Wealth effects: the French case*

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Abstract

This paper studies the relationship between consumption and wealth based on the concept of cointegration. The analysis focuses on French data over the 1987 - 2006 period. This relationship is expressed in two ways: in terms of Marginal Propensity to Consume out of wealth (MPC) and in terms of Elasticity of consumption to wealth. Three concepts of consumption are investigated: total households consumption expenditure, consumption excluding financial services and consumption excluding durable goods. Different estimators are also considered. Based on the MPC approach, when considered as permanent by households, an increase (decrease) in total wealth of one euro would lead to an increase (decrease) of 1 cent in total consumption. In terms of elasticity, an increase (decrease) of 10% in wealth would imply also a relatively small impact of 0.8 to 1.1% on consumption depending on the concept of consumption considered. In most cases, the effect of a change in financial wealth is bigger than of a change in housing wealth. The results indicate that the wealth effects in France are smaller than in the UK and US but close to what is observed in Italy. In addition, any deviation of the variables from their common trends is corrected at first by adjustments in disposable income in line with what has been uncovered by studies on Germany and consistent with the "saving for the rainy days" approach of Campbell (1987). But our results contrast with the seminal study of Lettau and Ludvigson (2004) where asset prices make the bulk of the adjustment.

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1 Introduction

Following the subprime crisis, asset prices lost more than half their value between June 2007 and April 2009. At the same time, activity and both business and consumer surveys plummeted. Hence a crucial question for monetary policy: is the impact of the financial crisis on activity permanent and what is its magnitude? Asset prices may impact economic activity *via* different channels. In this paper, we will focus on the wealth effect in France, restricted to the link between asset prices and households' consumption.

Using cointegration techniques, we estimate the relationship between households' consumption, disposable income and wealth. Aggregated and disaggregated (financial and housing) measures of wealth are considered and several concepts of consumption are analyzed. Furthermore, two different functional forms (marginal propensity to consume and elasticity) are tested here, contrary to other studies on this topic, especially considering the French case. Besides, a comparison of several estimators is derived. Following several papers in the literature (e.g. Lettau and Ludvigson, 2004) we try to assess how much of the wealth movements are considered as permanent and thus may influence consumption. All in all, there is some evidence of a small but robust wealth effect in France, whatever the approaches considered.

The remainder of this article is organized as follows. In the first part, we present the theoretical models underlying our approach. The second part describes the existing results concerning the French case. Finally, our results are derived and analyzed in the third part.

2 Theoretical background

The theoretical models developed in order to assess the impact of asset prices on consumption can be divided in two main categories.

2.1 Models based on budget constraint

Following Campbell and Mankiw (1989), Lettau and Ludvigson (2001) derived from the household budget constraint the existence of a cointegrating relationship between consumption, income and the components of wealth. As long as consumers are forward-looking, the gap between the observed variables and their long term equilibrium may convey information on the future development of consumption but also asset prices and income (Lettau and Ludvigson, 2004).

Campbell and Mankiw (1989), by rearranging the log-linearized budget constraint for *total* wealth which is defined as the sum of observable assets and human capital, found the following relationship:

$$(c_t - w_t) \approx E_t \sum_{k=1}^{\infty} \rho_w^k (r_{t+k}^w - \Delta c_{t+k}) \tag{1}$$

where c_t, w_t and r_t denote the log of consumption, total wealth and gross return on total wealth, and $\rho_w \equiv 1 - exp(\overline{c-w})$. The ratio of consumption to total wealth on the left hand side of the equation gives information on the future

developments of consumption and asset prices on the right hand side of the equation.

Moreover, if the term on the right hand side of equation (1) is stationary, then consumption and wealth (broadly defined) should be cointegrated. The problem is that, with the inclusion of human wealth, total wealth is not observable, so that the link cannot be tested empirically. Lettau and Ludvigson (2001) modified equation (1) by making assumptions about the unobserved human wealth. They first assume that the share ω of observable asset value a_t in total wealth is approximately constant and that the average return of overall wealth is a weighted sum of return on assets. They also assume that the nonstationary component of human wealth can be captured by aggregate labour income Y_t. So that they obtain the following equation linking observable data:

$$cay_t \equiv c_t - \omega a_t - (1-\omega) y_t \approx E_t \sum_{k=1}^{\infty} \rho_w^k [\omega r_{t+k}^a + (1-\omega) r_{t+k}^h - \Delta c_{t+k}] + (1-\omega) z_t \quad (2)$$

where z_t is a stationary zero-mean variable. One of the pitfalls of this approach is that ω cannot be observed. However, if the return on wealth and expected consumption growth are assumed to be stationary, cay_t is stationary as well. This implies a cointegration relationship between log consumption, assets and labor income. ω can then be estimated superconsistently by cointegration methods. Lettau and Ludvigson (2004) estimate the parameters of the cay_t series following Stock and Watson (1993). In a VECM (Vector Error Correction Model) framework, they find that departures of cay_t from its long run value in the US help forecast the returns on SP 500 stock index rather than consumption.

2.2 Models based on the consumption function

The approach developed above is very parsimonious, which makes it attractive. However, as it uses only the information contained in the budget constraint, it obviously misses some characteristics of the consumer behaviour that can be assessed for instance *via* the complete analysis of the consumer's program at the aggregate level. Moreover, the analytical resolution of the consumer's program may lead to a different functional link between consumption and wealth. Three features seem important in that respect.

