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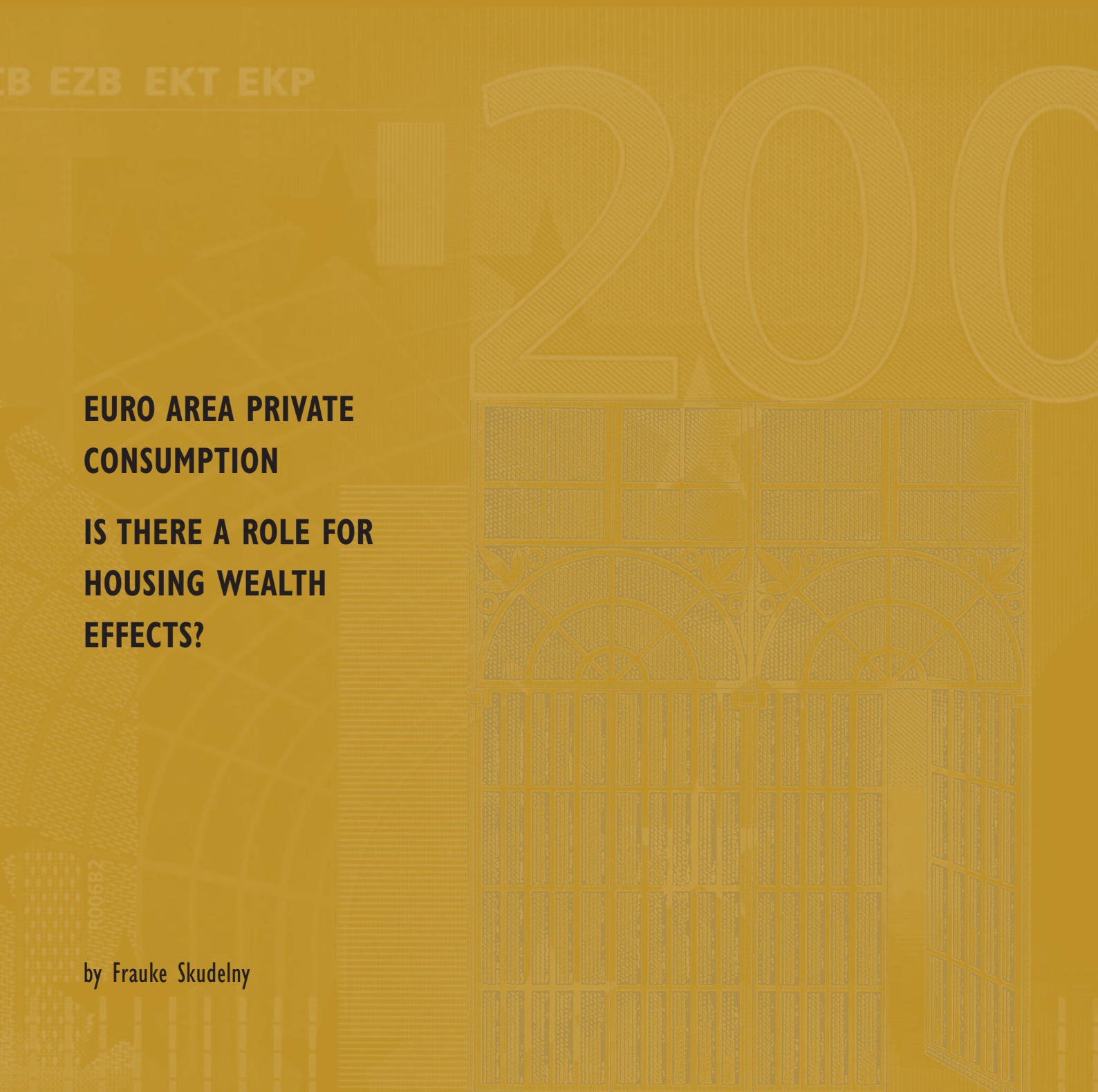

EURO AREA PRIVATE CONSUMPTION

IS THERE A ROLE FOR HOUSING WEALTH EFFECTS?

by Frauke Skudelny

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IS THERE A ROLE FOR HOUSING WEALTH EFFECTS? [1]

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In 2009 all ECB publications feature a motif taken from the €200 banknote.

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Abstract:

This paper adds to the literature on wealth effects on consumption by disentangling financial wealth effects from housing wealth effects for the euro area. We use two macro-datasets for our estimations, one on the aggregate euro area for the period 1980-2006, and one on the individual euro area countries from 1995-2006, using panel data techniques. The impact of all wealth variables on euro area consumption is significant and positive in most specifications for both datasets. The marginal propensity to consume (MPC) out of financial wealth is roughly in line with the literature, with 2.4 to 3.6 cents per euro of financial wealth spent on consumption according to the estimations with euro area aggregate data. However, the panel estimation yields somewhat lower results (0.6 to 1.1 cents). The MPC out of nominal housing wealth lies between 0.7 to 0.9 cents per euro for both datasets. When specifying housing wealth in real terms, i.e. when taking out the effect of volatile house prices, we find similar effects in the times series estimation while the MPC is larger in the panel estimation (2.5 cents).

Keywords: Housing wealth, financial wealth, consumption, euro area

JEL codes: E21

Non-technical summary

House prices in the euro area have risen by about 50% between 2000 and 2007. However, annual growth rates of house prices have declined from around 8% in 2005 to around 4% in 2007. Growth in nominal housing wealth, which is mainly driven by house price developments, increased from around 2% in 1994 to 10% in 2000, remaining relatively stable thereafter until 2007. In this context, the question arises in how far these developments have consequences for euro area private consumption. A large number of papers have analysed the impact of wealth on consumption, partly also distinguishing between financial and housing wealth, as an increase in wealth should, according to the life time permanent income hypothesis of consumption, lead to an increase in consumption. Most of these studies, however, focus on the United States and the United Kingdom.

This paper adds to the literature on wealth effects on consumption by disentangling financial wealth effects from housing wealth effects for the euro area. This has to our knowledge not yet been done, probably due to the difficult data situation. We use two macro-datasets for our estimations, one on the aggregate euro area for the period 1980-2006, and one on the individual euro area countries from 1997-2006, the latter relying on panel data techniques.

The impact of all wealth variables on euro area consumption is significant and positive in most specifications for both datasets. The marginal propensity to consume (MPC) out of financial wealth is roughly in line with the literature, with 2.4 to 3.6 cents per euro of financial wealth spent on consumption according to the estimations with euro area aggregate data. However, the panel estimation yields somewhat lower results (0.6 to 1.1 cents). The MPC out of nominal housing wealth lies between 0.7 to 0.9 cents per euro for both datasets. When specifying housing wealth in real terms, i.e. when taking out the effect of volatile house prices, we find similar effects in the time series estimation while the MPC is larger in the panel estimation (2.5 cents).

