k = LogH_i^k(X^k, e_i^k) = X^k b_i + e_i^k \tag{8}$$

$$h_c^k = LogH_c^k(X^k, e_c^k) = X^k b_c + e_c^k \tag{9}$$

where $X^k$ is the vector of explanatory variables, $e_c^k$ and $e_i^k$ are random errors that may be correlated. $H_c^k$ and $H_i^k$ are determined simultaneously and must satisfy: $H_c^k > 0$ and $H_i^k \geq 0$. The following figure shows the mechanism of the model. On the figure, $X^k$ is defined so that an increase in $X^k$ leads to an increase in both the investment and consumption demands.

The difference between $h_I^k$ and $h_c^k$, $J^k$, is defined for household $k$ by:

$$J^k = h_i^k - h_c^k = X^k(b_i - b_c) + (e_i^k - e_c^k) = X^k g + w^k \tag{10}$$



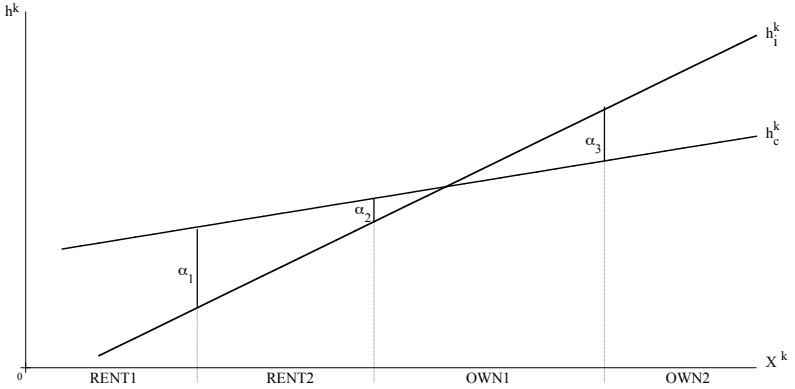
where $g = b_i - b_c$ and $w^k = (e_i^k - e_c^k)$. $h_c^k$ and $h_i^k$ are in logarithm form so the index $J^k$ and the critical values $\alpha_1$, $\alpha_2$ and $\alpha_3$ reflect the percentage difference between the demands. Hence, housing subtenure is determined by:

$$-\infty < J^k < \alpha_1 \Rightarrow -\infty < w^k < \alpha_1 - X^k g \Rightarrow RENT1 \tag{11a}$$

$$\alpha_1 < J^k < \alpha_2 \Rightarrow \alpha_1 - X^k g < w^k < \alpha_2 - X^k g \Rightarrow RENT2 \tag{11b}$$

$$\alpha_2 < J^k < \alpha_3 \Rightarrow \alpha_2 - X^k g < w^k < \alpha_3 - X^k g \Rightarrow OWN1 \tag{11c}$$

$$\alpha_3 < J^k < +\infty \Rightarrow \alpha_3 - X^k g < w^k < +\infty \Rightarrow OWN2 \tag{11d}$$




If $e_c^k$ and $e_I^k$ follow a bivariate normal distribution, then $w^k$ is distributed normally with variance: $\sigma_w^2 = \sigma_i^2 + \sigma_c^2 - 2\sigma_{ic}$. So, estimators of $g/\sigma_w$, $\alpha_1/\sigma_w$, $\alpha_2/\sigma_w$ and $\alpha_3/\sigma_w$ can be obtained with an ordered Probit model[9].

Ioannides and Rosenthal [1994] indicate that under the null hypothesis whereby the ordered Probit model describes the behavior of the household correctly, we can obtain other estimates with three independent Probit models:

$$\Pr(J^k > \alpha_3) = \Pr\left[\frac{w}{\sigma_w} < -\frac{\alpha_3}{\sigma_w} + X^k \frac{g_3}{\sigma_w}\right] \Rightarrow OWN2 \tag{12a}$$

$$\Pr(J^k > \alpha_2) = \Pr\left[\frac{w}{\sigma_w} < -\frac{\alpha_2}{\sigma_w} + X^k \frac{g_2}{\sigma_w}\right] \Rightarrow OWN \tag{12b}$$

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[9] For more details, see Ioannides and Rosenthal [1994]. In particular, it is possible to estimate simultaneously choice of subtenure and housing demands (appendix A in Ioannides and Rosenthal [1994]). However, the likelihood function is more complicated and the estimate does not converge easily. One of the reasons given by the authors is that the differential of housing demand might be insufficient to explain tenure choice.

$$\Pr(J^k > \alpha_1) = \Pr\left[\frac{w}{\sigma_w} < -\frac{\alpha_1}{\sigma_w} + X^k \frac{g_1}{\sigma_w}\right] \Rightarrow NORENT1 \qquad (12c)$$

(12a) is the probability that household *k* chooses *OWN2*, (12b) that he chooses *OWN1 or OWN2*, (12c) that he chooses subtenures other than *RENT1*. One of the motivations to estimate three independent Probit models is that contrary to the ordered model, (12a)-(12c) does not need the proportionality hypothesis between the effects of the explanatory variables on subtenure. Moreover, estimation of independent Probit models leads to consistent estimates under the hypothesis that (11a)-(11d) do not correctly characterize housing choice.

*3.2 The data*

The Bank of Spain Household Financial Survey contains detailed information about assets and debts held by Spanish households, and links this information with income and expenditure data. A detailed description of the dataset is contained in Bover [2004].

For the purposes of this paper we report, in Table 1, the portfolio composition of Spanish households.

