ASSET PRICES AND MONETARY POLICY: WEALTH EFFECTS ON CONSUMPTION

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ABSTRACT

The aim of this paper is to test a model explaining private consumption as a function of income and wealth (financial assets plus real estate), 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 USA 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 consider for the different countries a set of consumption equations that include variables related to asset prices. After studying the variables' stationarity properties, we estimate a model with a common error-correction formulation, with the long-run relationship - having terms in the variables for which we found significant cointegrating vectors - nested in a short-run equation. We found an implied elasticity of consumption with respect to real equities prices at around two per cent and, when there is available data, an implied elasticity of consumption with respect to real residential prices between ten and twenty per cent. This weak effect of stock prices on consumer spending is broadly consistent with life cycle saving and a modest wealth effect. Nevertheless, it is still worthy to do a further study of 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 (ECB) and to answer the question if 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 (financial assets plus real estate), 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 exchange prices fluctuations 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 of America (USA).

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 only data from five States, that we consider a meaningful sample: two core economies of the continental EU (France and Germany); 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 seminal paradigm concerning the explanation of 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:

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

There are some pitfalls in estimating that equation: i) planned consumption does not always equal actual consumption due to lags in adjustment, which suggests to use an error correction approach; ii) human wealth is not observable, so instead of it a proxy is taken, let it be some measure of income. So, traditionally the wealth effect has been measured by estimating aggregate time-series regressions of the form[1]:

$$C_t = ? + ?_1.W_t + ?_2.Y_t + u_t \qquad (2)$$

Where C stand for household actual consumer spending, Y represents disposable income and W is household net worth or wealth. $?_1$ and $?_2$ are, respectively, the marginal propensities to consume out of wealth and disposable income, respectively. 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) advocates 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[2]. 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 of Modigliani ignored several

[1] See among others Modigliani and Tarantelli (1975) and Steindel (1977).
[2] Modigliani (1971) and Bhatia (1972).

problems that could be crucial to explain the relationship between consumption and wealth[3].

Beyond the theoretical criticisms, there are also the econometric pitfalls associated to the value of estimations such as equation (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.

In the last few years, motivated by the rampant growth in equity markets and the potential consequences of a severe downturn, several authors studied the relation between wealth and consumption embodying more cautious econometric methods. The evidence remains mixed, varying greatly with the country considered, the data range, the wealth definition, etc..

We summarise now empirical results that other 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 USA. 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. 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 USA 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 for stock markets capitalisation.

[3] 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*

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 method

In the introduction of this paper we proposed to study the wealth effects on consumption. 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 United States. Since we focus our study on some EU countries, when there is lack of data we need to find 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 stock prices index and a real equities prices index (in different equations and depending on the time period considered) as proxies for financial household wealth. A real residential prices index is used as a proxy for the house prices wealth effect (this one only for UK and Finland)[4].

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:

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."

[4] The stock market capitalisation was also tested, but the results were very inconclusive. The real equity and residential prices indexes were obtained from the Bank of International Settlements (using national

$$ce = ? + ?_1 . y_D + ?_2 . hw + ?_3 . (\text{other variables}) \quad (3)$$

Where *ce* is household consumption expenditure per capita, y_D the disposable income per capita and *hw* represents a proxy for household wealth (financial and housing wealth). All variables are in logarithms and measured is real terms. The coefficient ? is a constant term, $?_1$ and $?_2$ are, respectively, the elasticities of the per capita consumption with relation to per capita disposable income and the equity prices index. Beyond those variables, we shall also take in account two additional variables[5]:

- The unemployment rate (*ur*), as a proxy to 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.

We analysed graphically the evolution of the asset prices indexes used in our work, for the period 1980-2000. We could clearly see that in 1995 the real equities prices began a rapid ascension that lasted five years. Recently, we observed a downturn in the markets, which motivates the concern with the consumption behaviour. With the same method, we also examined the evolution of households' consumption for the considered countries and we saw an ascendant trend since 1980 until 2000 for the five countries. Moreover, the simple correlations among consumption, disposable income, real equity and residential prices indexes were computed and the results are reported in Appendix A - Table 1.

As we shall see in the next section, we cannot estimate equation (3) directly because the estimated coefficients would be inconsistent. To take into account the non-stationary and endogenous problems in the variables we develop further that equation. That is, from the stationary tests we shall infer that the variables are generally integrated of order 1, so co-integration analysis is necessary to identify the target level defined in equation (3). The corresponding cointegration vector is then embedded in an error-correction model to capture the dynamics of the relationship.

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data). The remaining data are from Eurostat's NewCronos database. See Appendix B for a complete description of the data.

4. Econometric results

4.1. Stationarity and cointegration

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, Germany and Portugal and the short-term interest rate also 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[6].

