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Journal:	*Applied Economics*
Manuscript ID:	APE-06-0082.R1
Journal Selection:	Applied Economics
JEL Code:	D12 - Consumer Economics: Empirical Analysis < D1 - Household Behavior and Family Economics < D - Microeconomics, E21 - Consumption|Saving < E2 - Consumption, Saving, Production, Employment, and Investment < E - Macroeconomics and Monetary Economics, D91 - Intertemporal Consumer Choice|Life Cycle Models and Saving < D9 - Intertemporal Choice and Growth < D - Microeconomics
Keywords:	permanent income model, excess sensitivity, separability, heterogeneity

Full title: Further evidence of excess sensitivity of consumption?. Non-separability among goods and heterogeneity across households

Running title: The excess sensitivity of consumption to predictable income with Spanish data

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ABSTRACT

The standard theoretical framework for analysing households' intertemporal decisions is the life-cycle/permanent income model. Among its implications, testing the model allows to analyse the response of consumption to fiscal policy. However, the empirical literature with microdata has yielded mixed results. This paper examines the sensitivity of the results to the assumption of separability among goods and of homogeneity across households. For that purpose, we test a rational expectations permanent income model with household data drawn from the Spanish Family Expenditure Survey. This survey contains detailed information on total expenditure, and the income presents large, exogenous quarterly changes due to an institutional feature. The paper shows that assuming separability among commodities biases the test against the model. When separability is not imposed, we show that the rejection of the model depends on heterogeneity across households in terms of their members being unemployed or not. For those households permanently employed, the model cannot be rejected whatever their income status.

1. Introduction

Since Robert Hall's paper (1978), most studies of consumption have focused on Euler equations. The rational expectations permanent income hypothesis (henceforth the REPIH) states that households incorporate any available information into consumer-related decision making. Therefore, changes in household consumption should not respond to predicted income growth. In this sense, a tax policy's ability to affect the aggregate demand depends on the acceptance of the REPIH: if households are foresighted, only unexpected changes affecting their permanent income will modify current consumption.

Most of the early studies that tested Hall's model used aggregate data (e.g. Flavin, 1981; Hayashi, 1982; Campbell and Mankiw, 1989). However, the possibility of controlling for heterogeneity across households and of avoiding distortions caused by the aggregation of micro-level non-linear relations has gradually directed analyses of the intertemporal allocation of consumption towards the field of microeconomics, which also happens to be the level at which theories were formulated (Heckman, 2001). A review of empirical literature based on household data indicates that the rejection of the model is sensitive to the measure of consumption analysed (Lage, 1991; Ziliak, 1998; Parker, 1999; Soulesles, 1999, 2002), to the set of imposed separability hypotheses, mainly centred on leisure/consumption-type decision making (Attanasio and Browning, 1995; Attanasio and Weber, 1995) and on decisions associated with the family's demographic composition (Attanasio and Browning, 1995; Attanasio and Weber, 1995), or to the power of the instruments used to predict income growth (Altonji and Siow, 1987; Shea, 1995; Lusardi, 1996; Soulesles, 1999).

Although the overall rejection of the model has been reduced by taking into account the above aspects, there is no sufficient consensus as yet (Deaton, 1992; Browning and Lusardi, 1996; Attanasio, 1999). For this reason, in recent years a number of different studies have emerged that take advantage of existing "institutional features" associated with household income. These studies analyse situations in which individuals have prior knowledge of changes in their income. This can be construed as a "natural experiment" of the REPIH: if individuals are forewarned of variations in their income, their consumption patterns should not vary when their income changes.

These articles have mainly followed two alternative approaches. One consists of testing households' response to announced tax changes[1] (Shapiro and Slemrod, 1995; Soulesles, 2002).[2] The problem with this approach resides in the difficulty in discerning whether tax changes are permanent or transitory (Watanabe *et al*., 2001). A second approach has focused on households' reactions to intrayear fluctuations in income. Thus Paxson (1993) and Browning and Collado (2001) compare expenditure patterns across the year in Thailand and Spain, respectively, between households with an uneven intrayear income distribution and those with a more homogenous one. Other authors have analysed the excess sensitivity of consumption to intrayear income variations caused by tax refunds (Soulesles, 1999; Hsieh, 2003) or by the cessation of Social Security taxes (Parker, 1999). Finally, Stephens (2003, 2006) examines whether spending is sensitive to the time of month when people receive their pay in Great Britain and their Social Security cheques in the United States, respectively. Overall, the results of this second approach are not conclusive, with fewer studies that fail to reject the REPIH (Paxson, 1993; Browning and Collado, 2001; Hsieh, 2003). Nevertheless, in some of these articles income changes are small. In this context, if individuals must incur big costs in order to smooth consumption,

[1] A similar proposal is that made by Levenson (1996), who analyses whether households in Taiwan increased their consumption after an announced reform to the Social Security that represented windfall retirements/severance benefits.

then the rejection of the REPIH might be due to a near-rational type of behaviour (Thaler, 1990).

This paper aims to contribute towards testing the REPIH by taking advantage of information available in the Spanish Family Expenditure Survey (Encuesta Continua de Presupuestos Familiares, hereafter the ECPF), both in terms of income and expenditure data, so that our test of the REPIH overcomes some of the shortcomings highlighted above.

Most Spanish wage earners (and all pensioners) face periodic intrayear fluctuations in income with which they are perfectly familiar, both in terms of when they will occur and in the amount concerned. This is due to the existence of two extra payments (one in July and another in late December).[3] Since these extra payments are systematic, exogenous to individuals and non-performance related, there is no point in distinguishing between permanent and transitory quarterly variations in income for those individuals that are retired or permanently employed. From this point of view, this article complements other studies which analyse institutional features affecting income based on U.S. micro data (Soulesles, 1999; Parker, 1999; Hsieh, 2003) and Spanish micro data (Browning and Collado, 2001).[4]

With regard to the arguments of the utility function, in this paper we do not assume separability among commodities. This paper takes into account the relationship among the three categories that together make up total spending (food, other nondurable goods and services, and durables). The purpose is to test whether the rejection of the REPIH

[2] Poterba (1988) and Wilcox (1989) are examples of pioneering studies in this type of REPIH test, using aggregate data.
[3] See Browning and Collado (2001) for a description of the annotation of the extra payments in the ECPF.
[4] As commented below, the main differences between this study and that of Browning and Collado (2001) are that this paper does not assume separability among goods, whilst heterogeneity across households is contemplated via the sample's segmentation. Finally, this study includes households with unemployed members and households where the spouse works.

detected in other studies can be accounted for by the omission of spending variables as regressors, since this hypothesis is systematically overlooked in the literature (Browning and Lusardi, 1996; Attanasio, 1999), partially because this information is lacking in many databases.

Finally, we also explore the influence of heterogeneity across households on the excess sensitivity of consumption to income. Along some of the most commonly used criteria (based on income level or age) to segment the sample, this paper also tests whether the results are driven by transitory income caused by transitions into unemployment.[5]

The results of this paper show that the imposition of separability among goods biases the test against the REPIH. When the extended model that includes groups of commodities as regressors is tested, the rejection of the model is not extensive to the whole sample. Unlike, its rejection is dependent on the chosen source of heterogeneity across households. In this respect, our results allow to reconcile papers that reject the REPIH with those that fail to reject it, even when using the same database; the REPIH is rejected when we split the sample using income as our criterion and to a lesser extent when based on the age of the household head. However, we fail to reject the REPIH when households where either of the spouses is unemployed are dropped, regardless of whether segmentation is based on income or age. Our results suggest then that the mixed findings observed in empirical literature when income (wealth) or age is used as a segmentation criterion, might be due to these variables' correlation with transitory income caused by transitions into unemployment.

The remainder of the paper is structured as follows: Section 2 motivates our analysis; Section 3 presents the theoretical model; Section 4 describes the database; Section 5 is

dedicated to econometric issues; Section 6 comments the estimation results. Finally, the concluding remarks are presented in Section 7.

2. Motivation

Analyses of the REPIH have mainly been based on the correlation between consumption growth and predicted income (Deaton, 1992; Browning and Lusardi, 1996; Attanasio, 1999). In this respect, if we dispense with discussions on control variables, in order to test the REPIH it is essential to have a database that shows a sufficient variability in income, as well as powerful instruments for predicting income growth. Not only is income variability important in achieving precise estimates, but also due to the consequences of measurement errors. The lower the true variation in income, the easier it is for measurement error to drive the sign of income changes. In fact, measurement error in consumption and income is one of the most serious limitations when using household data to test the REPIH (Altonji and Siow, 1987; Runkle, 1991; Deaton, 1992; Lusardi, 1996).

As mentioned above, most permanently employed Spanish workers' (and all pensioners') yearly income is not evenly distributed across the twelve months, due to two extra payments (one in July and the other in late December). Each extra payment ranges between 60 to 100% of a normal monthly one. Thus most households interviewed in the ECPF present high quarterly income changes of between 15 and 30% in real terms that are not common with other microdata sets.

This considerable variability in quarterly income has important implications on the testing of the REPIH. First, as is also the case in Soulesles (1999), Parker (1999) and Hsieh

[5] See Browning and Crossley (1999) for theoretical and empirical results on consumption during an

(2003), because these extra payments are systematic and exogenous in nature, most of the quarterly income changes observed by the investigator are known to households in advance[6] and they do not transmit new information: a factor which is crucial in a rational-expectations context. Second, it compels forward-looking households to take an active role in planning the intrayear allocation of their income, which reduces the effect of bounded rationality.[7] Third, it greatly reduces the influence of measurement error in income on the sign of quarterly income changes. Finally, the extra payments' exogenous, systematic characteristic is reflected in the unusually high predictive power of our instruments of income growth (an adjusted R^2 of around 0.45). Thanks to this high value, we avoid the acceptance of the REPIH attributable to the usual weak correlation of the instrument set with income growth.

The second element we would like to focus on is the interrelation between the groups of commodities. If the possibility that households might readjust their total expenditure across different groups of commodities is not contemplated, this effect might be captured by income, rejecting the REPIH (Attanasio and Weber, 1995; Browning and Lusardi, 1996; Attanasio, 1999). One of the peculiarities of the ECPF is the fact that it contains detailed information on all household spending. Figure 1 shows the quarterly expenditure changes over the sample period for each of the three groups of commodities into which total expenditure has been divided: food, other nondurables and durables (see Appendix 1 for details of how the goods were grouped). Figure 1 highlights how Spanish households seem to adjust their expenditure on an intratemporal basis. In fact, after removing

unemployment spell.

[6] For those households without transitions into and out of employment, in 85% of all observations the sign of the quarterly income changes can be correctly predicted. In fact, despite a lack of official information on how widespread extra payments are, the analysis of the ECPF points to the fact that around 75% of all employees with no labour transitions receive extra payments.

[7] Browning and Crossley (2001) calculate the welfare costs for Spanish households of automatically consuming all current income (measured as a percentage of annual spending) rather than following an optimally smoothed path, under the hypothesis that, during months with extra payments, double the normal income is paid. The authors conclude that the welfare costs stand at around 7%, very much higher than the figure for institutional features examined by Hsieh (2003) and Parker (1999), thus demonstrating the relevance of intrayearly planning in the Spanish case.

seasonal patterns, simple Pearson correlations between other nondurables and food, between other nondurables and durables, and between food and durables showed values (and p-values) of 0.068 (0.0001), -0.050 (0.0001) and -0.047 (0.0001), respectively. Therefore, apart from seasonal preferences, it cannot be ruled out *a priori* that part of the quarterly changes in food or in other nondurables spending is due to nonseparability among commodity groups. For this reason, when specifying Euler equations for a group of commodities, the strategy used was to condition them on the expenditure of the remaining commodity groups. This issue will be taken up again in the following section, when specifying the utility function.

[INSERT FIGURE 1 ABOUT HERE]

3. The Model

The rational expectations permanent income hypothesis proposed by Hall (1978) establishes that households try to maximize their expected lifetime utility using all the available information on their expected lifetime income endowments. Thus households allocate their consumption on an intertemporal basis until their discounted marginal utility across periods is smoothed,

$$U'_{it} = E_t\left[U'_{it+1}\left(\frac{1+r_{it}}{1+\delta_i}\right)\right] + \mu_{it} \qquad (1)$$

where U'_{it} is the marginal utility of household *i* during period *t*, E_t the mean operator conditioned on the set of information known at moment *t*, δ_i the household *i* rate of time preference, r_{it} the after-tax real interest rate and μ_{it} a Lagrange multiplier associated with the non-negativity constraint on wealth (Zeldes, 1989b).

From (1) the rejection of the REPIH can be attributable to two main sources. On the one hand, the existence of liquidity constraints, a precautionary-saving motive or simply a "rule-of-thumb" behaviour, for example, which would hinder the intertemporal allocation process stated by the standard REPIH based on expected future information. In this case μ_{it}, which is unobservable, will be different from zero. So, to detect the violation of the martingale condition, variables must be introduced that are correlated with μ_{it}, such as income. The second source of rejection is when the researcher fails to include all the variables that the household incorporates into its utility function. In this second case, at least part of the model's rejection can be attributed to the omission of relevant variables whose effect might be captured by income, even if the model is true. In this paper we use a wider set of preference variables in the utility function (which usually includes demographic and labour-supply variables as taste shifters), based on the non-imposition of separability among food consumption, FC, other non-durable goods and services, ONDC, and the stock of durables, S.