Firstly, if the consumer utility function is quadratic or isoelastic, its consumption is equal to his/her permanent income and thus proportional to its total wealth, which can be separated in assets and human wealth. Considering that human wealth is determined by the current non property income:

$$C_t = \frac{W_t}{\kappa} = \frac{A_t + Wh_t}{\kappa} = \frac{A_t}{\kappa} + \frac{Y_t}{\kappa_h} \quad (3)$$

where C_t, W_t, A_t, Wh_t and Y_t denote respectively consumption, total wealth, assets, human wealth and non property income.

Secondly, households consume housing services whereas they do not consume services from their non housing assets. In autarky, households are either renters or owners. If housing prices rise, owners are better off, whereas renters (or future owners) are worse off, prefering that housing prices fall. Thus housing prices play a role in the distribution of wealth, but not necessarily on aggregate consumption, if all consumers have the same utility function for example. The

only potential source of wealth effect is a bubble in the housing market. In the recent literature, both Muellbauer (2008)[1] and Buiter (2008)[2] stress the difference between both kind of assets. The results above are partly due to the fact that the financial markets are assumed to be perfect. Credit constraints may change the role of housing prices on consumption in two opposite ways. Credit constraints for the first time buyers, who must save for the minimum deposit required to get onto the owner-occupied housing ladder, oblige the young to save all the more as prices are high. Thus, these constraints reinforce the negative impact of housing prices on consumption, compared to the results of the theoretical models developed above, but consumption smoothing is not affected. On the contrary, higher housing prices boost home equity loans and consumption in some countries such as the US, where housing wealth may be used as collateral to buy consumer goods.

Thirdly, Carroll, Otsuka, Slacalek (2006) remind that taxes[3], demographics, productivity growth, financial structure and regulation, interest rates, social insurance among others have changed, so that the cointegrating vector between consumption, income and wealth may not be stable. Indeed, Rudd and Whelan (2006) do not find any cointegrating vector for the US. Muellbauer (2008) and Barrell and Davis (2007) insist on the fact that the estimation of wealth effects may be biased by omitted variables. These previous studies lead us to carefully assess the robustness of our results, both over time and by controlling for omitted variables.

3 Wealth effect approach debate and empirical estimations for France

We first discuss the respective merits of consumption elasticities and marginal propensity to consume out of wealth as measures of wealth effect and then, in the light of the previous debate, the existing literature for France.

3.1 Elasticities versus marginal propensity to consume

As seen in section 2, the effect of wealth on consumption may be measured via two methods, which have been indifferently developed by various authors. One measure is the elasticity of consumption to wealth (section 2.1), which is the percentage change of consumption to be expected after a 10 percentage point change in wealth. The other measure (section 2.2) is the marginal propensity to consume (mpc) out of wealth, which is the marginal increase in consumption in euro due to a marginal increase in wealth of 1 euro. Formally, these measures, elasticity and mpc, are respectively defined by:

$\epsilon_{C/A} = \frac{\frac{\partial C}{C}}{\frac{\partial A}{A}}$ and $mpc = \frac{\partial C}{\partial A}$

[1] In a life-cycle permanent income model for a single representative agent where the future relative price of housing is expected to be constant.

[2] In a more developed framework, such as the general equilibrium model where there is no life-cycle-related effects on the demand for housing service (the Yaari-Blanchard overlapping generations model).

[3] In France, owner occupiers do not pay taxes on their housing and can even deduct part of the interests paid for housing loans from income taxes. On the other hand, transactions on housing are taxed.

If asset prices are unchanged relative to consumer prices, the elasticity may be deduced from *mpc* by: $\epsilon_{C/A} = mpc \cdot \frac{C}{A}$

The two different measures are equivalent as far as the ratio of consumption to assets ($\frac{C}{A}$) is stable. But this is not the case: the ratio of net wealth or housing wealth over consumption in France varied from respectively 3.9 and 2.6 in 1980 to 8.2 and 5.9 in 2007. Therefore, the specification choice is not without consequences on the results.

From a technical point of view, there are pros and cons for each approach.

- Elasticities are preferred by econometricians because of the good properties of estimation in log. There is a long term log-linear equilibrium (ie consumption, income and wealth grow at the same rate), provided that the sum of the two elasticities of consumption to wealth and to income is equal to 1, as shown in appendix 6.3.2, which can be tested. One disadvantage is, the equilibrium cannot be derived in an analytical way. Muellbauer and Lattimore (1995) and Altissimo et alii (2005) show that the log-linear specification leads to problems, especially when we try to estimate the impact of different kinds of wealth on consumption.

- The marginal propensity to consume is preferred by modelers because the long term equilibrium can be derived analytically, as shown in appendix 6.3.1.

3.2 Empirical results for France

Empirical work on the wealth effect in France has only been conducted on macro-data, because there is no common source of micro-data on households income and wealth. The estimations for the long term impact are presented in table 1. The various methodologies used across studies, as well as the sample chosen, may impact the results and are pointed out hereafter.