Table 1. Spanish Household Portfolio separated by financial and non financial assets

| ASSET CLASSIFICATION | PERCENTAGE HOLDING THE ASSET | PERCENTAGE ON WEALTH (mean wealth: 141.702 euros) | |
|---|---|---|---|
| | | On financial or non financial | On total wealth |
| Deposit and accounts | 98,2% | 41,9% | 6,1% |
| Shares | 12,5% | 29,2% | 4,2% |
| Mutual Funds | 2,5% | 6,3% | 0,9% |
| Public Debt | 1,9% | 2,2% | 0,3% |
| Money lender | 3,9% | 3% | 0,4% |
| Pension plan | 23,1% | 15,8% | 2,3% |
| Life insurance and annuities | 1,1% | 1,6% | 0,2% |
| ***Financial wealth*** | ***98,5%*** | ***100%*** | ***14,5%*** |
| Primary residence | 81,9% | 80,9% | 69,1% |
| Secondary | 12,5% | 11,8% | 10,1% |
| Dwelling for renting out | 6,8% | 6,3% | 5,4% |
| Transport other than cars | 9,5% | 0,3% | 0,3% |
| Art and jewellery | 18,2% | 0,7% | 0,6% |
| ***Non financial wealth*** | ***86,4%*** | ***100%*** | ***85,5%*** |



A classification which will be later on used for the ordered Probit model (*RENT1 RENT2 OWN1 OWN2*) shed some light on dwelling market in Spain.

*RENT1*: Do not own any dwelling not for living, neither for renting out. (13.05%)

*RENT2:* Owner of a dwelling not used for living. They rent the occupied dwelling. (0.84%)

*OWN1:* Homeowner with no dwelling for renting out. (74.18%)

*OWN2*: Owner-occupier and owner of other dwelling for renting out. (11.94%)

*3.3 The variables*

The set of explanatory variables $X^k$ has been chosen to respect the theoretical model and to be comparable to the U.S. empirical results of Ioannides and Rosenthal, who used data from the 1983 Survey of Consumer Finances (SCF) and with Arrondel and Lefebvre [2001a] that use data from the French Survey "Actifs Financiers 1992".

The theoretical model shows the importance of the level of resources (income and wealth) and of the income path on housing choice. The level of net wealth (gross wealth *minus* debts) influences positively both the investment and the consumption demand (*cf. supra*).

Investment demand $h_i^k$ is defined as a portfolio choice decision. Therefore, in order to select explanatory variables, it would be useful to refer to the intertemporal portfolio choice model and to its recent developments.

In a portfolio choice model where capital markets are imperfect, portfolios are incomplete (King and Leape [1998]). So portfolio composition depends on household's income and wealth (to finance transaction and information costs) and on the stock of financial information (proxied by age, education, etc.).

Recent theoretical savings models have placed greater emphasis on studying prudent behavior in the face of an uncertain future and have shown the influence of multiple risk and liquidity constraints on precautionary savings and portfolio choice (Kimball [1992], [1993]). In this vein, a household exposed to a high income risk in the future or a strong liquidity constraint may increase its savings, reduce its investments in risky assets and increase its share of liquid investments. New individual determinants, especially future risk expectations (income, health and family) and liquidity constraints, could therefore explain wealth accumulation behavior. Unfortunately, these variables are hard to observe in surveys and often need to be inferred using the households' characteristics (Arrondel and Masson [1996]). Hence, we introduced a set of variables to approximate the household's exposure to labor income risk and risk aversion[10]. As a first proxy for income risk we took present unemployment period(s). Second partner labor market participation is also an indicator of income risk; two-earner families are less exposed to risk. Moreover, the nature of professional activity (employee *vs.* self-employed) and professional status (retired *vs.* in activity) may also partially reflect some of this effect. Finally, households that are constrained on the capital market or anticipate to be so in the future (unemployed now or in the past, less educated people, constant or decreasing income, only one wage in the

[10] For example, the nature of professional activity (employee *vs.* self-employed) could be an indicator of income risk but also an indicator of risk aversion. A more risk averse household will choose a less risky career. It will be an employee. Its income risk is lower, so it can invest in riskier assets. Consequently, the net effect of this variable is ambiguous.

household...) are assumed to be more prudent in their investments (Paxson [1990], Koo [1991]).

Bodie *et al*. [1992] studied the influence of labor supply of households on their risky investments. The main prediction is that the more flexible their labor supply is, the more risky their investments. Second partner labor market participation is a first indicator of this flexibility. The investment demand $h_i$, with permanent income given, would be a negative function of this indicator. Age, level of schooling, status of professional activity (retired *vs*. in activity) could also partially reflect this effect of labor supply flexibility on portfolio investment (more flexibility for young educated and high-qualified employees).

Other characteristics (sociological or demographic) of the household may influence the difference in housing demands. The number of people in the household influences the consumption demand positively (more spacious housing). However, the influence of this variable on investment demand is ambiguous. On the one hand, precautionary needs are positively related to the number of children. But on the other hand, couples with children could be less impatient (they may also be more altruistic) and so have a higher housing investment demand (Masson [1995]). The set of explanatory variables and summary statistics are available in Table 2.

