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ABSTRACT

The aim of this paper is to explain private consumption as a function of income and wealth (proxied by financial assets and real estate prices), with data from European Union (EU) countries. We know that income explains a large part of consumption as well as wealth, but concerning the effects of the latter, mainly those of changes on financial asset prices, few is known for Europe. In a general way, and according to the literature, wealth effects are less significant in continental Europe, due to the less advanced financial deregulation degree and household stock ownership, when compared with the US or the United Kingdom. On the other hand, housing wealth effects on consumption would be more pronounced in Europe. To examine how recent developments in stock markets and housing prices may have affected consumption behaviour, we adopt two econometric procedures. Firstly, we will use the Stock-Watson procedure to account for wealth effects on consumption over the long-run. Secondly, through an error-correction model with the long-run relationship nested in a short-run equation we will measure wealth effects on consumption over the short-run. We found an implied long-run elasticity of consumption with respect to real equities prices between four and ten per cent and an implied elasticity of consumption with respect to real residential prices around seven per cent. We also found evidence that consumption exhibits error-correction behaviour in the short-run. Overall, our results are broadly consistent with life cycle saving and a modest wealth effect. Nevertheless, there remains the interest in studying the effects of stock market and residential wealth (and its fluctuations) on consumption and output of the different countries. The complete study of those differences and its magnitude is important even for the definition of the monetary policy by the European Central Bank and to answer the question whether it should consider asset prices in its decisions. The research presented here is a first essay preceding a deeper work on this subject, concerning economies of the EU. After this exercise we think that there is scope for future analysis on this matter that attempts to better explain the connection between asset prices and consumer spending.

1. Introduction

The aim of this paper is to test a model explaining private consumption as a function of income and wealth (proxied by financial assets and real estate prices), with data from European Union (EU) countries.

We know that income explains a large part of consumption as well as wealth, but concerning the effects of the latter, mainly those of changes on financial asset prices, few is known for Europe.

In recent years, the interest of studying the effect of stock prices fluctuations on consumption arose mainly as consequence of a large involvement of families in stock exchanges, placing their savings in equities that depreciated strongly after the collapse of the so called "new economy" boom. A fear that this collapse might imply a high decrease of private consumption, as well as a reduction of investment and income, has thrown the attention of economists towards the analysis of these wealth effects, mainly in the United States (US).

Beyond financial assets, we think that real estate prices may also influence private consumption and this may occur more when interest rates are low (mortgage credit cheaper) and stock ownership is viewed as too risky, hence dangerous for savings placements.

The research we present here is a first essay preceding a deeper work on this subject, concerning economies of the EU. Now we take data from only six States, that we consider a meaningful sample: three core economies of the continental EU (France, Germany and the Netherlands); two small and peripheral economies (Finland and Portugal) and an economy of the EU country that seems to approach more the American patterns (United Kingdom). We expect results that will suggest the better path to follow with further research.

In the following section we discuss the theoretical background pertinent to our research. The subsequent sections present the methodology, the data and the empirical results. The last section concludes.

2. Theoretical background and some earlier evidence

We depart from the "life cycle theory" of Modigliani (Ando and Modigliani [1963] and Modigliani [1971]) as a benchmark model that explains consumption as a variable depending on wealth, beyond income. In that framework, household planned consumption

(C_t*) is a function of total resources, which are net financial wealth at the beginning of the period (W_{t-1}) and human wealth (H_t). Therefore, planned consumption can be expressed as:

$$C_t^* = F(W_{t-1}, H_t) \quad (1)$$

The main result from the "life cycle theory" is that households adjust their savings and wealth over time to keep their planned spending levels steady in the face of uneven income or wealth streams[1]. Since human wealth is not observable, some measure of income is taken instead as a proxy. So, traditionally the wealth effect has been measured by estimating aggregate time-series regressions of the form[2]:

$$C_t = \alpha + \beta_1.W_t + \beta_2.Y_t + u_t \quad (2)$$

Where C stand for household actual consumer spending, Y represents disposable income and W is household net worth or wealth. β_1 and β_2 are, respectively, the marginal propensities to consume out of wealth and disposable income. A widespread empirical practice is to introduce lags and separate wealth into different categories, as stock market wealth or housing and property wealth.

Modigliani (1971) advocated the significance of wealth effects on consumption, and earlier empirical results established a *rule-of-thumb* that each increase of one dollar in wealth translated to a five cents increase in consumption[3]. Yet, as pointed by Boone *et al.* (1998, p. 6), subsequent evidence presented some criticisms to the "life cycle theory". That is, the simple theoretical formulation from Modigliani ignored several problems that could be crucial to explain the relationship between consumption and wealth[4].

Beyond the theoretical criticisms, there are also the econometric pitfalls associated to the value of estimations from equations such as (2). The conventional analysis presented above does not take into account the possibility that the variables are non-stationary or that there is reverse causality between, for instance, wealth and consumption. Failure to address these problems could lead to inconsistent estimates of the wealth effect on consumption.

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[1] For a simple illustration of the "life cycle theory" see Davis and Palumbo (2001).
[2] See among others Modigliani and Tarantelli (1975) and Steindel (1977).
[3] Modigliani (1971) and Bhatia (1972).
[4] Boone *et al*. (1998, p. 6) : "(…) *the life cycle model takes no account of uncertainty in the future stream of revenues (Deaton [1991] and Carrol [1992]), or bequest motives (Wilhelm [1996] and Laitner and Juster [1996]). Furthermore, Zeldes (1989) argued that the strength of any wealth effect should also be linked to the distribution of wealth and the existence of liquidity constraints.*"

In the last few years, motivated by the rampant growth in equity markets and the potential consequences of the present severe downturn, several authors studied the relation between wealth and consumption embodying more cautious econometric methods. The effect of stock market wealth on consumption has been a source of controversy. One reason is that the skewed concentration of stock holdings may imply that swings in stock market wealth have little effect on aggregate consumer spending. So, the evidence remains mixed, varying greatly with the country considered, the data range, the wealth definition, etc..