Table 1: *Long term impact of wealth on consumption in France*

		MPC			**Elasticity**		
Studies Wealth	**Sample**	**total**	**financial**	**housing**	**total**	**financial**	**housing**
Aviat et alii (2007)	1985q1-2006q1	0.4			**2.3**		
Barrell and Davis (2007)	1980q1-2001q4	3.1			**17.8**		
Barrell and Davis (2007)	1980q1-2001q4	3.6			**20.8**		
Slacalek (2006)	1970q2-2003q2	**3.2**	**2.6**	**2.0***	18.5	5.5	7.3
Slacalek (2006)	1970q2-2003q2	**4.6***	**2.9**	**2.3***	26.6	6.1	8.4
Catte et alii (2004)	1979q2-2002q1		1.4	0.0		**3.0**	**0.0**
IMF country report (2004)	1982q1-2003q4		2.5	0.5		**5.3**	**1.9**
Fraisse (2004)	1971q4-2003q2	**1.6**			9.2		
Beffy and Monfort (2003)	1978q1-2000q4	2.5			**14.0**		
Byrne et alii (2003)	1972q2-1998q4		3*			**16.3**	
Bertaut (2002)	1978q1-1998q4		4.7			**10.0**	
Boone et alii (2001)	1970q1-1996q2	2.5	6.8	4.2	12.3	12.0	13.1

Note : According to Aviat et alii, an increase in wealth by 100% implies an increase in consumption by 2.4%. Taking into account the average ratio of wealth over consumption during 1995-2005, this means that an increase by 1 euro of financial wealth induces an increase by 0.4 cents in annual consumption. Estimation results stated by the authors are in bold. * estimates are not significant.

Many papers estimate wealth effect for France in a context of international comparison by estimating a consumption function for each country separately, without taking into account the cross-country dispersion. To our knowledge,

Boone et alii (2001) were among the first ones. However, they estimate the cointegration vector between consumption, wealth and income without taking into account the potential endogeneity of the variables, which is also the case of Fraisse (2004). Bertaut (2002), Beffy and Monfort (2003), IMF (2004), Catte et alii (2004), Slacalek (2006) and Aviat et alii (2007) take into account this problem by using dynamic ordinary least squares (DOLS). In some cases, the sum of the parameters is constrained to one as in Beffy and Monfort (2003) and Aviat et alii (2007).

Barrell and Davis (2007) and Byrne et alii (2003) use unrestricted Error Correction Models (ECM) estimated via non linear least squares. Barrell and Davis used dummy variables to account for the impact of financial liberalisation. However, if they do consider the increasing oustanding amount of credit in the second half of the eighties, they do not take into account the reversal that came in 1991-1992, when banks restricted housing credits after having liberalised too much. Byrne et alii also test the impact of illiquid versus liquid wealth.

All these studies estimate only the impact of permanent change in wealth on consumption. Most of the authors find a significant impact of wealth on consumption in France, albeit smaller than in the United States. The lack of robustness of the results is highlighted in Bertaut (2002) and Byrne and Davis (2003). This may be due to the fact that these papers were among the first ones and the dataset they used stops at the end of the nineties.

None of the studies have analysed the sensitivity of the results to different approaches. Most of them make use of univariate methods and they never quantify how much of the adjustment to the long run equilibrium may come not from a change in consumption, but in wealth, as it is suggested by Lettau and Ludvigson (2001) and Whelan (2008), or in income.

4 Econometric results

Our empirical framework starts from the now well-known concept of cointegration. Two or more variables which are integrated to the same order and drift randomly are said to be cointegrated if there exists a linear combination between them which is stationary; in this case the series can deviate from the equilibrium in the short run but will return to it in the long run.

Concerning the data we used in this analysis (see appendix, tables 7a and 7b), most of them come from financial and non financial quarterly national accounts (Institut National de la Statistique et des Etudes Economiques, INSEE[4], 2008 and Banque de France, 2008). As developed in the first section, income is the flow of human wealth and thus is measured here by disposable income net of property and housing (imputed rents) income.

Three concepts of consumption are of interest. Total households expenditure is the most popular one. However, as income is net of property income and in particular net of FISIM (Financial Intermediation Services Indirectly Measured), we considered also consumption excluding financial services.[5] Finally, textbooks usually stress that simple consumer models consider a separable con-

[4]INSEE is the French National Statistic Institute.

[5]These FISIM behave erratically particularly since 2000 in line with the difference between long term and short term interest rates, which may not be relevant for consumption behavior. Financial services represent only 5 to 7.5% of total consumption.

sumption utility function and exclude liquidity constraints so that they are more adapted to describe non durable consumption than overall consumption. We then tested consumption excluding durables, although wealth was not adjusted for the stock of durables.[6]

As explained above, the link between consumption and wealth may be expressed in two manners: marginal propensity to consume (MPC hereafter) and elasticities. While only the second approach is analyzed in most empirical studies, we test and estimate both in the following sections.

4.1 Empirical MPC model investigation

We first investigate the existence of a long run relationship along the MPC pattern over 1987-2006. Although the data set starts in 1978, the estimation period starts in 1987, to avoid the financial liberalisation episode (lifting of credit controls...). In this case, based on the equation (3) in section 2.2, the following relationship is analyzed:

$$\frac{C_t}{Y_t} = \alpha + \beta \frac{A_{t-1}}{Y_t} + \epsilon or \frac{C_t}{Y_t} = \alpha + \beta \frac{H_{t-1}}{Y_t} + \gamma \frac{F_{t-1}}{Y_t} \tag{4}$$

where α is a constant and β the marginal propensity to consume out of wealth. In the first step, we use A_t as the aggregate non human wealth, in a second step, we test its disaggregation in two different components: housing H_t and financial wealth F_t.