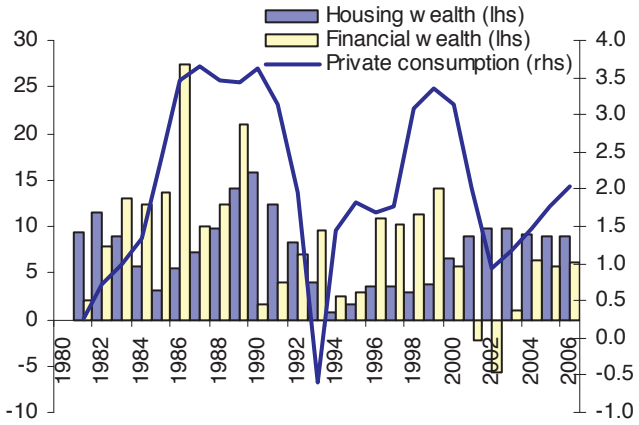
1. Introduction

House prices in the euro area have risen by about 50% between 2000 and 2007. However, annual growth rates of house prices have declined from around 8% in 2005 to around 4% in 2007. Annual growth in nominal housing wealth, which is mainly driven by house price developments, increased from around 2% in 1994 to 10% in 2000, remaining relatively stable thereafter until 2007. In this context, the question arises in how far these developments affect the behaviour of euro area consumers. A large number of papers have analysed the impact of wealth on consumption, partly also distinguishing between financial and housing wealth, as an increase in wealth should, according to the life time permanent income hypothesis of consumption, lead to an increase in consumption. [1] Most of these studies, however, focus on the United States and the United Kingdom.

Looking at the data, Chart 1 shows the annual growth rates of housing and financial wealth (net of debt) along with private consumption. It appears clearly that there are contemporaneous episodes of rising (declining) financial wealth and consumption, which at some occasions also co-incide with corresponding rises (declines) of housing wealth. Although income growth is strongly correlated with private consumption growth as well, it remains to be seen how strong is the impact of the different wealth components on euro area consumption.

Chart 1 Euro area private consumption, net housing and financial wealth

(annual growth rates)



[1] See also European Central Bank (2009) for the mechanisms underlying the link between consumption and housing wealth.

This paper adds to the literature on wealth effects on consumption by disentangling financial wealth effects from housing wealth effects for the euro area. A few studies have analysed the relationship for individual euro area countries for which data were available and found quite mixed results. To our knowledge, only one study (Slacalek (2006)) has analysed panel results for the euro area as a whole and found significant housing wealth effects for the period from 1989 to 1999. The lack of studies focussing on the euro area probably reflects the difficult data situation. The approach in our paper differs from his method, as we use two macro-datasets for our estimations, one on the aggregate euro area for the period 1980-2006, and one on the individual euro area countries from 1997-2006, using panel data techniques. Thereby, we also extent the sample under examination.

The paper is structured as follows: We start with a survey of the empirical literature (Section 2). Some theoretical considerations are described in Section 3, while Section 4 is devoted to the empirical results. Section 5 concludes.

2. Empirical results in the literature

A large number of studies have looked into the impact of housing wealth on consumption, most of them focussing on Anglo-Saxon countries due to the better data situation. Generally speaking, the literature can be divided into two groups, one dealing with macro-data and one using micro-data.

Regarding the macro approach, Skinner (1993) uses US data from 1950 to 1992 and explains (nondurable and services) consumption with financial and housing wealth, and real disposable income. His regression results suggest that there is only a small effect of financial wealth, while the MPC out of housing wealth is about 6 cents per dollar of housing wealth. Carroll (2004) also uses US data, from 1960 to 2003, to estimate the effect of stock and non-stock wealth on consumption. A new feature of his study is that he uses moving average terms over the past 4 quarters, as wealth is expected to have a more gradual impact on consumption. Other control variables are income, stock market prices and interest rates. While the impact of the wealth variables on consumption appears to be very small in the first quarter, the effect after several quarters converges to the finding of other studies, with an MPC out of housing wealth around 9 cents, which is somewhat higher than in the study by Skinner, possibly due to the later sample period.

Boone and Girouard (2002) use macro-data for the US, Canada, the UK, France, Italy and Japan for a sample period covering the 70s, 80s and 90s to analyse the role of household financial and housing wealth for private consumption. They find an MPC out of housing wealth between 3 and 5 cents for France, the UK and the US and higher than 10 cents for Canada and Japan. For the US, this is somewhat smaller than what was found in the two studies described above. For Italy, the coefficient is negative.

Ludwig and Sløk (2002) use data for 16 OECD countries and explain private consumption by stock market and housing prices and total disposable income, using a panel error correction model. The results suggest a significant long run impact of stock and house prices, with the elasticity of stock prices about twice as large as the one of house prices. An interesting finding of this study is that bank based economies tend to have lower elasticities on financial and housing prices than market based economies.

Case et al. (2005) use aggregate annual data for 14 OECD countries over the period 1975 to 1996 in a panel framework and compare the results to a dataset of all US states during the 1980s and the 1990s. Their estimation results are mixed for the financial wealth variable, while the effect of housing wealth on consumption is significant and positive. Their elasticities suggest that a 10% increase in housing wealth leads to about 1% increase in consumption. In the US regional dataset, they find an effect for financial and housing wealth around 0.4%.

Bertraut (2002) uses macro-data for Australia, Canada, France, Germany, Italy, the Netherlands, Sweden, Japan, the UK and the US from 1979Q1 to 1998Q4 to study the impact of stock prices and of financial and non-financial wealth on private consumption, controlling also for the impact of income, interest rates and unemployment. He finds that changes in stock prices are positive and significant in 7 countries but insignificant for Canada, Japan and Germany. Regarding the estimation of non-financial (mainly housing) wealth effects, he finds an MPC out of non-financial wealth of 5 cents for the US, 10 cents for Canada and 4 cents for the UK. While this estimate is similar to that found by Boone and Girouard (2002) for the UK, it is somewhat smaller for Canada. For the US, the estimate is roughly in line with the findings in the pre-cited studies. For the other countries, no data were available to estimate the impact of both financial and non-financial wealth on consumption.

Dvornak and Kohler (2007) estimate the impact of financial, housing and other wealth on consumption using regional and aggregate data for Australia. In their panel data estimation, they find a significant impact of all wealth variables in the specification using regional data, with an increase in annual consumption by about 3 cents following a one dollar increase in housing wealth, compared to 6-9 cents for financial wealth. Meanwhile there is no significant impact of housing wealth on consumption in the specification using aggregate data. Their main explanation is that there is too strong multicolinearity between the wealth variables when using aggregate data, which is partly corrected for when using regional data.

Aron et al. (2007) use UK and South African data on liquid assets, illiquid financial assets and housing wealth from about 1970 onwards to analyse the impact on private consumption. They control for a number of variables such as credit conditions, income growth expectations, interest rates etc. and find that such control variables have a strong impact on the significance of the wealth variables. They find an MPC out of net liquid assets of around 0.15, an MPC out of illiquid financial assets of around 0.03 and an MPC out of housing wealth of 0.04 for the UK, while they are about 0.15, 0.1 and 0.1, respectively, for South Africa.

Hoffmann et al. (2007) compare housing wealth effects on consumption in Germany with those in the US and the UK. They find significant results for all three countries, with the strongest impact in Germany. Slacalek (2006) studies housing wealth effects for 16 OECD countries but the only euro area countries for which he finds significant effects are Italy (negative) and Spain. Interestingly, this is – to our knowledge – the only study estimating explicitly a coefficient for the euro area. He finds no significant effect when imposing the same coefficient on housing for all euro area countries in a panel framework over the sample from 1979Q1 to 1999Q4. However, when dividing the sample into two subsamples, he finds no significant effect for the period up to 1989, and a significant and positive effect thereafter.