Table 2. Explanatory variables and summary statistics

| | Summary statistics |
|---|---|
| Variable | Sample means (standard deviation) |
| Net wealth | 357,533 (1,429,755) |
| Log Income | -1.391 (.9267) |
| Years working for current employer | 5.99 (9.95) |
| Anticipation about future income | |
| Inferior (ref.) | .1093 |
| Comparable | .6582 |
| Superior | .2325 |
| Both working in a couple | |
| No (ref.) | .8209 |
| Yes | .1791 |
| Age | 54.95 (17.43) |
| Inheritance motive of saving | |
| No (ref.) | .9889 |
| Yes | .0111 |
| Professional Activity | |
| Farmer (ref.) | .0196 |
| Self-employed | .0885 |
| Executive | .0383 |
| High-Qualified Employee | .0729 |
| Low-Qualified Employee | .1309 |
| High-Qualified Worker | .1153 |
| Low-Qualified Worker | .0968 |
| Farmer (retired) | .0576 |
| Non farmer (retired) | .2596 |
| Other | .1206 |
| Education Level | |
| Illiterate (ref.) | .0385 |
| Primary | .2985 |
| Secondary or less | .2322 |
| Other studies needing Secondary | .1740 |
| University or more | .2569 |



| | |
|---|---|
| Size of household | |
| One (ref.) | .1837 |
| Two | .3117 |
| Three | .2133 |
| Four | .2007 |
| Five | .0628 |
| More than five | .0278 |
| Marital Status | |
| Single (ref.) | .1925 |
| Married | .6142 |
| Cohabitance | .0214 |
| Separated | .0296 |
| Divorced | .0167 |
| Widow/er | .1256 |
| Self-declared health status | |
| Very good | .1795 |
| Good | .5629 |
| Acceptable | .1824 |
| Bad | .0647 |
| Very bad | .0105 |
| Public aid | |
| No (ref.) | .7927 |
| Yes | .2073 |
| Number of observations | 5129 |

## 4. EMPIRICAL RESULTS

The first stage was an estimation of various qualitative data models: the ordered Probit model with four housing subtenures (*RENT1*, *RENT2*, *OWN1* and *OWN2*), another with three housing subtenures (*RENT*, *OWN1* and *OWN2*) and the three independent Probit models (*NORENT1*, *OWN* and *OWN2*). Then, we have gone further into the analysis of households' various motives to buy a dwelling.

Results from the two ordered Probit models are very close. So we have focused on the ordered Probit model with four subtenures. We used the estimation of the three independent Probit models essentially in order to build specification tests. The empirical estimates of the Probit model with four subtenures are reported in Table 3 and those of the specification tests in Table 5.

### *4.1 The subtenure choice*

Critical values for $J$ are increasing with $\alpha_1$and $\alpha_2$ negative and $\alpha_3$ positive, consistent to the predictions of the theoretical model and to the American results (Ioannides and Rosenthal [20]), (see the comparative analysis in Table 5). On the contrary, our results are different with respect to the French scenario presented by Arrondel and Lefebvre [2001a].

Current income has positive and convex effects on the choice of the subtenure. The wealthier the households are, the greater their investment demand for housing relative to their consumption one is. Then they invest more in housing. Those results are consistent with the predictions of the theoretical model. Having a professional activity influences housing purchases positively. Conversely, having been unemployment in one's professional career or being unemployed has a negative effect on housing purchases. This fact can be

explained by the liquidity needs that are greater or by a more risky professional situation, and finally by difficulties of entering the credit market.

The other estimates that are statistically significant are the following. First, the age of heads of households has a positive effect. Second, household size has a concave effect on housing investment: household with three or four members invest more than the other. Third, the level of qualification also has a positive effect. The more educated the people are, the higher their income is and the easier it is for them to borrow. Finally, we obtain that unmarried couples, divorced and separated invest less in housing.

A Hausman test could be calculated to see if the coefficients in the independent Probit models (Table 3, models c, d, e) are statistically different from those of the ordered Probit models (a, b), leading to acceptance of the first models (Table 3). The value of the Hausman test is negative[11]. So we can not conclude definitively. But the coefficients of the successive level of ownership seem to differ from each other[12]. As with the US and French data, it is essentially on the subtenure *OWN2* that the effects of some variables differ from those of the other subtenures (*NORENT1*, *OWN*). As a matter of fact, some coefficients become insignificant or even switch sign in the *OWN2* model: the effect of labor income is convex now when it was concave for the two other subtenures; public assistance, current unemployment and household size become insignificant; education plays a positive and statistically significant role on the probability of owning housing to rent out. Some other variables display estimates that are quantitatively different: landlords who are also owner-occupiers seem to be different from other homeowners: the former are older and more educated. Interestingly we find a very strong and significant effect of the health status: people that feel him in a bad health state are more often owner of the two kind of housing. This effect is probably explained by precautionary and bequest motives. Investing in the housing market is less risky than in financial market.

To be short, we observe that demographic variables (marital status, number of children…) explain more the consumption aspect of housing demand and education, social status have a stronger influence on investment purpose of housing decision.

To explain the failure of the model, Ioannides and Rosenthal [1994, p. 135] suppose that some market imperfections, such as transactions costs, liquidity constraint or tax distortions, are not be taken in consideration. In Spain, it is quite possible that the difference in tax treatment of rental income between homeowner and landlord and the public help system for

11 Under the hypothesis $H_0$ described by the ordered probit model, the estimates are convergent and efficient while the coefficients estimated by the independent probit models are convergent but inefficient. Under the alternative hypothesis $H_1$, coefficients estimated by the independent probit models are always convergent while those of the ordered model are no more (Ioannides and Rosenthal, [1994], p. 131). Under the hypothesis $H_0$, the Hausman's statistic is defined by (Hausman [1978]) :

$$m = \sum_{l=1}^{3} (q_{ol} - q_{pl})'(V_{ol} - V_{pl})^{-1}(q_{ol} - q_{pl})$$

$m$ is asymptotically Chi-squared distributed (with degrees of freedom equal to the total number of restrictions). Index $p$ corresponds to the probit model's parameters, index $o$ to those of the ordered model and $V_{op}$ and $V_{ol}$ the corresponding covariance matrix. But for the test of ordered probit (see Table 5), we had a problem with the calculus of this test because as we quite frequently observed, it leads covariance matrices that are not always positive semi-definite (see for example Börsch-Supan [1987] p. 73).

