DURABLE CONSUMPTION AND HOUSE PURCHASES: EVIDENCE FROM SPANISH PANEL DATA

Olympia Bover
and Ángel Estrada

Banco de España - Servicio de Estudios
Documento de Trabajo nº 9411

DURABLE CONSUMPTION AND HOUSE PURCHASES: EVIDENCE FROM SPANISH PANEL DATA

Olympia Bover
and Ángel Estrada (*)

(*) We are grateful to Manuel Arellano and Martin Browning for many helpful suggestions and discussions. We also thank Víctor Aguirregabiria, Fernando Restoy and Miguel Sebastián for their comments.

Banco de España - Servicio de Estudios
Documento de Trabajo nº 9411

In publishing this series the Banco de España seeks to disseminate studies of interest that will help acquaint readers better with the Spanish economy.

The analyses, opinions and findings of these papers represent the views of their authors; they are not necessarily those of the Banco de España.

ISBN: 84-7793-292-1
Depósito legal: M-11490-1994
Imprenta del Banco de España

ABSTRACT

In this paper we specify and estimate Euler equations for durable expenditure with house purchase effects which are interpreted as capturing the influence of housing decisions on the intertemporal allocation of durable expenditure. We use household panel data obtained from the Spanish Family Expenditure Survey (1985.I to 1991.IV). Our results indicate that there is a significant effect of purchase of the main residence on durable expenditure, the former being associated with around a tenfold increase in durable expenditure. This result leads us to believe that this is a relevant part of the explanation of the consumption increase in the 80's in Spain, given the increased demand for owner-occupied housing at the time.

I. INTRODUCTION

In the second half of the 80's a large increase in consumption took place in Spain. Looking at the growth rates of different expenditure groups (reported in Table 1) we see that aside from expenditure on vehicles, expenditure on other durables experienced the highest rates of growth in that period. During the same period the housing market boomed and house prices rose substantially. In the last column of Table 1 we report the growth rates of a series that we use as an approximation to the number of house purchases[1]. The comparison between the peaks and troughs of the growth rates of the series of durables and house purchases suggests an association between the two variables[2]. This is consistent with the view that the two variables reflect simultaneous decisions that are driven by the same exogenous factors. However, it is plausible that specific shocks to the housing market would only have an effect on durable expenditure through house purchases, in which case it would be possible to identify a direct effect of housing decisions on expenditure on durables provided there were a sufficient number of valid instrumental variables available. If, due to a lower user cost of housing during the housing boom in 1985-90, various cohorts of people entered the housing market earlier than before, this may have had an impact on the aggregate expenditure on durables.

In this paper we investigate the magnitude of the effect of house purchase decisions on durable expenditure (excluding cars) by estimating an instrumental variables equation using a quarterly rotating panel obtained from the Spanish Family Expenditure Survey 1985.I-1991.IV ("Encuesta Continua de Presupuestos Familiares"). A distinctive advantage of these data is that they provide information on durables expenditure and tenancy status and that, since households are interviewed for eight consecutive quarters, we observe at which point in time a house purchase decision occurs and, at the same time the evolution of expenditure on durables. The total number of households in the data set is 13539.

We cast our IV equation in the theoretical framework of intertemporal consumption models. There are not many studies available on life-cycle durable consumption using micro data, with some exceptions such as Bernanke (1984), Brugiavini and Weber (1992) and Alessie et al (1993) all of which investigate car expenditure and liquidity problems. For his part, Hayashi (1985) focuses on the different degrees of durability and the estimation of the fraction of the population for which expenditure tracks income. We specify Euler equations for expenditure on durables with house purchase effects which are interpreted as capturing the influence of housing decisions on the intertemporal allocation of durables expenditure. We follow Mankiw (1982) in deriving the Euler equation for durable expenditure from the conditions for the stock of durables. We find that the purchase of a house has a significant effect on the intertemporal expenditure on durables; buyers experience a substantial increase in their expenditure on durables following the purchase of a house. This leads us to conclude that part of the increase in the consumption of durables over the 1985-90 period was the result of an increase in the inflow of buyers into the housing market. We estimate that the purchase of a house multiplies expenditure of durables by around ten. Of course, since we are not attempting to specify a full model we cannot disentangle the contributions of the ultimate factors leading to both an increase in purchases and an increase in durable consumption. Probably, an improvement in permanent income expectations played a major role. However, what our results do suggest is that variables that relate to the housing market, such as the rate of return on buying a house, were also responsible for the increased consumption.

The relationship between consumption and the housing market boom has also been addressed from other angles. The UK also experienced in the late 80's an important increase in consumption, mainly in its durable component (see Attanasio and Weber (1992)), and a booming housing market. There has been some controversy concerning the reasons for such an increase in consumption and the potential influence of the housing market, bearing in mind the consequences for the balance of payments. Muellbauer and Murphy (1990), using time series data, argue that the 80's increase in house prices originated a sizable increase in consumption. This increase in consumption took place through a wealth

effect and due to the combination of high house prices and financial liberalization. The conclusions of this study have been controversial. In particular, King (1990) and Pagano (1990) supported the view that it is an increase in expected permanent income that may have caused the consumption increase. On the other hand, due to the aggregate nature of the data, it is difficult to distinguish between competing alternative hypotheses. In a recent study, using cohorts from the UK Family Expenditure Survey, Attanasio and Weber (1992) find that younger cohorts were mainly responsible for the increase in consumption. In their analysis, an increase in consumption by the young would be coherent with the increase in perceived permanent income hypothesis, while the house wealth hypothesis would explain increased consumption by the older leveraged households. For the US and Canada, Carroll and Summers (1987) point to the housing capital gains as one of the main factors behind the diverging patterns in private savings in the late 70's between the two countries. Bosworth, Burtless and Sabelhaus (1991) report some evidence using survey data that points in the same direction for the US. In Spain it is hard to look at similar data given the short series that are available on house prices and related magnitudes. However, there does not seem to be any casual evidence that higher liquidity of increased housing wealth was widely used by older households.