The other strand of the literature looks into housing wealth effects on consumption for countries for which micro-data are available. These survey data can give more detailed information on how housing wealth is transmitted to consumption, as they often include information on demographic variables, the form of housing wealth, housing debt of the individual households, etc. Due to the data situation, many of these studies use surveys on the United States. Most of these studies, such as Bostic et al. (2007), Lehnert (2004) and Skinner

(1993) find a significant and relatively large housing wealth effect. Bostic et al. (2007) also finds that housing wealth is more relevant for non-durable goods consumption, while financial wealth has a stronger impact on durable goods consumption. Lehnert (2004) specifies that the housing wealth effect seems to be larger for young than for old households. However, Skinner (1993), who also studies a micro-dataset for the US, does not find a significant effect of financial wealth, while he finds a significant and positive effect of housing wealth for younger households only. He explains this with the fact that housing wealth can be considered as precautionary savings for unexpected events which is less so for elder households. It should be noted that his estimation is based on cross-sectional data of the year 1989, while the other above-mentioned studies also include other years, either with one regression per year (Bostic et al. (2007)), or with a panel data analysis.

Regarding countries other than the United States, Disney et al. (2003) use micro-data for the United Kingdom from 1993 to 2001 and distinguish between anticipated and unanticipated effects of changes in housing wealth. Whether a housing gain or loss is anticipated or not is analysed through the difference between observed housing wealth and an AR(2) based forecast. They indeed find an asymmetric impact of anticipated compared to non-anticipated housing gains and losses. Their MPC out of an unanticipated housing wealth shock is about 9-14 cents per euro, with a stronger impact of house price surprise losses than gains.

There are only few studies which have looked into micro-data for euro area countries, due to the fact that only few countries provide such data. For example, Bover (2006) analyses Spanish survey data of 2002 and finds an MPC out of housing of 2 to 7 cents per euro. Her results differ across age and location. Grant and Peltonen (2008) analyse micro-data for Italy from 1989 to 2002 and find a significant and positive effect of housing wealth which is larger than the effect of financial wealth. Meanwhile, their equity wealth effect yields ambiguous results. Finally, Sierminska and Takhtamanoya (2007) analyse the Luxemburg Wealth Survey (LWS) for Canada, Finland and Italy for the years 1999, 1998 and 2002, respectively. Their cross-sectional estimates suggest that the housing wealth effect is stronger than the financial wealth effect, with differences across age groups and countries only for the housing wealth effect: the housing wealth effect is significantly smaller for younger households. This can be related to the fact that they do not subtract mortgage debt from their housing wealth variable. According to their estimations, consumption changes by 0.10-0.13% following a 1% change in housing wealth.

3. Theoretical considerations

Dvornak and Kohler (2007) have extended the standard life-cycle permanent income hypothesis of consumption model by Ando and Modigliani (1963) to the case where wealth is split into housing and other wealth. They have maximised expected utility of a representative consumer subject to the standard budget constraint:

$$\max E_t\left[\sum_{t=0}^{T}(1+\theta)^{-t}u(C_t)\right] \tag{1.}$$

$$\text{s.t. } A_{t+1} = (1+r_t)(A_t + Y_t - C_t) \tag{2.}$$

where t is the rate of time preference, u is life time utility, C is consumption, A are assets, Y is labour income and r is the interest rate. The first-order condition, assuming a quadratic utility function, a constant interest rate equal to the rate of time preference, the holding of the life-time budget constraint and infinite horizon for optimisation, yields:

$$C_t = \frac{r}{1+r}A_t + \frac{r}{1+r}\sum_{k=0}^{T=\infty}(1+r)^{-k}E_tY_{t+k} \tag{3.}$$

In this equation, the MPC out of wealth is $\frac{r}{1+r}$. With an infinite planning horizon, as assumed above, and an interest rate of 3 percent, the MPC would be around 0.03, i.e. consumers would spend 3 cents out of one euro of wealth for consumption. Poterba (2000) relaxes the assumption of an infinite planning horizon and shows that under the same interest rate assumption, the MPC varies between 8 cents for a planning horizon of 15 years and 4 cents for a horizon of 45 years (see also Altissimo et al. (2005) for a similar calculation).

Following further Dvornak and Kohler (2007), assuming that income follows a stochastic AR(1) process, and separating total wealth into financial and housing wealth ($A = W^F + W^H$), we can rewrite (3.):

$$C_t = \alpha_1 W_t^F + \alpha_2 W_t^H + \alpha_3 Y_t \tag{4.}$$

A number of arguments point to a different MPC out of financial and out of housing wealth. For example, the two forms of wealth show differences in liquidity, debt underlying the wealth (which should normally be subtracted from the wealth component in order to estimate the MPC), risk (also in terms of distinguishing between permanent and temporary shocks), bequest motives and taxation. In addition, the interest rate effect on the holding of these two forms of

assets could differ, as it should be positive on financial wealth, while in particular for housing wealth, it has a negative impact on new mortgage debt and mortgage debt contracted with flexible interest rates.

Among others, Ludwig and Sløk (2002) argue that there are three channels which work similarly for stock market wealth as for housing wealth: (i) the realised wealth effect, which occurs when consumers sell their increased wealth and therefore results in a direct effect on consumption; (ii) the unrealised effect, which works through expectations as the increase in wealth is not realised (the house is not sold following its higher value), but it still can result in higher consumption today; and (iii) the liquidity constraints effect, where consumers take consumer credits out of the higher value of its wealth. However, they also point to two channels working on housing wealth which could dampen the positive effect of higher housing wealth on consumption: (i) the budget constraint effect according to which rents (and possibly also housing related services prices) might increase as a consequence of higher house prices and thereby reduce consumption, in particular of non-house owners;[2] and (ii) a substitution effect, as households who are planning to purchase a new house may lower consumption as they have to take a higher loan to pay the house. This shows that the effect of housing wealth increases on consumption is ambiguous. We will now try to analyse which effect seems to empirically dominate in the euro area.

4. Empirical results

4.1. Data

We use two different datasets to test what effect housing wealth has on euro area consumption. The first dataset consists of quarterly data aggregated for the euro area (in its composition of 2005, i.e. with 12 countries) over the period 1981Q1 to 2006Q4, while the second dataset is based on country data for the period 1995Q1 to 2006Q4, with slight differences of coverage across countries. We had to exclude Ireland, Luxemburg, Greece and Portugal from our sample due to data availability so that the panel estimation covers 8 countries. Euro area data were partly back dated using partially available country data from national sources. However, we chose not to

[2] See also European Central Bank (2003) for a discussion of this effect.

use these data for the panel estimation with individual countries, as it would have made the panel more heterogeneous regarding the data sources and even more unbalanced in terms of the time dimension available for the individual countries. Therefore, the panel data only start in 1995.

For financial wealth, we take data for financial assets of households and non-profit institutions serving households, in nominal terms expressed in million of euro from Eurostat.[3] We subtract financial debt (excluding mortgage debt, from the BIS) from nominal financial wealth in order to get net wealth data.

The housing wealth estimates used in our estimation is household housing wealth at current replacement costs net of mortgage debt, in nominal terms expressed in million of euro. Nominal housing wealth estimates are available only for the euro area aggregate.