12 To estimate the three independent probit, we use the same set of explanatory variables as for the ordered probit models.



housing result in distortion effects. Households could have also a direct utility from ownership status.

In order to understand better, we can go back over the two main hypotheses of the model of Henderson and Ioannides. They postulate that it is better for households to be homeowners rather than tenants. This is due to a moral hazard problem in the principal-agent relationship between landlords and tenants. Moreover in the rented public sector accommodation, rents are regulated and it is not certain that the housing expenditure of the tenants is higher than the cost they have to bear in a situation in which they are homeowners. And in the private rental sector, even if now it is less strong, rent control could have the same result.

### *4.2 The estimation of demand functions*

To study more precisely the logic of housing behavior of Spanish households, it is useful to identify the determining factors of demand, both housing investment and consumption (equations 8 and 9). For that, we have considered four housing demand functions: *CONS1*, *CONS2*, *INVT* and *TRAD*. First, it is only in households of *OWN2* that it is possible to separate the housing investment demand, *INVT*[13], from that of consumption, *CONS2*. Second, the housing demand of households of *OWN1* is a mix of both consumption motives and investment motives, for instance *CONS1,* while it is possible to consider a traditional housing demand that mixes consumption motives and investment ones for all owner-occupier households, for instance *TRAD*. The empirical estimates of the regressions are reported in Table 4. We have alternatively estimated those four functions without corrections for selectivity bias and with a correction according to the two step method of Heckman [1979]. But in our case, this correction is problematic because identification of Mill's ratio comes only from the non-linearity of Probit models and so, there is collinearity between the ratio estimated from households' characteristics and the other explanatory variables of the model. Consequently we have used mainly the former estimations (Table 4) but we indicate also the results of the Hausman specification test of the second specification including the Mill ratio in Table 5.

When we analyze both the consumption (*CONS2*) and the investment (*INVT*) demand functions of *OWN2* households, we can see that the explanatory factors are qualitatively the same (Table 4). The income has a positive effect. The fact of being a farmer or an unskilled worker or a member of the professional classes in activity tends to decrease housing demand. Level of qualification has a positive effect. Household size has a negative effect except for the very big families. However, the coefficients are a little different quantitatively. For social classes and qualifications, they are lower in the investment demand function than in the consumption one.

Interestingly (and this is the main result of our paper), an F-test (about 1.29) leads us to accept the null hypothesis that parameters are the same in the two regressions (the critical value at a 5% critical value is 1.34) (Table 5). This conclusion means that we cannot distinguish the determinants in the housing demand for investment purpose from the housing demand for consumption motives.

13 The investment demand corresponds to the value of all housing owned by households to satisfy their needs or to rent out.

Among the significant explanatory variables of the two housing demand functions that mix consumption motives and investment ones (*CONS1* and *TRAD*), there are all the significant explanatory variables of the previous functions. Moreover age of household head, self employed, are statistically significant and have a positive effect. Health status and anticipation of an increasing income have a negative one.

From the Chi-squared tests, we have compared housing demand functions: investment demand (*INVT*) *vs.* mixed demand of *OWN1* households (*CONS1*); consumption demand of *OWN1* households (*CONS1*) *vs.* consumption demand of *OWN2* households (*CONS2*); traditional demand (*TRAD*) *vs. CONS1* or *CONS2*.

First, the Chi-squared test leads us to reject the null hypothesis that the mixed function *CONS1* and investment function *INVT* are the same (Table 5)[14]. Secondly the Chi-squared test shows a statistically significant difference between *CONS1* and *CONS2*[15]. But the values of the test are relatively low compared with the statistics obtained in USA and in France. Moreover, a test between *INVT* and *TRAD* function leads us to accept the similarity of the two demands. Last, Hausman specification tests show that *CONS2* and *CONS1* are not significantly different from *TRAD*. Hence, *TRAD* provides consistent estimates of housing consumption.

One lecture of all the tests is the following. Demands for housing are very similar. If we have identified the determinant of housing demand for investment purpose and if the housing demand for consumption motive do not differ from the previous one, we can conclude that Spanish household housing behavior are primarily determined by a logic of investment. The fact that other consumption demand for housing do not differ very much from *INVT* confirm this conclusion.

This conclusion is contrasted with that of Ioannides and Rosenthal (see results of their tests in Table 5)[16]. They have found also that *CONS2* and *INVT* are different and express only consumption motives for the first function and investment motives for the second. But they have found no difference between *CONS2*, *CONS1* and *TRAD*. Consequently *CONS1* and *TRAD* express only consumption motives for becoming a homeowner.

It seems, therefore, that household behavior with regard to the decision to become a homeowner is not the same in the U.S., in France and in Spain. In the U.S., portfolio motives do not affect demand of home ownership, conversely consumption motives prevail. In France, portfolio motives explain also primary residence purchase. In Spain only portfolio motives seem to be relevant. Future research should take into account this findings and should try to study these behaviors with a purely portfolio choice model as in Arrondel and Lefebvre [2001b].

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14 The formula of Chi-squared statistic is : $(q_{c1} - q_i)'(V_{c1} - V_i)^{-1}(q_{c1} - q_i)$ where $q_{c1}$ and $V_{c1}$ refer to estimates and covariance matrix of *CONS1* function and $q_i$ and $V_i$ to estimates and covariance matrix of *INVT* function. The samples of *OWN1* and *OWN2* are different, so it is possible to calculate this test which requires the independence of the two samples. The value of the test is 75.83 for a critical value (at 5%) of 51 (see Table 5).