Thus the utility function used, which is of the constant relative risk aversion type, takes a multiplicative form which includes the three aforementioned expenditure categories and a vector of household preferences, θ_{it}.

$$U\left(FC_{it}, ONDC_{it}, S_{it}; \theta_{it}\right) = \frac{1}{1-\tau} FC_{it}^{1-\alpha} \frac{1}{1-\alpha} ONDC_{it}^{1-\tau} \frac{1}{1-\Psi} S_{it}^{1-\Psi} \exp\left(\theta_{it}\right) \qquad (2)$$

θ_{it} is composed of an observable stochastic part, expressed as a vector of demographic variables (the age of the household head, age_{it}; the age squared, age^2_{it}; and the family size, $FAMS_{it}$) and of labour supply (the number of earners, NE_{it}; and the household head's unemployment status, UH_{it}), and an unobservable part. The latter is made up of an individual effect which does not vary over time, β_i, and an error term for household preferences that varies in time and across households, ϖ_{it}, which we assume is orthogonal to β_i.

$$\theta_{it} = b_0 age_{it} + b_1 age_{it}^2 + b_2 FAMS_{it} + b_3 NE_{it} + b_4 UH_{it} + \beta_i + \varpi_{it} \quad (3)$$

For the sake of brevity we restrict the exposition to the case of other nondurables consumption. If we suppose that the rate of time preference is equal to the real interest rate, $\delta_i = r_{it}$, as in Lusardi (1996) and Jappelli and Pistaferri (2000), taking logarithms of both sides of the expression derived from the substitution of the utility function (2) and household preferences (3) in the first-order condition (1), and using a second-order Taylor expansion, we can express the Euler equation as follows, once rational expectations have been applied:

$$\Delta LnONDC_{it+1} = k_{0i} + k_1 age_{it} + k_2 \Delta FAMS_{it+1} + k_3 \Delta NE_{it+1} + k_4 \Delta UH_{it+1} +$$
$$+ k_5 \Delta LnFC_{it+1} + k_6 \Delta LnS_{it+1} + k_7 \Delta LnY_{it+1} + \phi_{it+1} \quad (4)$$

where

$$k_{0i} = \frac{1}{\alpha}\left(b_0 + \frac{1}{2}\sigma^2_{\varepsilon it+1}\right); \quad \phi_{it+1} = \frac{1}{\alpha}\left[\Delta\varpi_{it+1} - Ln(1+\varepsilon_{it+1}) - \frac{1}{2}\sigma^2_{\varepsilon it+1} + Ln(1+\mu_{it}')\right]$$

where Δ is the first difference operator, α is the coefficient of relative risk aversion and $\sigma^2_{\varepsilon it+1}$ is the variance in consumption growth. The term ε_{it+1} incorporates expectational errors; it has mean zero and is uncorrelated with any information available at time t, $E[\varepsilon_{it+1}/\Omega_{it}]=0$. Following Runkle (1991), except where otherwise noted, k_{0i} is assumed to be the same for all households (see Section 5).

Equation (4) incorporates the variables that determine the intertemporal allocation of consumption. The central hypothesis to test is whether the lagged information over which the household has intertemporal control has predictive power over consumption growth. For this reason, predicted income has been included in equation (4): if income is

statistically significant, $k_7 \neq 0$, then the REPIH is rejected. Note, therefore, that possible specific sources of excess sensitivity are not tested in this paper. The other hypothesis of interest concern separability among commodity groups, tested via parameters k_5 and k_6.

4. The Data

The household-information data set used in this paper was drawn from the Spanish Family Expenditure Survey for the period 1986-1996. The ECPF, which is conducted by the National Institute of Statistics (INE), is a rotating quarterly panel survey representative of the Spanish population. The survey combines direct annotations of expenditure made during the week when contact with the household is maintained and a personal interview regarding expenditure prior to that week.[8] In addition, income made during the previous three months is recorded, together with sociodemographic and labour-related information concerning the households during the week of the interview. For the purposes of comparisons with other surveys, the information not available includes household members' number of working hours and households' net wealth and stock of durables.

Each quarter 3,200 households are interviewed. From these, 12.5% are randomly replaced each quarter, so that each household is monitored for up to eight consecutive quarters. In order to minimize possible inconsistency in parameter estimates associated with panel data sets where the number of observations per household is small (Chamberlain, 1984), we restricted our sample to households that answered the survey for the maximum eight possible quarters, leading to a sample of 8,774 households. From these, households were

[8] The reference period for each type of goods depends on the frequency of its purchase. Food expenditure corresponds to purchases made during the week of the interview, other nondurables to the previous month including the week of the interview, and durables to the previous three months including the week of the

selected whose heads were aged between 25 and 80, and who were not self-employed. We followed previous empirical work in applying several filters to exclude households with extreme measurement errors in consumption or income (Altonji and Siow, 1987; DeJuan and Seater, 1999). The final sample consisted of 5,143 households, representing a total of 41,144 observations.

As for the construction of the variables used in the model, total expenditure was divided into three groups of commodities: food (in and away from home), other nondurable goods and services (including clothes and footwear as semi-durables), and durables. Each group of commodities was deflated by a household-specific Stone Price Index, derived from the dissaggregated national consumer retail price index published by the INE, where the household budget shares were taken as weights. The income variable comprises total after-tax household income and it was deflated to 1985 prices with the general CPI. Variations in the stock of durables were proxied by a dummy variable that took a value of one when the household's expenditure on durables was equal to or higher than 60€ and zero otherwise.[9] The household head's transitions into and out of unemployment were also controlled by a dummy variable, with a value of one if the household head was unemployed during the week of the interview and zero if not. The remaining explanatory variables were specified as continuous variables. The family size was measured in adult-equivalent terms, according to the OECD equivalence scale.

Appendix 1 details the components of each commodity group of commodities and the filters used. It also contains a table with descriptive statistics of all the variables used in the Euler equation estimates.

interview. The INE raises food spending and expenditure on other nondurables to a standard three-month period to homogenize the global expenditure period.

5. Econometric Issues

Equation (4) was estimated using the Generalised Method of Moments (GMM), exploiting the orthogonality conditions imposed by the rational expectations hypothesis, i.e., $E[\phi_{it}/\Omega_{is}] = 0 \ \forall \ t>s$ where Ω_{is} is the set of information available at time s, that contains the instrument set. The standard errors are robust to general forms of heterocedasticity and serial correlation.[10] In this context of rational expectations, testing the model's overidentifying restrictions constitutes a complementary test of the REPIH (Runkle, 1991).

For the estimation of equation (4), controls were made for the information contained in the error term. Following Runkle (1991), different factors were taken into account: the presence of aggregate shocks, the presence of persistent household-specific effects,[11] and measurement error in consumption. The aggregate shocks were accounted for using year dummies, under the null hypothesis of aggregate shocks to consumption growth that are common across households (Mariger and Shaw, 1993). Measurement error in consumption was controlled using a twofold approach: household filters (see Appendix 1) and the number of instrument lags. Given the MA(1) structure of the error term, instruments were used with two lags and earlier.

All the explanatory variables, except for time dummies, were assumed to be endogenous and so they were instrumented. The availability of suitable instruments is crucial in

[9] The results were not affected when other minimum values for expenditure on durables were used.
[10] We estimated the Euler equations by GMM using the DPD programme written in GAUSS by Arellano and Bond (1998).
[11] This type of heterogeneity could arise if each household had its own discount rate, which remained constant across time. In this case, the presence of persistent household-specific effects causes lagged consumption growth to have predictive power over current consumption growth.For this reason, to test their existence, ΔLnC_{t-1}, which would be correlated with the household-specific effect, was incorporated into the instrument set.

testing orthogonality between consumption growth and predicted income.[12] In this paper advantage was taken of the unique extra-payment factor and the fact that the ECPF monitors the same households for over four quarters. As can be seen in Appendix 2, the exogenous, systematic, non-performance-related nature of these extra payments provides powerful instruments of ΔLnY_{it+1} with an adjusted R^2 of up to 0.46 for those households without unemployed members: a figure much higher than the normal 0.02 offered by other databases (Altonji and Siow, 1987; Shea, 1995; Lusardi, 1996; Browning and Lusardi, 1996). Appendix 2 details the set of instruments used in the estimations, comprising sociodemographic, labour-supply, expenditure and income variables.

6. Results

In this section, we discuss the results of the Euler equations for the two groups of nondurable commodities: food and other nondurables. In order to check how heterogeneity across households could influence the test of the REPIH, we segmented the sample using different criteria. On the one hand, the sample was separated into three groups based on the age of the household head: 25 to 44 years old, 45 to 60 years old and 65 to 80 years old.[13] Most articles do not consider households with heads over the age of 64 suitable for testing the REPIH, because certain factors such as health, the likelihood of death, changes in family size etc. can alter how they plan consumption. In this paper, households with heads aged over 64 were included as an additional group in order to complement previous papers. If the model's violation is due to liquidity constraints or to precautionary saving, excess sensitivity is more likely to arise in the younger and older age groups (Jappelli, 1990; Gourinchas and Parker, 2002). On the other hand, the sample

[12] See Hansen and Singleton (1982), Arellano and Bond (1991) and Bound *et al*. (1995) for the properties of the IV estimators when the instruments are weakly correlated with the endogenous variable.
[13] The group aged between 61 and 64 was excluded to prevent transitions into retirement from distorting the results.

was also split according to household income[14] into a low-income and high-income group. The statistical power of the test is dependent on the capacity of the segmentation criterion to ensure the correct separation of those households able to smooth their marginal utility intertemporally from those not able to do so. We therefore considered high-income households to be those that remained above the 6th decile for each of the eight waves. Those households that consistently remained below the 6th decile were classified low-income households. If the REPIH's violation is due to liquidity constraints or to a precautionary motive, excess sensitivity should only arise in the low-income group. As with the age-based segmentation criterion, if excess sensitivity is due to some other source, e.g. a rule-of-thum behaviour, there is no reason to believe that the results for the two income groups should differ. Appendix 3 shows the sociodemographic and economic characteristics of each household sample.

For the sake of brevity, we only report the parameter estimates of interest: those referred to the excess sensitivity of consumption to predicted income ($\Delta \ln Y_{t+1}$ or $\ln Y_t$) and those concerning the influence that non-separability among commodity groups can have on it. All the other results are available from the authors on request.

6a. *Results for the consumption of other nondurables*

Tables 1 and 2 present the results of the Euler equations for other nondurables using the extended model and when we assume separability among commodity groups, respectively. From Table 1 it can be seen that for household groups whose head is below the age of 61 (columns 1 to 4), neither of the two income specifications is statistically significant at the 5% level. Neither can overidentifying restrictions be rejected.[15] Notice,

[14] Zeldes (1989b) and most subsequent authors separate the sample on the basis of (liquid) wealth to income ratios. Unfortunately, wealth-related information is not available in the ECPF.
[15] The null hypothesis of absence of second-order autocorrelation for the disturbance term (M2) could not be rejected. Neither could the null hypothesis of absence of persistent household-specific effects. These results

however, that failure to reject the REPIH for the younger group is dependent upon the hypothesis of nonseparability of other nondurables from durables (see Table 2). Unlike the previous age groups, there is evidence against the REPIH for the over-64 age group (columns 5 and 6 of Table 1): $\ln Y_t$ is significant at the 5% level and overidentifying restrictions are also rejected.

An analysis of the Euler equations when the sample is split according to income (columns 7 to 10 of Table 1), shows that there is evidence of excess sensitivity of consumption to predicted income growth for the low-income group: the coefficient on $\Delta \ln Y_{t+1}$ is significant at the 5% level.[16] In contrast, as expected when there is a precautionary motive or liquidity constraints, the REPIH cannot be rejected for the high-income group, as in Soulesles (1999).[17] It is important to note that, as detected for the younger group, assuming separability among commodity groups biases the results against the REPIH for the high-income group: Table 2, in particular, shows that the overidentifying restrictions are rejected.

On the other hand, the hypotheses of separability between other nondurables and food, and between other nondurables and durables are rejected for several household groups, as shown in Table 1. The signs of the coefficients obtained are the expected ones: positive for food and negative for durables.[18]

[INSERT TABLES 1 AND 2 ABOUT HERE]

were repeated in the remaining estimations. For the sake of brevity, tests of persistent household-specific effects are not reported, but are available upon request.

[16] Note from table 2 that the excess sensitivity is maintained when neither of the two groups of commodities is included as an explanatory variable.

[17] The results were not affected when retired households were excluded.

[18] Brugiavini and Weber (1994) also obtain a negative correlation between nondurables and durables with cross-section data.

6b. *Results for food consumption*

When the REPIH is tested for food consumption, it shows the same results as the test for other nondurables when the youngest household group is analysed: the orthogonality condition between consumption growth and predicted income cannot be rejected (columns 1 and 2 of Table 3). The results obtained for the other two household age groups are the opposite of those observed for other nondurables: the REPIH is rejected for the middle-age household group, but not for the older group. Again, the failure to reject the REPIH for some household groups is dependent upon the assumption of separability among groups of commodities, as shown in Table 4.

When the sample is segmented according to income, the same different intertemporal allocation capacity observed for nondurables is maintained. The REPIH is rejected for the low-income group, but not for the high-income group, as also detected in Zeldes (1989b), Jappelli *et al*. (1998) and Soulesles (1999).

[INSERT TABLES 3 AND 4 ABOUT HERE]

As for explanatory consumption variables, in those cases in which they are statistically significant, the expected parameter signs are also obtained: positive for other nondurables, as in Attanasio and Weber (1995), and negative for durables.