Before testing the existence of one or more cointegration relationship(s), we need to investigate the order of integration of the series. They are the ratio over income net of property income of total consumption/non durable consumption/consumption net of financial services consumption, financial wealth and housing wealth/total wealth. Usual unit root tests - Augmented Dickey-Fuller (ADF, 1979) and DF-GLS from Elliot Rothenberg Stock (ERS, 1996) are performed using the usual selection criteria (LR, AIC, SC, HQ).[7] Note that the last one is the most powerful and has been found to dominate the others under certain conditions.

Table 9 (see appendix) outlines the usual unit root statistics results for consumption and wealth ratios. Following the usual unit root tests, we do not reject the null hypothesis of unit root at 1% apart from the housing wealth/income ratio.[8] In the wealth income ratio series (in level and difference), one or two structural breaks seem nevertheless present. To avoid problems of bias rejections and to take account potential structural breaks, we performed the endogenous two-break LM unit root test derived in Lee and Strazicich (2003). This test is an extension of the LM unit root test developed by Schmidt and Phillips (1992).

[6] It is difficult to assess the impact of this lack of adjustment on the estimated mpc and elasticity, as the dynamics of the stock of durables is different from that of wealth.

[7] It is well known that the determination of the number of lags is very important because unit root tests are sensitive to it. The number of lags is determined by comparing the different criteria.

[8] Only non durable consumption and excluding financial services consumption specifications are presented in table 9 because the total consumption expenditure ratio is stationary. Therefore, no long run relationship in the equation (3) is possible considering the total consumption concept.

As compared with the Zivot and Andrews (1992) test assuming no break under the null, the Lee and Strazicich one allows for breaks both under the null and the alternative hypothesis. The results of the LM unit root test with two structural breaks are reported in table 10. According to it, the unit root of the housing wealth/income ratio is rejected at the 5% level. Hence, the unit root test of Lee and Strazicich (2003) provides evidence in favor of the stationarity of the housing wealth ratio in difference. All of the series are therefore I(1) and cointegration methods are warranted in our view. Note finally that considering the other series (consumption and financial wealth ratios), the conclusions are similar when the unit root with breaks tests are used.

Using the Johansen (1988) methodology, we test the existence of the exact number of cointegrating relationships in a multivariate VAR (Vector AutoRegressive) model by performing the Johansen and Juselius Trace and Maximum Eigenvalue Statistics. Considering both nondurable consumption and net of financial services consumption ratios during 1987-2006, we find strong evidence of the existence of a cointegrating vector among the ratio of consumption and the aggregate wealth ratio.We also find strong evidence of a single cointegrating vector among the consumption ratio and the disaggregated wealth ratio. On both data sets, one can reject indeed the null hypothesis of no cointegration at the 1% level. (In addition, these conclusions are robust to the cointegration recursive test we performed. The tests are not reported here but available upon request). We can consequently estimate this cointegrating vector in order to evaluate the marginal propensity to consume.

There are two main cointegration approaches to estimate the long-run model (3): single equation approaches and multivariate VAR approaches. The oldest single equation approach is the Engle and Granger 2 step method (1987) which consists in using OLS to obtain a cointegrating vector (or a long-run estimate) and then testing for cointegration using ECM cointegration tests. Indeed, OLS provide superconsistent estimates when the data seem to support the assumption of a single cointegration vector. However, we have to assume that all regressors are exogenous, which is not the case as the dynamics of wealth and income depends on that of consumption. An estimation method taking into account the possible endogeneity of the regressors (wealth, income) and improving the Engle and Granger single equation approach is thus needed. We consequently performed the DOLS method proposed by Stock and Watson (1993) *via* a dynamic OLS (DOLS) regression and the VECM Johansen approach by ML (Maximum Likelihood) estimation in line with Johansen (1995). Note that in small sample, the DOLS estimator is more precise, as it has a smaller mean squared-error than the MLE, see Stock and Watson (1993). In order to test the stability of the long term results, a Generalized Least Squares (GLS) system approach is also proposed for comparison[9].

The following table 3 summarizes the estimated cointegrating vectors:

[9]This remark is analysed in section 4.3.

Table 3: *Estimates of long run MPC*

Total Wealth	OLS	DOLS	VECM-ML	VECM-GLS
Wealth 1	1.83 (0.73)	1.73* (0.69)	1.79* (0.72)	0.437* (0.17)
Wealth 2	3.06 (1.22)	3.45* (1.38)	3.27* (1.31)	1.329 (0.53)
Disagr. Wealth	OLS	DOLS	VECM-ML	VECM-GLS
Housing wealth 1	0.83 (0.33)	4.33* (1.73)	2.76* (1.10)	2.73* (1.09)
Housing wealth 2	0.79 (0.32)	1.74* (0.70)	0.96 (0.38)	0.85 (0.34)
Financial wealth 1	4.55 (1.82)	4.43* (1.77)	4.40* (1.76)	4.58* (1.83)
Financial wealth 2	11.93 (4.77)	9.71* (3.88)	9.51* (3.80)	9.8* (3.92)

*, ** and *** indicate significance at 1%, 5% and 10% level respectively and (.) indicate the annualized results that is the increase in cents in annual consumption induced by an increase by one euro in wealth.

3 or 6 lags for disaggregate, 1 or 2 lags for aggregate. We do not introduce any deterministic term in the VECM model.

1=nondurable consumption ratio 2= excluding financial consumption ratio

Our results seem rather robust to the estimator used. We describe our methodology for the elasticity approach before concluding for both sets of results.