The paper is structured as follows. In Section II we describe the models and the econometric implementation we have adopted, taking into account the nature of durable goods. In Section III we describe the data and the results. Section IV contains the conclusions.

II. MODELS AND ECONOMETRIC ISSUES

The theory underlying our empirical models assumes an individual choosing the level of nondurable consumption C, the housing stock HS and the durables stock DS to maximise an intertemporal expected utility of the form

$$E_t \left\{ \sum_{s=t}^{T} \frac{1}{(1+\rho)^s} U_s[C_s, HS_s, DS_s, F(X_s)] \right\} \qquad (1)$$

subject to the sequence of period budget constraints

$$A_s = (1+r_{s-1})\, A_{s-1} + Y_s - p_{Cs}\, C_s - p_{Ds}[DS_s - (1-\delta_1)\, DS_{s-1})] - p_{Hs}[HS_s - (1-\delta_2)\, HS_{s-1}] \qquad (2)$$

where $E_t(.)$ denotes a conditional expectation given information available at time t, $F(X_s)$ represents an index of personal characteristics X in order to allow for heterogeneity in preferences, and ρ represents the time preference parameter. In the budget constraints, r denotes the real interest rate, A is real liquid assets and Y is real labour income; p_C, p_D and p_H represent the relative prices of nondurables, durables and housing, respectively. Lastly, δ_1 and δ_2 are durables and housing depreciation rates[3].

In the empirical analysis, all the variables are treated as household specific except for the prices and the interest and depreciation rates. This is also true of F, which could include an unobservable time-invariant individual effect.

The first order conditions for this problem are:

$$\frac{\partial U_t}{\partial C_t} = \lambda_t\, p_{Ct} \qquad (3)$$

$$\frac{\partial U_t}{\partial DS_t} = \lambda_t p_{Dt} - E_t\left[\frac{\lambda_{t+1}(1-\delta_1) p_{Dt+1}}{1+\rho}\right] \quad (4)$$

$$\frac{\partial U_t}{\partial HS_t} = \lambda_t p_{Ht} - E_t\left[\frac{\lambda_{t+1}(1-\delta_2) p_{Ht+1}}{1+\rho}\right] \quad (5)$$

$$E_t\left[\frac{(1+r_t)\lambda_{t+1}}{1+\rho}\right] = \lambda_t \quad (6)$$

where λ_t is the marginal utility of wealth. Equations (4) and (6) can be combined to obtain

$$\frac{\partial U_t}{\partial DS_t} = E_t\left[\frac{(1+r_t)}{1+\rho}\lambda_{t+1} p^*_{Dt}\right] = 0 \quad (7)$$

where $p^*_{Dt} = p_{Dt} - \frac{1-\delta_1}{1+r_t} p_{Dt+1}$ is the user cost or the rental equivalent. If p^*_{Dt} and $(1+r_t)\lambda_{t+1}$ are uncorrelated given information dated t, we can use (6) in order to eliminate λ_{t+1} from equation (7). A sufficient condition for this to hold is that p^*_{Dt} is known at time t. Using this assumption, we obtain an Euler equation for durables of the form:

$$E_t\left[\frac{1+r_t}{1+\rho}\frac{p^*_{Dt}}{p^*_{Dt+1}}\left(\frac{\partial U_{t+1}/\partial DS_{t+1}}{\partial U_t/\partial DS_t}\right)\right] = 1 \quad (8)$$

In the absence of this assumption, we could still use the equilibrium condition

$$E_t\left[\frac{1+r_t}{1+\rho}\frac{p^*_{Dt}}{p_{Ct+1}}\left(\frac{\partial U_{t+1}/\partial C_{t+1}}{\partial U_t/\partial DS_t}\right)\right] = 1 \quad (9)$$

as the basis for an estimable model.

If we consider the following instantaneous utility (see for example MaCurdy (1987) who uses a similar form)

$$U(C_t, HS_t, DS_t, X_t) = \exp\{\alpha_1 C_t + \alpha_2 HS_t + \alpha_3 DS_t + X_t'\gamma + \eta\} \tag{10}$$

where η is an individual effect, backdating (8) one period, the Euler equation will be of the form:

$$E_{t-1}[\exp\{\alpha_3 \Delta DS_t - \ln(1+\rho) + \alpha_2 \Delta HS_t + \alpha_1 \Delta C_t - \Delta \ln p^*_{Dt} + \ln(1+r_{t-1}) + \Delta X_t'\gamma\}] = E_{t-1}(1+\varepsilon_t) = 1 \tag{11}$$

where ε_t is defined as the expectational error such that $E_{t-1}(\varepsilon_t) = 0$. Dropping expectations, taking logs and solving for ΔDS_t we obtain:

$$\Delta DS_t = \beta_0 + \beta_1 \Delta HS_t + \beta_2 \Delta C_t + \beta_3 \Delta \ln p^*_{Dt} + \beta_4 \ln(1+r_{t-1}) + \beta_5' \Delta X_t + \xi_t \tag{12}$$

In relation to (11) we have $\xi_t = \ln(1+\varepsilon_t) - E[\ln(1+\varepsilon_t)]$. Therefore ξ_t will also be an expectational error in the sense that $E_{t-1}(\xi_t)=0$ provided $E_{t-1} \ln(1+\varepsilon_t) = E \ln(1+\varepsilon_t)$, which we take to be the case as an approximation. Alternatively, the analysis could be based on the nonlinear equation (11). Also note that, in theory, $\beta_3 = -\beta_4$.

Given equation (12) and the fundamental identity between the stock and the expenditure on durables (cd)

$$DS_t = (1 - \delta_1) DS_{t-1} + cd_t \tag{13}$$

it follows that the consumer expenditure on durables is driven by a process of the form (expanding on Mankiw (1982)):

$$\Delta cd_t = w_t' \phi_0 + w_{t-1}' \phi_1 + \left(\xi_t - (1-\delta_1)\xi_{t-1}\right) \tag{14}$$

where $w_t' = (1, \Delta HS_t, \Delta C_t, \Delta \ln p^*_{Dt}, \ln(1 + r_{t-1}), \Delta X_t')$, $\phi_0 = \beta = (\beta_0, \ldots\ldots, \beta_5)'$ and $\phi_1 = -(1-\delta_1)\beta$.