6c. The segmentation criteria and the effect of being unemployed

The results reported so far indicate that segmenting the sample according to income provides more stable results than dividing it into age groups. In other words, they do not seem to have the same power to classify those households with and those without difficulties in allocating their consumption intertemporally. The question we raise in this

sub-section is whether the disparity of our results is due to the fact that income and age are not equally correlated with the latent variable that conditions the intertemporal allocation.

In order to check this possibility and to make our results comparable with previous work, we concentrated on those households whose heads were 60 years old or younger. From these, households were excluded if either the head or the spouse (if applicable) was unemployed during any of the eight quarters. This led to a new sample of 2,576 households and 20,608 observations. This new sample allows us to compare our results directly with those of Browning and Collado (2001), who also use a sample of Spanish households drawn from the ECPF characterized by their household head's "permanent employment status". Unlike us, however, these authors do not segment the sample.

After dropping those households with unemployed members, our new sample is less likely to be affected by income risk or liquidity constraints. Thus, if the results differ from those obtained using our whole sample, it could be attributable to a correlation between the segmentation criterion and unemployment (e.g. with transitory income). Moreover, by dropping those households with unemployed members, we can take full advantage of the extra payments' systematicity. In fact, Appendix 2 shows how the predictive power of the instruments of income growth rises dramatically for these households, thus enhancing the statistical power of the REPIH test.

[INSERT TABLES 5 AND 6 ABOUT HERE]

Tables 5 and 6 report the estimated Euler equations for other nondurables and food, respectively, based on the new sample. From both tables it can be observed that neither type of segmentation, by age or income, shows evidence of an excess sensitivity of consumption growth to predicted income, regardless of the group of commodities

analysed. That is, once we remove those households with unemployed members, we cannot reject the REPIH on the basis of expected future information, thus corroborating Browning and Collado's findings (2001). In this respect, these results suggest that age or income criteria *per se* do not capture the true source of heterogeneity in Spanish household consumption patterns. The key element that conditions the results of the Euler equations for the whole ECPF sample is the transitory income that accompany a transition into unemployment. The more highly correlated the segmentation variable is with transitions into and out of work, the greater capacity it will have to classify households correctly.

7. Conclusions

Empirical literature on the REPIH yields mixed results. This paper has attempted to contribute towards the testing of the REPIH by using a high-quality database, the Spanish ECPF, and by analysing the influence of heterogeneity both across households and goods. In two respects the information on total expenditure and income offered by the ECPF has allowed us to overcome some of the drawbacks detected in empirical literature. On the one hand, this paper has extended the standard Euler equation by assuming non-separability between food and other nondurables, as in Attanasio and Weber (1995), and also of the latter two categories from durables. On the other hand, we have also taken advantage of a Spanish institutional feature that leads to an uneven intrayear wage and pension distribution. Unlike other data sets, the large, highly predictable quarterly income changes that these extra payments produce enhance the power of the REPIH test.

This paper has shown that conditioning the Euler equations on consumption variables, including durables, can alter the rejection of the REPIH. In consequence, assuming separability among commodity groups biases the results against the REPIH, so that the

rejection of the REPIH observed with other databases might partially be attributable to this omission.

The overall result of this paper, when separability among commodity groups is not imposed, is the rejection of the REPIH, in the sense that not all households behave according to the orthogonality condition between consumption growth and predicted income. However, this paper has shown that not all segmentation criteria are equally correlated with the latent variable (i.e. the true source of heterogeneity across households) that conditions the intertemporal allocation of consumption. Whilst the results are not stable for households with heads over the age of 44, segmentation by income always leads to the rejection of the REPIH for the low-income group, but not for the high-income one (as in Zeldes, 1989b; Jappelli *et al*., 1998; Soulesles, 1999) regardless of the measure of consumption analysed.

The importance of controlling for the correct source of heterogeneity is shown when we drop those households with unemployed members: there is no evidence against the REPIH for any group of households, neither when segmented by age nor by income, irrespective of the group of consumption commodities analysed. In consonance with the standard REPIH, for those households permanently employed segmentation according to current income does not show different results for high-income and low-income groups, because their reference variable is permanent income.

The different conclusions that we reach when households with unemployed members are either taken or not taken into account are not contradictory under a less restrictive Rational Expectations Permanent Income Model. As suggested by Zeldes (1989a), the rejection of the standard REPIH is the expected result in an uncertain framework like that experienced by prudent families with unemployed members. Indeed, our results suggest that the mixed findings obtained in empirical literature might be attributable to the failure

to control properly for heterogeneity across households. For instance, if being unemployed is the key variable, the sample period (in terms of the stages of the business cycle covered) is an important issue, as some authors (e.g. Deaton, 1992) have emphasized to explain in part the different conclusions reached by Zeldes (1989b) and Runkle (1991). In this respect, our results suggest that the segmentation criterion should be flexible enough to separate households according to their economic performance (with greater flexibility in the case of income than age or other variables also used, such as home ownership versus tenancy).

In terms of fiscal policy, the rejection of the REPIH for the household sample containing unemployed members but not for those with permanently employed members points to the existence of two groups at the aggregate, as suggested by Hall and Mishkin (1982) and Campbell and Mankiw (1989). What is more, the importance of transitory income that accompany transitions into unemployment might suggest that the fraction of consumers who track their consumption to current income is not constant over time, but might have a cyclical profile as shown by Jappelli and Fissel (1990).

In summary, this paper has shown that heterogeneity across households and separability among goods strongly influences the results of consumption Euler equations. Future research should focus on analysing how the sources of heterogeneity that influence the consumption Euler equations are correlated with structural factors, like unemployment, as demonstrated in this paper for Spanish households. This could be an avenue for reconciling the mixed results shown in empirical literature.

Appendices

A1. The ECPF: commodity groups, filters and descriptive statistics of estimation variables.

Composition of commodity groups: the food category includes spending on food in and away from home, and spending on alcoholic drinks and tobacco. The category for other non-durable goods and services includes spending on clothes and footwear, housing, heating and lighting (not including any imputed rent from owner occupation), household goods, goods and services for the home maintenance, medicine, fuels, public transport, postage and communications, leisure and cultural services, books, newspapers and magazines. Durables include spending on furniture, carpets and rugs, heating and kitchen appliances, household fittings, glassware, the purchase of vehicles and other appliances and accessories.

Filters: households fulfilling any of the following conditions were dropped: (a) those at the 0.5% bottom or top percentiles of the income distribution, (b) those experiencing a quarterly income change per earner higher than +200% or lower than -75% during one of the quarters, (c) those experiencing a quarterly expenditure change per adult equivalent on food or on other nondurables higher than +300% or lower than -85% during one of the quarters, and (d) those whose expenditure on food or other nondurables fell below 6 euros during one quarter.

Descriptive Statistics. Whole sample. 1986.IV-1996.IV

	Mean	Standard deviation	Maximum	Minimum	Median
Income (€)	1,912.72	1,130.72	8,862.12	90.51	1,671.01
Food (€)	803.97	473.61	6,313.81	33.35	717.40
Other nondurables (€)	835.76	685.23	10,936.99	12.46	665.80
Durables +	0.482	0.499	1	0	-
Family size	2.58	0.978	9.80	1	2.40
Number of earners	1.78	0.896	7	1	2
Inactive household head +	0.429	0.494	1	0	-
Employed household head +	0.570	0.499	1	0	-
Unemployed household head+	0.047	0.21	1	0	-
Sex (female) * +	0.169	0.375	1	0	-
Age *	54.27	14.81	80	25	55
Educational level *+					
Elementary school or less	0.723	0.447	1	0	-
Compulsory secondary school studies (up to 16 years old)	0.103	0.304	1	0	-
Full secondary school studies (up to 18 years old)	0.099	0.299	1	0	-
University	0.073	0.260	1	0	-
Professional group (those economically active) *+					-
Labourers	0.216	0.411	1	0	-
Management	0.094	0.291	1	0	-
Others	0.689	0.462	1	0	-

Note: (*) refers to the household head. (+) indicates a dummy variable.

A2. The predictive power of the quarterly income growth instruments

The table below shows the adjusted R^2 from the regressions of ΔLnY_{t+1} on the instrument set used. With the database used, different sub-samples were created to highlight the influence of two factors. Firstly, transitions into unemployment, so that distinguishing between households with and those without unemployed members. Secondly, the length of the quarterly database. Consequently, in one case we used only four quarters for each household (as in the widely used American CEX), whereas in the other all eight available observations were used.

Adjusted R^2 of ΔLnY_{t+1} on different instrument sets (OLS)

4 observations		8 observations	
All households (a)	Households without unemployed members (b)	All households (c)	Households without unemployed members (d)
0.2581	0.3960	0.3067	0.4615

The instrument set used in the estimations of equation (4) includes the following variables and lags:

- With no lags: a constant, seasonal dummies and yearly dummies.
- With two lags (t-1): age, the age squared, the interaction of both with the household head's educational level and employment status, dummies for the permanently employed status of the two spouses and a dummy reflecting whether or not the household head was retired.
- With three lags (t-2): a dummy for purchases of durables.
- With two and three lags (t-1 and t-2): the total spending on food and other nondurables, the number of household members under 14 years of age, the total number of household members, and a dummy reflecting whether the spouse (if applicable) was unemployed. In the Euler equations for other nondurables (for food) spending on food (on other nondurables) was also included.
- All lags from t-1: income, a dummy reflecting whether the household head was unemployed, and the number of wage and pension earners.

A3. Household groups' sociodemographic and economic features

	Low-income group	High-income group		25-44 years	45-60 years	65-80 years
# **households**	2,092	2,224	# **households**	1,639	1,714	1,678
Age *			**Income groups**			
25 – 44	29.7	35.8	Deciles 1 to 3	14.5	13.7	51.6
45 – 64	33.5	50.8	Deciles 4 to 6	38.5	31.4	27.8
65 – 80	36.7	13.2	Deciles 7 to 10	46.8	54.8	20.4
Labour status *			**Labour status ***			
Economically inactive	52.8	24.2	Economically inactive	2.4	20.7	98.6
Working	40.0	72.8	Working	91.9	70.6	1.2
Unemployed	7.0	2.8	Unemployed	5.6	8.6	0.1
House			**House**			
Rented home	16.2	7.5	Rented home	15.5	9.7	15.2
Mortgage	9.7	19.6	Mortgage	23.3	13.0	5.9
Dummy for spending on durables	37.5	61.4	**Dummy for spending on durables**	56.3	53.2	33.8
# members	2.26	3.04	**# members**	2.73	3.07	1.96
# earners	1.52	2.16	**# earners**	1.54	2.04	1.69
Educational studies *			**Educational studies ***			
Illiterate or without studies	34.0	12.1	Illiterate or without studies	5.5	24.1	45.8
Elementary	58.8	55.5	Elementary	60.5	59.9	48.0
Secondary or higher	7.2	32.4	Secondary or higher	34.0	16.0	6.2

Notes: in percentages for each variable. (*) refers to the household head.

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Table 1. Euler equation estimates for other nondurables ($\Delta LnONDC_{t+1}$)

	25-44 years		45-60 years		65-80 years		Low-income group		High-income group	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Δ Ln $Food_{t+1}$	-0.045	-0.043	0.474	0.469	-0.181	-0.231	-0.030	-0.131	-0.027	-0.066
	(0.150)	(0.150)	(0.191)**	(0.197)**	(0.204)	(0.213)	(0.165)	(0.167)	(0.144)	(0.146)
$Durables_{t+1}$	-0.028	-0.025	-0.046	-0.057	-0.096	-0.208	-0.078	-0.119	-0.104	-0.133
	(0.034)	(0.044)	(0.029)	(0.049)	(0.035)*	(0.063)*	(0.037)**	(0.044)*	(0.032)*	(0.040)*
Δ LnY_{t+1}	-0.042	-	-0.093	-	0.362	-	0.338	-	-0.150	-
	(0.155)		(0.146)		(0.216)		(0.135)**		(0.132)	
LnY_t	-	-0.002	-	0.007	-	0.047	-	0.024	-	0.023
		(0.018)		(0.022)		(0.023)**		(0.022)		(0.022)
OI	58.62	58.89	62.78	64.153	61.422	59.140	62.681	65.306	73.62	73.041
[p-value]	[0.698]	[0.689]	[0.554]	[0.506]	[0.042]	[0.063]	[0.558]	[0.460]	[0.216]	[0.220]
M1	-22.219	-22.235	-17.607	-16.402	-16.766	-14.480	-24.551	-23.437	-24.771	-25.192
M2	0.603	0.597	-0.046	-0.008	-1.287	-1.148	0.532	0.481	0.655	0.529

Notes: The standard errors are in parentheses below the coefficients. One and two starts denote significance at the 1% and 5% level, respectively. All the estimations include seasonal dummies and time dummies as explanatory variables. M1 and M2 are test statistics for first and second order serial correlation, respectively. M1 and M2 tests follow a standardized normal distribution. The Sargan test analyses the lack of correlation of instruments with the error term. It is distributed as an χ^2, with degrees of freedom equal to the number of overidentifying restrictions. These notes are extensible to the remaining tables.

Table 2. Sensitivity of the test of excess sensitivity of other nondurables spending to separability among commodity groups.