15 The value of the Chi-squared statistics (see the former note) is 63.85 for a critical level (at 5%) equal to 51 (see Table 5).

16 Ioannides and Rosenthal [1994, p. 132] show that if "*OWN1* families choose their residence based on their consumption demand (as opposed to their investment demand), the traditional housing demand function yields consistent estimates of the consumption demand for housing... If however *OWN1* housing is influenced by portfolio motives, the traditional demand function (*TRAD*) is an inconsistent estimate of the housing consumption function…".



## 5. CONCLUSION

The two-dimensional aspect of dwellings occupied by their owners, consumption and investment, make the analysis of housing purchases difficult. As in most housing demand studies, we could suppose that dwellings occupied by their owner were purchased to respond only to consumption motives. But all specificities of these assets would be overlooked: their durability, their possibility to generate returns, their capital losses or gains, that is to say all specificities that make housing a potential investment in competition with financial assets or other real estate. Conversely, as in portfolio choice model, we can ignore consumption motives and consider all dwellings as assets. For this we simply have to suppose that owner-occupiers rent to themselves the dwellings that they own and occupy, but that they can also rent other dwellings to satisfy their housing needs and rent out the dwellings owned. Previous results on US, France, was supporting the idea that neither of these two ways is completely satisfactory and it is better to refer to a model that keeps simultaneously the two-dimensional aspects of housing, such as the model of Henderson and Ioannides [1983]. In this model, in the absence of institutional considerations, it is the difference between the housing investment demand and the housing consumption demand that explains decisions to purchase dwellings for owner occupation and for renting out.

The availability of a rich and detailed dataset as the 2002 Bank of Spain Survey of Household Finances gave us the possibility to perform another empirical test of the Henderson-Ioannides model.

Results show that even if the effect of some of the explanatory variables are consistent with those predicted by the model, the difference between the two demands is not statistically significant and it cannot in itself explain housing purchases. It seems that housing purchase is more a question of portfolio choices than of consumption of durable goods. Even if transaction costs, the tax system, the public aid policies for home ownership, and other market imperfections are inadequately dealt with, this will not affects our results.

These results are not the same as those obtained on U.S. and on French data. Ioannides and Rosenthal, for the US, show that the difference of demands explains the facts and that consumption motives prevail to determine primary residence value. Arrondel and Lefebvre shows that in France, portfolio motives are predominant in explaining primary residence purchase but consumption and investment demand are statistically different. These results lead us to conclude that there is a strong difference in the status of this asset in the 3 countries and that there is also a Spanish case that is completely different and need to be analyzed in details.

Further research should address the analysis of housing behaviour in a portfolio perspective. It seems that, for the case of Spain, it will be possible to include housing in a portfolio choice model accounting for the specificity of this asset, in particular its illiquidity (Yao and Zhang, 2005, Schwartz and Tebaldi, 2006). This topic has been largely treated in recent research on housing, both theoretical and empirical: Flavin and Yamashita (2002) show how the house-to-net-worth ratio could explain certain heterogeneity in stockholding (Yamashita, 2003 tests this model); Cocco (2004) show that investment in housing plays a crucial role in explaining the empirical pattern of composition of wealth; Pelizzon and Weber (2006) argue that standard tests of portfolio efficiency are biased because they neglect the existence of illiquid wealth. This opens the door for future research.

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Table 3. Model test based on ordered and single Probit parameter values

| | a | | b | | c | | d | | e | |
|---|---|---|---|---|---|---|---|---|---|---|
| | FOUR CELLED ORDERED PROBIT | | THREE CELLED ORDERED PROBIT | | NORENT | | OWN | | OWN2 | |
| | Coefficient | *Z* statistic | Coefficient | *Z* statistic | Coefficient | *Z* statistic | Coefficient | *Z* statistic | Coefficient | *Z* statistic |
| Variable | | | | | | | | | | |
| Alpha 1 | -.499 | -1.756 | | | .41942 | 1.15 | | | | |
| Alpha 2 | -.455 | -1.601 | -.476617 | -1.673 | | | .3002492 | 0.84 | | |
| Alpha 3 | 2.081 | 7.2852 | 2.0590 | 7.193 | | | | | -1.529398 | -3.50 |
| Net wealth | -2.25e-08 | -1.00 | -2.37e-08 | -1.06 | -1.88e-08 | -0.63 | -1.98e-08 | -0.73 | -1.07e-08 | -0.32 |
| Net wealth$^2$ | 7.96e-16 | 1.61 | 7.46e-16 | 1.55 | 5.51e-16 | 0.66 | 2.32e-16 | 0.41 | 8.23e-16 | 1.15 |
| Log Income | .519 | 13.54 | .5153384 | 13.40 | .6646307 | 7.49 | .5709599 | 6.96 | .439932 | 8.63 |
| Log Income$^2$ | .035 | 3.83 | .0360852 | 3.86 | .0740425 | 3.43 | .0656435 | 3.22 | -.0388114 | -1.83 |
| Years working for current employer | .007 | 2.40 | .0071208 | 2.47 | .0133295 | 3.15 | .014131 | 3.45 | .0008291 | 0.20 |
| Anticipation about future income | | | | | | | | | | |
| Inferior (ref.) | | | | | | | | | | |
| Comparable | .011 | 0.19 | .0118814 | 0.21 | .0508642 | 0.63 | .0682187 | 0.87 | -.0357213 | -0.47 |
| Superior | -.065 | -1.00 | -.0667998 | -1.02 | -.0354023 | -0.39 | -.0410088 | -0.47 | -.0782411 | -0.87 |
| Both working in a couple | | | | | | | | | | |
| No (ref.) | | | | | | | | | | |
| Yes | -.070 | -1.28 | -.0705 | -1.28 | -.0276 | -0.35 | -.0285 | -0.37 | -.1085 | -1.43 |
| Age | .029 | 3.73 | .0281947 | 3.60 | .0356337 | 3.56 | .0319422 | 3.26 | .0221363 | 1.90 |
| Age$^2$ | -.0002 | -2.65 | -.0001759 | -2.56 | -.0002283 | -2.55 | -.0002132 | -2.44 | -.0001213 | -1.22 |
| Inheritance motive of saving | | | | | | | | | | |
| No (ref.) | | | | | | | | | | |



| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Yes | -.011 | -0.06 | -.0061601 | -0.04 | .1702795 | 0.60 | .2442992 | 0.86 | -.219849 | -0.96 |
| Professional Activity | | | | | | | | | | |
| Farmer (ref.) | | | | | | | | | | |
| Self-employed | .151 | 1.07 | .1437014 | 1.02 | .2436385 | 1.34 | .195924 | 1.11 | -.0331945 | -0.17 |
| Executive | -.074 | -0.45 | -.0817869 | -0.49 | -.0423692 | -0.18 | -.0531361 | -0.24 | -.193453 | -0.85 |
| High-Qualified Employee | -.178 | -1.14 | -.194995 | -1.24 | -.0627346 | -0.31 | -.1340334 | -0.68 | -.3218313 | -1.47 |
| Low-Qualified Employee | -.189 | -1.31 | -.196432 | -1.36 | -.1080976 | -0.61 | -.1078248 | -0.62 | -.3621024 | -1.75 |
| High-Qualified Worker | -.276 | -1.94 | -.2860307 | -2.00 | -.1129765 | -0.65 | -.1377741 | -0.81 | -.7473035 | -3.41 |
| Low-Qualified Worker | -.276 | -1.94 | -.2849436 | -1.99 | -.3010559 | -1.74 | -.3244473 | -1.91 | -.2577194 | -1.24 |
| Farmer (retired) | .254 | 1.68 | .2553818 | 1.69 | .2498675 | 1.28 | .2933157 | 1.53 | .0886489 | 0.43 |
| Non farmer (retired) | .083 | 0.60 | .0874729 | 0.64 | .2122278 | 1.23 | .2827589 | 1.68 | -.2015528 | -1.05 |
| Other | .085 | 0.62 | .0845365 | 0.62 | .1458221 | 0.87 | .1601657 | 0.98 | -.057803 | -0.29 |
| Education Level | | | | | | | | | | |
| Illiterate (ref.) | | | | | | | | | | |
| Primary | .152 | 1.54 | .1535193 | 1.56 | .0962025 | 0.81 | .1165866 | 0.99 | .2176156 | 1.19 |
| Secondary or less | .236 | 2.28 | .2345842 | 2.26 | .1801328 | 1.40 | .1860131 | 1.48 | .283053 | 1.50 |
| Other studies needing Secondary | .165 | 1.53 | .1653211 | 1.53 | .0018673 | 0.01 | .0134877 | 0.10 | .3122316 | 1.62 |
| University/ more | .163 | 1.49 | .1638236 | 1.50 | -.0496446 | -0.36 | -.0208713 | -0.15 | .3111746 | 1.62 |
| Size of household | | | | | | | | | | |
| One (ref.) | | | | | | | | | | |
| Two | .379 | 5.35 | .3821708 | 5.38 | .4757464 | 5.16 | .494564 | 5.49 | .1436325 | 1.38 |
| Three | .386 | 4.94 | .392176 | 5.00 | .4585131 | 4.52 | .5058249 | 5.10 | .1221697 | 1.06 |
| Four | .346 | 4.11 | .3562676 | 4.22 | .4787261 | 4.32 | .5580829 | 5.16 | .0005896 | 0.00 |
| Five | .280 | 2.74 | .2934411 | 2.86 | .1956755 | 1.43 | .2955159 | 2.22 | .1167596 | 0.81 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| More than five | .233 | 1.80 | .2494178 | 1.92 | .1867338 | 1.06 | .3064168 | 1.77 | .0650625 | 0.36 |
| Marital Status | | | | | | | | | | |
| Single (ref.) | | | | | | | | | | |
| Married | -.093 | -1.47 | -.0920766 | -1.45 | -.1230833 | -1.44 | -.1154221 | -1.38 | -.0684907 | -0.76 |
| Cohabitance | -.575 | -4.40 | -.5657021 | -4.32 | -.7358938 | -4.92 | -.7009471 | -4.75 | -.1508537 | -0.68 |
| Separated | -.344 | -3.09 | -.3472229 | -3.11 | -.4848391 | -3.74 | -.4953088 | -3.89 | -.0450774 | -0.26 |
| Divorced | -.456 | -3.27 | -.4790611 | -3.40 | -.5040278 | -3.05 | -.5794951 | -3.64 | -.2254128 | -1.06 |
| Widow/er | .033 | 0.39 | .0316735 | 0.37 | .0243579 | 0.22 | .0290633 | 0.26 | -.0138753 | -0.11 |
| Self-declared health status | | | | | | | | | | |
| Very good | | | | | | | | | | |
| Good | .004 | 0.07 | .0074395 | 0.15 | -.0872027 | -1.28 | -.0593065 | -0.89 | .0800133 | 1.14 |
| Acceptable | .058 | 0.89 | .0599677 | 0.91 | -.0844013 | -0.92 | -.0783048 | -0.87 | .2060431 | 2.28 |
| Bad | -.064 | -0.72 | -.0675529 | -0.76 | -.2133732 | -1.82 | -.2291462 | -2.01 | .0933629 | 0.73 |
| Very bad | -.214 | -1.22 | -.197645 | -1.12 | -.6740885 | -3.35 | -.6153438 | -3.07 | .4944349 | 2.06 |
| Public aid | | | | | | | | | | |
| No (ref.) | | | | | | | | | | |
| Yes | .108 | 2.03 | .1091603 | 2.04 | .1567501 | 2.12 | .1561872 | 2.16 | .0455847 | 0.61 |
| Log likelihood | | -3604.5 | | -3448.9 | | -1717.2 | | -1805.9 | | -1635.9 |
| Hausman test | <0 | | <0 | | | | | | | |
| Sample size | 5129 | | 5129 | | 5129 | | 5129 | | 5129 | |