4.2 Logarithm or elasticity approach

Following the Lettau and Ludvingson (2001) approach presented in 2.1, we estimate here:

$$c_t = \alpha + \beta_1 a_{t-1} + \beta_2 y_t + \epsilon \text{ or } c_t = \alpha + \beta_1 f_{t-1} + \beta_2 h_{t-1} + \beta_3 y_t, \tag{5}$$

where c, a , f, h, y are the log of the consumption, aggregate non human wealth, financial wealth, housing wealth and disposable income.[10]

The time series properties of the log variables are first tested. The study of the non stationary properties of the variables is crucial in the investigation of cointegration relationships. We find evidence in favour of a single unit root test in the stochastic process of most log variables (see table 9). Nevertheless, the housing wealth seems to be integrated of order two while the other variables are integrated of order one, whatever the deflator considered. As in the previous section, the Lee and Strazicich unit root test (2003) test was performed to check this conclusion. The results of table 10 show that the log of the real housing wealth considering the non durable consumption concept is difference stationary at 10% level. However, the housing wealth deflated by consumption excluding financial services is still I(2). Thereafter we will test the existence of a cointegrating relationship between consumption, disposable income, financial wealth and housing wealth in a "'disaggregated"' analysis.

As in the previous approach, Johansen and Juselius Trace and Maximum Eigenvalue statistics are performed. Some evidence of two cointegrating relationships arises in aggregate and disaggregate analysis (statistic values are not reproduced here). More over, the sum of the elasticity of income and wealth is far from one in most cases, which shows the weakness of this approach. It is indeed particularly true for our estimations concerning consumption excluding

[10] a, f, h, y are computed as the value deflated by the deflator coherent with the concept of consumption used.

durable goods, but this variable is integrated with total consumption with an elasticity of 0.9, which explains why elasticities with income and wealth are so low in that case.

Table 4: *Estimates of the long run elasticity of total consumption*

Total Wealth	DOLS	VECM-ML	VECM-GLS
Wealth	0.13*	0.10*	0.11*
Income	0.69*	0.75*	0.75*
Disagr. Wealth			
Housing	0.08*	0.08*	0.08*
Financial	0.08*	0.09*	0.09*
Income	0.63*	0.62*	0.60*

*, ** and *** indicate significance at 1%, 5% and 10% level respectively
2 lags for disaggregate (results no sensitive), 2 lags for aggregate

Table 5: *Estimates of the long run elasticity of non-durables consumption*

Total Wealth	DOLS	VECM-ML	VECM-GLS
Wealth	0.08**	0.08*	0.09
Income	0.90*	0.58*	0.53*
Disagr. Wealth			
Housing	0.05*	0.06*	0.06*
Financial	0.11*	0.10*	0.12*
Income	0.73*	0.63*	0.62*

*, ** and *** indicate significance at 1%, 5% and 10% level respectively
6 or 1 lags for disaggregate (results no sensitive), 5 lags for aggregate

Table 6: *Estimates of the long run elasticity of total consumption excluding financial services*

Total Wealth	DOLS	VECM-ML	VECM-GLS
Wealth	0.08*	0.07*	0.08*
Income	0.92*	0.67*	0.65*
Disagr. Wealth			
Housing	0.08*	0.06*	0.06*
Financial	0.11*	0.12*	0.13*
Income	0.65*	0.66*	0.64*

*, ** and *** indicate significance at 1%, 5% and 10% level respectively
2 lags for disaggregate and aggregate wealth

Considering long term relationship between log of total/non durable consumption, wealth (total and disaggregated) and income, it is possible to outline the joint dynamics of these variables by a vector error correction model. The vector of estimated adjustments (or loading) coefficients associated with the long run relationship, which are also the coefficients on the lagged cointegrating residuals, is the most interesting feature of the dynamics analysis (that is the reason why all the coefficients of the lagged variables are not reproduced here). Our results suggest that any deviations of the variables from their common

trends are corrected at first by adjustments in disposable income. The coefficient of adjustment for wealth is only slightly significant in one case (elasticity of non durable consumption) and always smaller than that of income. This is in line with the study for Germany conducted by Hamburg et al. (2006) but in contrast with the seminal study of Lettau and Ludvigson (2001, 2004) for the US, where asset prices adjusted.

Table 7: *Coefficients of the lagged cointegrating residuals*

MPC	Consumption to income ratio	Wealth to income ratio	
1	-0.19*	0.001	
2	-0.38*	-0.0007	
Elasticity	Consumption	Wealth	Income
1	-0.24*	0.56***	0.66***
2	-0.24*	0.25	0.66*
3	-0.07	0.27	0.72*

*, ** and *** indicate significance at 1%, 5% and 10% level respectively
1=nondurable consumption ratio 2=excluding financial consumption ratio 3=total consumption ratio

4.3 Main conclusions of both approaches

Overall, estimates are in general statistically significant and economically plausible in terms of sign and magnitude of estimated coefficients.

Robustness tests and stability analysis are performed for both approaches. First, eigenvalue recursive and CUSUM tests suggest that the estimated relationship between consumption and wealth (disaggregated or not) is rather stable over the sample period (the CUSUM tests are available upon request). Second, Portmanteau and LM test for residual autocorrelation, Heteroskedasticity ARCH test and Jarque Bera normality test show that models seem to be robust to various departures from the standard linear model assumptions (see table 10 in appendix). Third, the vector of regressors has been extended by adding unemployment rate, real interest rate and delinquency rates (considering these variables as strictly exogenous and consequently out of the VECM cointegrating space estimated)without any significant change in the results. Fourth, all the computations have been made on the sample extended to include preliminary data for 2007 and 2008. The Lee and Strazicich results concerning the stationarity of housing wealth (not reproduced here) are still more significant. The estimation results are also robust to this change.