	Δ Ln Food$_{t+1}$	Durables$_{t+1}$	Δ LnY$_{t+1}$	LnY$_t$	OI [p-value]	M1	M2
25-44 years old	-0.006 (0.143)	-	-0.631 (0.156)*	-	59.139 [0.681]	-22.181	0.632
	-	-0.022 (0.033)	-0.047 (0.156)	-	57.527 [0.733]	-22.000	0.609
	-	-	-0.066 (0.157)	-	57.750 [0.726]	-22.028	0.633
	-0.016 (0.143)	-	-	-0.009 (0.014)	59.478 [0.669]	-22.304	0.614
	-	-0.014 (0.043)	-	-0.006 (0.019)	57.814 [0.693]	-22.052	0.603
	-	-	-	-0.009 (0.014)	58.100 [0.684]	-22.098	0.613
45-60 years old	0.517 (0.189)*	-	-0.055 (0.144)	-	65.661 [0.453]	-17.509	-0.082
	-	-0.049 (0.029)	-0.125 (0.145)	-	69.451 [0.298]	-21.779	0.046
	-	-	-0.089 (0.142)	-	73.719 [0.190]	-21.926	0.004
	0.534 (0.192)**	-	-	-0.014 (0.013)	64.325 [0.500]	-16.681	0.017
	-	-0.087 (0.047)	-	0.023 (0.022)	71.540 [0.241]	-21.747	0.026
	-	-	-	-0.007 (0.013)	75.150 [0.160]	-22.130	0.073
65-80 years old	0.011 (0.1929	-	0.433 (0.207)**	-	70.848 [0.006]	-19.131	-1.241
	-	-0.068 (0.033)**	0.376 (0.211)	-	52.382 [0.154]	-18.831	-1.291
	-	-	0.419 (0.208)**	-	57.150 [0.072]	-19.113	-1.243
	-0.001 (0.188)	-	-	-0.011 (0.012)	73.68 [0.003]	-19.488	-1.472
	-	-0.124 (0.057)**	-	0.023 (0.021)	55.838 [0.090]	-19.808	-1.354
	-	-	-	-0.0130 (0.012)	60.334 [0.041]	-19.810	-1.477
Low-income group	0.060 (0.160)	-	0.387 (0.133)*	-	68.271 [0.366]	-24.901	0.396
	-	-0.052 (0.036)	0.308 (0.132)**	-	51.540 [0.869]	-24.767	0.430
	-	-	0.331 (0.131)**	-	53.636 [0.818]	-24.838	0.347
	-0.001 (0.157)	-	-	-0.007 (0.018)	76.683 [0.152]	-24.913	0.330
	-	-0.065 (0.043)	-	0.002 (0.022)	56.638 [0.731]	-24.775	0.376
	-	-	-	-0.0152 (0.018)	59.621 [0.631]	-24.907	0.306
High-income group	0.066 (0.140)	-	-0.197 (0.131)	-	82.564 [0.069]	-23.512	0.744
	-	-0.109 (0.032)*	-0.141 (0.132)	-	72.668 [0.214]	-25.248	0.682
	-	-	-0.169 (0.131)	-	85.440 [0.045]	-25.541	0.672
	0.030 (0.140)	-	-	-0.017 (0.018)	85.079 [0.048]	-24.032	0.646
	-	-0.135 (0.040)*	-	0.022 (0.022)	71.789 [0.235]	-25.019	0.601
	-	-	-	-0.020 (0.018)	86.88 [0.031]	-25.576	0.623

Notes: The standard errors are in parentheses below the coefficients. One and two starts denote significance at the 1% and 5% level, respectively.

Table 3. Euler equation estimates for food ($\Delta LnFOOD_{t+1}$)

	25-44 years		45-60 years		65-80 years		Low-income group		High-income group	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Δ $LnOND_{t+1}$	0.018	0.017	0.114	0.120	0.005	-0.032	0.089	0.052	0.050	0.039
	(0.082)	(0.084)	(0.067)	(0.070)	(0.073)	(0.075)	(0.078)	(0.075)	(0.070)	(0.071)
$Durables_{t+1}$	-0.053	-0.049	0.004	-0.045	-0.075	-0.121	-0.025	-0.052	-0.028	-0.048
	(0.026)**	(0.031)	(0.020)	(0.030)	(0.027)*	(0.038)*	(0.025)	(0.028)	(0.025)	(0.029)
Δ LnY_{t+1}	0.055	-	-0.007	-	-0.030	-	-0.122	-	0.145	-
	(0.107)		(0.097)		(0.141)		(0.085)		(0.096)	
LnY_t	-	-0.002	-	0.030	-	0.022	-	0.028	-	0.022
		(0.014)		(0.013)**		(0.012)		(0.014)**		(0.015)
OI	61.754	58.89	56.617	48.531	40.084	36.961	65.475	65.843	73.54	72.853
[p-value]	[0.591]	[0.689]	[0.761]	[0.936]	[0.640]	[0.764]	[0.460]	[0.447]	[0.218]	[0.235]
M1	-18.630	-22.235	-17.601	-17.483	-16.730	-16.527	-20.074	-20.514	-21.559	-21.744
M2	-1.298	0.597	-1.393	-1.279	-0.124	-0.179	-0.851	-0.998	-1.125	-1.187

Notes: The standard errors are in parentheses below the coefficients. One and two starts denote significance at the 1% and 5% level, respectively.

Table 4. Sensitivity of the test of excess of sensitivity of food spending to separability among commodity groups.

	Δ Ln Other nondurables$_{t+1}$	Durables$_{t+1}$	Δ LnY$_{t+1}$	LnY$_t$	OI [p-value]	M1	M2
25-44 years old	0.052 (0.081)	-	0.031 (0.107)	-	64.957 [0.443]	-18.317	-1.312
	-	-0.056 (0.027)**	0.064 (0.109)	-	60.977 [0.583]	-18.630	-1.287
	-	-	0.039 (0.108)	-	65.318 [0.430]	-18.688	-1.311
	0.026 (0.084)	-	-	-0.013 (0.011)	76.210 [0.161]	-18.491	-1.298
	-	-0.050 (0.033)	-	-0.002 (0.014)	61.061 [0.581]	-18.555	-1.265
	-	-	-	-0.014 (0.011)	63.961 [0.477]	-18.688	-1.291
45-60 years old	0.108 (0.065)	-	-0.014 (0.095)	-	56.361 [0.768]	-17.715	-1.380
	-	-0.0000 (0.020)	0.001 (0.094)	-	57.540 [0.702]	-18.560	-1.451
	-	-	-0.003 (0.092)	-	57.249 [0.712]	-18.550	-1.444
	0.138 (0.068)**	-	-	0.0161 (0.0088)	51.584 [0.886]	-17.144	-1.351
	-	-0.051 (0.031)	-	0.029 (0.0134)**	49.935 [0.901]	-18.362	-1.342
	-	-	-	0.013 (0.008)	54.380 [0.798]	-18.606	-1.453
65-80 years old	0.071 (0.069)	-	-0.100 (0.137)	-	49.50 [0.263]	-17.797	-0.228
	-	-0.079 (0.026)*	-0.031 (0.137)	-	40.168 [0.636]	-17.443	-0.114
	-	-	-0.060 (0.135)	-	49.995 [0.215]	-17.748	-0.227
	0.063 (0.068)	-	-	-0.006 (0.008)	73.68 [0.003]	-17.666	-0.165
	-	-0.127 (0.036)*	-	0.024 (0.012)	55.838 [0.108]	-17.298	-0.158
	-	-	-	-0.006 (0.008)	49.107 [0.246]	-17.684	-0.173
Low-income group	0.110 (0.076)	-	-0.115 (0.085)	-	67.139 [0.403]	-19.465	-0.877
	-	-0.039 (0.026)	-0.096 (0.082)	-	67.870 [0.346]	-20.679	-0.834
	-	-	-0.077 (0.081)	-	68.722 [0.320]	-20.825	-0.905
	0.097 (0.073)	-	-	0.019 (0.012)	69.130 [0.339]	-19.784	-1.012
	-	-0.070 (0.029)**	-	0.031 (0.014)**	62.074 [0.544]	-20.624	-0.958
	-	-	-	-0.015 (0.012)	69.336 [0.302]	-20.833	-1.018
High-income group	0.077 (0.067)	-	0.136 (0.096)	-	75.442 [0.176]	-21.147	-1.049
	-	-0.029 (0.024)	0.157 (0.096)	-	70.721 [0.263]	-22.249	-1.218
	-	-	0.146 (0.096)	-	73.162 [0.202]	-22.302	-1.198
	0.078 (0.067)	-		0.013 (0.013)	76.210 [0.161]	-21.346	-1.096
	-	-0.047 (0.028)	-	0.020 (0.015)	70.451 [0.270]	-21.996	-1.252
	-	-	-	0.008 (0.012)	74.400 [0.175]	-22.189	-1.231

Notes: The standard errors are in parentheses below the coefficients. One and two starts denote significance at the 1% and 5% level, respectively.

Table 5. Euler equation estimates for other nondurables ($\Delta LnONDC_{t+1}$). Households aged between 25 and 60 without unemployed members.

	25-44 years		45-60 years		Low-income group		High-income group	
	(1)	(2)	(3)	(4)	(7)	(8)	(9)	(10)
Δ Ln $Food_{t+1}$	0.044	0.034	0.339	0.325	0.136	0.147	0.243	0.263
	(0.149)	(0.149)	(0.192)	(0.192)	(0.149)	(0.147)	(0.200)	(0.193)
$Durables_{t+1}$	-0.036	-0.021	-0.053	-0.080	-0.076	-0.110	-0.065	-0.079
	(0.036)	(0.043)	(0.032)	(0.051)	(0.050)	(0.061)	(0.037)	(0.042)
Δ LnY_{t+1}	-0.043	-	0.092	-	0.042	-	0.053	-
	(0.180)		(0.183)		(0.201)		(0.202)	
LnY_t	-	-0.011	-	0.014	-	0.035	-	0.016
		(0.018)		(0.022)		(0.038)		(0.023)
OI	39.994	39.756	53.718	53.555	23.625	22.798	41.320	40.918
[p-value]	[0.867]	[0.872]	[0.370]	[0.376]	[0.908]	[0.928]	[0.181]	[0.192]
M1	-18.472	-18.552	-17.576	-17.232	-14.066	-14.131	-19.644	-19.272
M2	0.784	0.755	0.086	0.078	1.179	1.171	0.461	0.525

Notes: The standard errors are in parentheses below the coefficients. One and two starts denote significance at the 1% and 5% level, respectively.

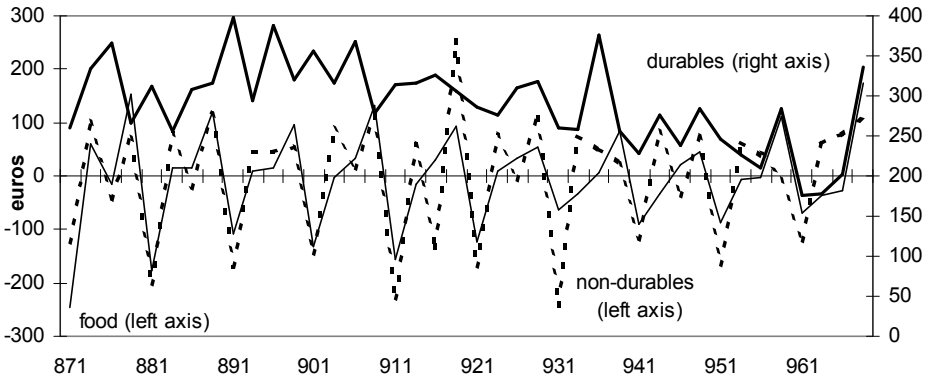
Table 6. Euler equation estimates for food ($\Delta LnFOOD_{t+1}$).
Households aged between 25 and 60 without unemployed members.

	25-44 years		45-60 years		Low-income group		High-income group	
	(1)	(2)	(3)	(4)	(7)	(8)	(9)	(10)
Δ $LnOND_{t+1}$	0.094	0.082	0.072	0.072	0.160	0.202	0.050	0.087
	(0.107)	(0.110)	(0.077)	(0.078)	(0.142)	(0.142)	(0.105)	(0.103)
$Durables_{t+1}$	-0.009	0.002	-0.002	-0.041	-0.045	-0.030	-0.022	-0.025
	(0.030)	(0.033)	(0.023)	(0.033)	(0.038)	(0.044)	(0.029)	(0.032)
Δ LnY_{t+1}	0.019	-	0.146	-	0.252	-	0.272	-
	(0.136)		(0.118)		(0.136)		(0.150)	
LnY_t	-	-0.009	-	0.018	-	-0.002	-	0.004
		(0.015)		(0.013)		(0.027)		(0.017)
OI	53.736	57.420	50.391	49.717	47.208	48.472	40.403	40.409
[p-value]	[0.369]	[0.249]	[0.497]	[0.524]	[0.065]	[0.051]	[0.208]	[0.208]
M1	-13.990	-14.070	-15.801	-15.746	-9.717	-9.078	-16.791	-16.828
M2	-0.812	-0.832	-1.654	-1.501	-1.026	-0.900	-0.939	-0.892

Notes: The standard errors are in parentheses below the coefficients. One and two starts denote significance at the 1% and 5% level, respectively.

FIGURE 1

Quarterly household expenditure on food, other nondurables and durables. 1987-1996.



Notes: Expenditure on food and other nondurables are measured as quartely changes and expenditure on durables in levels. All values are deflated to 1985 prices.

ACKNOWLEDGEMENTS

The authors acknowledge the financial support of the Spanish Ministry of Science and Technology through the SEC2002-01512 project.