In our dataset we have continuous records on cd_t and c_t. Since cd_t measures quarterly expenditure on an aggregate of durable goods, only about 10 percent of the recorded expenditures in the sample are equal to zero. We use a binary indicator of whether the individual became house-owner between t and t-1 as the relevant housing variable. Specifically, $\Delta HS_t = 1$ if the household was renting in t-1 but became owner-occupier at t. This is taken as a rough proxy for the increase in the housing stock.

The unrestricted parameters ϕ_0 and ϕ_1 are estimated by instrumental variables methods using income, consumption and labour force variables, all dated t-2, time dummies and demographics. This includes the size of town of residence which is an important exogenous instrument in our context. We also estimate more general versions of the model in which the user cost and the interest rate variables are replaced by time dummies that will pick up the effect of any common aggregate shock[4]. Given the first-order moving average structure of the error, we assume as a starting point that endogenous variables dated t-2 or less, but not endogenous variables dated t-1, are valid instruments.

The IV estimates of ϕ_0 and ϕ_1 are based on cross-sectional orthogonality conditions of the form

$$b_t = \sum_{i=1}^{N} z_{it} \left(\Delta cd_{it} - w'_{it} \phi_0 - w'_{i(t-1)} \phi_1 \right) \qquad (t=2,\ldots,T) \qquad (15)$$

where N is the number of households in the sample and z_{it} is a vector of valid instruments for equation t; $\tilde{\phi}_0$ and $\tilde{\phi}_1$ are chosen to minimize

$$\sum_{t=2}^{T} \sum_{s=2}^{T} b'_t A_{ts} b_s \qquad (16)$$

where the A_{ts} are optimal weights. In the implementation of this procedure both t and T are individual specific since our sample is a rotating panel.

We obtain minimum distance estimates of β and δ_1 by minimizing

$$\begin{pmatrix} \hat{\phi}_0 - \beta \\ \hat{\phi}_1 + (1 - \delta_1)\beta \end{pmatrix}' \hat{V}^{-1} \begin{pmatrix} \hat{\phi}_0 - \beta \\ \hat{\phi}_1 + (1 - \delta_1)\beta \end{pmatrix} \qquad (17)$$

where $\hat{V}$ is an estimate of the asymptotic covariance matrix of $\hat{\phi}_0$ and $\hat{\phi}_1$. Standard errors for the resulting estimates $\hat{\beta}$ and $\hat{\delta}_1$ are obtained from their estimated covariance matrix $(\hat{D}' \hat{V}^{-1} \hat{D})^{-1}$, where $\hat{D}$ contains the partial derivatives of the restrictions given by

$$\hat{D} = \begin{pmatrix} I & 0 \\ -(1 - \hat{\delta}_1) I & \hat{\beta} \end{pmatrix} \qquad (18)$$

Note that our estimation procedure does not restrict the moving average coefficient of the error term to $(1 - \delta_1)$ as equation (14) suggests. Indeed, the empirical moving average structure of the error term may be the result of the moving average structure in (14) combined with ordinary measurement errors or unobserved random preferences.

III. DATA AND RESULTS

The data we use come from the Spanish Family Expenditure Survey ("Encuesta Continua de Presupuestos Familiares" (ECPF)) conducted by the Instituto Nacional de Estadistica (INE - the Spanish National Statistics Office). Every quarter around 3000 households are interviewed and for each household the interview is repeated for eight consecutive quarters at most since 1/8 of the sample is renewed every quarter. The survey is a mixture of diary records by the household for weekly expenditures and incomes and of a personal quarterly interview for expenditures and incomes that cover more than a week. The survey contains information on 268 expenditure categories, household characteristics and different sources of income.

The ECPF started in its current form in the first quarter of 1985. We use the waves up to the last quarter of 1991 to construct a "pooled rotating panel"; that is, given the length of our sample and the sample renewal rate, all the households appearing in our sample do not have a common interview quarter. Our sample includes 77441 observations corresponding to 13539 households. We have only considered households that stay in the survey for at least three quarters due to the timing of the instruments used in the estimation. We exclude households that report for some period zero non-durable expenditure or income, have lodgers, or misreport in the variables we use.

For an indication of the extent to which the ECPF data match the National Accounts (NA) series, we report in Table 2 for various consumption groups, the average growth rates over the period when data are available from both sources as well as the correlations of the annual growth rates. The correlations for the different consumption groups (except durables and food, drinks, tobacco and energy) are high although from the average growth rates there seems to be a degree of under-reporting by the ECPF. There is a substantial difference between the two sources in the data on consumption growth profiles for food, drink and energy. Under-reporting the intake of drinks and tobacco by the consumer is a common finding. We believe the difference may also be due to the fact that food, drinks, tobacco and part of energy consumption

is recorded by daily entries in a diary and no questions are asked at the personal interview. On the contrary, for more substantial items like clothing, footwear and durables, the record is monthly and questions are asked at the personal interview. As for the durables component (excluding cars), the correlation for annual rates is very low but the average growth rate over the period coincides. For the reasons given previously, we believe that durables expenditures are well recorded but the low correlation is due to the fact that the ECPF records actual payments made for durables and, on the contrary, the National Accounts reflect the full value of the durable purchase. The extended practice of purchases of durables with credit may explain the low correlation. Another possibility is that the ECPF is unable to obtain data from the rich and the very rich. Over the period however, the average rate of growth of durables (excluding cars) matches.