In addition, the estimates of wealth effect are very similar with a given specification, whatever the estimating method, DOLS, Maximum Likelihood and Generalize Least Squares. In particular, Maximum Likelihood and Generalize Least Squares estimates are very close: this is an indicator of robustness in accordance to Bruggemann and Lutkepohl (2005).[11]

However, DOLS results seem to draw a more realistic picture than the ML and GLS ones in the elasticity approach. The sum of elasticity coefficients is indeed closer to one, especially when analysing the impact of total wealth on

[11]They have indeed shown that GLS system estimator has better properties than the dominant Johansen MLE in small samples and/or in situations where the MLE produces extreme estimates. The convergence beetween the results of the two different estimators is thus a robustness indicator.

total consumption or on non durables . It may be due to the the satisfactory small sample properties of the DOLS estimator - we worked with only 80 observations. As pointed out by Stock and Watson (1993), the Johansen estimators exhibit more dispersion than the DOLS one in small samples.[12]

Estimates for disaggregated wealth are somewhat less robust than the ones for aggregated wealth and need to be cautiously interpreted, although they pass many tests. In particular, the elasticity approach may be weaker than the mpc approach, for two reasons. On the one hand, the cointegration tests imply the existence of two rather than one cointegrating vector. On the other hand, the sum of the elasticity of consumption to wealth and to income is not equal to one except in two DOLS regressions (see tables 5 and 6), which is the condition of long-term equilibrium. It may be so because elasticity is not the best approach with disaggregated wealth or because the housing wealth is not clearly integrated of order one.

Finally, considering both approaches, there is some evidence that the estimated long run relation between financial wealth, housing wealth and aggregate consumption is significantly positive but weak. Based on the MPC estimates, an increase (decrease) in one euro in total asset wealth considered as permanent by households would lead to an increase (decrease) of about 1 cent in annual consumption, which is equivalent to an 5 to 8 % elasticity, given the average wealth to consumption ratio over the period 1995-2005. The estimated long run elasticity of consumption with respect to the total wealth is somewhat higher, about 8-11% (which means a MPC of about 2 cents); the estimated long run elasticity of consumption with respect to the housing effect is very weak (at most 6%, that is a MPC of 2 cents) and the estimated long run elasticity of consumption with respect to the financial wealth is about 10%, which is a MPC of 4 cents. This order of magnitude is coherent with theory, according to which consumption is equal to permanent income. Also consistently with economic theory, the financial effect is bigger than the housing effect whatever the approaches and the concepts of consumption used. This dampens the overall impact of wealth on consumption as housing wealth is a bigger component of non human wealth than financial wealth.

All these estimates are smaller than in the US and the UK, but close to the Italian ones. With the greatest importance of wealth in the US and the UK, this dissimilarity is likely to explain the fact that the saving rate is more important in France than in the US. On the whole, our result is not surprising as the financing system in France is more based on banks, as in Italy, than on the market, as in the US and the UK. Moreover, the retirement system is nearly only based on pay-as-you-go schemes.[13] Finally, our results are near the average of the results of earlier studies for the French case reported in table 1.

[12]It is well known that the Johansen estimates are somewhat sensitive to the sample and to the lag length choice and that the small sample properties of the MLE are not very good.

[13]The comparison with Germany is more difficult as estimates may differ widely: Barrell and Davis (2007), Catte et alii (2004) and Byrne and Davis (1998) find results similar to ours, whereas Slacalek (2006) and Hamburg et alii (2008) find much higher estimates.

5 Conclusions

Based on the elasticity strategy, an increase (decrease) of 10% in wealth would imply a relatively small impact, of 0.8 to 1.1% on households consumption, according to the concept of consumption considered. Considering the MPC estimates, an increase (decrease) in one euro in total asset wealth would lead to an increase (decrease) of about 1 cent in consumption. Therefore, there is somewhat convergence between the different specifications we tested here (MPC and elasticity) in the sense that the wealth effects are quite weak. In most cases, the financial effect is bigger than the housing one. Nevertheless, this result should be considered very cautiously. Firstly, we only analysed the impact of a change in wealth considered as permanent by the consumers. Secondly, the results are somewhat sensitive to the econometric framework, especially when the total wealth effect is considered. In addition, MPC results are more robust than Elasticity results in our case (especially, the housing wealth ratio is clearly I(1)).

All in all, this analysis extends the existing papers about the wealth effect in European countries by focusing on the special case of France. This is the first paper to compare different specifications for France, using the latest and an original dataset and confronting several cointegration approaches and estimators. Moreover, this is the first attempt to evaluate the dynamics of the wealth effects in France. And income seems to adjust in the short term rather than non human wealth of consumption. At this stage, an interesting further research direction would be to address a variance decomposition analysis in order to identify permanent and transitory components in the consumption dynamics.

6 Appendix

6.1 Data

Most of the data come from the national accounts (see table 7). Interest rates are those agreed for new housing loans, as most housing loans have fixed interest rates in France. Current series of MFI interest rates starting in 2003 have been backdated by different vintages of data, see Boutillier and Rousseaux (2005) in particular.