We summarise now empirical results that some authors found for wealth effects on consumption, associated to the financial and housing markets, for the European countries considered in this paper. Boone *et al.* (1998) found less significant results for Germany and UK than those found for the US. For France, Grunspan and Sicsic (1997) provide no strong evidence of any wealth effect, although Carruth *et al.* (1999) find evidence using a proxy for inflation. Byrne and Davis (2001) consider that the aggregation of wealth in a typical consumption function is inappropriate, finding evidence that illiquid wealth dominates the effect of conventional liquid assets. They present evidence that in France the former effect is stronger. Bertaut (2002) examining a set of European countries finds a significant response of consumption to stock price changes in the Netherlands, only surpassed by the UK results. Case *et al.* (2001) provide a weak wealth effect associated to the stock market but show evidence that in a set of European countries house price changes have a significant impact on consumption. Muellbauer and Murphy (1994), using UK regional consumption data, find a negative effect from house prices and Kennedy and Anderson (1994) find evidence of mixed effects from house price increases in consumption, for a set of OECD countries.

In summary, according to the literature, wealth effects are less significant in continental Europe, compared with the US or the United Kingdom. The reasons behind that are the more advanced financial deregulation degree in those last two countries, with higher numbers for household stock ownership and stock market capitalisation. Nevertheless, at least theoretically, the continuous process of financial deregulation in Europe - motivated in part by the single currency and the creation of pan-European financial markets – would facilitate the flow of the "wealth effects".

As we explain in the following section, the serious lack of data and the short range of the series for the smaller European countries, poses serious problems to the estimation of wealth effects on consumption. The available empirical work for those countries is

practically inexistent. In the specific case of Portugal, we have no knowledge of such an empirical exercise relating stock market wealth to consumer spending.

3. Model, data and methodology

In the introduction to this paper we proposed to study the wealth effects on consumption. A process of rapid ascension of asset prices lasted from 1995 to 2000 and since then we are observing a severe downturn in the markets, which motivates our concern with the consumption behaviour.

Nevertheless, a non-negligible handicap before us is to obtain data on household wealth for a set of European countries. Reliable time series for household financial wealth are more readily available for the US. Since we focus our study on some EU countries, due to the lack of data we use proxies to wealth variables, in order to capture the likely effects of wealth on consumption. So, to examine how recent developments in stock markets may have affected consumption behaviour, we estimate for the considered countries a set of consumption equations that include different variables related to asset prices. That is, in a rather *ad-hoc* procedure, we use a real equity prices index as a proxy for financial household wealth. A real residential prices index is used as a proxy for the housing prices wealth effect (this one only for Finland, the Netherlands and UK)[5].

To study the impact of stock market fluctuations on consumption, we shall represent that relation with the variables in logarithms and we follow the general specification adopted by Boone *et al.* (1998), Ludvigson and Steindel (1999), Byrne and Davis (2001), Case *et al.* (2001) and Davis and Palumbo (2001). So, we initially pretend to study the following equation for consumption:

$$lfcep = \alpha + \beta_0 \,.\, lndip + \beta_1 \,.\, leqp + \beta_2 \,.\, lrep + \beta_3 \,.\, (\text{other variables}) \qquad (3)$$

Where *lfcep* is household consumption expenditure per capita, *lndip* the disposable income per capita, *leqp* the equity prices index and *lrep* the residential prices index, as proxies for household financial and housing wealth. All variables are in logarithms and measured in

[5] The stock market capitalisation was also tested, but the results were inconclusive. The real equity and residential prices indexes were obtained from the Bank of International Settlements (using national data). The remaining data are from Eurostat's NewCronos database. The BIS database does not include Portugal, so instead we use a "share price index" taken from Eurostat's NewCronos database. See Appendix B for a complete description of the data. For the limitations in using asset prices as proxies, see Bertaut (2002, p. 10).

real terms. The coefficient α is a constant term, β_0, β_1 and β_2 are, respectively, the elasticities of the per capita consumption with relation to per capita disposable income, equity and residential prices index. By "other variables", we mean two additional variables[6]:

- The unemployment rate (*ur*), as a proxy to precautionary behaviour of households motivated by uncertainty in the future stream of revenues (a problem evidenced by Deaton [1991] and Carrol [1992]);
- The short-term interest rate (*str*), as a proxy to substitution effects on consumption.

Table 1 in Appendix A presents the simple correlations among consumption, disposable income, real equity and residential prices indexes. If the variables in equation (3) are not stationary, we cannot estimate it using ordinary least squares because the estimated coefficients would be inconsistent. So, we begin by studying the presence of unit roots in the employed variables (in logs). With that purpose we used the standard Augmented Dickey-Fuller (ADF) procedure (Dickey and Fuller, 1979) and Table 2 in Appendix A presents the results. The chosen specification includes generally an intercept and in some occasions a time trend. The results are as expected. According to McKinnon's critical values (McKinnon, 1991), all variables are I(1) with the exception of the unemployment rate in France and Germany and the short-term interest rate in Portugal. The great majority of test statistics fall within the 95 percent confidence region and are therefore consistent with the hypothesis of a unit root in those series[7].