We have cross checked these data against publicly available data in order to obtain a series for each individual country as well. In particular, nominal housing wealth data were constructed from the UNECE (United Nations Economic Commission for Europe) data on dwelling stock and/or dwelling changes. These data were converted to an index and multiplied with residential property prices in order to obtain nominal housing wealth. Appendix 1 provides more details on the data availability for the individual countries. Nominal wealth was converted to an index with the base year 2002:

$$WI_{it,b}^{H} = \frac{W_{it}^{H}}{W_{ib}^{H}}$$

where WI_{it}^{H} is the nominal housing (H) wealth index of country i in period t, using year b as base year for the calculation of the index which is known, while W_{it}^{H} is the level of nominal housing wealth at time t, i.e. the variable we are looking for. In order to obtain the level of housing wealth in euro, we have used available information on the share of housing wealth in total wealth in 2002 which is 57% for the euro area as a whole, ranging from 40 to 68% in the individual countries (see Slacalek (2006)). Using nominal financial wealth data which we have for all countries, we therefore can approximate housing wealth in 2002 and apply forwards and

[3] Financial accounts balance sheet data. For the backcasting of financial wealth, MUFA data and national sources were used for Germany, France, Spain (all from 1980 to 1994) and Italy (from 1990 to 1994) and linked on to the Eurostat data on euro area financial wealth and debt.

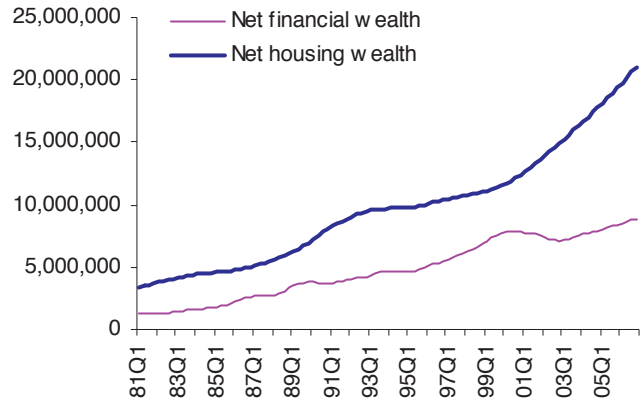
backwards the growth rates of the housing wealth index to obtain a series of housing wealth data in euro. The resulting series for housing wealth shows a similar development as the euro area estimate of the ECB, so that we can confidently use these data in our panel estimation.

According to our data, housing wealth net of mortgage debt represents about 60% of total wealth net of debt, with a somewhat stronger increase over more recent years in housing wealth compared to financial wealth due to the strong rise in house prices (see Chart 2). The data for housing and financial wealth and total debt were available only on an annual basis and have been interpolated to a quarterly frequency using cubic smoothing methods. In particular the cubic spline option was used for the interpolation, assigning each value in the annual series to the last quarterly observation, then placing all intermediate points on a natural cubic spline connecting all the points.

We estimate the MPC directly rather than estimating the elasticity and converting it to an MPC, as in particular in the cross country panel estimations we would otherwise need to correct for differences over time and countries in the shares of wealth in consumption.

Chart 2 Euro area housing and financial wealth

(million euro)



Sources: ECB and own calculations

The income variable is total compensation of employees, as the inclusion of personal disposable income would include income from wealth due to the inclusion of interest, profits and dividends and thereby lead to double accounting (see also Labhard et al. (2005)).

For consumption, we take data on total final nominal private consumption.

4.2. Estimated model

We estimate 3 different specifications derived from equation (4.). First, as a starting point, we estimate the effect of relative total nominal wealth net of debt on relative consumption, dividing both sides in equation (4.) by Y_t:

$$\frac{C_t}{Y_t} = \beta_0 + \beta_1 \frac{\left(W_t^F - D_t^F\right) + \left(W_t^H - D_t^H\right)}{Y_t} + \varepsilon_{1t} \qquad (5.)$$

where C is nominal private consumption, Y is nominal compensation of employees, W is wealth, D is debt and the superscript F stands for financial and H for housing. Wealth and debt are nominal and expressed in million of euro.

In equation 2, we distinguish between relative financial and housing wealth net of debt:

$$\frac{C_t}{Y_t} = \gamma_0 + \gamma_1 \frac{W_t^F - D_t^F}{Y_t} + \gamma_2 \frac{W_t^H - D_t^H}{Y_t} + \varepsilon_{2t} \qquad (6.)$$

Finally, we also want to see whether the housing wealth effects work mainly through its real or nominal component. Therefore, we estimate equation (6.) taking the net housing wealth evaluated at 2002 prices:

$$\frac{C_t}{Y_t} = \gamma_0 + \gamma_1 \frac{W_t^F - D_t^F}{Y_t} + \gamma_2 \frac{W_t^H / P_{t.b2002}^H - D_t^H}{Y_t} + \varepsilon_{3t} \qquad (7.)$$

where $P^H_{t,b2002}$ is the residential property price index with the base year 2002. This equation can also be considered as a cross check of equation (6.).

4.3. Aggregate euro area results

For the time series estimations, we use an error correction mechanism, similar to what is suggested in Gali (1990) and Lettau and Ludvigson (2001). Variables are originally in levels as put forward in the theoretical section above, i.e. they are not transformed into logarithms.[4] Table 1 shows the result of the stationarity tests. As our theoretical model suggests the inclusion of a constant term and no trend in the estimated equation, we have also tested the variables in

[4] Hamburg et al. (2005) have shown that the equations can be transformed into a logarithmic specification as well. However, we have cross checked the results against a logarithmic version and found similar results to the ones in levels.

this configuration, i.e. with a constant but without trend. The constant was skipped when it was not significant in the underlying equations. The lag length was also chosen depending on the significance of the lags in the Augmented Dickey-Fuller tests and selected following the Newey-West bandwidth for the Philips-Perron test. According to augmented Dickey-Fuller tests (without trend, as we should not introduce a trend into the estimation equations above), all variables in equations (5.) to (7.) are I(1), except for relative net housing wealth ($\frac{W_t^H - D_t^H}{Y_t}$) which might be I(2). However, the Philips-Perron test suggests that the variable is I(1).

Table 1 Unit root test results

	Augmented Dickey-Fuller test				Phillips-Perron test			
	Level		Difference		Level		Difference	
	test statistic	p-value	test statistic	p-value	test statistic	p-value	test statistic	p-value
C/Y	2.65	**0.998**	-10.14	0.000	2.83	**0.999**	-10.16	0.000
$(W^{T}-D^{T)}/Y$	3.96	**1.000**	-5.45	0.000	2.54	**1.000**	-5.69	0.000
$(W^{F}-D^{F)}/Y$	1.38	**0.958**	-5.18	0.000	-1.22	**0.663**	-3.59	0.008
$(W^{H}-D^{H)}/Y$	1.55	**0.970**	-1.54	**0.116**	2.11	**1.000**	-5.08	0.000
$(W^{H,R-}\ D^{H}\ )/Y$	-2.58	**0.100**	-7.05	0.000	-0.13	**0.637**	-6.96	0.000

Note: P-values are bold when the test indicates non-stationarity.

Next we performed the Johansen cointegration test. Following Enders (2004) we use the lag length suggested by a VAR including relative consumption, and the respective explanatory variables of equations (5.) to (7.). We use the specification with constant term and without trend, as suggested in the theoretical part. The test results point to one co-integration relationship in all three specifications according to both the trace and the maximum eigenvalue tests (although only at around 10% for the latter in the specification with financial and nominal housing wealth, and not according to the maximum eigenvalue test for the specification with real housing wealth - see Appendix 2). Table 2 shows the results for the long-term relationship.