Table 8a: *Data sources (1)*

Series name	**Full denomination**
Consumption	Households consumption expenditures
Household income	Households disposable income (B6) excluding net property income (d40) and imputed rents (part of b2)
Consumption deflator	Households consumption expenditures deflator
Net financial wealth	Households financial assets net of debts
Housing wealth	Households' tangible assets: land and housing
Interests paid for housing loans	Interest paid for housing loans
Interest rates paid for housing loans	Interest rates paid for housing loans
Default rate for households	Write-offs over total households loans
Unemployment rate	Unemployment rate

Table 8b: *Data sources (2)*

Series name	**Treatment if any**
Consumption	Quarterly national accounts, INSEE
Household income	Quarterly national accounts, INSEE
Consumption deflator	Quarterly national accounts, INSEE
Net financial wealth	Quarterly financial accounts, Banque de France
Housing wealth	Wealth account, converted to quarterly data with a housing price index as a guide
Interest paid for housing loans	Bank accounts annual data converted to quarterly data without guide(*)
Interests rates paid for housing loans	Monetary data from Banque de France
Default rate for households	Monetary data from Banque de France
Unemployment rate	INSEE

(*) Note: see Demuynck et alii (2008), Kierzenkowski and Oung (2007), Wilhelm (2005).

6.2 Unit root tests and specifications tests

Table 9: *Usual unit root tests*

Variables	**ADF**		**DF-GLS**	
	Intercept	Intercept/Trend	Intercept	Intercept/Trend
Consumption/Income 1	-2.36 (-12.25)	-3.16 (-12.24)	0.21 (-4.54)	-1.72 (-4.79)
Consumption/Income 2	-2.25 (-13.37)	-3.21 (-13.37)	-2.43 (-12.95)	-0.45 (-12.22)
Aggregate Wealth/Income	3.74 (-3.13)	1.49 (-7.42)	5.77 (-2.82)	-1.14 (-7.51)
Housing Wealth/Income	**-2.48 (-2.65)**	**0.68 (-2.20)**	0.34 (-2.04)	**-2.12 (-2.65)**
Financial Wealth/Income	-1.44 (-8.17)	2.02 (-8.16)	0.62 (-8.20)	-1.84 (-8.20)
Log Real Financial Wealth 1	-1.69 (-8.38)	-2.58 (-8.43)	-1.71 (-8.50)	1.80 (-8.22)
Log Real Financial Wealth 2	-1.47 (-8.12)	-2.53 (-8.16)	-1.85 (-8.02)	1.84 (-7.98)
Log Real Housing Wealth	**0.52 (-1.65)**	**-1.57 (-2.10)**	**-2.05 (-1.79)**	**0.43 (-1.63)**
Log Real Housing Wealth 1	**-0.23 (-0.99)**	**-0.08 (-1.50)**	**-1.75 (-1.67)**	**-2.13 (-1.70)**
Log Real Housing Wealth 2	**1.61 (-1.44)**	**-1.67 (-1.66)**	**-2.09 (-1.68)**	**-0.13 (-0.96)**
Log Aggregate Wealth	0.96 (-5.83)	-0.27 (-5.93)	1.37 (-5.87)	-1.43 (-5.97)
Log Aggregate Wealth 1	**2.54 (-2.43)**	0.87 (-8.19)	6.36 (-2.45)	**-1.41 (-2.73)**
Log Aggregate Wealth 2	1.96 (-6.21)	0.45 (-6.59)	3.32 (-2.26)	-0.92 (-6.44)
Log Real Income	-1.38 (-12.39)	-1.87 (-12.43)	1.93 (-10.96)	-1.34 (-12.31)
Log Real Income 1	0.60 (-4.11)	-1.96 (-4.18)	-2.02 (-2.11)	-2.20 (-3.00)
Log Real Income 2	0.53 (-11.04)	-1.22 (-11.05)	3.37 (-2.43)	-1.35 (-10.33)
Log Aggregate Real Income	-1.38 (-12.40)	-1.87 (-12.42)	-1.33 (-12.31)	1.93 (-10.96)

Note: (.) are unit root statistics (Augmented Dickey Fuller and DF-GLS) referring differences variables. Bold results denotes I(2) variables. 1=non durable consumption used 2=excluding financial services consumption used.

Table 10: *Lee and Strazicich LM unit root test with two breaks*

Variables	**k**	$\widehat{T_B}$	**Statistics**
Housing Wealth/Income	0	1997:01, 2004:04	-9.39***
Log Real Housing Wealth 1	6	1996:01, 2003:02	-5.76**
Log Real Housing Wealth 2	3	1991:02, 1997:04	-5.12

Note: Statistics refer to variables in first difference. k is the number of lagged first-differenced terms included to correct the serial correlation and $\widehat{T_B}$ denotes the estimated break points. 1=non durable consumption used 2=excluding financial services consumption used.

Table 11: *Specifications tests*

Elasticity 1 Disaggregated			
	DOLS	**ML**	**GLS**
Portmanteau	0.00	0.00	0.53
LM	0,02	0,98	0,05
JB	0,80	0,00	0,15
Elasticity 2 Disaggregated			
	DOLS	**ML**	**GLS**
Portmanteau	0,00	0,14	0,00
LM	0,01	0,36	0,00
JB	0,32	0,01	0,49
Elasticity 1 Aggregated			
	DOLS	**ML**	**GLS**
Portmanteau	0,00	0,01	0,21
LM	0,00	0,42	0,01
JB	0,99	0,02	0,79
Elasticity 2 Aggregated			
	DOLS	**ML**	**GLS**
Portmanteau	0,00	0,06	0,22
LM	0,00	0,14	0,03
JB	0,36	0,13	0,74
MPC 1 Disaggregated			
	DOLS	**ML**	**GLS**
Portmanteau	0,00	0,00	0,01
LM	0,09	0,00	0,00
JB	0,85	0,01	0,45
MPC 2 Disaggregated			
	DOLS	**ML**	**GLS**
Portmanteau	0,00	0,00	0,01
LM	0,01	0,26	0,00
JB	0,32	0,01	0,50
MPC 1 Aggregated			
	DOLS	**ML**	**GLS**
Portmanteau	0,00	0,00	0,99
LM	0,00	0,48	0,00
JB	0,08	0,15	0,04
MPC 2 Aggregated			
	DOLS	**ML**	**GLS**
Portmanteau	0,00	0,00	0,99
LM	0,00	0,47	0,22
JB	0,26	0,37	0,01