So, to take into account the non-stationary and endogenous problems in the variables we develop equation (3) adopting two econometric procedures: first we will estimate that equation using the Stock-Watson procedure to account for wealth effects on consumption over the long-run. Next, through an error-correction model, we will measure wealth effects on consumption over the short-run.

[6] Boone *et al.* (1998) use the inflation rate, nevertheless since all our variables are in real terms we are not going to include it.

4. Econometric results

4.1. Wealth effects over the long-run: Stock-Watson procedure

Since all the above variables (with the mentioned exceptions) are integrated of order 1, we should avoid using a static regression approach as (3) and use instead a dynamic approach. We begin by a baseline model of consumption, inspired in Davis and Palumbo (2001), that uses the dynamic OLS approach of Stock and Watson (1993) to estimate the long-run relationship among consumption, disposable income, equity and residential prices. So, we are going to estimate the following regression equations for the considered countries:

Finland, the Netherlands and United Kingdom (4A):

$$lfcep_t = \beta_0 . lndip_t + \beta_1 . leqp_t + \beta_2 . lrep_t + \sum_{i=-3}^{3} \delta_0 . dlndip_{t+i} + \sum_{i=-3}^{3} \delta_1 . dleqp_{t+i} + \sum_{i=-3}^{3} \delta_2 . dlrep_{t+i}$$

France (4B):

$$lfcep_t = c + \beta_0 . lndip_t + \beta_1 . leqp_t + \sum_{i=-3}^{3} \delta_0 . dlndip_{t+i} + \sum_{i=-3}^{3} \delta_1 . dleqp_{t+i}$$

Germany (4C):

$$lfcep_t = \beta_0 . lndip_t + \beta_1 . leqp_t + \sum_{i=-2}^{2} \delta_0 . dlndip_{t+i} + \sum_{i=-2}^{2} \delta_1 . dleqp_{t+i}$$

Portugal (4D):

$$lfcep_t = c + \beta_0 . lndip_t + \beta_1 . lsp_t + \sum_{i=-1}^{1} \delta_0 . dlndip_{t+i} + \sum_{i=-1}^{1} \delta_1 . dlsp_{t+i}$$

This specification - aiming to reduce the effects of regressor endogeneity - involves adding leads and lags of the growth rates of each of the cointegrated series to equation (3) and then apply ordinary least squares to the augmented regression. Table 3 in Appendix A looks at evidence on whether or not consumption, disposable income and asset prices (in logs) are cointegrated. Using testing procedures suggested by Johansen (1988, 1991) that allow the researcher to estimate the number of cointegrating relationships, our results suggest that there is at least one (and in most cases only one) cointegrating vector between those variables. Then the estimation results of equations (4) are presented in Table 1.

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[7] The results presented in Table 2 - Appendix A, are almost in all cases unchanged if the ADF model includes an intercept and/or a trend or a different lag structure.

Table 1: Estimates of the Income, Equity and Residential Prices Elasticities of Consumption

	Finland	France	Germany	The Netherlands	Portugal	United Kingdom
estimation period	**1980:1-2001:4**	**1987:4-2001:4**	**1991:1-2001:4**	**1987:4-2001:2**	**1995:1-2001:3**	**1980:1-2001:3**
variables						
constant		**0,51540**			**- 0,20561**	
		11,5223 ***			*- 6,3954* ***	
lndip	**0,27363**	**- 0,04076**	**0,66979**	**0,22061**	**0,46627**	**0,29806**
	6,7477 ***	*- 0,8436*	*4,3408* ***	*2,5114* **	*6,1998* ***	*1,8645* *
leqp	**0,03586**	**0,10023**	**0,02031**	**0,05919**		**0,07703**
	2,6418 ***	*6,4134* ***	*0,4551*	*2,8448* ***		*0,5487*
lrep	**0,07465**			**0,06574**		**0,0082**
	12,3226 ***			*2,7313* ***		*0,0743*
lsp					**0,03734**	
					2,5525 **	

Notes: For Portugal, and due to the lack of data in the BIS database, we use the log of share prices index (lsp), from Eurostat's NewCronos database. The equations are estimated applying the Stock and Watson procedure, with 3 leads, 3 lags and the contemporaneous first difference of the estimating equation's variables included as stationarity regressors (Germany and the UK include only two leads and lags and Portugal only one). t-statistics are calculated as in Hamilton (1994, p. 611). Coefficients significant at 10%, 5% and 1%, are denoted by *, ** and ***, respectively. The constant was excluded in Finland, Germany, the Netherlands and the United Kingdom. Coefficients on led and lagged variables not shown. See also Appendix B for the specific range of each series.

The coefficients on the log levels of income and asset prices can be interpreted as the implied long-run elasticities of consumption with respect to the given variables. The results imply reasonable long-run coefficients for some of the six countries, being more robust the results for the smaller economies. Equity prices exert a significant influence on consumption in all countries except Germany and the United Kingdom. The elasticity values range from almost four per cent in Finland and Portugal to ten per cent in France. In relation to residential prices the results are also very significant for Finland and the Netherlands with the long-run consumption elasticity to the residential prices around seven per cent. Surprisingly, UK presents non-significant coefficients for the asset price variables, which contradicts its more advanced level of stock ownership and financial deregulation. We highlight also the results for Portugal. In that country equity financing is becoming more common and stock ownership has increased among households, there through contributing to stronger wealth effects. Finally, splitting the sample in two periods, we found stronger stock market effects on consumption on the second one (beginning in 1994:1) in France and in the Netherlands. In the UK, the coefficient turns significant in opposition to what happens in Finland. In Finland and in the Netherlands, the residential

prices effect is also stronger in the second period. We also do not present that results, but if for the UK we omit the residential price effect, the stock market fluctuations become highly significant, with the coefficient around the eight per cent.