Ludwig and Sløk (2002) argue that the wealth variable could also have a leading indicator role as an increase in stock values might indicate that the economy booms, with an increase in consumption, but not as a result of a wealth effect. Granger causality tests indeed suggest that there could also be an impact of private consumption on financial wealth (see Appendix 3).

In the first specification (equation (5.)), the MPC out of total net wealth is statistically significant and amounts to 0.011, implying that 1.1 cent are consumed out of 1 euro of total wealth. When

splitting total net wealth into financial and housing (equations (6.) and (7.)), we see that the coefficient on financial wealth is statistically significantly different from zero with an MPC of 2.4 and 3.6 respectively, which is roughly in line with the literature. The coefficients of the housing wealth variables are also significantly different from zero and suggest a marginal propensity to consume out of nominal housing wealth of 0.8 cent and out of real housing wealth of 1.1 cent per euro.[5] Overall, these results are also in line with Slacalek (2006), the only study which – to our knowledge – has provided estimates for the euro area aggregate. The results of this paper suggest an MPC out of total, financial and housing wealth of 0.8, 1.8 and zero cent for the sample 1979 to 1999 while his estimates starting in 1989 suggest MPCs of 2.6, 3.8 and 1.9 cents, respectively.

Table 2 Long-term results

	Equ. (*5.*)		Equ. (*6.*)		Equ. (*7.*)	
$\frac{(W_t^F - D_t^F) + (W_t^H - D_t^H)}{Y_t}$	0.011	**				
	(0.00004)					
$\frac{W_t^F - D_t^F}{Y_t}$			0.024	**	0.036	**
			(0.001)		(0.002)	
$\frac{W_t^H - D_t^H}{Y_t}$			0.008	**		
			(0.001)			
$\frac{W_t^{R,H} - D_t^H}{Y_t}$					0.011	**
					(0.003)	
Constant	0.953	**	0.939	**	0.710	**
	(0.010)		(0.010)		(0.076)	
R-squared	0.88		0.91		0.86	
Adjusted R-squared	0.88		0.91		0.86	

*Note: ** denotes significance at 5%, * at 10%.*

Given that we are also interested in the adjustment to the long-run equilibrium estimated above, we estimate in a second step a short term equation in first differences, introducing the long-run (ECM) term as estimated above. Chart 3 shows the resulting impulse responses of private consumption following shocks to financial wealth and housing wealth, according to the

[5] We have cross-checked the above results using a VECM. However, the results from the VECM were not robust, probably due to the quality of the data and the relatively short sample period.

three specifications discussed above and using the information from both long-term and short term equations.[6]

Chart 3 Impulse responses

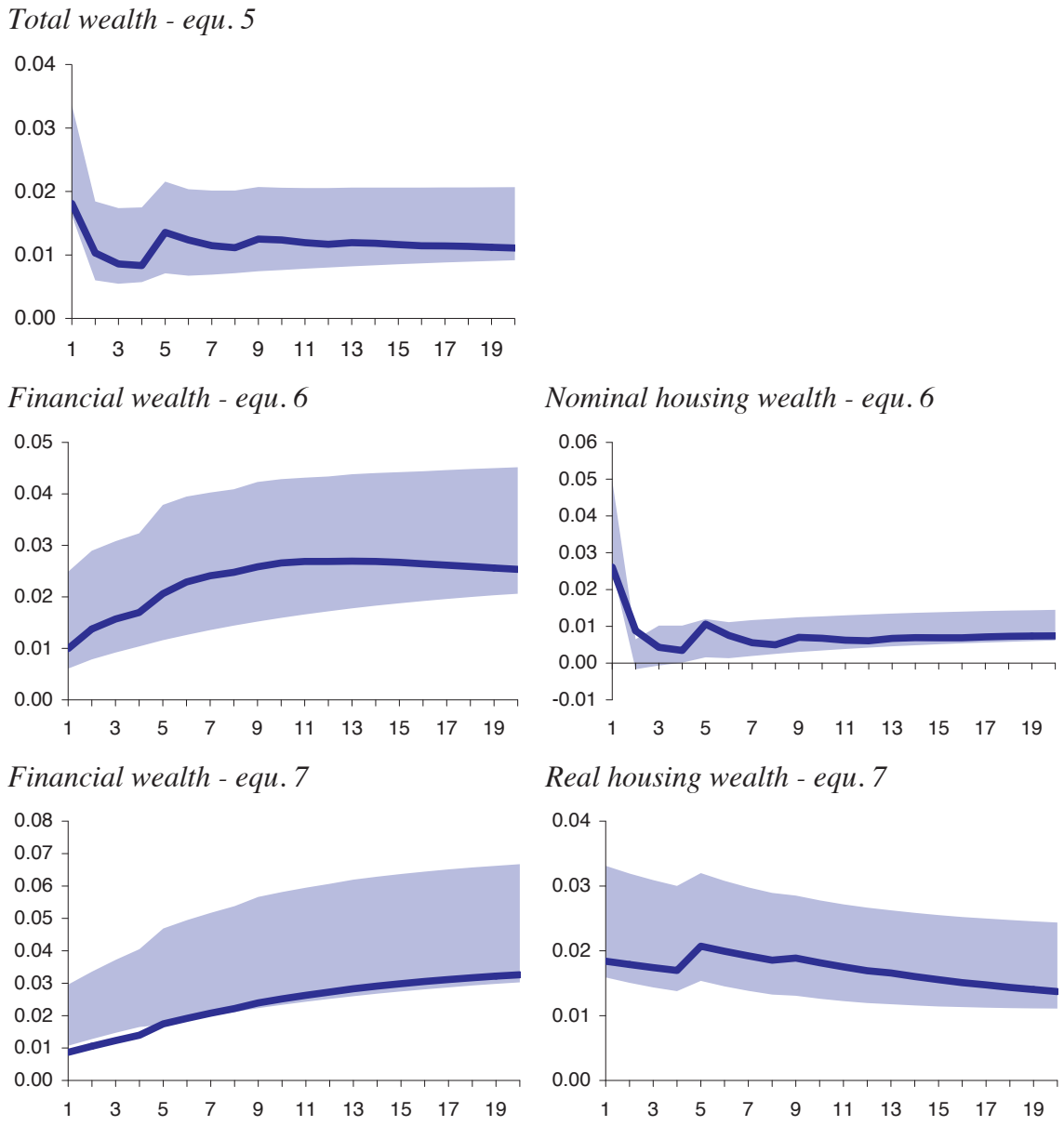


Chart 3 also includes 95% confidence intervals around the estimated impulse responses. These intervals are calculated in the following way: first, the long-run equation is estimated and the

[6] In equation 5, we have used a specification with lags 1 and 4 of consumption and lags 0 and 1 for total wealth, in equation 6 lags 1 and 4 of consumption, contemporaneous financial wealth and lags 0 and 1 for nominal housing wealth, and in equation 7 the fourth lag of consumption and contemporaneous financial and real housing wealth.