An important variable for our analysis is the increase in the housing stock, ΔHS_t. The ECPF records for every quarter the tenancy regime of the household's main and secondary residence (if any). Therefore, through repeated interviews we observe at which point in time the household ceases to be a tenant (or to be in some free or semi-free accommodation) to become an owner-occupier. We define two 0-1 dummies, one indicating whether the household has become owner of his main residence (between t and t-1) and a second one indicating whether the household has become owner of a second residence. These are taken to be proxies for the increase in the housing stock, given that the ECPF does not provide any value of housing stock. Note that we cannot identify households owning at t-1 that have moved between t and t-1 and remain owners at t. More importantly however, what we cannot identify with the ECPF is young people, previously living with their parents, who start up a home and buy directly their first house. To be able to identify a purchase we must observe the household renting (or being in some free or semi-free accommodation) the previous quarter. However, if the results indicate that a purchase is associated with an increase in durables expenditure even without this group of the population, we believe the association would be stronger if we were able to observe them. The other variables used in this work are described in the Data Appendix.

We have estimated the unrestricted Euler equations by instrumental variables using the DPD program written by Arellano and Bond (1988). We have chosen to use simple IV estimates rather than the generalised method of moments estimator proposed by Arellano and Bond (1991) because our time dimension is 28 quarters and, therefore, even for reasonable choices we had well over two hundred instruments. The instruments used are log of non-durable consumption, an index 0-1 to indicate non zero durable expenditure, log of real income, labour force variables (the detailed list of instruments is given at the bottom of table 3), all dated t-2, demographics and time dummies. Regional economic variables would be very valuable instruments in our context but, unfortunately, we were unable to obtain the household's region identifier. Note that the standard errors reported are robust to general forms of heteroscedasticity and serial correlation.

The results obtained from the minimum distance estimation are reported in Table 3. The specification involving the user cost and the interest rate terms is not satisfactory (column 3, Table 3). This is not very surprising given that these variables do not have individual variation and therefore they are not the ones implied ideally by the theory. Since this specification is nested in the more general specifications that include time dummies, we focus our attention on the latter. Indeed, the time dummies will allow for any macroeconomic influence, including the user cost and the interest rate which are not household-specific.

The main result that seems to emerge is that the purchase of the main residence is important in explaining the intertemporal pattern of durable expenditure. This purchase is associated with an increase in durables expenditure of over 280 thousand pesetas over the quarter. Given the sample mean of durable expenditure this would indicate an approximatively tenfold increase in durable expenditure. Note that to judge the significance of these estimates we have to take into account that despite the large sample size, the number of households that become owners of their main residence is only 375 (ie a 0.48% of the sample). Furthermore, this finding is made more remarkable by the fact that we cannot pin down new households buying their first home and therefore we believe that in the entire population this effect could be stronger.

Our evidence on the influence of a second residence on durable expenditure is weaker. Reasonably, the magnitude of the effect is much smaller (an increase of around 80 thousand pesetas) and on the verge of significance. Therefore, one conclusion is that it is relevant to distinguish between purchase of the main residence and purchase of secondary housing.

When studying the potential association between house purchase and durables, we account for the potential influence of non-durable expenditure on intertemporal durable expenditure (Bernanke (1985), with aggregate data, did not reject the less restrictive assumption of strong separability). Our results suggest a significant influence and this may be relevant for the study of the intertemporal non-durable consumption function.

The utility function may depend on individual and household characteristics and hence we included different demographic variables. The only variables that seem to matter somehow are the ones that measure changes in the number of young children (aged 0 to 5).

It has often been argued in the literature on intertemporal (non-durable) consumption that it is important to condition on labour force participation variables (see for example Attanasio and Browning (1991)). We have tried different household labour supply variables but none of them proved significant. As an illustration, we report in column 2 the estimates obtained when the number of income earners in the household is included.

The effects of the conditioning variables, such as the housing stock or non-durable consumption, are interpreted within our model as reflecting the influence of these variables on the intertemporal allocation of durable consumption but not on the demand system (for a detailed explanation of the distinction see MaCurdy (1983) and Blundell, Browning and Meghir (1992)). Outside our theoretical model, the significant effects of the conditioning variables could be interpreted as an indication of strong non-separability that would be also reflected in the demand system. This has not been formally considered given the form for the utility function that we have adopted (for a similar interpretation see Attanasio and Weber (1992)).

The estimate for the durables depreciation rate is not significantly different from unity, which means that we find no evidence of a reversion of the initial impact of the conditioning variables. This would imply a pattern for durable expenditure too close to the one for non-durables to be consistent with the life-cycle-permanent income hypothesis. Mankiw (1982) found a similar result with aggregate data. Although particular groups of durables may have a much smaller depreciation rate and therefore imply infrequent purchase at the individual level, spending on the total of durables is far more frequent and therefore durable expenditure may behave more like non-durable expenditure. Indeed, Caballero (1993) shows that aggregation across individuals or across goods may produce the kind of smooth behaviour for durable expenditure that we observe in the data. This aggregation (either across individuals or across goods) would eventually induce a reversion of the initial impact but only slowly, in the long run (see Caballero (1990,1993)). However, an important conclusion in our case is that housing decisions have an important impact on the change in durable expenditure and that this impact may be reversed but only in the long run.

It is worth stressing that the estimates are very robust to changes in the instrument set. Our estimated equations do satisfy the Sargan test of overidentifying restrictions and the minimum distance test accepts the restrictions implied by the theoretical model. We also report moment tests for serial correlation. They indicate presence of first order serial correlation (but not second) which is coherent with our theoretical model. Accordingly, all our potentially endogenous variables are dated t-2 when used as instruments.

The results clearly show a significant house purchase effect. As always, we cannot be sure up to what extent this is free from finite sample simultaneity bias which is specially hard to get rid of when the instruments are only weakly correlated with the endogenous variables as in our case (see for example the recent discussion in Bound et al. (1993)). However an important consideration here is that the OLS estimates of our equation provide very different results from those obtained using instrumental variables. Indeed, according to the OLS results in col. 4 (Table 3) the house purchase effect would be completely insignificant.