Full title: Further evidence of excess sensitivity of consumption?. Non-separability among goods and heterogeneity across households

Running title: The excess sensitivity of consumption to predictable income with Spanish data

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ABSTRACT

The standard theoretical framework for analysing households' intertemporal decisions is the life-cycle/permanent income model. Among its implications, testing the model allows to analyse the response of consumption to fiscal policy. However, the empirical literature with microdata has yielded mixed results. This paper examines the sensitivity of the results to the assumption of separability among goods and of homogeneity across households. For that purpose, we test a rational expectations permanent income model with household data drawn from the Spanish Family Expenditure Survey. This survey contains detailed information on total expenditure, and the income presents large, exogenous quarterly changes due to an institutional feature. The paper shows that assuming separability among commodities biases the test against the model. When separability is not imposed, we show that the rejection of the model depends on heterogeneity across households in terms of their members being unemployed or not. For those households permanently employed, the model cannot be rejected whatever their income status.

1. Introduction

Since Robert Hall's paper (1978), most studies of consumption have focused on Euler equations. The rational expectations permanent income hypothesis (henceforth the REPIH) states that households incorporate any available information into consumer-related decision making. Therefore, changes in household consumption should not respond to predicted income growth. In this sense, a tax policy's ability to affect the aggregate demand depends on the acceptance of the REPIH: if households are foresighted, only unexpected changes affecting their permanent income will modify current consumption.

Most of the early studies that tested Hall's model used aggregate data (e.g. Flavin, 1981; Hayashi, 1982; Campbell and Mankiw, 1989; Wirjanto, 1996; Villagomez, 1997). However, the possibility of controlling for heterogeneity across households and of avoiding distortions caused by the aggregation of micro-level non-linear relations has gradually directed analyses of the intertemporal allocation of consumption towards the field of microeconomics, which also happens to be the level at which theories were formulated (Heckman, 2001). A review of empirical literature based on household data indicates that the rejection of the model is sensitive to the measure of consumption analysed (Lage, 1991; Ziliak, 1998; Parker, 1999; Soulesles, 1999, 2002),[1] to the set of imposed separability hypotheses, mainly centred on leisure/consumption-type decision making (Attanasio and Browning, 1995; Attanasio and Weber, 1995) and on decisions associated with the family's demographic composition (Attanasio and Browning, 1995; Attanasio and Weber, 1995), or to the power of the instruments used to predict income growth (Altonji and Siow, 1987; Shea, 1995; Lusardi, 1996; Soulesles, 1999).

Although the overall rejection of the model has been reduced by taking into account the above aspects, there is no sufficient consensus as yet (Deaton, 1992; Browning and Lusardi, 1996; Attanasio, 1999). For this reason, in recent years a number of different studies have emerged that take advantage of existing "institutional features" associated with household income. These studies analyse situations in which individuals have prior knowledge of changes in their income. This can be construed as a "natural experiment" of the REPIH: if individuals are forewarned of variations in their income, their consumption patterns should not vary when their income changes.

These articles have mainly followed two alternative approaches. One consists of testing households' response to announced tax changes[2] (Shapiro and Slemrod, 1995; Soulesles, 2002).[3] The problem with this approach resides in the difficulty in discerning whether tax changes are permanent or transitory (Watanabe *et al*., 2001). A second approach has focused on households' reactions to intrayear fluctuations in income. Thus Paxson (1993) and Browning and Collado (2001) compare expenditure patterns across the year in Thailand and Spain, respectively, between households with an uneven intrayear income distribution and those with a more homogenous one. Other authors have analysed the excess sensitivity of consumption to intrayear income variations caused by tax refunds (Soulesles, 1999; Hsieh, 2003) or by the cessation of Social Security taxes (Parker, 1999). Finally, Stephens (2003, 2006) examines whether spending is sensitive to the time of month when people receive their pay in Great Britain and their Social Security cheques in the United States, respectively. Overall, the results of this second approach are not conclusive, with fewer studies that fail to reject the REPIH (Paxson, 1993; Browning and Collado, 2001; Hsieh, 2003). Nevertheless, in some of these articles income changes are small. In this context, if individuals must incur big costs in order to smooth consumption,

[1] See also the papers by Dow (1993), Shea (1994), and Lee and Kong (2000), with aggregate data.
[2] A similar proposal is that made by Levenson (1996), who analyses whether households in Taiwan increased their consumption after an announced reform to the Social Security that represented windfall retirements/severance benefits.

then the rejection of the REPIH might be due to a near-rational type of behaviour (Thaler, 1990).

This paper aims to contribute towards testing the REPIH by taking advantage of information available in the Spanish Family Expenditure Survey (Encuesta Continua de Presupuestos Familiares, hereafter the ECPF), both in terms of income and expenditure data, so that our test of the REPIH overcomes some of the shortcomings highlighted above.

Most Spanish wage earners (and all pensioners) face periodic intrayear fluctuations in income with which they are perfectly familiar, both in terms of when they will occur and in the amount concerned. This is due to the existence of two extra payments (one in July and another in late December).[4] Since these extra payments are systematic, exogenous to individuals and non-performance related, there is no point in distinguishing between permanent and transitory quarterly variations in income for those individuals that are retired or permanently employed. From this point of view, this article complements other studies which analyse institutional features affecting income based on U.S. micro data (Soulesles, 1999; Parker, 1999; Hsieh, 2003) and Spanish micro data (Browning and Collado, 2001).[5]

With regard to the arguments of the utility function, in this paper we do not assume separability among commodities. This paper takes into account the relationship among the three categories that together make up total spending (food, other nondurable goods and services, and durables). The purpose is to test whether the rejection of the REPIH

[3] Poterba (1988) and Wilcox (1989) are examples of pioneering studies in this type of REPIH test, using aggregate data.
[4] See Browning and Collado (2001) for a description of the annotation of the extra payments in the ECPF.
[5] As commented below, the main differences between this study and that of Browning and Collado (2001) are that this paper does not assume separability among goods, whilst heterogeneity across households is contemplated via the sample's segmentation. Finally, this study includes households with unemployed members and households where the spouse works.

detected in other studies can be accounted for by the omission of spending variables as regressors, since this hypothesis is systematically overlooked in the literature (Browning and Lusardi, 1996; Attanasio, 1999), partially because this information is lacking in many databases.

Finally, we also explore the influence of heterogeneity across households on the excess sensitivity of consumption to income. Along some of the most commonly used criteria (based on income level or age) to segment the sample, this paper also tests whether the results are driven by transitory income caused by transitions into unemployment.[6]

The results of this paper show that the imposition of separability among goods biases the test against the REPIH. When the extended model that includes groups of commodities as regressors is tested, the rejection of the model is not extensive to the whole sample. Unlike, its rejection is dependent on the chosen source of heterogeneity across households. In this respect, our results allow to reconcile papers that reject the REPIH with those that fail to reject it, even when using the same database; the REPIH is rejected when we split the sample using income as our criterion and to a lesser extent when based on the age of the household head. However, we fail to reject the REPIH when households where either of the spouses is unemployed are dropped, regardless of whether segmentation is based on income or age. Our results suggest then that the mixed findings observed in empirical literature when income (wealth) or age is used as a segmentation criterion, might be due to these variables' correlation with transitory income caused by transitions into unemployment.

The remainder of the paper is structured as follows: Section 2 motivates our analysis; Section 3 presents the theoretical model; Section 4 describes the database; Section 5 is

dedicated to econometric issues; Section 6 comments the estimation results. Finally, the concluding remarks are presented in Section 7.

2. Motivation

Analyses of the REPIH have mainly been based on the correlation between consumption growth and predicted income (Deaton, 1992; Browning and Lusardi, 1996; Attanasio, 1999). In this respect, if we dispense with discussions on control variables, in order to test the REPIH it is essential to have a database that shows a sufficient variability in income, as well as powerful instruments for predicting income growth. Not only is income variability important in achieving precise estimates, but also due to the consequences of measurement errors. The lower the true variation in income, the easier it is for measurement error to drive the sign of income changes. In fact, measurement error in consumption and income is one of the most serious limitations when using household data to test the REPIH (Altonji and Siow, 1987; Runkle, 1991; Deaton, 1992; Lusardi, 1996).

As mentioned above, most permanently employed Spanish workers' (and all pensioners') yearly income is not evenly distributed across the twelve months, due to two extra payments (one in July and the other in late December). Each extra payment ranges between 60 to 100% of a normal monthly one. Thus most households interviewed in the ECPF present high quarterly income changes of between 15 and 30% in real terms that are not common with other microdata sets.

This considerable variability in quarterly income has important implications on the testing of the REPIH. First, as is also the case in Parker (1999), Soulesles (1999) and Hsieh

[6] See Browning and Crossley (1999) for theoretical and empirical results on consumption during an

(2003), because these extra payments are systematic and exogenous in nature, most of the quarterly income changes observed by the investigator are known to households in advance[7] and they do not transmit new information: a factor which is crucial in a rational-expectations context. Second, it compels forward-looking households to take an active role in planning the intrayear allocation of their income, which reduces the effect of bounded rationality.[8] Third, it greatly reduces the influence of measurement error in income on the sign of quarterly income changes. Finally, the extra payments' exogenous, systematic characteristic is reflected in the unusually high predictive power of our instruments of income growth (an adjusted R^2 of around 0.45). Thanks to this high value, we avoid the acceptance of the REPIH attributable to the usual weak correlation of the instrument set with income growth.

The second element we would like to focus on is the interrelation between the groups of commodities. If the possibility that households might readjust their total expenditure across different groups of commodities is not contemplated, this effect might be captured by income, rejecting the REPIH (Attanasio and Weber, 1995; Browning and Lusardi, 1996; Attanasio, 1999). One of the peculiarities of the ECPF is the fact that it contains detailed information on all household spending. Figure 1 shows the quarterly expenditure changes over the sample period for each of the three groups of commodities into which total expenditure has been divided: food, other nondurables and durables (see Appendix 1 for details of how the goods were grouped). Figure 1 highlights how Spanish households seem to adjust their expenditure on an intratemporal basis. In fact, after removing

unemployment spell.

[7] For those households without transitions into and out of employment, in 85% of all observations the sign of the quarterly income changes can be correctly predicted. In fact, despite a lack of official information on how widespread extra payments are, the analysis of the ECPF points to the fact that around 75% of all employees with no labour transitions receive extra payments.

[8] Browning and Crossley (2001) calculate the welfare costs for Spanish households of automatically consuming all current income (measured as a percentage of annual spending) rather than following an optimally smoothed path, under the hypothesis that, during months with extra payments, double the normal income is paid. The authors conclude that the welfare costs stand at around 7%, very much higher than the figure for institutional features examined by Hsieh (2003) and Parker (1999), thus demonstrating the relevance of intrayearly planning in the Spanish case.

seasonal patterns, simple Pearson correlations between other nondurables and food, between other nondurables and durables, and between food and durables showed values (and p-values) of 0.068 (0.0001), -0.050 (0.0001) and -0.047 (0.0001), respectively. Therefore, apart from seasonal preferences, it cannot be ruled out *a priori* that part of the quarterly changes in food or in other nondurables spending is due to nonseparability among commodity groups. For this reason, when specifying Euler equations for a group of commodities, the strategy used was to condition them on the expenditure of the remaining commodity groups. This issue will be taken up again in the following section, when specifying the utility function.

[INSERT FIGURE 1 ABOUT HERE]

3. The Model

The rational expectations permanent income hypothesis proposed by Hall (1978) establishes that households try to maximize their expected lifetime utility using all the available information on their expected lifetime income endowments. Thus households allocate their consumption on an intertemporal basis until their discounted marginal utility across periods is smoothed,

$$U'_{it} = E_t\left[U'_{it+1}\left(\frac{1+r_{it}}{1+\delta_i}\right)\right] + \mu_{it} \qquad (1)$$

where U'_{it} is the marginal utility of household *i* during period *t*, E_t the mean operator conditioned on the set of information known at moment *t*, δ_i the household *i* rate of time preference, r_{it} the after-tax real interest rate and μ_{it} a Lagrange multiplier associated with the non-negativity constraint on wealth (Zeldes, 1989b).

From (1) the rejection of the REPIH can be attributable to two main sources. On the one hand, the existence of liquidity constraints, a precautionary-saving motive or simply a "rule-of-thumb" behaviour, for example, which would hinder the intertemporal allocation process stated by the standard REPIH based on expected future information. In this case μ_{it}, which is unobservable, will be different from zero. So, to detect the violation of the martingale condition, variables must be introduced that are correlated with μ_{it}, such as income. The second source of rejection is when the researcher fails to include all the variables that the household incorporates into its utility function. In this second case, at least part of the model's rejection can be attributed to the omission of relevant variables whose effect might be captured by income, even if the model is true. In this paper we use a wider set of preference variables in the utility function (which usually includes demographic and labour-supply variables as taste shifters), based on the non-imposition of separability among food consumption, FC, other non-durable goods and services, ONDC, and the stock of durables, S.