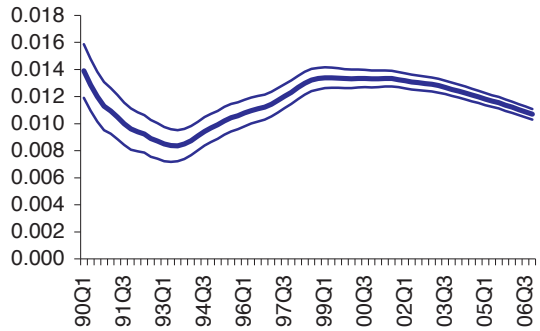
long-run residual is saved. Then, the short-run equation is estimated using the long-run ECM term, and the short-run residuals are saved. For the bootstrapping exercise, a combined residual is calculated, subtracting from the short-run residual the long-run residual multiplied with the ECM coefficient. This combined residual is then randomly re-ordered, added to the initial series of fitted consumption (i.e. consumption growth minus the initial combined residual) and the impulse response is calculated using the previously estimated coefficients. This procedure is repeated 10.000 times. The resulting 10.000 impulse responses are ordered by the size of the response after 20 quarters and the upper and lower 5% (i.e. 250 observations) are subtracted to get the upper and lower bounds of the confidence bands. The results show that the impulse responses of all equations for all variables lie within the bands over most of the simulation period, though not always in the middle.

Finally, given the strong increase in house prices at the end of the sample, we have also estimated the above long-term equations recursively and computed recursive long-term coefficients (see Chart 4).

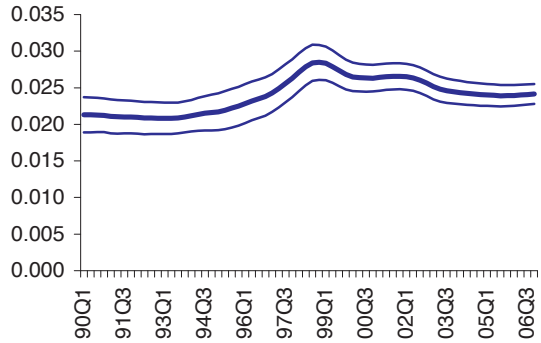
The results show quite stable coefficients except for housing wealth in equation (6.). This could be related to some non-linear effects of the strong increase in house prices towards the end of the sample. Indeed, as argued in the report of the European Central Bank (2003), the factors underlying house price changes are important determinants of the impact on the economy. Taking out the effect of house prices, the specification with real housing wealth (equation (7.)) yields relatively high stability in the estimated coefficients.

Chart 4 Recursive long-term coefficients

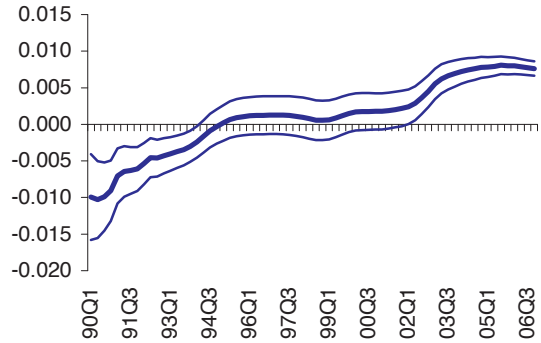
Total wealth - equation 5



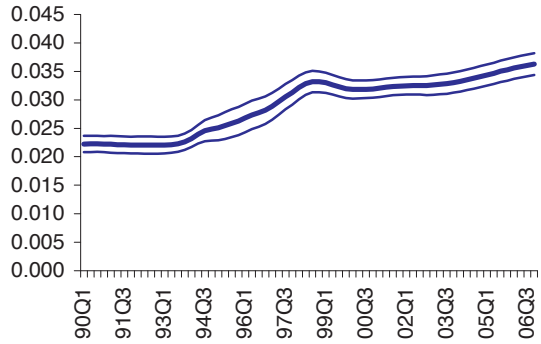
Financial wealth - equation 6



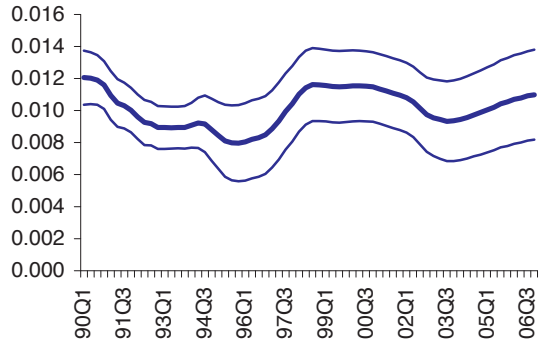
Nominal housing wealth - equation 6



Financial wealth - equation 7



Real housing wealth - equation 7



Note: Confidence bands are +- 1 standard deviation of the coefficients.

Although the above time series analysis is insightful as it is based on a relatively long sample period, there are a few caveats to bear in mind. First, the quality of the wealth data is relatively poor due to the various transformations (backcasting, interpolation and different sources). In addition, we consider a time period which coincides with financial liberalisation and with some policy changes such as structural reforms of labour markets and pension systems. While financial liberalisation could affect our results for the impact of financial wealth, labour market and pension system reforms increase uncertainty related to future expected income and might

thereby negatively effect consumption. However, we computed the recursive coefficients of all variables in our long-run equation and the short-run adjustment and did not find any evidence for strong changes which could be indicative for an impact of financial liberalisation. We would therefore argue that financial liberalisation has an impact on financial wealth *per se*, but not on the impact of financial wealth on consumption, unless its main effects occurred only very recently. In addition, the constant term which reflects the impact of income on consumption (see equation (4.)) did not show any instability when computed recursively, while reforms could have lowered its impact.

Another shortcoming of the above analysis is that wealth effects on consumption could be different across euro area countries due to different factors, such as demographics (changing the planning horizon), the income and wealth distribution, the form of financial wealth, national characteristics of the housing market (including different owner-occupation rates), taxation and data measurement. Such differences might be better reflected in panel data estimations which also exploit country specific differences (see also Labhard et al. (2005)). In addition, Dvornak and Kohler (2007) also argued in favour of a panel approach as there may be too strong multicolinearity between the wealth variables when using aggregate data, which is partly corrected for when using regional data.

4.4. Panel data results

Given that the estimation period for the panel data is significantly shorter than for the time series results above, we have not done any stationarity tests. We have transformed the equations into first differences as the level equation yielded relatively unstable results. Granger causality tests indicate that both wealth variables might be Granger caused by private consumption (see Appendix 3). Therefore, the table presents the OLS estimator with robust standard errors for equations (5.) to (7.) without and with instruments.[7] In particular, we have instrumented for total and financial wealth, using as instruments up to 4 lags of each of the instrumented variables (column 'IV'). Table 3 shows the estimation results.

[7] We have not used the fixed effects estimator, as the fixed effects drop out when using a specification in first differences.