Given the way we define a house purchase to occur in our data, it would be possible that sometimes what we take to be a purchase is only a move back to a house acquired earlier. To check the robustness of our results to different definitions of house purchase we construct, aside from our basic sample, other samples using more restrictive criteria for the house purchase definition. For example, for one sample we dropped families for which our original definition of purchase identified two purchases of main accommodation with an interim in free (or semi-free) housing. In the most restrictive sample we constructed, we dropped families for which a purchase was identified because there was a very short spell (one quarter) in a different tenancy regime (for example, families owning continuously over the period except for one quarter where they declare to be renting or in some sort of free accommodation). For all the different definitions of house purchase the results are qualitatively the same with very small changes in coefficient estimates and standard errors.

IV. CONCLUSIONS

Looking at the evolution of consumption growth over the second half of the 80's we can see that in Spain (and other countries such as the UK) durable consumption experienced the highest rates of growth. We believe it is important that more research should be aimed at studying durables rather than non-durables, to which substantial literature has already been devoted. In this paper we have specified and estimated a life-cycle model that allows for different variables to affect the intertemporal pattern of durables expenditure and in particular for the housing stock to influence the inter-period allocation of durable expenditure (excluding cars) using panel data obtained from the Spanish Family Expenditure Survey (1985.I to 1991.IV). Our results indicate that there is a significant direct effect of purchase of the main residence on durable expenditure, the former being associated with around a tenfold increase in durable expenditure. We believe this is a relevant part of the explanation of the consumption increase in the 80's given the increased demand for owner-occupied housing at the time. We do not study which factors did ultimately produce both phenomena. It probably was mostly an increase in perceived permanent income. However the results do suggest that housing market variables, like the expected rate of return on owner-occupied housing, are relevant in understanding the durable consumption boom of the 80's.

Data Appendix

Household variables

Source: Family Expenditure Surveys ("Encuesta Continua de Presupuestos Familiares") from 1985 first quarter to 1991 fourth quarter, provided by the "Instituto Nacional de Estadistica" (INE-National Statistics Office).

Durables expenditure. This includes furniture, fixtures, household textiles, heating and cooking appliances, refrigerators, washing machines, glassware, tableware, equipment and accessories for recreational activities, personal care items, jewellery, watches, rings and other personal goods, therapeutic appliances and equipment. Repairs on those items are also included. Only actual payments are recorded.

Non-durables expenditure. This is obtained by excluding from total expenditure:

(i) Car expenditure, which includes personal transport, tires, tubes and repairs.

(ii) Housing expenditure, which includes actual or imputed rents and water charges.

(iii) Durables expenditure.

This classification corresponds to the UN classification with the exception of clothing and footwear which are accounted for as non-durables instead of semi-durables as in the UN classification.

Becoming a main-residence owner-occupier. We define a household as "becoming main-residence owner-occupier" when it is observed to be the owner of the main residence the current quarter but was observed the previous quarter in some other tenancy status (free or semi-free usage, renting).

Becoming a second-residence owner. This variable was constructed in the same way as the main-residence one but there is an extra category for people with no second residence.

Number of household members, by age groups. From the age variable available for all the family members we construct six variables indicating the number of members:

0 - 2 years old
3 - 5 " "
6 - 14 " "
15 - 18 " "
19 - 65 " "
65 and over

Number of income earners. This variable indicates the number of family members that receive some sort of monetary income (wage or others). From this variable we have as well four 0-1 dummies indicating whether it is a zero, one, two, three or four and over earners household.

Head of household education. We consider the following categories:

illiterate
no schooling
primary education
lower secondary education
upper secondary education
higher education - first degree
higher education - completed higher education and post-graduate studies

City of residence size. We consider the following categories:

less than 10000 inhabitants
between 10001 and 50000
between 50001 and 500000
more than 500000

We also construct a 0-1 dummy indicating whether the household has changed town size group.

Household structure. We define two 0-1 dummies. One to indicate households where the only member is an over-65 person, the other to indicate couple-with-one-child households.

Head of household sex. We define a 0-1 dummy indicating the sex of the head.

Head of household labour market variables. We consider 0-1 dummies for the following categories

not in the labour force

in the labour force - { employee - { blue collar / white collar }, self-employed, unemployed }

Head's spouse labour market variables. We use the same classification as above but without distinguishing between blue and white collar workers.

Income. This variable relates to the household and includes all sorts of payments (payments in money including transfers and payments in kind).

<u>National Economic Variables</u>

Interest rate: Overall credit rate. Including (weighted by balances according to periods) mortgage loans, commercial discounts and loans and credits to households and firms. Source: Cuenca (1991).

Durables price index: Weighted average of the corresponding items of the CPI (base 1983). Source: INE and Banco de España.

Non-durables price index: Constructed in the same way as the durables price index. Source: INE and Banco de España.

Aggregate purchases: "Fincas enajenadas urbanas mediante precio, excluyendo opción de re-compra". Source: "Dirección General de los Registros y del Notariado".

Durables depreciation rate: It is assumed to be (1/18) per quarter, in line with other studies (see eg. Muellbauer (1981)).

In Tables A.1 and A.2 we provide frequencies and sample statistics of the variables.

Table A1. Sample statistics of the variables
Discrete variables

	Number	Percentage
Total number of observations	77441	100
Number of households	13539	100
Length of stay in the Survey		
Three quarters	5565	7.19
four quarters	9152	11.82
five quarters	11480	14.82
six quarters	11604	14.98
seven quarters	11816	15.26
eight quarters	27824	35.93
Main residence tenancy status		
own	60268	77.82
rent	11454	14.79
other	5717	7.38
Second residence tenancy status		
no second residence	69341	89.54
own	7554	9.75
rent	297	0.38
other	249	0.32
Number of income earners		
zero	494	0.64
one	39843	51.45
two	26090	33.69
thee	8182	10.57
four	2146	2.77
five	589	0.76
six	79	0.10
seven	16	0.02
eight	2	0.0
Head of household education		
illiterate	3396	4.39
no schooling	19227	24.83
primary education	36187	46.73
lower secondary education	6764	8.73
upper secondary education	6305	8.14
higher education - 1st degree	3020	3.90
higher education - completed and post graduate studies	2542	3.28
City of residence size		
less than 10000 inhabitants	22469	29.01
between 10001 and 50000	16314	21.07
between 50001 and 500000	27288	35.24
over 500000	11370	14.68
Household structure		
only one member and over 65	4068	5.25
couple with one child	5018	6.48
Head of household sex		
male	65067	84.02
female	12374	15.98

(cont.)