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 error correction approach. So, cointegration analysis is necessary to identify the target level defined in equation (3). The corresponding cointegrating vector will then be embedded in an error-correction model to capture the dynamics of the relationship. That is, albeit it would be tempting to purge nonstationarity by differencing and estimate using 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.

In order to find the cointegrated variables and the corresponding cointegrating vector we use testing procedures suggested by Johansen (1988, 1991) that allow the researcher to estimate the number of cointegrating relationships. Cointegrating tests were undertaken for seven variables: per capita consumption expenditure, per capita disposable income, unemployment rate, short-term interest rate, share prices index and real equities and residential prices indexes.

Table 3 in Appendix A presents the results for the different countries. We present two significant (at least at 5 per cent confidence level) cointegrating vectors for each country. For Finland, the cointegrating vectors include a constant being vector number 1 strongly significant at different lag lengths. For France and Germany the most

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

significant cointegrating vector does not include a constant and always includes the short-term interest rate. Assuming an intercept and no trend in the cointegrating vectors, we found two significant vectors for Portugal and for the United Kingdom with different lag lengths[7].

4.2. Error correction model specification

The model we are going to estimate features an error-correction formulation, with the long-run having terms in the variables for which we found significant cointegrating vectors in the last sub-section.

The estimated equations are the following:

Finland and United Kingdom (4A):

$dlfcep_t = c + ? . CI(-1) + ?_1 . dlfcep_{t-i} + ?_2 . dlndip_{t-i} + ?_3 . str_{t-i} + ?_4 . dur_{t-i} + ?_5 . dleqp_{t-i} + ?_6 . dlrep_{t-i}$

France and Germany (4B):

$dlfcep_t = ? . CI(-1) + ?_1 . dlfcep_{t-i} + ?_2 . dlndip_{t-i} + ?_3 . str_{t-i} + ?_4 . dur_{t-i} + ?_5 . dleqp_{t-i}$

Portugal (4C):

$dlfcep_t = c + ? . CI(-1) + ?_1 . dlfcep_{t-i} + ?_2 . dlndip_{t-i} + ?_3 . str_{t-i} + ?_4 . dur_{t-i} + ?_5 . dlsp_{t-i}$

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 variables from the cointegrating vector number 1 of Table 3, lagged one period. Intuitively, ? should be negative so that when the variable *lfcep* is moving away from equilibrium it adjusts back in the next period. The larger ?, the faster will be the convergence to equilibrium. When the unemployment rate, the short-term interest rate and other variables do not enter the cointegrating vector they are included in differenced form with the possibility of lags, to help explain short-run adjustments.

It should be noted that specifications (4) incorporate equation (2) but consumption and other variables are contemporaneously co integrated. That is, following Davidson *et al.* (1978), we derive a short-run model that has a log linear approximation of equation (2) as a

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

[7] In general, in all the cointegrating vectors there is not a significant difference between using *lsp* or *leqp*.

cointegrating vector. Next we estimate equations (4) by non-linear least squares. The results are shown in the following table.

Results for the five considered countries (dependent variable: dlfcep)

	Finland		France	Germany	Portugal	United Kingdom	
estimation period	**1980:1-2001:4**		**1987:4-2001:4**	**1991:1-2001:4**	**1995:1-2001:3**	**1980:1-2001:3**	
	I	**II**				**I**	**II**
variables							
coint. eq.	**-0,06478**	**-0,05794**	**-0,00486**	**-0,01001**	**-0,05094**	**-0,01237**	**-0,01591**
	-1,91164	*-1,70596*	*-1,61026*	*-1,68112*	*-2,72137*	*-2,21194*	*-2,46106*
constant	**0,00339**	**0,00369**			**0,01934**	**0,00421**	**0,00456**
	2,26366	*2,51085*			*2,53673*	*3,34080*	*3,86164*
dlfcep(-1)			**0,24353**	**-0,40686**	**-0,47052**		
			1,46640	*-2,68051*	*-2,41448*		
dlfcep(-2)	**-0,16832**	**-0,17452**					
	-1,39049	*-1,44311*					
dlndip				**0,28929**		**0,02944**	**0,02759**
				2,90780		*1,08580*	*1,02581*
dlndip(-1)	**0,08045**	**0,09307**	**-0,40812**	**0,23358**	**0,19067**		
	2,08447	*2,55434*	*-3,09470*	*2,29187*	*1,56511*		
dlndip(-2)			**0,23490**				
			2,20105				
str(-1)					**-0,00209**		
					-1,58561		
dur			**-0,01255**				
			-2,61239				
dur(-1)				**0,00237**		**-0,00628**	**-0,00657**
				0,32739		*-1,60403*	*-1,69103*
dleqp							
dleqp(-1)			**0,02139**				
			2,01917				
dleqp(-2)	**0,01154**			**0,02427**			
	1,06125			*1,34249*			
dleqp(-3)						**0,01210**	
						0,77557	
dlrep	**0,19719**	**0,20897**					
	3,92934	*4,27218*					
dlrep(-1)						**0,10415**	**0,10524**
						2,76379	*2,81163*
dlsp							
dlsp(-1)							
dlsp(-3)					**0,01742**		
					1,42125		
R-squared	**0,51**	**0,50**	**0,31**	**0,35**	**0,46**	**0,26**	**0,26**
Adjusted R-squared	**0,46**	**0,46**	**0,24**	**0,25**	**0,31**	**0,21**	**0,22**
S.E. equation	**0,0095**	**0,0095**	**0,0063**	**0,0085**	**0,0060**	**0,0077**	**0,0077**
Sum of squared residuals	**0,0041**	**0,0041**	**0,0020**	**0,0023**	**0,0006**	**0,0040**	**0,0040**
F-statistic	**9,360**	**11,457**	**4,397**	**3,411**	**2,932**	**4,827**	**6,008**
Log likelihood	**168,345**	**167,792**	**203,483**	**127,076**	**88,434**	**254,693**	**254,510**