Thus the utility function used, which is of the constant relative risk aversion type, takes a multiplicative form which includes the three aforementioned expenditure categories and a vector of household preferences, θ_{it}.

$$U\left(FC_{it}, ONDC_{it}, S_{it}; \theta_{it}\right) = \frac{1}{1-\tau} FC_{it}^{1-\alpha} \frac{1}{1-\alpha} ONDC_{it}^{1-\tau} \frac{1}{1-\Psi} S_{it}^{1-\Psi} \exp\left(\theta_{it}\right) \qquad (2)$$

θ_{it} is composed of an observable stochastic part, expressed as a vector of demographic variables (the age of the household head, age_{it}; the age squared, age^2_{it}; and the family size, $FAMS_{it}$) and of labour supply (the number of earners, NE_{it}; and the household head's unemployment status, UH_{it}), and an unobservable part. The latter is made up of an individual effect which does not vary over time, β_i, and an error term for household preferences that varies in time and across households, ϖ_{it}, which we assume is orthogonal to β_i.

$$\theta_{it} = b_0 age_{it} + b_1 age_{it}^2 + b_2 FAMS_{it} + b_3 NE_{it} + b_4 UH_{it} + \beta_i + \varpi_{it} \quad (3)$$

For the sake of brevity we restrict the exposition to the case of other nondurables consumption. If we suppose that the rate of time preference is equal to the real interest rate, $\delta_i = r_{it}$, as in Lusardi (1996) and Jappelli and Pistaferri (2000), taking logarithms of both sides of the expression derived from the substitution of the utility function (2) and household preferences (3) in the first-order condition (1), and using a second-order Taylor expansion, we can express the Euler equation as follows, once rational expectations have been applied:

$$\Delta LnONDC_{it+1} = k_{0i} + k_1 age_{it} + k_2 \Delta FAMS_{it+1} + k_3 \Delta NE_{it+1} + k_4 \Delta UH_{it+1} +$$
$$+ k_5 \Delta LnFC_{it+1} + k_6 \Delta LnS_{it+1} + k_7 \Delta LnY_{it+1} + \phi_{it+1} \quad (4)$$

where

$$k_{0i} = \frac{1}{\alpha}\left(b_0 + \frac{1}{2}\sigma^2_{\varepsilon it+1}\right); \quad \phi_{it+1} = \frac{1}{\alpha}\left[\Delta\varpi_{it+1} - Ln(1+\varepsilon_{it+1}) - \frac{1}{2}\sigma^2_{\varepsilon it+1} + Ln(1+\mu_{it})\right]$$

where Δ is the first difference operator, α is the coefficient of relative risk aversion and $\sigma^2_{\varepsilon it+1}$ is the variance in consumption growth. The term ε_{it+1} incorporates expectational errors; it has mean zero and is uncorrelated with any information available at time t, $E[\varepsilon_{it+1}/\Omega_{it}]=0$. Following Runkle (1991), except where otherwise noted, k_{0i} is assumed to be the same for all households (see Section 5).

Equation (4) incorporates the variables that determine the intertemporal allocation of consumption. The central hypothesis to test is whether the lagged information over which the household has intertemporal control has predictive power over consumption growth. For this reason, predicted income has been included in equation (4): if income is

statistically significant, $k_7 \neq 0$, then the REPIH is rejected. Note, therefore, that possible specific sources of excess sensitivity are not tested in this paper.[9] The other hypothesis of interest concern separability among commodity groups, tested via parameters k_5 and k_6.

4. The Data

The household-information data set used in this paper was drawn from the Spanish Family Expenditure Survey for the period 1986-1996. The ECPF, which is conducted by the National Institute of Statistics (INE), is a rotating quarterly panel survey representative of the Spanish population. The survey combines direct annotations of expenditure made during the week when contact with the household is maintained and a personal interview regarding expenditure prior to that week.[10] In addition, income made during the previous three months is recorded, together with sociodemographic and labour-related information concerning the households during the week of the interview. For the purposes of comparisons with other surveys, the information not available includes household members' number of working hours and households' net wealth and stock of durables.

Each quarter 3,200 households are interviewed. From these, 12.5% are randomly replaced each quarter, so that each household is monitored for up to eight consecutive quarters. In order to minimize possible inconsistency in parameter estimates associated with panel data sets where the number of observations per household is small (Chamberlain, 1984), we restricted our sample to households that answered the survey for the maximum eight

[9] In order to have a direct measure of liquidity constraints, García (1999) substitutes the income variable for the change in households' indebtedness, the latter obtained from National Accounts.

[10] The reference period for each type of goods depends on the frequency of its purchase. Food expenditure corresponds to purchases made during the week of the interview, other nondurables to the previous month including the week of the interview, and durables to the previous three months including the week of the interview. The INE raises food spending and expenditure on other nondurables to a standard three-month period to homogenize the global expenditure period.

possible quarters, leading to a sample of 8,774 households. From these, households were selected whose heads were aged between 25 and 80, and who were not self-employed. We followed previous empirical work in applying several filters to exclude households with extreme measurement errors in consumption or income (Altonji and Siow, 1987; DeJuan and Seater, 1999). The final sample consisted of 5,143 households, representing a total of 41,144 observations.

As for the construction of the variables used in the model, total expenditure was divided into three groups of commodities: food (in and away from home), other nondurable goods and services (including clothes and footwear as semi-durables), and durables. Each group of commodities was deflated by a household-specific Stone Price Index, derived from the dissaggregated national consumer retail price index published by the INE, where the household budget shares were taken as weights. The income variable comprises total after-tax household income and it was deflated to 1985 prices with the general CPI. Variations in the stock of durables were proxied by a dummy variable that took a value of one when the household's expenditure on durables was equal to or higher than 60€ and zero otherwise.[11] The household head's transitions into and out of unemployment were also controlled by a dummy variable, with a value of one if the household head was unemployed during the week of the interview and zero if not. The remaining explanatory variables were specified as continuous variables. The family size was measured in adult-equivalent terms, according to the OECD equivalence scale.

Appendix 1 details the components of each commodity group of goods and the filters used. It also contains a table with descriptive statistics of all the variables used in the Euler equation estimates.

[11] The results were not affected when other minimum values for expenditure on durables were used.

5. Econometric Issues

Equation (4) was estimated using the Generalised Method of Moments (GMM), exploiting the orthogonality conditions imposed by the rational expectations hypothesis, i.e., $E[\phi_{it}/\Omega_{is}] = 0 \ \forall \ t>s$ where Ω_{is} is the set of information available at time s, that contains the instrument set. The standard errors are robust to general forms of heterocedasticity and serial correlation.[12] In this context of rational expectations, testing the model's overidentifying restrictions constitutes a complementary test of the REPIH (Runkle, 1991).

For the estimation of equation (4), controls were made for the information contained in the error term. Following Runkle (1991), different factors were taken into account: the presence of aggregate shocks, the presence of persistent household-specific effects,[13] and measurement error in consumption. The aggregate shocks were accounted for using year dummies, under the null hypothesis of aggregate shocks to consumption growth that are common across households (Mariger and Shaw, 1993). Measurement error in consumption was controlled using a twofold approach: household filters (see Appendix 1) and the number of instrument lags. Given the MA(1) structure of the error term, instruments were used with two lags and earlier.

[12] We estimated the Euler equations by GMM using the DPD programme written in GAUSS by Arellano and Bond (1998).

[13] This type of heterogeneity could arise if each household had its own discount rate, which remained constant across time. In this case, the presence of persistent household-specific effects causes lagged consumption growth to have predictive power over current consumption growth.For this reason, to test their existence, ΔLnC_{t-1}, which would be correlated with the household-specific effect, was incorporated into the instrument set.

All the explanatory variables, except for time dummies, were assumed to be endogenous and so they were instrumented.[14] The availability of suitable instruments is crucial in testing orthogonality between consumption growth and predicted income.[15] In this paper advantage was taken of the unique extra-payment factor and the fact that the ECPF monitors the same households for over four quarters. As can be seen in Appendix 2, the exogenous, systematic, non-performance-related nature of these extra payments provides powerful instruments of ΔLnY_{it+1} with an adjusted R^2 of up to 0.46 for those households without unemployed members: a figure much higher than the normal 0.02 offered by other databases (Altonji and Siow, 1987; Shea, 1995; Lusardi, 1996; Browning and Lusardi, 1996). Appendix 2 details the set of instruments used in the estimations, comprising sociodemographic, labour-supply, expenditure and income variables.

6. Results

In this section, we discuss the results of the Euler equations for the two groups of nondurable commodities: food and other nondurables. In order to check how heterogeneity across households could influence the test of the REPIH, we segmented the sample using different criteria. On the one hand, the sample was separated into three groups based on the age of the household head: 25 to 44 years old, 45 to 60 years old and 65 to 80 years old.[16] Most articles do not consider households with heads over the age of 64 suitable for testing the REPIH, because certain factors such as health, the likelihood of death, changes in family size etc. can alter how they plan consumption. In this paper, households with heads aged over 64 were included as an additional group in order to

[14] Attention was also paid to the possible correlation between age and unemployment. The analysis of the sample did not show a high degree of correlation between age and unemployment transitions.
[15] See Hansen and Singleton (1982), Arellano and Bond (1991) and Bound *et al*. (1995) for the properties of the IV estimators when the instruments are weakly correlated with the endogenous variable.
[16] The group aged between 61 and 64 was excluded to prevent transitions into retirement from distorting the results.

complement previous papers. If the model's violation is due to liquidity constraints or to precautionary saving, excess sensitivity is more likely to arise in the younger and older age groups (Jappelli, 1990; Gourinchas and Parker, 2002). On the other hand, the sample was also split according to household income[17] into a low-income and high-income group. The statistical power of the test is dependent on the capacity of the segmentation criterion to ensure the correct separation of those households able to smooth their marginal utility intertemporally from those not able to do so. We therefore considered high-income households to be those that remained above the 6th decile for each of the eight waves. Those households that consistently remained below the 6th decile were classified low-income households. If the REPIH's violation is due to liquidity constraints or to a precautionary motive, excess sensitivity should only arise in the low-income group. As with the age-based segmentation criterion, if excess sensitivity is due to some other source, e.g. a rule-of-thum behaviour, there is no reason to believe that the results for the two income groups should differ. Appendix 3 shows the sociodemographic and economic characteristics of each household sample.

For the sake of brevity, we only report the parameter estimates of interest: those referred to the excess sensitivity of consumption to predicted income ($\Delta \ln Y_{t+1}$ or $\ln Y_t$) and those concerning the influence that non-separability among commodity groups can have on it. All the other results are available from the authors on request.

6a. *Results for the consumption of other nondurables*

Tables 1 and 2 present the results of the Euler equations for other nondurables using the extended model and when we assume separability among commodity groups, respectively. From Table 1 it can be seen that for household groups whose head is below

[17] Zeldes (1989b) and most subsequent authors separate the sample on the basis of (liquid) wealth to income ratios. Unfortunately, wealth-related information is not available in the ECPF.

the age of 61 (columns 1 to 4), neither of the two income specifications is statistically significant at the 5% level. Neither can overidentifying restrictions be rejected.[18] Notice, however, that failure to reject the REPIH for the younger group is dependent upon the hypothesis of nonseparability of other nondurables from durables (see Table 2). Unlike the previous age groups, there is evidence against the REPIH for the over-64 age group (columns 5 and 6 of Table 1): $\ln Y_t$ is significant at the 5% level and overidentifying restrictions are also rejected.

An analysis of the Euler equations when the sample is split according to income (columns 7 to 10 of Table 1), shows that there is evidence of excess sensitivity of consumption to predicted income growth for the low-income group: the coefficient on $\Delta \ln Y_{t+1}$ is significant at the 5% level.[19] In contrast, as expected when there is a precautionary motive or liquidity constraints, the REPIH cannot be rejected for the high-income group, as in Soulesles (1999).[20] It is important to note that, as detected for the younger group, assuming separability among commodity groups biases the results against the REPIH for the high-income group: Table 2, in particular, shows that the overidentifying restrictions are rejected.

On the other hand, the hypotheses of separability between other nondurables and food, and between other nondurables and durables are rejected for several household groups, as shown in Table 1. The signs of the coefficients obtained are the expected ones: positive for food and negative for durables.[21]

[18] The null hypothesis of absence of second-order autocorrelation for the disturbance term (M2) could not be rejected. Neither could the null hypothesis of absence of persistent household-specific effects. These results were repeated in the remaining estimations. For the sake of brevity, tests of persistent household-specific effects are not reported, but are available upon request.
[19] Note from table 2 that the excess sensitivity is maintained when neither of the two groups of commodities is included as an explanatory variable.
[20] The results were not affected when retired households were excluded.
[21] Brugiavini and Weber (1994) also obtain a negative correlation between nondurables and durables with cross-section data.

[INSERT TABLES 1 AND 2 ABOUT HERE]

6b. *Results for food consumption*

When the REPIH is tested for food consumption, it shows the same results as the test for other nondurables when the youngest household group is analysed: the orthogonality condition between consumption growth and predicted income cannot be rejected (columns 1 and 2 of Table 3). The results obtained for the other two household age groups are the opposite of those observed for other nondurables: the REPIH is rejected for the middle-age household group, but not for the older group. Again, the failure to reject the REPIH for some household groups is dependent upon the assumption of separability among groups of commodities, as shown in Table 4.

When the sample is segmented according to income, the same different intertemporal allocation capacity observed for nondurables is maintained. The REPIH is rejected for the low-income group, but not for the high-income group, as also detected in Zeldes (1989b), Jappelli *et al*. (1998) and Soulesles (1999).

[INSERT TABLES 3 AND 4 ABOUT HERE]

As for explanatory consumption variables, in those cases in which they are statistically significant, the expected parameter signs are also obtained: positive for other nondurables, as in Attanasio and Weber (1995), and negative for durables.