	Number	Percentage
(table A1. cont.)		
Head of household labour market status		
not in the labour force	27086	34.98
in the labour force	50355	65.02
. employee		
blue collar	8928	11.53
white collar	26337	34.01
. self-employed	11627	15.01
. unemployed	3463	4.47
Head's spouse labour market status		
no spouse present	15186	19.61
not in the labour force	49000	63.27
in the labour force	13255	17.12
employee	8365	10.80
self-employed	3569	4.61
unemployed	1321	1.71
Zero durable expenditure	8955	11.56
Variables involving change		
Total number of observations	63902	100
Becoming main-residence owner-occupier	375	0.59
Becoming second-residence owner	701	1.10
Change in town size group	103	0.16
cd_t or cd_{t-1} is zero	13080	20.47

Table A2. Sample statistics of the variables.
Continuous variables

	Mean	Standard deviation	Min.	Max.
Real durable expenditure	29471.3	53617.5	0	1770225
Real non-durable expenditure	210005.8	140735.4	1137.0	5759497
Real household income	284147.4	199198.7	0.325	7014598
Durables price index	1.35	0.11	1.13	1.53
Non-durables price index	1.48	0.18	1.19	1.80
Retail price index	1.46	0.17	1.17	1.78
Annual interest rate	0.16	0.01	0.14	0.17

NOTES

1. It is difficult to obtain an aggregate series that represents exactly this magnitude. We report a series on the number of real estate urban transactions which includes land and buildings but excludes inherited property, donations and back-purchase lending agreements.

2. Regreatedly in 1979, a year in which housing purchases growth peaked, there were no official disaggregated consumption data in the National Accounts and, on the contrary, in 1986 there was an important increase in durables consumption but the housing transactions data was not published. However, in 1986, from the Family Expenditure Surveys, we observe an important peak in the rate of growth of the number of households that are owner-occupiers, despite this being a less sensitive series due to its stock nature.

3. Our empirical model would not be altered if the individual perceives some return r^R on holding a house. In such case, δ_2 would be replaced by $(\delta_2 - r^R/p_{Hs})$.

4. Given the chosen utility function, our empirical specifications using time dummies do not rely on the assumption about p^*_{Dt} made to obtain (8). They can also be interpreted in terms of (9).

Table 1

CONSUMPTION AND NUMBER OF REAL ESTATE URBAN TRANSACTIONS

RATES OF GROWTH

	Total consumption	Non-durable consumption	Cars	Durable consumption (other than cars)	Real estate transactions
1971	5.10	4.62	11.44	7.86	7.40
1972	8.30	7.15	27.34	13.07	16.39
1973	7.80	7.46	21.08	5.52	9.19
1974	5.10	5.89	-3.10	1.25	10.76
1975	1.80	2.20	-0.60	-1.25	6.94
1976	5.60	5.54	7.60	5.31	4.14
1977	1.50	1.21	8.30	1.36	12.81
1978	0.90	*	-1.33	*	-4.88
1979	1.30	*	-5.10	*	11.18
1980	0.60	*	-7.49	*	-4.90
1981	-1.26	-0.81	-12.11	-1.62	-1.97
1982	-0.11	-0.07	5.41	-2.80	7.95
1983	0.29	0.08	2.77	1.65	11.03
1984	-0.21	0.46	-5.87	-5.47	-5.36
1985	3.53	3.14	10.51	5.36	-0.79
1986	3.32	2.40	19.09	7.25	**
1987	5.79	4.60	33.98	5.23	**
1988	4.76	3.96	15.50	7.10	7.03
1989	5.80	5.46	7.50	8.38	18.24

* Official desegregated consumption data for 1978, 1979 and 1980 (1970 base) were not published. Cars expenditure can be quite safely estimated from registration-plate records.

** 1986 value for the number of transactions was not published

Source: National Accounts (INE),
"Anuario de la Dirección General de los Registros y del Notariado",
Banco de España.

Table 2

COMPARING CONSUMPTION GROWTH RATES FROM THE ECPF AND THE NATIONAL ACCOUNTS

	Average real growth rate 1986-1990		Correlation annual growth rates
	NA	ECPF	
Total consumption	4.91	3.67	0.79
Total consumption excluding housing	5.40	3.69	0.71
Non-durable consumption	4.11	2.88	0.88
Non-durable consumption excluding housing	4.53	2.70	0.68
Food, Drink, Tobacco and Energy	2.76	1.84	0.20
Total Durable consumption	11.07	8.76	0.18
Car durable consumption	19.02	12.20	0.58
Durable consumption excluding cars	6.99	6.89	0.13

Table 3
INTERTEMPORAL DURABLE EXPENDITURE EQUATIONS

	1 IV	2 IV	3 IV	4 OLS
Becoming main-residence owner-occupier	2814.385 (2.45)[1]	2792.660 (2.42)	-1493.677 (1.74)	64.442 (1.19)
Becoming a second-residence owner	770.166 (1.98)	829.522 (1.98)	1935.181 (1.99)	41.520 (1.21)
Δ non-durables consumption	0.201 (3.0)	0.236 (2.11)	-0.003 (0.22)	0.039 (6.15)
Δ nº of 0-2 years old	33.294 (1.23)	29.921 (1.02)	73.782 (3.03)	48.655 (2.11)
Δ nº of 3-5 years old	34.442 (1.29)	32.519 (1.18)	47.561 (2.06)	42.563 (1.87)
Δ nº of 6-13 years old	24.872 (1.31)	23.902 (1.24)	34.906 (1.92)	19.792 (1.18)
Δ nº of earners	-	-20.912 (0.41)	-	-
Depreciation rate (δ_1)	0.939 (29.46)	0.943 (34.80)	0.430 (2.57)	0.751 (6.44)
Δln user cost	-	-	-103.974 (3.11)	-
$\ln(1+r_{-1})$	-	-	-1099.794 (1.85)	-
Time dummies	yes	yes	-	yes
Seasonal dummies	-	-	yes	-
Sargan test[3]	12.44 (26)[2]	11.97 (24)	55.91 (44)	-
Test for 1st order serial correlation[3]	-9.98	-8.98	-8.96	-17.5
Test for 2nd order serial correlation[3]	-1.37	-1.28	-1.09	-1.84
Minimum Distance test for the validity of the restrictions	2.92 (5)[2]	3.15 (6)	15.84 (7)	14.01 (5)