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

We present only the most significant results obtained from different specifications of equations (4) with various lag lengths. All error correction terms coefficients (*coint. eq.*) are negative and significant. In relation to asset prices influence on consumption, we found that the stock price effect is only significant in the countries for which we do not have data about residential prices. In those countries the implied elasticity of consumption with respect to real equities prices is around two per cent, being Germany the country in which that effect is stronger. In some cases, the effect is only significant after some lags. In Finland and in the UK, the equities price coefficient has the right sign but it is not significant. When we consider only the variable *rep* (columns II) the results for those two countries 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, twenty and ten per cent, respectively[8]. We do not present that results, but for Finland and the UK, if we omit the residential price effect, the stock market fluctuations become significant, with the coefficient also around the two per cent. If we split the estimation period in two, we find that in Finland the residential prices had an even more significant effect on consumption in the first half. For the UK we did not found any significant difference in the asset price effects when splitting the estimation period. These scarce results do not 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[9]. For this immobility, we think that we have the plausible explanation that much of the households' stock market wealth is invested in long-term savings schemes, such as pension funds[10].

Notice that, for some countries the impact of changes in disposable income on consumption is weak or even not significant (e.g., UK). That could be due to the income variable that it is being used[11].

So, generally the results are according with the literature, since we found a weak albeit significant effect on consumption derived from stock market wealth. By the other hand,

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

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

[10] See Byrne and Davis (2001, p. 15), "*The rising trend of pension plan ownership in the US and elsewhere would imply that it is pertinent to include pension funds in stock market wealth when modelling consumption*".

[11] 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.

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. Conclusion

The analysis that we developed focused on the direct effects of equity and residential prices on consumer spending. Pertinent statistical results were obtained but the present conclusion must be seen as a tentative, because it seems reasonable to increase the number of countries to include in the sample and other model specifications have to be tested.

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 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[12]. 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, it is still worthy to do a further study of the effects of stock market and residential wealth (and its fluctuations)

[12] See Romer (1990) for this discussion in the context of the Great Depression and Otto (1999) for the examination of the relationship between movements in consumer sentiment and stock prices. Otto (1999),

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 (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 explain better the connection between asset prices and consumer spending. This paper is a preliminary step in that direction, whose continuity will pass trough the collection of better data, an amplification of the set of considered countries and a refinement of the econometric procedures. We think also 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[13]. Specifically in the case of Portugal, the collection of larger data sets, perfectly harmonized with the other EU countries, is an important step in studying this topic.

concludes that individuals use movements in equity prices as a leading indicator, which diminishes the role for a wealth effect on consumption.

[13] 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	
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	
Portugal		**dlfcep**	**dlndip**	**dlsp**	
	dlfcep	1			
	dlndip	0,066319	1		
	dlsp	0,350224	-0,080842	1	
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**
lsp	-2,840	I(0)	X	X	1	-4,190	-3,519	-3,190
	-3,349	I(1)				-4,196	-3,522	**-3,191**
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
lsp	-2,063	I(0)	X	X	1	-4,131	-3,492	-3,174
	-4,506	I(1)				**-4,135**	-3,494	-3,175
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
lsp	-2,043	I(0)	X	X	1	-4,184	-3,516	-3,188
	-4,269	I(1)				**-4,190**	-3,519	-3,190
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%
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	**-1,733**	I(0)			1	-2,660	-1,955	**-1,623**
	-1,635	I(1)				-2,665	-1,956	-1,623
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**
lsp	-1,153	I(0)	X	X	1	-4,173	-3,511	-3,185
	-4,595	I(1)				**-4,178**	-3,514	-3,187
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 - Johansen cointegration tests

We present here the Johansen cointegration tests for the five countries. Only cointegrating vectors whose components are all significant (at 5 per cent or 1 per cent confidence level) are presented. The tables present different cointegrating vectors, with different lag assumptions. The numbers in parentheses under the estimated coefficients are the asymptotic standard errors.