6c. The segmentation criteria and the effect of being unemployed

The results reported so far indicate that segmenting the sample according to income provides more stable results than dividing it into age groups. In other words, they do not

seem to have the same power to classify those households with and those without difficulties in allocating their consumption intertemporally. The question we raise in this sub-section is whether the disparity of our results is due to the fact that income and age are not equally correlated with the latent variable that conditions the intertemporal allocation, that we proxy for the fact of being unemployed.

In order to check this possibility and to make our results comparable with previous work, we concentrated on those households whose heads were 60 years old or younger. From these, households were excluded if either the head or the spouse (if applicable) was unemployed during any of the eight quarters. This led to a new sample of 2,576 households and 20,608 observations. This new sample allows us to compare our results directly with those of Browning and Collado (2001), who also use a sample of Spanish households drawn from the ECPF characterized by their household head's "permanent employment status". Unlike us, however, these authors do not segment the sample.

After dropping those households with unemployed members, our new sample is less likely to be affected by income risk or liquidity constraints. Thus, if the results differ from those obtained using our whole sample, it could be attributable to a correlation between the segmentation criterion and unemployment (e.g. with transitory income). Moreover, by dropping those households with unemployed members, we can take full advantage of the extra payments' systematicity. In fact, Appendix 2 shows how the predictive power of the instruments of income growth rises dramatically for these households, thus enhancing the statistical power of the REPIH test.

[INSERT TABLES 5 AND 6 ABOUT HERE]

Tables 5 and 6 report the estimated Euler equations for other nondurables and food, respectively, based on the new sample. From both tables it can be observed that neither

type of segmentation, by age or income, shows evidence of an excess sensitivity of consumption growth to predicted income, regardless of the group of commodities analysed. That is, once we remove those households with unemployed members, we cannot reject the REPIH on the basis of expected future information, thus corroborating Browning and Collado's findings (2001). In this respect, these results suggest that age or income criteria *per se* do not capture the true source of heterogeneity in Spanish household consumption patterns. The key element that conditions the results of the Euler equations for the whole ECPF sample is the transitory income that accompany a transition into unemployment. The more highly correlated the segmentation variable is with transitions into and out of work, the greater capacity it will have to classify households correctly.

7. Conclusions

Empirical literature on the REPIH yields mixed results. This paper has attempted to contribute towards the testing of the REPIH by using a high-quality database, the Spanish ECPF, and by analysing the influence of heterogeneity both across households and goods. In two respects the information on total expenditure and income offered by the ECPF has allowed us to overcome some of the drawbacks detected in empirical literature. On the one hand, this paper has extended the standard Euler equation by assuming non-separability between food and other nondurables, as in Attanasio and Weber (1995), and also of the latter two categories from durables. On the other hand, we have also taken advantage of a Spanish institutional feature that leads to an uneven intrayear wage and pension distribution. Unlike other data sets, the large, highly predictable quarterly income changes that these extra payments produce enhance the power of the REPIH test.

This paper has shown that conditioning the Euler equations on consumption variables, including durables, can alter the rejection of the REPIH. In consequence, assuming separability among commodity groups biases the results against the REPIH, so that the rejection of the REPIH observed with other databases might partially be attributable to this omission.

The overall result of this paper, when separability among commodity groups is not imposed, is the rejection of the REPIH, in the sense that not all households behave according to the orthogonality condition between consumption growth and predicted income. However, this paper has shown that not all segmentation criteria are equally correlated with the latent variable (i.e. the true source of heterogeneity across households) that conditions the intertemporal allocation of consumption. Whilst the results are not stable for households with heads over the age of 44, segmentation by income always leads to the rejection of the REPIH for the low-income group, but not for the high-income one (as in Zeldes, 1989b; Jappelli *et al*., 1998; Soulesles, 1999) regardless of the measure of consumption analysed.

The importance of controlling for the correct source of heterogeneity is shown when we drop those households with unemployed members: there is no evidence against the REPIH for any group of households, neither when segmented by age nor by income, irrespective of the group of consumption commodities analysed. In consonance with the standard REPIH, for those households permanently employed segmentation according to current income does not show different results for high-income and low-income groups, because their reference variable is permanent income.

The different conclusions that we reach when households with unemployed members are either taken or not taken into account are not contradictory under a less restrictive Rational Expectations Permanent Income Model. As suggested by Zeldes (1989a), the

rejection of the standard REPIH is the expected result in an uncertain framework like that experienced by prudent families with unemployed members. Indeed, our results suggest that the mixed findings obtained in empirical literature might be attributable to the failure to control properly for heterogeneity across households. For instance, if being unemployed is the key variable, the sample period (in terms of the stages of the business cycle covered) is an important issue, as some authors (e.g. Deaton, 1992) have emphasized to explain in part the different conclusions reached by Zeldes (1989b) and Runkle (1991). In this respect, our results suggest that the segmentation criterion should be flexible enough to separate households according to their economic performance (with greater flexibility in the case of income than age or other variables also used, such as home ownership versus tenancy).

In terms of fiscal policy, the rejection of the REPIH for the household sample containing unemployed members but not for those with permanently employed members points to the existence of two groups at the aggregate, as suggested by Hall and Mishkin (1982) and Campbell and Mankiw (1989). What is more, the importance of transitory income that accompany transitions into unemployment might suggest that the fraction of consumers who track their consumption to current income is not constant over time, but might have a cyclical profile as shown by Jappelli and Fissel (1990).

In summary, this paper has shown that heterogeneity across households and separability among goods strongly influences the results of consumption Euler equations. Future research should focus on analysing how the sources of heterogeneity that influence the consumption Euler equations are correlated with structural factors, like unemployment, as demonstrated in this paper for Spanish households. This could be an avenue for reconciling the mixed results shown in empirical literature.

Appendices

A1. The ECPF: commodity groups, filters and descriptive statistics of estimation variables.

Composition of commodity groups: the food category includes spending on food in and away from home, and spending on alcoholic drinks and tobacco. The category for other non-durable goods and services includes spending on clothes and footwear, housing, heating and lighting (not including any imputed rent from owner occupation), household goods, goods and services for the home maintenance, medicine, fuels, public transport, postage and communications, leisure and cultural services, books, newspapers and magazines. Durables include spending on furniture, carpets and rugs, heating and kitchen appliances, household fittings, glassware, the purchase of vehicles and other appliances and accessories.

Filters: households fulfilling any of the following conditions were dropped: (a) those at the 0.5% bottom or top percentiles of the income distribution, (b) those experiencing a quarterly income change per earner higher than +200% or lower than -75% during one of the quarters, (c) those experiencing a quarterly expenditure change per adult equivalent on food or on other nondurables higher than +300% or lower than -85% during one of the quarters, and (d) those whose expenditure on food or other nondurables fell below 6 euros during one quarter.

Descriptive Statistics. Whole sample. 1986.IV-1996.IV

	Mean	Standard deviation	Maximum	Minimum	Median
Income (€)	1,912.72	1,130.72	8,862.12	90.51	1,671.01
Food (€)	803.97	473.61	6,313.81	33.35	717.40
Other nondurables (€)	835.76	685.23	10,936.99	12.46	665.80
Durables +	0.482	0.499	1	0	-
Family size	2.58	0.978	9.80	1	2.40
Number of earners	1.78	0.896	7	1	2
Inactive household head +	0.429	0.494	1	0	-
Employed household head +	0.570	0.499	1	0	-
Unemployed household head+	0.047	0.21	1	0	-
Sex (female) * +	0.169	0.375	1	0	-
Age *	54.27	14.81	80	25	55
Educational level *+					
Elementary school or less	0.723	0.447	1	0	-
Compulsory secondary school studies (up to 16 years old)	0.103	0.304	1	0	-
Full secondary school studies (up to 18 years old)	0.099	0.299	1	0	-
University	0.073	0.260	1	0	-
Professional group (those economically active) *+					-
Labourers	0.216	0.411	1	0	-
Management	0.094	0.291	1	0	-
Others	0.689	0.462	1	0	-

Note: (*) refers to the household head. (+) indicates a dummy variable.

A2. The predictive power of the quarterly income growth instruments

The table below shows the adjusted R^2 from the regressions of ΔLnY_{t+1} on the instrument set used. With the database used, different sub-samples were created to highlight the influence of two factors. Firstly, transitions into unemployment, so that distinguishing between households with and those without unemployed members. Secondly, the length of the quarterly database. Consequently, in one case we used only four quarters for each household (as in the widely used American CEX), whereas in the other all eight available observations were used.

Adjusted R^2 of ΔLnY_{t+1} on different instrument sets (OLS)

4 observations		8 observations	
All households	Households without unemployed members	All households	Households without unemployed members
(a)	(b)	(c)	(d)
0.2581	0.3960	0.3067	0.4615

The instrument set used in the estimations of equation (4) includes the following variables and lags:

- With no lags: a constant, seasonal dummies and yearly dummies.
- With two lags (t-1): age, the age squared, the interaction of both with the household head's educational level and employment status, dummies for the permanently employed status of the two spouses and a dummy reflecting whether or not the household head was retired.
- With three lags (t-2): a dummy for purchases of durables.
- With two and three lags (t-1 and t-2): the total spending on food and other nondurables, the number of household members under 14 years of age, the total number of household members, and a dummy reflecting whether the spouse (if applicable) was unemployed. In the Euler equations for other nondurables (for food) spending on food (on other nondurables) was also included.
- All lags from t-1: income, a dummy reflecting whether the household head was unemployed, and the number of wage and pension earners.

A3. Household groups' sociodemographic and economic features

	Low-income group	High-income group		25-44 years	45-60 years	65-80 years
# **households**	2,092	2,224	# **households**	1,639	1,714	1,678
Age *			**Income groups**			
25 – 44	29.7	35.8	Deciles 1 to 3	14.5	13.7	51.6
45 – 64	33.5	50.8	Deciles 4 to 6	38.5	31.4	27.8
65 – 80	36.7	13.2	Deciles 7 to 10	46.8	54.8	20.4
Labour status *			**Labour status** *			
Economically inactive	52.8	24.2	Economically inactive	2.4	20.7	98.6
Working	40.0	72.8	Working	91.9	70.6	1.2
Unemployed	7.0	2.8	Unemployed	5.6	8.6	0.1
House			**House**			
Rented home	16.2	7.5	Rented home	15.5	9.7	15.2
Mortgage	9.7	19.6	Mortgage	23.3	13.0	5.9
Dummy for spending on durables	37.5	61.4	**Dummy for spending on durables**	56.3	53.2	33.8
# members	2.26	3.04	**# members**	2.73	3.07	1.96
# earners	1.52	2.16	**# earners**	1.54	2.04	1.69
Educational studies *			**Educational studies** *			
Illiterate or without studies	34.0	12.1	Illiterate or without studies	5.5	24.1	45.8
Elementary	58.8	55.5	Elementary	60.5	59.9	48.0
Secondary or higher	7.2	32.4	Secondary or higher	34.0	16.0	6.2

Notes: in percentages for each variable. (*) refers to the household head.

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Table 1. Euler equation estimates for other nondurables ($\Delta LnONDC_{t+1}$)

	25-44 years		45-60 years		65-80 years		Low-income group		High-income group	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Δ Ln $Food_{t+1}$	-0.045	-0.043	0.474	0.469	-0.181	-0.231	-0.030	-0.131	-0.027	-0.066
	(0.150)	(0.150)	(0.191)**	(0.197)**	(0.204)	(0.213)	(0.165)	(0.167)	(0.144)	(0.146)
$Durables_{t+1}$	-0.028	-0.025	-0.046	-0.057	-0.096	-0.208	-0.078	-0.119	-0.104	-0.133
	(0.034)	(0.044)	(0.029)	(0.049)	(0.035)*	(0.063)*	(0.037)**	(0.044)*	(0.032)*	(0.040)*
Δ LnY_{t+1}	-0.042	-	-0.093	-	0.362	-	0.338	-	-0.150	-
	(0.155)		(0.146)		(0.216)		(0.135)**		(0.132)	
LnY_t	-	-0.002	-	0.007	-	0.047	-	0.024	-	0.023
		(0.018)		(0.022)		(0.023)**		(0.022)		(0.022)
OI	58.62	58.89	62.78	64.153	61.422	59.140	62.681	65.306	73.62	73.041
[p-value]	[0.698]	[0.689]	[0.554]	[0.506]	[0.042]	[0.063]	[0.558]	[0.460]	[0.216]	[0.220]
M1	-22.219	-22.235	-17.607	-16.402	-16.766	-14.480	-24.551	-23.437	-24.771	-25.192
M2	0.603	0.597	-0.046	-0.008	-1.287	-1.148	0.532	0.481	0.655	0.529

Notes: The standard errors are in parentheses below the coefficients. One and two starts denote significance at the 1% and 5% level, respectively. All the estimations include seasonal dummies and time dummies as explanatory variables. M1 and M2 are test statistics for first and second order serial correlation, respectively. M1 and M2 tests follow a standardized normal distribution. The Sargan test analyses the lack of correlation of instruments with the error term. It is distributed as an χ^2, with degrees of freedom equal to the number of overidentifying restrictions. These notes are extensible to the remaining tables.

Table 2. Sensitivity of the test of excess sensitivity of other nondurables spending to separability among commodity groups.