Notes: 1 - t-ratios in brackets. Standard errors are robust to heteroscedasticity and serial correlation
2 - degrees of freedom
The 64 instruments used are:
est1 to est6: dummies for education of head
sexm : sex of head
nmeda: nº of members of the household that are 0 - 2
nmedb: " " " " " " " " 3 - 5
nmedc: " " " " " " " " 6 - 13
nmedd: " " " " " " " " 14 - 17
nmede: " " " " " " " " 18 - 64
nmedf: " " " " " " " " 65 and over
nmeda(-1), nmedb(-1), nmedc(-1),
tmr1, tmr2, tmr3 which are dummies indicating size of town of residence,
cdumres, dummy indicating whether there has been a move between the previous size of town categories,
th2, th4, th2(-1), th4(-1) dummies for household composition,
np0(-2), np1(-2), np2(-2), np3(-2) dummies indicating whether it is a household with none, one, two, three earners,
par(-2), inac(-2), bluecol(-2), whitecol(-2), dummies on labour force status of the head at t-2,
inacc(-2), asalc(-2), selfemc(-2) " " " " the spouse at t-2,
lnc(-2) log of nondurables at t-2,
lnincr(-2) log of real income at t-2,
ind(-2) 0-1 dummy indicating whether there was expenditure on durables at t-2,
time dummies.
3 - calculated from the unrestricted estimates.

REFERENCES

ALESSIE, R., DEVEREUX, M. and G. WEBER (1993): "Intertemporal Consumption, Durables and Liquidity Constraints: A Cohort Analysis" IFS, mimeo.

ARELLANO, M. and S. BOND (1988): "Dynamic Panel Data Estimation Using DPD - A Guide for Users", IFS Working Paper 88/15, London.

ARELLANO, M. and S. BOND (1991): "Some Test of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations", Review of Economic Studies, 277-297.

ATTANASIO, O. and M. BROWNING (1991): "Consumption over the Life Cycle and over the Business Cycle", mimeo, Stanford.

ATTANASIO, O. and G. WEBER (1992): "Consumption Growth and Excess Sensitivity to Income: Evidence from US Micro Data", mimeo.

ATTANASIO, O. and G. WEBER (1992): "The UK Consumption Boom of the late 1980's: Aggregate Implications of Microeconomic Evidence", mimeo.

BERNANKE, B.S. (1984): "Permanent Income, Liquidity, and Expenditure on Automobiles: Evidence from Panel Data", The Quarterly Journal of Economics, August, 587-614.

BERNANKE, B.S. (1985): "Adjustment Costs, Durables, and Aggregate Consumption", Journal of Monetary Economics, january, 41-68.

BLUNDELL, R., BROWNING, M. and C. MEGHIR (1992): "Consumer Demand and the Life-Cycle Allocation of Household Expenditures", mimeo, forthcoming in The Review of Economic Studies.

BOSWORTH, B., BURTLESS, G. and J. SABELHAUS (1991): "The Decline in Saving: Evidence from Household Surveys", Brookings Papers on Economic Activity, 183-256.

BOUND, J., JAEGER, D.A. and R. BAKER (1993): "The Cure can be Worse than the Disease: A Cautionary Tale Regarding Instrumental Variables", NBER Technical Paper Series No. 137.

BRUGIAVINI, A. and G. WEBER (1992): "Durable and Nondurable Consumption: Evidence from Italian Household Data", IFS Working Paper nº W92/13.

CABALLERO, R.J. (1990): "Expenditure on Durable Goods: A Case for Slow Adjustment", Quarterly Journal of Economics, August, 727-744.

CABALLERO, R.J. (1993): "Durable Goods: An Explanation for their Slow Adjustment", Journal of Political Economy, April, 351-384.

CARROLL, C. and L. SUMMERS (1987): "Why Have Private Savings Rates in the United States and Canada Diverged?", Journal of Monetary Economics, september, 249-279.

CUENCA, J.A. (1991): "La construcción de variables financieras para el análisis del sector monetario de la economia española", mimeo, Banco de España, Servicio de Estudios.

HAYASHI, F. (1985): "The Permanent Income Hypothesis and Consumption Durability: Analysis based on Japanese Panel Data", The Quarterly Journal of Economics, November, 1083-1113.

KING, M. (1990): "Discussion", Economic Policy, 383-387.

MACURDY, T. (1983): "A Simple Scheme for Estimating an Intertemporal Model of Labour Supply and Consumption in the Presence of Taxes and Uncertainty", International Economic Review, june, 265-289.

MACURDY, T. (1987): "A Framework for Relating Microeconomic and Macroeconomic Evidence of Intertemporal Substitution", in Advances in Econometrics - Fifth World Congress of the Econometric Society Vol. II, Ed.: Truman Bewley, New York: Cambridge University Press, 1987, pp. 149-176.

MANKIW N.G. (1982): "Hall's Consumption Hypothesis and Durable Goods", Journal of Monetary Economics, 417-425.

MUELLBAUER, J. (1981): "Testing Neoclassical Models of the Demand for Consumer Durables", in Essays in the Theory and Measurement of Consumer Behaviour in honour of Sir Richard Stone, edited by Angus Deaton, Cambridge University Press.