These scarce results do seem to support the idea that financial liberalisation and broadening of stock ownership has increased the potential impact of stock market fluctuations on consumption in the last decade[8]. Notice that, for France the impact of changes in disposable income on consumption is negative and non-significant. That could be due to the income variable that it is being used[9].

The relatively small errors obtained with this specification suggest that empirical life cycle models like (4) estimate with a great degree of accuracy the long-run effects of disposable income and asset prices on consumption. Additionally, as we can see in Figure 1 in the Appendix, the estimation errors tend to be quickly reversed in the different countries. A behaviour of this kind led Davidson *et al.* (1978) to ask whether consumption moves in the current period to offset (or correct) a previous error. If consumption exhibits this tendency, the short-run wealth effects can be different from those estimated above[10]. So, we need to find evidence that consumption exhibits error-correction behaviour in the short-run to assert that changes in income or asset prices eventually generate changes in consumption in the long-run.

4.2. Wealth effects over the short-run: error-correction model specification

The wealth effects estimates presented in Table 1 represent long-run effects. If consumption expenditures do not fully react immediately to changes in asset prices then wealth effects in the first periods will be of lesser magnitude than long-run effects. Nevertheless, the error-correction process eventually will bring actual spending into line with the long-run prediction of the life cycle model[11]. So, let's use now an additional approach to model the quarter-to-quarter dynamics of consumption, obtaining the short-run wealth effects. With a dynamic error-correction approach we will embed the corresponding vector of cointegrated variables in an error-correction model to capture the dynamics of the relationship. That is, albeit it would be tempting to purge non-stationarity by differencing and estimate using

[8] An idea supported by Poterba and Samwick (1995) and Boone *et al.* (1998).

[9] As stated by Byrne and Davis (2001, p.11), commenting the work from Muellbauer and Lattimore (1995), the type of income variable used in consumption function estimation can have serious implications on the obtained results.

[10] See Tinsley (1993).

only differenced variables, that would imply that valuable information from economic theory concerning the long-run equilibrium properties of the data would be lost. So, the model will feature a common error correction formulation with the long-run relationship nested in a short-run equation.

The model we are going to estimate features an error-correction formulation, with the long-run having terms in the cointegrated variables. Thus, the estimated equations are the following:

Finland (5A):

$$dlfcep_t = c + \tau \,.\, CI(-1) + \beta_1 \,.\, dlfcep_{t-i} + \beta_2 \,.\, dlndip_{t-i} + \beta_3 \,.\, str_{t-i} + \beta_4 \,.\, dur_{t-i} + \beta_5 \,.\, dleqp_{t-i} + \beta_6 \,.\, dlrep_{t-i}$$

France (5B)

$$dlfcep_t = c + \tau \,.\, CI(-1) + \beta_1 \,.\, dlfcep_{t-i} + \beta_2 \,.\, dlndip_{t-i} + \beta_3 \,.\, str_{t-i} + \beta_4 \,.\, dur_{t-i} + \beta_5 \,.\, dleqp_{t-i}$$

Germany (5C):

$$dlfcep_t = \tau \,.\, CI(-1) + \beta_1 \,.\, dlfcep_{t-i} + \beta_2 \,.\, dlndip_{t-i} + \beta_3 \,.\, str_{t-i} + \beta_4 \,.\, dur_{t-i} + \beta_5 \,.\, dleqp_{t-i}$$

the Netherlands and United Kingdom (5D):

$$dlfcep_t = \tau \,.\, CI(-1) + \beta_1 \,.\, dlfcep_{t-i} + \beta_2 \,.\, dlndip_{t-i} + \beta_3 \,.\, str_{t-i} + \beta_4 \,.\, dur_{t-i} + \beta_5 \,.\, dleqp_{t-i} + \beta_6 \,.\, dlrep_{t-i}$$

Portugal (5E):

$$dlfcep_t = \tau \,.\, CI(-1) + \beta_1 \,.\, dlfcep_{t-i} + \beta_2 \,.\, dlndip_{t-i} + \beta_3 \,.\, str_{t-i} + \beta_4 \,.\, dur_{t-i} + \beta_5 \,.\, dlsp_{t-i}$$

In that specification d represents first-order differences and CI is the cointegrating vector, with CI(-1) the corresponding error-correction term. In that error-correction term we are going to consider the cointegrated variables considered in Appendix A – Table 3, lagged one period. Intuitively, τ should be negative so that when the variable *lfcep* is moving away from equilibrium it adjusts back in the next period. The larger τ, the faster will be the convergence to equilibrium. The short-term interest rate, the unemployment rate and other variables are included in differenced form with the possibility of lags, to help explain short-run adjustments.

It should be noted that specifications (5) incorporate equation (2) but consumption and other variables are contemporaneously cointegrated. That is, following Davidson *et al.* (1978), we derive a short-run model that has a log linear approximation of equation (2) as a cointegrating vector. The results from the estimation of equations (5) are shown in the following table.

[11] For a complete exposition of this problem see the stylised example presented in Davis and Palumbo (2001).