Table 4. Consumption and investment demands for housing

| | Investment | | Consumption | | Mixed | | Traditional | |
|---|---|---|---|---|---|---|---|---|
| Variable | | | | | | | | |
| Constant | 12.91588 | 26.18 | 12.43057 | 21.61 | 11.42453 | 60.95 | 11.51589 | 65.25 |
| Net wealth | 1.54e-08 | 0.38 | 3.34e-08 | 0.71 | -1.27e-08 | -0.52 | -6.72e-09 | -0.44 |
| Net wealth$^2$ | -1.36e-16 | -0.22 | -3.37e-16 | -0.46 | 4.45e-16 | 0.21 | 2.18e-16 | 0.76 |
| Log Income | .4014659 | 8.38 | .4155949 | 7.44 | .4723948 | 18.88 | .4534858 | 20.60 |
| Log Income$^2$ | .0225284 | 1.01 | .0403902 | 1.56 | .0280063 | 4.79 | .025787 | 4.66 |
| Years working for current employer | -.0020945 | -0.49 | -.0032953 | -0.67 | .0007515 | 0.41 | .0002627 | 0.15 |
| Anticipation about future income | | | | | | | | |
| Inferior (ref.) | | | | | | | | |
| Comparable | .0507433 | 0.65 | .0729386 | 0.80 | -.0614898 | -1.67 | -.0439252 | -1.30 |
| Superior | .0772549 | 0.85 | .0621883 | 0.59 | -.1557923 | -3.71 | -.1321093 | -3.40 |
| Both working in a couple | | | | | | | | |
| No (ref.) | | | | | | | | |
| Yes | -.1144414 | -1.52 | -.0820818 | -0.93 | -.0397742 | -1.13 | -.0443101 | -1.36 |
| Age | -.0120066 | -0.98 | -.0158185 | -1.10 | .0183744 | 3.57 | .0149158 | 3.09 |
| Age$^2$ | .0001793 | 1.75 | .0002047 | 1.71 | -.0001124 | -2.49 | -.0000739 | -1.76 |
| Inheritance motive of saving | -.0960514 | -0.42 | -.00753 | -0.03 | .0481833 | 0.47 | .034738 | 0.37 |
| No (ref.) | | | | | | | | |
| Yes | | | | | | | | |
| Professional Activity | | | | | | | | |
| Farmer (ref.) | | | | | | | | |
| Self-employed | -.1675184 | -0.82 | -.3688462 | -1.55 | .052711 | 0.55 | -.0093212 | -0.11 |
| Executive | -.1845001 | -0.77 | -.3328755 | -1.20 | -.0073651 | -0.07 | -.0506772 | -0.50 |
| High-Qualified Employee | -.2866141 | -1.22 | -.4433612 | -1.62 | -.1907752 | -1.82 | -.2218399 | -2.27 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Low-Qualified Employee | -.2496211 | -1.11 | -.3476826 | -1.32 | -.2064585 | -2.14 | -.2251573 | -2.49 |
| High-Qualified Worker | -.5054213 | -1.98 | -.6304652 | -2.11 | -.2866599 | -3.02 | -.3433183 | -3.85 |
| Low-Qualified Worker | -.6374679 | -2.79 | -.9165804 | -3.44 | -.3135148 | -3.25 | -.3861937 | -4.26 |
| Farmer (retired) | -.3674483 | -1.75 | -.5149964 | -2.11 | .039647 | 0.39 | -.0515667 | -0.55 |
| Non farmer (retired) | -.5091016 | -2.53 | -.7651614 | -3.27 | -.129694 | -1.40 | -.2299107 | -2.68 |
| Other | -.2971633 | -1.40 | -.44747 | -1.81 | -.0488024 | -0.53 | -.106937 | -1.24 |
| Education Level | | | | | | | | |
| Illiterate (ref.) | | | | | | | | |
| Primary | .3192622 | 1.30 | .4289671 | 1.49 | .3791516 | 6.20 | .382136 | 6.38 |
| Secondary or less | .6289226 | 2.50 | .7142122 | 2.44 | .5881502 | 9.12 | .5983848 | 9.53 |
| Other studies needing Secondary | .6555748 | 2.57 | .7335259 | 2.46 | .7758053 | 11.42 | .7608391 | 11.58 |
| University or more | .8348537 | 3.29 | 1.003.213 | 3.39 | .9579004 | 13.94 | .9502165 | 14.35 |
| Size of household | | | | | | | | |
| One (ref.) | | | | | | | | |
| Two | -.069596 | -0.60 | -.1122242 | -0.82 | .026085 | 0.55 | .0146843 | 0.33 |
| Three | -.1277705 | -0.96 | -.0891003 | -0.58 | -.0559488 | -1.08 | -.0505927 | -1.04 |
| Tour | -.2559309 | -1.82 | -.2860256 | -1.75 | -.0362888 | -0.65 | -.0609246 | -1.16 |
| Five | -.2846333 | -1.86 | -.3492674 | -1.95 | -.0542878 | -0.80 | -.0895585 | -1.42 |
| More than five | -.134477 | -0.70 | -.1950676 | -0.88 | -.1080325 | -1.27 | -.0983397 | -1.25 |
| Marital Status | | | | | | | | |
| Single (ref.) | | | | | | | | |
| Married | .178331 | 1.75 | .2711169 | 2.29 | .0408984 | 1.01 | .0624411 | 1.64 |
| Cohabitance | .3734424 | 1.50 | .1655276 | 0.57 | -.1143483 | -1.19 | -.0921467 | -1.01 |
| Separated | -.0237041 | -0.13 | -.2107815 | -0.96 | .0330154 | 0.42 | -.0079079 | -0.11 |
| Divorced | .262625 | 1.12 | .2686924 | 0.98 | .1886464 | 1.86 | .1992686 | 2.10 |
| Widow/er | .1180653 | 0.91 | .1908972 | 1.27 | .1219851 | 2.21 | .1104093 | 2.14 |



| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Self-declared health status | | | | | | | | |
| Very good | | | | | | | | |
| Good | -.1288755 | -1.77 | -.0787771 | -0.93 | -.114431 | -3.64 | -.1103356 | -3.75 |
| Acceptable | -.1766478 | -1.94 | -.1839248 | -1.73 | -.1585006 | -3.77 | -.1642995 | -4.23 |
| Bad | -.3842245 | -2.92 | -.3142558 | -2.05 | -.2696736 | -4.73 | -.2825095 | -5.31 |
| Very bad | -.1025112 | -0.43 | -.5079933 | -1.84 | -.2603835 | -1.96 | -.2845565 | -2.40 |
| Public aid | | | | | | | | |
| No (ref.) | | | | | | | | |
| Yes | -.1210673 | -1.60 | -.14691 | -1.66 | -.0685638 | -2.00 | -.0825974 | -2.59 |
| R2 adjusted | 0.3894 | | 0.3490 | | 0.3821 | | 0.3919 | |
| sample size | | | 614 | | | | 614 | |

Table 5: Comparison of French, US and Spanish Results

| | US results (Ioannides & Rosenthal [1994]) | | French results (Arrondel and Lefebvre [2001a]) | | Spanish results | | |
|---|---|---|---|---|---|---|---|
| **Threshold values** | | | | | | | |
| $\alpha_1$ | -1.0122 | | -5.602 | | -.499 | | |
| *t-statistics* | *(-1.9046)* | | *(-29.155)* | | *(-1.756)* | | |
| $\alpha_2$ | -0.89671 | | -3.658 | | -.455 | | |
| *t-statistics* | *(-1.6873)* | | *(-19.107)* | | *(-1.601)* | | |
| $\alpha_3$ | 0.95617 | | -3.513 | | 2.081 | | |
| *t-statistics* | *(1.7952)* | | *(-18.432)* | | *(-72.852)* | | |
| | | | | | | | |
| **Hausman test between ordered and single Probit*** | | | | | | | |
| | *4-celled* | *3-celled* | *4-celled* | *3-celled* | *4-celled* | *3-celled* | |
| *NORENT1* | 62.3 | | 9418.9 | | -86,682 | | |
| *OWN* | 110.1 | 106.2 | - | 8272.2 | -125.523 | -120.928 | |
| *OWN2* | 134.3 | 152.2 | 13150.8 | 13320.6 | -88.073 | -118.397 | |
| | | | | | | | |
| *Total* | 306.7 | 258.4 | - | 21492.8 | -300.278 | -239.325 | |
| $\chi^2$(5%) | (79.1) | (55.75) | (176.3) | (122.1) | (54.57) | (54.57) | |
| | | | | | | | |
| **Tests between Demand functions** | | | | | **Without including inverse of Mills ratio** | | **Including inverse of Mills ratio** |
| *INVT-CONS2* | *n.a* | | 2.5 | | 1.29 | | 1.27 |
| *F (5%)* | *n.a* | | *(1.34)* | | *(1.34)* | | *(1.46)* |
| **Hausman test**** | | | | | *(Chi-squared 36 df.)* | | *(Chi-squared 37 df.)* |
| *INVT-CONS1* | 350.24 | | 1122.45 | | 75.83 | | 56.51 |



| | | | | |
|---|---|---|---|---|
| $\chi^2$(5%) | *(31.4)* | *(64.87)* | *(51.00)* | *(52.19)* |
| *CONS2-CONS1* | 23.88 | 117.69 | 63.85 | 59.00 |
| $\chi^2$(5%) | *(31.4)* | *(64.87)* | *(51.00)* | *(52.19)* |
| *TRAD-CONS1* | 16.33 | 77.58 | <0 | <0 |
| $\chi^2$(5%) | *(31.4)* | *(64.87)* | *(51.00)* | *(52.19)* |

* *OWN2* corresponds to households who own both primary residence and dwelling for renting out; *OWN* corresponds to households who own primary residence; *NORENT1* corresponds to households who own housing.

** *INVT* and *CONS2* are respectively the housing investment demand and the housing consumption demand of households who own both primary residence and dwelling for renting out. *CONS1* is housing consumption demand of households who own only their primary residence. *TRAD* is housing consumption demand of all households who own their primary residence.