MUELLBAUER, J. and A. MURPHY (1990): "Is the UK Balance of Payments Sustainable?", Economic Policy, 345-383.

PAGANO, M. (1990): "Discussion", Economic Policy, 387-390.

WORKING PAPERS (1)

9301 **Emiliano González Mota:** Políticas de estabilización y límites a la autonomía fiscal en un área monetaria y económica común.

9302 **Anindya Banerjee, Juan J. Dolado and Ricardo Mestre:** On some simple tests for cointegration: the cost of simplicity.

9303 **Juan Ayuso and Juan Luis Vega:** Weighted monetary aggregates: The Spanish case. (The Spanish original of this publication has the same number.)

9304 **Ángel Luis Gómez Jiménez:** Indicadores de la política fiscal: una aplicación al caso español.

9305 **Ángel Estrada y Miguel Sebastián:** Una serie de gasto en bienes de consumo duradero.

9306 **Jesús Briones, Ángel Estrada e Ignacio Hernando:** Evaluación de los efectos de reformas en la imposición indirecta

9307 **Juan Ayuso, María Pérez Jurado and Fernando Restoy:** Credibility indicators of an exchange rate regime: the case of the peseta in the EMS. (The Spanish original of this publication has the same number.)

9308 **Cristina Mazón:** Regularidades empíricas de las empresas industriales españolas: ¿existe correlación entre beneficios y participación?

9309 **Juan Dolado, Alessandra Goria and Andrea Ichino:** Immigration and growth in the host country.

9310 **Amparo Ricardo Ricardo:** Series históricas de contabilidad nacional y mercado de trabajo para la CE y EEUU: 1960-1991.

9311 **Fernando Restoy and G. Michael Rockinger:** On stock market returns and returns on investment.

9312 **Jesús Saurina Salas:** Indicadores de solvencia bancaria y contabilidad a valor de mercado.

9313 **Isabel Argimón, José Manuel González-Páramo, María Jesús Martín y José María Roldán:** Productivity and infrastructure in the Spanish economy. (The Spanish original of this publication has the same number.)

9314 **Fernando Ballabriga, Miguel Sebastián and Javier Vallés:** Interdependence of EC economies: A VAR approach.

9315 **Isabel Argimón y M.ª Jesús Martín:** Series de «stock» de infraestructuras del Estado y de las Administraciones Públicas en España.

9316 **Pedro Martínez Méndez:** Fiscalidad, tipos de interés y tipo de cambio.

9317 **Pedro Martínez Méndez:** Efectos sobre la política económica española de una fiscalidad distorsionada por la inflación.

9318 **Pablo Antolín and Olympia Bover:** Regional Migration in Spain: The effect of Personal Characteristics and of Unemployment, Wage and House Price Differentials Using Pooled Cross-Sections.

9319 **Samuel Bentolila y Juan J. Dolado:** La contratación temporal y sus efectos sobre la competitividad.

9320 **Luis Julián Álvarez, Javier Jareño y Miguel Sebastián:** Salarios públicos, salarios privados e inflación dual.

9321 **Ana Revenga:** Credibility and inflation persistence in the European Monetary System. (The Spanish original of this publication has the same number.)

9322 **María Pérez Jurado and Juan Luis Vega:** Purchasing power parity: An empirical analysis. (The Spanish original of this publication has the same number.)

9323 **Ignacio Hernando y Javier Vallés:** Productividad sectorial: comportamiento cíclico en la economía española.

9324 **Juan J. Dolado, Miguel Sebastián and Javier Vallés:** Cyclical patterns of the Spanish economy.

9325 **Juan Ayuso y José Luis Escrivá:** La evolución del control monetario en España.

9326 **Alberto Cabrero Bravo e Isabel Sánchez García:** Métodos de predicción de los agregados monetarios.

9327 **Cristina Mazón:** Is profitability related to market share? An intra-industry study in Spanish manufacturing.

9328 **Esther Gordo y Pilar L'Hotellerie:** La competitividad de la industria española en una perspectiva macroeconómica.

9329 **Ana Buisán y Esther Gordo:** El saldo comercial no energético español: determinantes y análisis de simulación (1964-1992).

9330 **Miguel Pellicer:** Functions of the Banco de España: An historical perspective.

9401 **Carlos Ocaña, Vicente Salas y Javier Vallés:** Un análisis empírico de la financiación de la pequeña y mediana empresa manufacturera española: 1983-1989.

9402 **P. G. Fisher and J. L. Vega:** An empirical analysis of M4 in the United Kingdom.

9403 **J. Ayuso, A. G. Haldane and F. Restoy:** Volatility transmission along the money market yield curve.

9404 **Gabriel Quirós:** El mercado británico de deuda pública.

9405 **Luis J. Álvarez and Fernando C. Ballabriga:** BVAR models in the context of cointegration: A Monte Carlo experiment.

9406 **Juan José Dolado, José Manuel González-Páramo y José M.ª Roldán:** Convergencia económica entre las provincias españolas: evidencia empírica (1955-1989).

9407 **Ángel Estrada e Ignacio Hernando:** La inversión en España: un análisis desde el lado de la oferta.

9408 **Ángel Estrada García, M.ª Teresa Sastre de Miguel y Juan Luis Vega Croissier:** El mecanismo de transmisión de los tipos de interés: el caso español.

9409 **Pilar García Perea y Ramón Gómez:** Elaboración de series históricas de empleo a partir de la Encuesta de Población Activa (1964-1992).

9410 **F. J. Sáez Pérez de la Torre, J. M.ª Sánchez Sáez y M.ª T. Sastre de Miguel:** Los mercados de operaciones bancarias en España: especialización productiva y competencia.

9411 **Olympia Bover and Ángel Estrada:** Durable consumption and house purchases: Evidence from Spanish panel data.

(1) Working Papers prior to 1993 are listed in Banco de España's publications catalogue.

Queries should be addressed to: Banco de España
Sección de Publicaciones. Negociado de Distribución y Gestión
Teléfono: 338 51 80
Alcalá, 50. 28014 Madrid