Table 2 - Results for the six considered countries (dependent variable: dlfcep)

	Finland	France	Germany	The Netherlands	Portugal	United Kingdom
estimation period	**1980:1-2001:4**	**1987:4-2001:4**	**1991:1-2001:4**	**1987:1-2001:4**	**1995:1-2001:3**	**1980:1-2001:3**
variables						
coint. eq.	**-0,15695**	**-0,06152**	**-0,04081**	**-0,03209**	**-0,26698**	**-0,04915**
	-2,65274	*-2,09321*	*-3,34189*	*-3,26480*	*-3,06118*	*-3,96891*
constant	**0,00292**	**0,00082**				
	2,35738	*0,59395*				
dlfcep(-1)	**0,09833**		**-0,43173**	**-0,31667**	**-0,34233**	**0,09070**
	0,97977		*-3,03078*	*-2,57282*	*-1,99304*	*0,79271*
dlfcep(-2)		**-0,20672**	**-0,25863**			
		-1,24292	*-1,78965*			
dlndip(-1)	**0,03901**		**0,05029**	**0,04386**	**0,15598**	**-0,03664**
	1,40886		*0,54617*	*0,77821*	*1,43294*	*-1,29203*
dlndip(-2)		**0,30385**	**-0,11461**			
		2,36255	*-1,21161*			
str(-1)					**-0,00123**	
					-1,37152	
dur		**-0,00870**		**-0,01074**		
		-1,73481		*-2,24075*		
dur(-1)						**-0,00835**
						-2,09678
dur(-2)			**-0,02928**			
			-4,75126			
dleqp(-1)				**0,01586**		
				1,28535		
dleqp(-2)	**0,01954**		**0,02211**			
	1,98711		*1,30646*			
dleqp(-3)		**-0,01601**				**0,00248**
		-1,41249				*0,15550*
dlrep(-1)				**0,01115**		**0,09366**
				0,23259		*2,31500*
dlrep(-2)	**0,06937**					
	1,80748					
dlsp(-3)					**0,01045**	
					0,85782	
R-squared	**0,37**	**0,25**	**0,55**	**0,31**	**0,49**	**0,30**
Adjusted R-squared	**0,33**	**0,17**	**0,45**	**0,24**	**0,37**	**0,25**
S.E. equation	**0,0100**	**0,0068**	**0,0073**	**0,0075**	**0,0057**	**0,0075**
Sum of squared residuals	**0,0080**	**0,0021**	**0,0016**	**0,0029**	**0,0006**	**0,0038**
F-statistic	**9,419**	**3,197**	**5,854**	**4,476**	**4,245**	**5,832**
Log likelihood	**273,241**	**197,051**	**129,767**	**200,627**	**88,924**	**256,652**

Notes: t-statistics in italic. See also Appendix B for the specific range of each series.

We present only the most significant results obtained from different specifications of equations (5) with various lag lengths. We begin by noticing that these short-run results are sensitive to model and data specification. All error correction terms coefficients (*coint. eq.*) are negative and significant in explaining consumption growth, presenting values well below -1. These estimated coefficients are consistent with households gradually adjusting their spending to income and asset price changes. Thus only increases in asset prices that are sustained for a sufficiently long period of time can be expected to affect levels of

consumption. These consumption growth equations also allow for short-run effects on consumption growth through changes in income and asset prices. In relation to stock prices, only for Finland are the results significant, with the coefficient with respect to real equity prices around two per cent.

When we consider only the variable *lrep* (results not shown) the results for Finland and the UK increase their robustness and that variable maintains its importance. For Finland and the UK, the implied elasticities of consumption with respect to real residential prices are around, six and nine per cent, respectively[12]. On the other hand, in the Netherlands the coefficient on residential prices is not significant, even when we omit equity prices. We also do not present that results, but for Finland and the Netherlands, if we omit the residential price effect, the stock market fluctuations become significant, with the coefficient also around the two per cent.

So, summing up this section, generally the results are according with the literature, since we found a weak albeit significant effect on consumption derived from stock market wealth. Despite a rapid appreciation in equity prices and an increase in equity ownership in the European countries, consumption responses to stock market wealth remain limited. On the other hand, we found a strong residential price effect on consumption. The no appreciable effect of stock prices on consumer spending is broadly consistent with life cycle saving and a modest wealth effect. That is, the life cycle theory predicts only modest effects of wealth gains on consumer spending, as spending gains would be distributed over the household's lifetime.

5. Conclusions

The analysis that we developed focused on the direct effects of equity and residential prices on consumer spending. The statistical results obtained are dependent on the econometric specification, so any conclusion must only be tentative. **On one hand, we found a strong and almost contemporaneous connection between residential prices growth and consumption growth. On the other hand, we found the traditional weak effect of equity prices fluctuations on consumption. So, the housing market appears to be more important than the stock market as a factor influencing consumption**. This is in

[12] As stated by Boone *et al.* (1998, p.12, footnote 19), *"(…) house prices affect household wealth in a similar way to financial asset prices. However, this only applies to house owners; a rise in house prices might*

accordance with the existing strong correlation between residential prices changes, consumption and the credit cycles. This conclusion also stresses the importance of disaggregating the different types of assets, to see their individual influence on consumer spending.

However, it is possible that changes in asset prices have an impact on household consumption, even if most households do not own equities. That can happen because stock prices are a general indicator of future economic conditions, affecting consumers confidence and the way they perceive the future[13]. This effect can stimulate the global impact of asset prices fluctuations on consumption. Additionally, sharp variations in stock prices can affect investment and credit in the economy, further amplifying the effects on output.