Table 3 Panel estimation results

	Equation (5.)			Equation (6.)			Equation (7.)		
	OLS		IV	OLS		IV	OLS		IV
$((W_{it}^{F}-D_{it}^{F})+(W_{it}^{H}-D_{it}^{H}))/Y_{it}$	0.006	**	0.014						
	(15.37)		(0.017)						
$(W_{it}^{F}-D_{it}^{F})/Y_{it}$				0.011	**	0.008 **	0.006	**	0.007 **
				(2.09)		(2.52)	(2.77)		(3.65)
$(W_{it}^{H}-D_{it}^{H})/Y_{it}$				0.007	**	0.009 **			
				(9.2)		(2.76)			
$(W_{it-1}^{H}/P_{it}^{H}-D_{it-1}^{H})/Y_{it-1}$							0.025	**	0.025 **
							(6.49)		(11.55)
c	-0.0004		-0.001	-0.001	**	-0.001 *	0.002	**	0.002 **
	(-0.85)		(0.0022)	(-2.11)		(-1.78)	(3.71)		(3.64)
RSQ	0.15		-0.06	0.21		0.22	0.46		0.48
# obs	276		268	276		268	284		276

*Note: ** denotes significance at 5%, * at 10%.*

The results of equation (5.) show that the coefficient on total wealth is statistically significant only in the OLS estimation, with a very small MPC of 0.6 cent out of 1 euro of total wealth. The second set of coefficients in Table 3 shows the results of equation (6.) which disentangles the effect of financial wealth from that of housing wealth. The results are significant and suggest an MPC out of both wealth components between 0.7 and 1.1 cent according to the OLS and the instrumental variable estimation. Finally, when using real instead of nominal housing wealth (equation (7.)) we also find a significant impact of both financial and housing wealth at 5%. The MPC out of financial wealth is between 0.6 and 0.7 cent per euro, which is still somewhat smaller than in the time series estimations above. However, the results for real housing wealth is significant and suggests that the MPC out of real housing wealth is 2.5 cents per euro, substantially higher than in the time series results. The results of the OLS estimations are very similar to those when instrumenting financial wealth.

We have also checked whether our panel data would suggest strong differences of housing wealth effects across countries. Bearing in mind the relatively short data sample and the relatively poor quality of the data, we have allowed the coefficient of housing wealth only to differ across countries while we have kept the other coefficients homogenous across countries. Interestingly, the results suggest MPCs out of nominal housing wealth of 10 cents for Belgium and between 0 and 2 cents for the other countries, i.e. when excluding Belgium the results are in

line with the time series results. The MPC out of real housing wealth varies between 1 and 7 cents for all countries.

Overall, the panel results thus find similar results to the evidence from the time series analysis, with a significant impact of both financial and housing wealth on consumption. The effect is, however, smaller for financial and larger for housing wealth than what was observed in the time series regressions. In addition, the results yield a stronger MPC out of real than out of nominal housing wealth, indicating that house price increases might have a negative rather than a positive effect of consumption.

5. Concluding remarks

In this paper, we have estimated wealth effects on euro area consumption. We have used two datasets, one on euro area aggregate data from 1980Q1 to 2006Q4, and one on individual euro area country data from 1995Q1 to 2006Q4. Three different equations were estimated, derived from a theoretical model: in the first one, we have used total wealth; in the second, total wealth is split into financial and housing wealth; and in the third, we have replaced nominal by real housing wealth.

Overall, the impact of all wealth variables on euro area consumption is significant and positive in most specifications for both datasets. The marginal propensity to consumer (MPC) out of financial wealth is roughly in line with the literature, with 2.4 to 3.6 cents per euro of financial wealth spent on consumption according to the estimations with euro area aggregate data. However, the panel estimation yields somewhat lower results (0.6 to 1.1 cents). The MPC out of nominal housing wealth lies between 0.7 to 0.9 cents per euro according to both datasets. When specifying housing wealth in real terms, i.e. when taking out the effect of volatile house prices, we find similar effects in the times series estimation while the MPC is larger in the panel estimation (2.5 cents).

A caveat which should be borne in mind concerning the results of this paper is the poor quality of the housing wealth data, as they are partly based on estimates, and we had to do a number of transformations such as interpolations. In addition, the panel estimation is based on a relatively short time period of less than 10 years, so that the long term relationship should be interpreted with caution. The finding that the MPC of financial wealth is stronger in the time series than in

the panel estimation could be related to this difference in sample size. However, the results are relatively robust to different specifications and in line with the literature on individual countries and on the euro area as a whole. Indeed, the estimated MPCs for euro area countries range between 0 and 10 cents for financial wealth, and between 0 and 6 cents for housing wealth.

A new feature of this paper is to have estimated not only the effect of nominal, but also of real housing wealth. The reason was mainly that robustness checks showed some instability in the recursive estimation of the coefficients in the time series regression, and that we have found outliers when estimating the MPCs out of housing wealth per country in the panel estimation. This could be due to non-linear impacts of house price changes on consumption, which are not captured in the above estimations. Such non-linearities could be related to a different impact of house price increases than declines on the one hand, and to differences related to the anticipated or non-anticipated and the temporary or permanent nature of the change in house prices. Therefore, we have cross-checked the results against a specification with real housing wealth for which we found a significant MPC similar to the one in the nominal specification for the time series regression, and significantly stronger in the panel regression. This difference is most likely again due to the difference in the time coverage and is consistent with the finding of Slacalek (2006) that housing wealth effects are significant only from the 90s onwards.

An interesting cross-check of the results of this paper would be to use microeconomic data from surveys which are not yet available for all euro area countries. Therefore, a number of mechanisms could not be analysed, such as the impact of high versus low income households, different behaviour of young versus elder households, inheritance versus purchase of residential property and the like. A number of interesting studies on individual countries, though only a few on euro area countries, have analysed such effects and future research could, if such data become available at the euro area level, shed further light on the mechanisms underlying the findings of this paper.

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Appendix 1 Data description

Euro area aggregate

Consumption and wages

Quarterly data on private consumption and compensation of employees from Eurostat from 1995Q1; backdata up to 1980Q1 obtained by applying backwards the growth rates from the Area Wide Model database (see http://www.ecb.europa.eu/pub/pdf/scpwps/ecbwp.zip).

Financial wealth and debt

Aggregation of the annual country data – see below for source and data availability. For the euro area aggregate, we have taken the sum of all countries for which data were available between 1995 and 2005 (i.e. all euro area 12 countries except Ireland and Luxemburg). Before 1995, we have used growth rates weighted together from the available countries using the average weight of each country between 1995 and 2005. Therefore, the euro area is composed by France, Germany and Spain between 1980 and 1988, plus the Netherlands in 1989, plus Italy for 1990-1993, plus Belgium for 1994.

Housing wealth and debt

Annual data on household housing wealth at current replacement costs from the ECB. These data are available from 1980 to 2007. Quarterly housing debt stems from the ECB, Balance sheet item database.

Country data

Consumption

Quarterly nominal private consumption obtained from Eurostat. The data start in 1980Q1 for Finland, France, Italy, the Netherlands and Spain; in 1988Q1 for Austria; in 1991Q1 for Germany; in 1995Q1 for Belgium, Luxemburg and Portugal; in 2000Q1 for Luxemburg and are not available for Greece.

Wages

Quarterly data on nominal compensation of employees from Eurostat. The data start in 1980Q1 for Finland, France, Italy, the Netherlands and Spain; in 1988Q1 for Austria; in 1991Q1 for Germany; in 1995Q1 for Belgium and Luxemburg and are not available for Ireland and Greece.

Financial wealth and debt

Annual data for financial assets of households and non-profit institutions serving households from Eurostat. The data are available from 1989 for the Netherlands, 1990 for Spain, 1994 for Belgium, and 1995 for Austria, Finland, France, Germany, Greece, Italy and Portugal. They are not available for Ireland and Luxemburg. Financial loans are calculated using total loans from the same source (same data availability as for financial assets) and subtracting loans to households for house purchase (see below). Data are available until 2007 for all countries except for the Netherlands (until 2006 only).

In addition, we have applied backwards the growth rates of data from national sources for France, Germany, Spain (all back to 1980) and Italy (back to 1990).