	Δ Ln Food$_{t+1}$	Durables$_{t+1}$	Δ LnY$_{t+1}$	LnY$_t$	OI [p-value]	M1	M2
25-44 years old	-0.006 (0.143)	-	-0.631 (0.156)*	-	59.139 [0.681]	-22.181	0.632
	-	-0.022 (0.033)	-0.047 (0.156)	-	57.527 [0.733]	-22.000	0.609
	-	-	-0.066 (0.157)	-	57.750 [0.726]	-22.028	0.633
	-0.016 (0.143)	-	-	-0.009 (0.014)	59.478 [0.669]	-22.304	0.614
	-	-0.014 (0.043)	-	-0.006 (0.019)	57.814 [0.693]	-22.052	0.603
	-	-	-	-0.009 (0.014)	58.100 [0.684]	-22.098	0.613
45-60 years old	0.517 (0.189)*	-	-0.055 (0.144)	-	65.661 [0.453]	-17.509	-0.082
	-	-0.049 (0.029)	-0.125 (0.145)	-	69.451 [0.298]	-21.779	0.046
	-	-	-0.089 (0.142)	-	73.719 [0.190]	-21.926	0.004
	0.534 (0.192)**	-	-	-0.014 (0.013)	64.325 [0.500]	-16.681	0.017
	-	-0.087 (0.047)	-	0.023 (0.022)	71.540 [0.241]	-21.747	0.026
	-	-	-	-0.007 (0.013)	75.150 [0.160]	-22.130	0.073
65-80 years old	0.011 (0.1929	-	0.433 (0.207)**	-	70.848 [0.006]	-19.131	-1.241
	-	-0.068 (0.033)**	0.376 (0.211)	-	52.382 [0.154]	-18.831	-1.291
	-	-	0.419 (0.208)**	-	57.150 [0.072]	-19.113	-1.243
	-0.001 (0.188)	-	-	-0.011 (0.012)	73.68 [0.003]	-19.488	-1.472
	-	-0.124 (0.057)**	-	0.023 (0.021)	55.838 [0.090]	-19.808	-1.354
	-	-	-	-0.0130 (0.012)	60.334 [0.041]	-19.810	-1.477
Low-income group	0.060 (0.160)	-	0.387 (0.133)*	-	68.271 [0.366]	-24.901	0.396
	-	-0.052 (0.036)	0.308 (0.132)**	-	51.540 [0.869]	-24.767	0.430
	-	-	0.331 (0.131)**	-	53.636 [0.818]	-24.838	0.347
	-0.001 (0.157)	-	-	-0.007 (0.018)	76.683 [0.152]	-24.913	0.330
	-	-0.065 (0.043)	-	0.002 (0.022)	56.638 [0.731]	-24.775	0.376
	-	-	-	-0.0152 (0.018)	59.621 [0.631]	-24.907	0.306
High-income group	0.066 (0.140)	-	-0.197 (0.131)	-	82.564 [0.069]	-23.512	0.744
	-	-0.109 (0.032)*	-0.141 (0.132)	-	72.668 [0.214]	-25.248	0.682
	-	-	-0.169 (0.131)	-	85.440 [0.045]	-25.541	0.672
	0.030 (0.140)	-	-	-0.017 (0.018)	85.079 [0.048]	-24.032	0.646
	-	-0.135 (0.040)*	-	0.022 (0.022)	71.789 [0.235]	-25.019	0.601
	-	-	-	-0.020 (0.018)	86.88 [0.031]	-25.576	0.623

Notes: The standard errors are in parentheses below the coefficients. One and two starts denote significance at the 1% and 5% level, respectively.

Table 3. Euler equation estimates for food ($\Delta LnFOOD_{t+1}$)

	25-44 years		45-60 years		65-80 years		Low-income group		High-income group	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Δ $LnOND_{t+1}$	0.018	0.017	0.114	0.120	0.005	-0.032	0.089	0.052	0.050	0.039
	(0.082)	(0.084)	(0.067)	(0.070)	(0.073)	(0.075)	(0.078)	(0.075)	(0.070)	(0.071)
$Durables_{t+1}$	-0.053	-0.049	0.004	-0.045	-0.075	-0.121	-0.025	-0.052	-0.028	-0.048
	(0.026)**	(0.031)	(0.020)	(0.030)	(0.027)*	(0.038)*	(0.025)	(0.028)	(0.025)	(0.029)
Δ LnY_{t+1}	0.055	-	-0.007	-	-0.030	-	-0.122	-	0.145	-
	(0.107)		(0.097)		(0.141)		(0.085)		(0.096)	
LnY_t	-	-0.002	-	0.030	-	0.022	-	0.028	-	0.022
		(0.014)		(0.013)**		(0.012)		(0.014)**		(0.015)
OI	61.754	58.89	56.617	48.531	40.084	36.961	65.475	65.843	73.54	72.853
[p-value]	[0.591]	[0.689]	[0.761]	[0.936]	[0.640]	[0.764]	[0.460]	[0.447]	[0.218]	[0.235]
M1	-18.630	-22.235	-17.601	-17.483	-16.730	-16.527	-20.074	-20.514	-21.559	-21.744
M2	-1.298	0.597	-1.393	-1.279	-0.124	-0.179	-0.851	-0.998	-1.125	-1.187

Notes: The standard errors are in parentheses below the coefficients. One and two starts denote significance at the 1% and 5% level, respectively.

Table 4. Sensitivity of the test of excess of sensitivity of food spending to separability among commodity groups.

	Δ Ln Other nondurables$_{t+1}$	Durables$_{t+1}$	Δ LnY$_{t+1}$	LnY$_t$	OI [p-value]	M1	M2
25-44 years old	0.052 (0.081)	-	0.031 (0.107)	-	64.957 [0.443]	-18.317	-1.312
	-	-0.056 (0.027)**	0.064 (0.109)	-	60.977 [0.583]	-18.630	-1.287
	-	-	0.039 (0.108)	-	65.318 [0.430]	-18.688	-1.311
	0.026 (0.084)	-	-	-0.013 (0.011)	76.210 [0.161]	-18.491	-1.298
	-	-0.050 (0.033)	-	-0.002 (0.014)	61.061 [0.581]	-18.555	-1.265
	-	-	-	-0.014 (0.011)	63.961 [0.477]	-18.688	-1.291
45-60 years old	0.108 (0.065)	-	-0.014 (0.095)	-	56.361 [0.768]	-17.715	-1.380
	-	-0.0000 (0.020)	0.001 (0.094)	-	57.540 [0.702]	-18.560	-1.451
	-	-	-0.003 (0.092)	-	57.249 [0.712]	-18.550	-1.444
	0.138 (0.068)**	-	-	0.0161 (0.0088)	51.584 [0.886]	-17.144	-1.351
	-	-0.051 (0.031)	-	0.029 (0.0134)**	49.935 [0.901]	-18.362	-1.342
	-	-	-	0.013 (0.008)	54.380 [0.798]	-18.606	-1.453
65-80 years old	0.071 (0.069)	-	-0.100 (0.137)	-	49.50 [0.263]	-17.797	-0.228
	-	-0.079 (0.026)*	-0.031 (0.137)	-	40.168 [0.636]	-17.443	-0.114
	-	-	-0.060 (0.135)	-	49.995 [0.215]	-17.748	-0.227
	0.063 (0.068)	-	-	-0.006 (0.008)	73.68 [0.003]	-17.666	-0.165
	-	-0.127 (0.036)*	-	0.024 (0.012)	55.838 [0.108]	-17.298	-0.158
	-	-	-	-0.006 (0.008)	49.107 [0.246]	-17.684	-0.173
Low-income group	0.110 (0.076)	-	-0.115 (0.085)	-	67.139 [0.403]	-19.465	-0.877
	-	-0.039 (0.026)	-0.096 (0.082)	-	67.870 [0.346]	-20.679	-0.834
	-	-	-0.077 (0.081)	-	68.722 [0.320]	-20.825	-0.905
	0.097 (0.073)	-	-	0.019 (0.012)	69.130 [0.339]	-19.784	-1.012
	-	-0.070 (0.029)**	-	0.031 (0.014)**	62.074 [0.544]	-20.624	-0.958
	-	-	-	-0.015 (0.012)	69.336 [0.302]	-20.833	-1.018
High-income group	0.077 (0.067)	-	0.136 (0.096)	-	75.442 [0.176]	-21.147	-1.049
	-	-0.029 (0.024)	0.157 (0.096)	-	70.721 [0.263]	-22.249	-1.218
	-	-	0.146 (0.096)	-	73.162 [0.202]	-22.302	-1.198
	0.078 (0.067)	-		0.013 (0.013)	76.210 [0.161]	-21.346	-1.096
	-	-0.047 (0.028)	-	0.020 (0.015)	70.451 [0.270]	-21.996	-1.252
	-	-	-	0.008 (0.012)	74.400 [0.175]	-22.189	-1.231

Notes: The standard errors are in parentheses below the coefficients. One and two starts denote significance at the 1% and 5% level, respectively.

Table 5. Euler equation estimates for other nondurables ($\Delta LnONDC_{t+1}$). Households aged between 25 and 60 without unemployed members.

	25-44 years		45-60 years		Low-income group		High-income group	
	(1)	(2)	(3)	(4)	(7)	(8)	(9)	(10)
Δ Ln $Food_{t+1}$	0.044	0.034	0.339	0.325	0.136	0.147	0.243	0.263
	(0.149)	(0.149)	(0.192)	(0.192)	(0.149)	(0.147)	(0.200)	(0.193)
$Durables_{t+1}$	-0.036	-0.021	-0.053	-0.080	-0.076	-0.110	-0.065	-0.079
	(0.036)	(0.043)	(0.032)	(0.051)	(0.050)	(0.061)	(0.037)	(0.042)
Δ LnY_{t+1}	-0.043	-	0.092	-	0.042	-	0.053	-
	(0.180)		(0.183)		(0.201)		(0.202)	
LnY_t	-	-0.011	-	0.014	-	0.035	-	0.016
		(0.018)		(0.022)		(0.038)		(0.023)
OI	39.994	39.756	53.718	53.555	23.625	22.798	41.320	40.918
[p-value]	[0.867]	[0.872]	[0.370]	[0.376]	[0.908]	[0.928]	[0.181]	[0.192]
M1	-18.472	-18.552	-17.576	-17.232	-14.066	-14.131	-19.644	-19.272
M2	0.784	0.755	0.086	0.078	1.179	1.171	0.461	0.525

Notes: The standard errors are in parentheses below the coefficients. One and two starts denote significance at the 1% and 5% level, respectively.

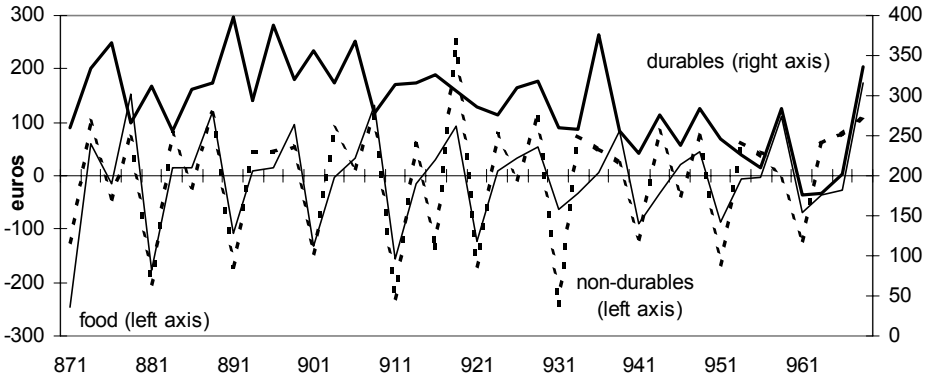
Table 6. Euler equation estimates for food ($\Delta LnFOOD_{t+1}$).
Households aged between 25 and 60 without unemployed members.

	25-44 years		45-60 years		Low-income group		High-income group	
	(1)	(2)	(3)	(4)	(7)	(8)	(9)	(10)
Δ $LnOND_{t+1}$	0.094	0.082	0.072	0.072	0.160	0.202	0.050	0.087
	(0.107)	(0.110)	(0.077)	(0.078)	(0.142)	(0.142)	(0.105)	(0.103)
$Durables_{t+1}$	-0.009	0.002	-0.002	-0.041	-0.045	-0.030	-0.022	-0.025
	(0.030)	(0.033)	(0.023)	(0.033)	(0.038)	(0.044)	(0.029)	(0.032)
Δ LnY_{t+1}	0.019	-	0.146	-	0.252	-	0.272	-
	(0.136)		(0.118)		(0.136)		(0.150)	
LnY_t	-	-0.009	-	0.018	-	-0.002	-	0.004
		(0.015)		(0.013)		(0.027)		(0.017)
OI	53.736	57.420	50.391	49.717	47.208	48.472	40.403	40.409
[p-value]	[0.369]	[0.249]	[0.497]	[0.524]	[0.065]	[0.051]	[0.208]	[0.208]
M1	-13.990	-14.070	-15.801	-15.746	-9.717	-9.078	-16.791	-16.828
M2	-0.812	-0.832	-1.654	-1.501	-1.026	-0.900	-0.939	-0.892

Notes: The standard errors are in parentheses below the coefficients. One and two starts denote significance at the 1% and 5% level, respectively.

FIGURE 1

Quarterly household expenditure on food, other nondurables and durables. 1987-1996.



Notes: Expenditure on food and other nondurables are measured as quartely changes and expenditure on durables in levels. All values are deflated to 1985 prices.

ACKNOWLEDGEMENTS

The authors would like to thank José M. Labeaga for helpful comments. Financial support of the Spanish Ministry of Science and Technology through the SEC2002-01512 project is also acknowledged.