For those reasons, and particularly in the European case, there is further interest to study the effects of stock market and residential wealth (and its fluctuations) on consumption and output. The complete study of those differences and its magnitude is important even for the definition of the monetary policy by the European Central Bank (ECB), since several authors discuss whether the ECB should consider asset prices in its decisions (Gertler *et al.*, 1998). In addition, the monetary authorities must also weight the risk that a severe contraction in asset markets could lead to systemic problems in the financial system, threatening the soundness of financial intermediaries.

We think that there is scope for future analysis on this matter that attempts to better explain the connection between asset prices and consumer spending. This paper is a preliminary step in that direction, whose continuity will pass trough the continuous collection of better and updated data, an amplification of the set of considered countries and a refinement of the econometric procedures. We also think that it is important to distinguish between the permanent and transitory elements in asset prices and wealth, to see how they are related to consumption[14]. Specifically in the case of Portugal, and albeit the weak effect encountered, the collection of larger data sets perfectly harmonized with the other EU countries is an important step to better study this topic.

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actually depress the current consumption of households wishing to buy a house, since they then need to accumulate higher savings".

[13] See Romer (1990) for this discussion in the context of the Great Depression. Examining the relationship between movements in consumer sentiment and stock prices, Otto (1999), concludes that individuals use movements in equity prices as a leading indicator, which diminishes the role for a direct wealth effect on consumption. On the other hand, Dynan and Maki (2001), using micro data from the *Consumer Expenditure Survey* provide evidence for a direct wealth effect on consumption.

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[14] See Lettau and Ludvigson (2002).

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Appendix A

Table 1 - Simple correlations (in levels and in first differences)

Finland		lfcep	lndip	leqp	lrep
	lfcep	1			
	lndip	0,974966	1		
	leqp	0,91288	0,879721	1	
	lrep	0,665079	0,66339	0,496042	1
France		**lfcep**	**lndip**	**leqp**	
	lfcep	1			
	lndip	0,86291	1		
	leqp	0,937557	0,894658	1	
Germany		**lfcep**	**lndip**	**leqp**	
	lfcep	1			
	lndip	0,86071	1		
	leqp	0,901821	0,79822	1	
the Netherlands		**lfcep**	**lndip**	**leqp**	**lrep**
	lfcep	1			
	lndip	0,933203	1		
	leqp	0,943393	0,900732	1	
	lrep	0,976142	0,933316	0,943896	1
Portugal		**lfcep**	**lndip**	**lsp**	
	lfcep	1			
	lndip	0,986458	1		
	lsp	0,890265	0,844066	1	
United Kingdom		**lfcep**	**lndip**	**leqp**	**lrep**
	lfcep	1			
	lndip	0,965731	1		
	leqp	0,978328	0,968039	1	
	lrep	0,992068	0,95509	0,957675	1

Finland		dlfcep	dlndip	dleqp	dlrep
	dlfcep	1			
	dlndip	0,139053	1		
	dleqp	0,118901	0,150904	1	
	dlrep	0,501051	0,531403	0,392668	1
France		**dlfcep**	**dlndip**	**dleqp**	
	dlfcep	1			
	dlndip	0,57005	1		
	dleqp	-0,11269	0,031402	1	
Germany		**dlfcep**	**dlndip**	**dleqp**	
	dlfcep	1			
	dlndip	0,267427	1		
	dleqp	-0,171575	-0,163466	1	
the Netherlands		**dlfcep**	**dlndip**	**dleqp**	**dlrep**
	dlfcep	1			
	dlndip	0,203099	1		
	dleqp	-0,013362	-0,090928	1	
	dlrep	0,153914	0,190374	0,268057	1
Portugal		**dlfcep**	**dlndip**	**dlsp**	
	dlfcep	1			
	dlndip	0,066319	1		
	dlsp	0,350224	-0,080842	1	

Cont. - Simple correlations (in levels and in first differences)

United Kingdom	dlfcep	dlndip	dleqp	dlrep
dlfcep	1			
dlndip	0,058287	1		
dleqp	0,079011	0,074679	1	
dlrep	0,290282	0,290209	-0,050325	1

Note: See Appendix B for a complete description of each variable.

Appendix A

Table 2 - Results of ADF tests

Variables	ADF Test estatistic	Null hip.	Intercept	trend	lags	McKinnon critical values		
						1%	5%	10%
Finland								
lfcep	-1,491	I(0)	X	X	2	-4,069	-3,463	-3,157
	-3,697	I(1)				-4,070	**-3,463**	-3,158
lndip	-2,332	I(0)	X	X	2	-4,069	-3,463	-3,157
	-4,483	I(1)				**-4,070**	-3,463	-3,158
str	-0,742	I(0)	X		2	-3,508	-2,896	-2,585
	-4,987	I(1)				**-3,509**	-2,896	-2,585
ur	-0,426	I(0)			2	-2,620	-1,947	-1,619
	-1,632	I(1)				-2,611	-1,948	**-1,619**
leqp	-2,020	I(0)	X	X	1	-4,067	-3,462	-3,157
	-4,678	I(1)				**-4,069**	-3,463	-3,157
lrep	0,458	I(0)			1	-2,589	-1,944	-1,618
	-2,502	I(1)				-2,590	**-1,944**	-1,618
France								
lfcep	-0,091	I(0)	X	X	2	-4,125	-3,489	-3,173
	-3,964	I(1)				-4,125	**-3,489**	-3,173
lndip	-2,691	I(0)	X	X	2	-4,125	-3,489	-3,173
	-4,079	I(1)				-4,125	**-3,489**	-3,173
str	-0,943	I(0)	X		2	-3,548	-2,913	-2,594
	-3,847	I(1)				**-3,548**	-2,913	-2,594
ur	-2,260	I(0)	X		1	-3,548	-2,913	-2,594
	-2,040	I(1)				-3,548	-2,913	-2,594
leqp	-2,205	I(0)	X	X	2	-4,125	-3,489	-3,173
	-3,317	I(1)				-4,125	-3,489	**-3,173**
Germany								
lfcep	-1,574	I(0)	X	X	2	-4,196	-3,522	-3,191
	-6,267	I(1)				**-4,202**	-3,525	-3,193
lndip	-2,614	I(0)	X	X	2	-4,202	-3,525	-3,193
	-3,399	I(1)				-4,209	-3,528	**-3,195**
str	-1,732	I(0)	X		1	-3,589	-2,930	-2,603
	-2,722	I(1)				-3,593	-2,932	**-2,604**
ur	**-2,734**	I(0)	X		2	-3,612	-2,940	**-2,608**
	-2,233	I(1)				-3,617	-2,942	-2,609
leqp	-2,272	I(0)	X	X	1	-4,184	-3,516	-3,188
	-4,209	I(1)				**-4,190**	-3,519	-3,190