Housing wealth and loans

Nominal housing wealth data for the individual countries were reconstructed using data on the stock of existing dwellings, house prices and the share of housing wealth in total wealth. For the stock of existing dwellings, we have used UNECE statistics which provide data on the stock of existing dwellings, total dwellings completed during the year, the dwelling stock per 1000 inhabitants and population data on an annual basis. While the preferred solution was to take directly dwelling stock data, missing gaps were filled with the other before-mentioned data in the following way:

Austria 1980-2003 applying increases (dwelling stocks completed during the year) backwards from 1988 due to a break in the original series

Belgium 1980-2002 applying increases (dwelling stocks completed during the year) backwards from 1996 due to several breaks in the original series; using dwelling stock per 1000 inhabitants multiplied with population for 2002 due to missing observation; applying constant growth rate between 1997 and 2001 due to missing observations

Finland 1980-2004 applying increases (dwelling stocks completed during the year) backwards from 1988 and in 1991 due to missing observations

France 1980-2005 dwelling stock data from INSEE; applying increases (dwelling stocks completed during the year) backwards from 1982 onwards due to missing observations

Germany 1980-2003 applying increases (dwelling stocks completed during the year) backwards from 1989 onwards due to missing observations

Greece 1980-2004 applying increases (dwelling stocks completed during the year) backwards before 2001 and forward after 2001 due to missing observations

Italy 1980-2003 applying increases (dwelling stocks completed during the year) backwards before 2002 and forward after 2002 due to missing observations, with a linear interpolation of the increases in 1989 and 1990 (missing); the dwelling stock number for 2002 was taken from the Survey of Italian Households and Wealth, Banca d'Italia, 2002 in the following way: the average nominal housing wealth per household in the survey was multiplied with the average number of persons per household and divided by the residential property price index.

Netherlands 1980-2005 applying increases (dwelling stocks completed during the year) backwards before 1989 due to missing observations and outliers

Portugal 1980-2004 applying increases (dwelling stocks completed during the year) backwards before 2000, using interpolation of the increases in 1985, 1987 and 1989, due to missing observations and outliers

Spain 1980-2004 applying increases (dwelling stocks completed during the year) forward after 1992 due to missing observations, and with linear interpolations of the dwelling stock for 1985 and 1988-1990

Quarterly data for loans to households for house purchase are taken from the ECB, Balance sheet item database and are available from 1980Q1 to 2007Q4 for all countries.

Appendix 2 Cointegration tests

The lag length of the Johansen cointegration tests is based on a combination of the Schwarz criterion and the results of residual tests on a VAR of the variables to be tested for cointegration. All specifications point to the existence of one cointegrating relation, mostly at 5% but in some cases with probablilities between 5 and 10% .

Variables: $\frac{C_t}{Y_t}$ and $\frac{\left(W_t^F - D_t^F\right)+\left(W_t^H - D_t^H\right)}{Y_t}$ (lags 1 to 6)

	Eigenvalue	Statistic	Critical value	Probability
Unrestricted Cointegration Rank Test (Trace)				
No CE	0.1453	21.0989	20.2618	0.0383
At most 1 CE	0.0566	5.7147	9.1645	0.2140
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
No CE	0.1453	15.3842	15.8921	0.0599
At most 1 CE	0.0566	5.7147	9.1645	0.2140

Variables: $\frac{C_t}{Y_t}$, $\frac{W_t^F - D_t^F}{Y_t}$ and $\frac{W_t^H - D_t^H}{Y_t}$ (lags 1 to 6)

s	Eigenvalue	Statistic	Critical value	Probability
Unrestricted Cointegration Rank Test (Trace)				
No CE	0.1858	34.7552	35.1928	0.0557
At most 1 CE	0.0898	14.6160	20.2618	0.2492
At most 2 CE's	0.0535	5.3914	9.1645	0.2432
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
No CE	0.1858	20.1392	22.2996	0.0974
At most 1 CE	0.0898	9.2247	15.8921	0.4101
At most 2 CE's	0.0535	5.3914	9.1645	0.2432

Variables: $\frac{C_t}{Y_t}$, $\frac{W_t^F - D_t^F}{Y_t}$ and $\frac{W_t^{R,H} - D_t^H}{Y_t}$ (lags 1 to 5)

	Eigenvalue	Statistic	Critical value	Probability
Unrestricted Cointegration Rank Test (Trace)				
No CE	0.1633	35.2813	35.1928	0.0489
At most 1 CE	0.1130	18.3400	20.2618	0.0900
At most 2 CE's	0.0705	6.9483	9.1645	0.1292
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
No CE	0.1633	16.9413	22.2996	0.2365
At most 1 CE	0.1130	11.3917	15.8921	0.2241
At most 2 CE's	0.0705	6.9483	9.1645	0.1292

Appendix 3 Granger causality tests

The lag selection for the Granger causality test in the time series analysis was based on the AIC criterion in a VAR. The results (see below) indicate that Granger causality generally does not work in the expected direction, i.e. relative private consumption seems to granger cause all variables, while not all variables granger cause consumption. At the same time, there also seem to be issues of causality between the right hand side variables However, the Granger causality test gives only of partial picture of the situation. We should therefore not overemphasize these results.

Aggregate euro area

	Null-hypothesis		F-Stat.	Prob.	nobs
RELNNTW	does not Granger cause	RELPCN	**0.929**	**0.398**	103
RELPCN	does not Granger cause	RELNNTW	5.272	0.007	103
RELNNFW	does not Granger cause	RELPCN	**0.672**	**0.513**	103
RELPCN	does not Granger cause	RELNNFW	9.128	0.000	103
RELNNHW	does not Granger cause	RELPCN	**1.785**	**0.155**	102
RELPCN	does not Granger cause	RELNNHW	12.077	0.000	102
RELNRHW	does not Granger cause	RELPCN	**0.125**	**0.724**	100
RELPCN	does not Granger cause	RELNRHW	12.003	0.001	100
RELNNHW	does not Granger cause	RELNNFW	16.273	0.000	100
RELNNFW	does not Granger cause	RELNNHW	***1.440***	***0.218***	100
RELNRHW	does not Granger cause	RELNNFW	20.697	0.000	98
RELNNFW	does not Granger cause	RELNRHW	3.919	0.011	98

The tests for the panel data using 4 lags show a somewhat different picture, probably due to the short sample period. We have included four lags for all tests. The results indicate that consumption granger causes all variables except net nominal housing wealth. We therefore also estimated a version of the model where we instrument for the problematic variables with lags.

Panel

	Null-hypothesis		F-Stat.	Prob.	nobs
DRELNNTW	does not Granger cause	DRELPCN	**1.820**	**0.125**	254
DRELPCN	does not Granger cause	DRELNNTW	5.690	0.000	246
DRELNNFW	does not Granger cause	DRELPCN	**1.870**	**0.115**	304
DRELPCN	does not Granger cause	DRELNNFW	16.280	0.000	304
DRELNNHW	does not Granger cause	DRELPCN	**1.670**	**0.158**	236
DRELPCN	does not Granger cause	DRELNNHW	11.330	0.000	228
DRELNRHW	does not Granger cause	DRELPCN	**1.700**	**0.150**	236
DRELPCN	does not Granger cause	DRELNRHW	**1.910**	**0.109**	228
DRELNNHW	does not Granger cause	DRELNNFW	14.740	0.000	236
DRELNNFW	does not Granger cause	DRELNNHW	3.840	0.005	228
DRELNRHW	does not Granger cause	DRELNNFW	19.580	0.000	236
DRELNNFW	does not Granger cause	DRELNRHW	**0.890**	**0.473**	228

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