Significant cointegrating vectors (standard errors in parentheses)

FINLAND

vector number	lags	constant	lfcep	lndip	ur	str	lsp	leqp
1	2	-0,3417	1	-0,3913	0,0033			-0,0152
				(,0337)	*(,0005)*			*(,0057)*
	4	-0,4384	1	-0,2264	0,0053			-0,0416
				(,0300)	*(,0006)*			*(,0050)*
	6	-0,4206	1	-0,2527	0,0045			-0,0371
				(,0090)	*(,0002)*			*(,0014)*
	8	-0,4442	1	-0,2134	0,0053			-0,0440
				(,0003)	*(,0000)*			*(,0005)*
2	2	-0,2218	1	-0,4967		-0,0046		
				(,0566)		*(,0032)*		
	6	-0,2443	1	-0,4830		-0,0035		
				(,0352)		*(,0019)*		

Note: This results assume an intercept in the Cointegrating Equation.

FRANCE

vector number	lags	constant	lfcep	lndip	ur	str	lsp	leqp
1	2		1	-0,6159		-0,1016		
				(,0955)		*(,1096)*		
	4		1	-0,5606		-0,0295		
				(,0179)		*(,0035)*		
	6		1	-0,4206		-0,0767		
				(,1246)		*(,0344)*		
2	6	-1,2363	*1*	0,7850		0,0403	-0,2394	
				(,3203)		*(,0159)*	*(,0664)*	
	8	-0,8297	*1*	0,2633		0,0160	-0,1382	
				(,0334)		*(,0015)*	*(,0068)*	

Note: vector 1 assumes no intercept or trend in the Cointegrating Equation. Vector 2 assumes an intercept in the Cointegrating Equation.

Table 3 (cont.)

GERMANY

vector number	lags	constant	lfcep	lndip	ur	str	lsp	leqp
1	**4**		**1**			**-0,0151**		**-0,2219**
						(,0076)		*(,0137)*
	6		**1**			**0,0044**		**-0,2082**
						(,0039)		*(,0046)*
	8		**1**			**0,0084**		**-0,2117**
						(,0025)		*(,0036)*
2	**2**	**0,0055**	**1**	**-0,6840**		**-0,0236**		
				(,1078)		(,0060)		
	6	**-0,1948**	**1**	**-0,5791**		**-0,0164**		
				(,0207)		(,0010)		
	8	**-0,0933**	**1**	**-0,6575**		**-0,0118**		
				(,0386)		(,0022)		

Note: vector 1 assumes no intercept or trend in the Cointegrating Equation. Vector 2 assumes an intercept in the Cointegrating Equation.

PORTUGAL

vector number	lags	constant	lfcep	lndip	ur	str	lsp	leqp
1	**4**	**0,27542**	**1**	**-0,5655**			**-0,0352**	
				(,0344)			*(,0064)*	
2	**2**	**-0,2470**	**1**	**-0,3121**	**0,0242**			
				(,0517)	*(,0041)*			
	4	**-0,0287**	**1**	**-0,2656**	**0,0245**			
				(,0197)	*(,0013)*			

Note: This results assume an intercept in the Cointegrating Equation.

UNITED KINGDOM

vector number	lags	constant	lfcep	lndip	ur	str	lsp	leqp
1	**6**	**-0,7218**	**1**		**0,0466**			**-0,0873**
					(,0094)			*(,0304)*
2	**4**	**-0,2659**	**1**	**0,3692**	**0,0595**			**-0,2732**
				(,1495)	*(,0134)*			*(,0624)*
	6	**-0,1828**	**1**	**0,1984**	**0,0406**			**-0,2216**
				(,0770)	*(,0054)*			*(,0366)*
	8	**-0,4901**	**1**	**0,1864**	**0,0518**			**-0,1797**
				(,0680)	*(,0060)*			*(,0365)*

Note: This results assume an intercept in the Cointegrating Equation.

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 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 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 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 Portugal: 95:1-01:3 United Kingdom: 83:1-01:3
Share prices index	Index (1995 = 100)	sp	Finland: 91:1-01:4 France: 87:4-01:4 Germany: 91:1-01:4 Portugal: 95:1-01:3 United Kingdom: 90:1-01:3
Equities prices index	Index (1985 = 100)	eqp	Finland: 80:1-01:4 France: 80:1-01:4 Germany: 91:1-01:4 United Kingdom: 80:1-01:3
Residential prices index	Index (1985 = 100)	rep	Finland: 80:1-01:4 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*.