Results of ADF tests (cont.)

Variables	ADF Test estatistic	Null hip.	Intercept	trend	lags	McKinnon critical values		
						1%	5%	10%
The Netherlands								
lfcep	-1,466	I(0)	X	X	2	-4,125	-3,489	-3,173
	-3,730	I(1)				-4,128	**-3,490**	-3,174
lndip	-1,983	I(0)	X	X	2	-4,125	-3,489	-3,173
	-5,084	I(1)				**-4,128**	-3,490	-3,174
str	-1,084	I(0)	X		1	-3,546	-2,912	-2,593
	-3,349	I(1)				-3,548	**-2,913**	-2,594
ur	-0,112	I(0)			1	-2,546	-2,912	-2,593
	-3,630	I(1)				**-3,548**	-2,913	-2,594
leqp	-1,783	I(0)	X	X	1	-4,122	-3,488	-3,172
	-4,625	I(1)				**-4,125**	-3,489	-3,173
lrep	1,293	I(0)	X	X	1	-4,122	-3,488	-3,172
	-7,751	I(1)				**-4,125**	-3,489	-3,173
Portugal								
lfcep	-1,279	I(0)	X	X	1	-4,374	-3,603	-3,237
	-3,382	I(1)				-4,394	-3,612	**-3,242**
lndip	-2,938	I(0)	X	X	1	-4,374	-3,603	-3,237
	-3,774	I(1)				-4,394	**-3,612**	-3,242
str	**-2,664**	I(0)	X		1	-3,720	-2,985	**-2,632**
	-1,969	I(1)				-3,734	-2,991	-2,635
ur	-1,333	I(0)			2	-2,665	-1,956	-1,623
	-1,739	I(1)				-2,670	-1,957	**-1,624**
lsp	0,460	I(0)			1	-2,660	-1,955	-1,623
	-2,198	I(1)				-2,665	**-1,956**	-1,623
United Kingdom								
lfcep	-1,700	I(0)	X	X	2	-4,070	3,463	-3,158
	-4,098	I(1)				**-4,071**	-3,464	-3,158
lndip	-2,542	I(0)	X	X	2	-4,070	-3,463	-3,158
	-5,159	I(1)				**-4,071**	-3,464	-3,158
str	-1,925	I(0)	X		2	-3,509	-2,896	-2,585
	-4,780	I(1)				**-3,510**	-2,896	-2,585
ur	-1,571	I(0)	X		1	-3,521	-2,901	-2,588
	-2,684	I(1)				-3,523	-2,902	**-2,588**
leqp	-1,379	I(0)	X	X	2	-4,070	-3,463	-3,158
	-5,372	I(1)				**-4,071**	-3,464	-3,158
lrep	-1,358	I(0)	X	X	1	-4,069	-3,463	-3,157
	-4,452	I(1)				**-4,070**	-3,463	-3,158

Appendix A – Table 3

Results for cointegrating tests (** significant at 1%; * significant at 5%)

Finland	H_0: rank = p	LR test	5% critical value	1% critical value
	p = 0	56,5346 **	47,21	54,46
	p = 1	31,9972 *	29,68	35,65
	p = 2	14,7042	15,41	20,04
	p = 3	0,0856	3,76	6,65

France	H_0: rank = p	LR test	5% critical value	1% critical value
	p = 0	36,0853 **	29,68	35,65
	p = 1	11,5731	15,41	20,04
	p = 2	1,2939	3,76	6,65

Germany	H_0: rank = p	LR test	5% critical value	1% critical value
	p = 0	41,5452 **	34,91	41,07
	p = 1	17,0870	19,96	24,60
	p = 2	4,0561	9,24	12,97

The Netherlands	H_0: rank = p	LR test	5% critical value	1% critical value
	p = 0	66,7868 **	39,89	45,58
	p = 1	22,8495	24,31	29,75
	p = 2	9,0086	12,53	16,31
	p = 3	3,6069	3,84	6,51

Portugal	H_0: rank = p	LR test	5% critical value	1% critical value
	p = 0	33,2723 **	24,31	29,75
	p = 1	11,1895	12,53	16,31
	p = 2	3,0592	3,84	6,51