Note: Portmanteau and LM refer to Portmanteau and Breush-Godfrey Lagrange Multiplier test for residual autocorrelation and JB refers to the Jarque-Bera statistic of the test for normal residuals. All results are p-values. Note that the LM test is more suitable to test for low order autocorrelation, contrary to the Portmanteau test (see for instance Lutkepohl, 2008). 1=nondurable consumption 2= excluding financial consumption.

6.3 Conditions for long term equilibrium

6.3.1 Marginal propensity to consume

If the estimation of the wealth effect is based on a marginal propensity to consume, then the joint dynamics of consumption and non human wealth is given by

$$\begin{cases} C_t = \alpha Y_t + \beta A_{t-1} \\ A_t = (1+\rho)A_{t-1} + Y_t - C_t \end{cases} \tag{6}$$

where ρ is the real total return on wealth; C_t, the consumption in volume; Y_t, the real income net of property income and A_t, real non human wealth. In the long run, the first equality insures that A, C and Y grow at the same rate.

The dynamics of wealth is described by:

$$A_t = (1+\rho)A_{t-1} + Y_t - \alpha Y_t - \beta A_{t-1} \tag{7}$$

which can be expressed in terms of the ratio wealth/income:

$$\frac{A_t}{Y_t} = (1+\rho-\beta)\cdot\frac{Y_{t-1}}{Y_t}\cdot\frac{A_{t-1}}{Y_{t-1}} + (1-\alpha) \tag{8}$$

The ratio $\frac{A_t}{Y_t}$ converges towards the fixed point of this equation and this fixed point is positive if and only if

$$0 < (1+\rho-\beta)\cdot\frac{Y_{t-1}}{Y_t} < 1 \tag{9}$$

These conditions are usually verified as β is estimated small compared to ρ and the product is inferior to 1.

In the long run, the ratio $\frac{A_t}{Y_t}$ converges towards the fixed point, dependant on the constant growth rate of real income:

$$\frac{A}{Y} = \frac{(1-\alpha)}{1-(1+\rho-\beta)\cdot\frac{Y_{t-1}}{Y_t}} \tag{10}$$

From (6) the consumption ratio is:

$$\frac{C_t}{Y_t} = \alpha + \beta\cdot\frac{Y_{t-1}}{Y_t}\cdot\frac{A_{t-1}}{Y_{t-1}} \tag{11}$$

The consumption ratio at the equilibrium depends on the rate of return of assets ρ, and in particular on the interest rates.

$$\frac{C_t}{Y_t} = \alpha + \frac{\beta\cdot(1-\alpha)}{(1+\rho-\beta)} \tag{12}$$

6.3.2 Elasticity

$$\begin{cases} C_t = \gamma\cdot Y_t^{\alpha}\cdot W_{t-1}^{\beta} \\ W_t = (1+\rho)W_{t-1} + Y_t - C_t \end{cases} \tag{13}$$

In the long run, the first equality insures that A, C and Y grow at the same rate if $\beta = 1-\alpha$, which will be assumed subsequently.

The dynamics of wealth is described by:

$$A_t = (1+\rho)A_{t-1} + Y_t - \gamma\cdot Y_t^{\alpha}\cdot A_{t-1}^{(1-\alpha)} \tag{14}$$

which can be expressed in terms of the ratio wealth/income:

$$\frac{A_t}{Y_t} = 1 + (1+\rho)\cdot\frac{Y_{t-1}}{Y_t}\cdot\frac{A_{t-1}}{Y_{t-1}} - \gamma\big(\frac{Y_{t-1}}{Y_t}\big)^{(1-\alpha)}\cdot\big(\frac{A_{t-1}}{Y_{t-1}}\big)^{(1-\alpha)} \tag{15}$$

The ratio $\frac{A_t}{Y_t}$ at equilibrium verifies $f(x) = 0$ where

$$f(x) = x - 1 - (1+\rho)\cdot\frac{Y_{t-1}}{Y_t}\cdot x + \gamma\big(\frac{Y_{t-1}}{Y_t}\big)^{(1-\alpha)}\cdot x^{(1-\alpha)} = \big(1-(1+\rho)\cdot\frac{Y_{t-1}}{Y_t}\big)\cdot x - 1 + \gamma\big(\frac{Y_{t-1}}{Y_t}\big)^{(1-\alpha)}\cdot x^{(1-\alpha)} \tag{16}$$

If $1-(1+\rho)\cdot\frac{Y_{t-1}}{Y_t} \geq 0$, then there always exists a fixed point. Otherwise, there may exist situations where there is none. In any case, if $1-(1+\rho)\cdot\frac{Y_{t-1}}{Y_t} \neq 0$ the equilibrium value of the saving rate cannot be computed literally.

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