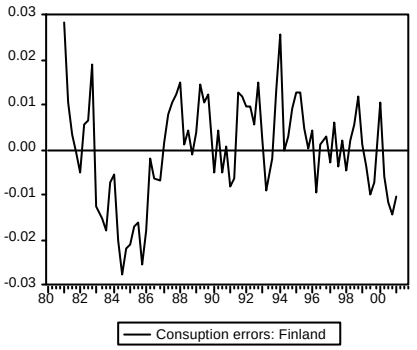
United Kingdom	H_0: rank = p	LR test	5% critical value	1% critical value
	p = 0	44,8149 *	39,89	45,58
	p = 1	19,9245	24,31	29,75
	p = 2	9,1388	12,53	16,31
	p = 3	3,1399	3,84	6,51

Notes: When the residential prices index is available the test is for rank p = 0 up to p = 3. With only the equity prices index, the test is for rank p = 0 up to p = 2. The results are for a VAR with 2 lags, except in France and in the UK where it has 4 lags. In most cases, the results were little changed to additional or fewer lags in the model. The test assumes no deterministic trend in data with an intercept (no trend) in the Cointegrating Equation (CE) and test VAR for Finland and Germany and no intercept or trend in CE and test VAR for the Netherlands, Portugal and UK. The results for France include a deterministic trend in data with an intercept.

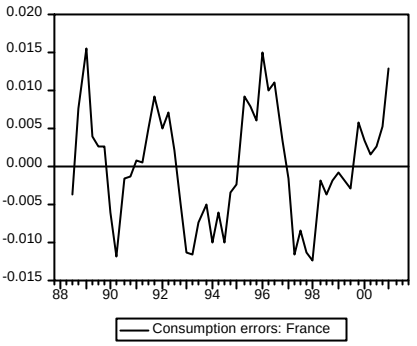
Appendix A – Figure 1

Consumption errors predicted from equation (4)

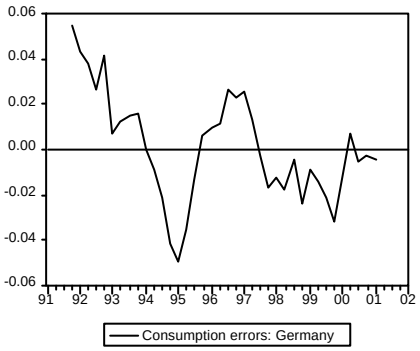
Finland



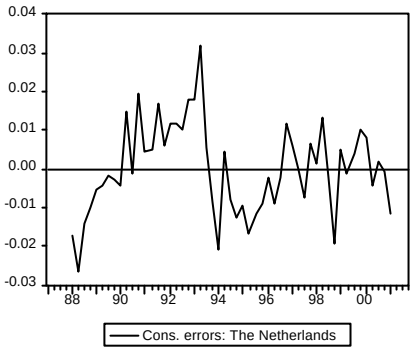
France



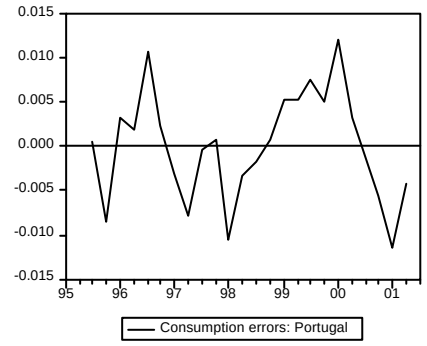
Germany



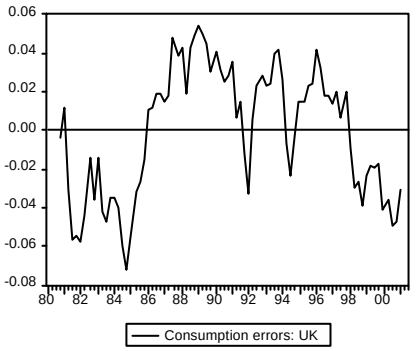
the Netherlands



Portugal



United Kingdom



Appendix B

Description of variables

Variable	Unit	Designation	Country sample
Final consumption expenditure by households (per capita)	Millions of euros (1995 prices)	fcep	Finland: 80:1-01:4 France: 80:1-01:4 Germany: 91:1-01:4 The Netherlands: 87:1-01:4 Portugal: 95:1-01:3 United Kingdom: 80:1-01:3
Net disposable income (per capita)	Millions of euros (1995 prices)	ndip	Finland: 80:1-01:4 France: 80:1-01:4 Germany: 91:1-01:4 The Netherlands: 87:1-01:4 Portugal: 95:1-01:3 United Kingdom: 80:1-01:3
Short-term interest rate (3M)	Percentage	str	Finland: 80:1-01:4 France: 80:1-01:4 Germany: 91:1-01:4 The Netherlands: 87:1-01:4 Portugal: 95:1-01:3 United Kingdom: 80:1-01:3
Harmonized unemployment rate	Percentage	ur	Finland: 89:1-01:4 France: 83:1-01:4 Germany: 91:1-01:4 The Netherlands: 87:1-01:4 Portugal: 95:1-01:3 United Kingdom: 83:1-01:3
Share prices index	Index (1995 = 100)	sp	Portugal: 95:1-01:3
Equities prices index	Index (1985 = 100)	eqp	Finland: 80:1-01:4 France: 80:1-01:4 Germany: 91:1-01:4 The Netherlands: 87:1-01:4 United Kingdom: 80:1-01:3
Residential prices index	Index (1985 = 100)	rep	Finland: 80:1-01:4 The Netherlands: 87:1-01:4 United Kingdom: 80:1-01:3

Where logs were applied the variable appears with the letter **l** and when in first differences it appears with the letter **d**.