CONSUMPTION, FINANCIAL AND REAL WEALTH IN THE G-5

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Abstract

Financial assets are generally chosen for encapsulating wealth effects in empirical work on aggregate consumption, but there is growing interest in tangible wealth, notably housing, as a potential determinant. We estimate consumption functions for the G-5 on a Pooled Mean Group panel basis, which encapsulate roles for both tangible and financial wealth. Results suggest that tangible wealth plays a distinctive role in the determination of consumption in the short- and long-run. We also detect a marked negative effect of real interest rates in most countries. Results are of particular relevance to monetary policy, as well as being of importance for modelling and forecasting.

Keywords: Consumption, Housing and Financial Wealth, Cross country panel data
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Introduction

Most empirical studies of aggregate consumers' expenditure which test for wealth effects have used aggregate financial wealth definitions, and have been estimated on a single country basis. However, an increasing focus is being placed on the potential role of tangible wealth, and in particular the housing component, as a potential determinant of aggregate consumption. For example, in the wake of the crash in the stock market after 2000, the strength of consumption in a number of countries has been linked to the strength of house prices. We first discuss the literature in the area, and suggest that using either a life cycle approach or an Euler equation on its own can be misleading. We then discuss a widely-used empirically-based approach and implement it, estimating consumption functions for the G-5 on a Pooled Mean Group panel basis, which encapsulate a role both for tangible and financial wealth. Our sample covers 1981-2001, a period during which most of these countries were generally more financially liberalised than they had been in the 1970s and previously[2]. Our results suggest that tangible wealth plays a distinctive role in the determination of aggregate consumption. Furthermore, we find a marked negative effect of real interest rates on consumption in most countries. These results are of particular relevance to monetary policy makers, given their need for accurate forecasting of consumption in assessing overall inflationary pressures, as well as being of general importance for modelling and forecasting.

1 Theoretical and empirical background

The case for including wealth generally in the consumption function is based on the concept of the life cycle, whereby planned consumption is a function of total wealth, based on human wealth and non-human wealth. Non-human wealth comprises both financial and non-financial wealth. This can be seen in the version of the Life-Cycle Hypothesis of Ando and Modigliani (1963) as derived in Deaton (1992). In this model, planned consumption is a function of total wealth. Total wealth is the sum of human wealth, net financial wealth and tangible wealth. The weights on financial and non-financial nonhuman wealth could plausibly vary, given their varying liquidity, and the possibility of liquidity constraints on households in general.

In the case that households are constrained in their borrowing, the direct liquidity of the components of wealth will be crucial for their effect on consumption. A lower weight would accordingly be anticipated for less liquid assets, including both illiquid financial assets (equities, bonds, life insurance and pension funds) and a fortiori for tangible wealth. Illiquid assets are not just capital uncertain but also subject to higher transactions costs, in some cases restrictions on transactions (e.g. cashing pension rights) and indivisibilities (e.g. housing).

When there are no credit constraints, as in a liberalised financial system, the ability to consume out of illiquid wealth is enhanced. This affects both illiquid financial wealth and non financial tangible wealth. The incidence of liquidity constraints will be shown inter alia by the relative size of income and wealth terms in the consumption function. In particular we might expect to see a

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[2] Discussions of the evolution of the impacts of financial liberalisation on consumption can be found inter alia in Blundell-Wignall et. al. (1995), Weale (1990), Campbell and Mankiw (1991), Williamson and Mahar (1998) and Barrell and Davis (2004).

relatively larger role for recent changes in income in systems with more liquidity constrained consumers. Note that housing may be used as collateral just as readily as less liquid financial assets, as well as being more widely distributed, while mortgages facilitate the release of housing equity without moving home. Hence there seems no reason for tangible assets not to enter the consumption function in the same way as illiquid financial wealth.

On the other hand, we note that there are arguments suggesting that even in a liberalised financial system, housing wealth should have a lower weight in consumption than financial wealth. Housing offers utility in itself and is a consumer durable as well as an asset. There will be a wealth effect of increased housing wealth, whether it arises from higher house prices or from accumulation of residential fixed investment for all consumers, which depends on the liquidity of housing. But it may be largely offset by an income and substitution effect for those who are not owner-occupiers. Those wishing to buy houses will have to save more to do so, while those renting in a free market will anticipate higher future rents.

There is a major alternative to the life cycle hypothesis approach to the theory of consumption, and that is based on the Euler equation, which seeks to aggregate the optimal intertemporal consumption decision of a representative consumer characterised by rational expectations (Hall 1978). This suggests that consumption should be a random walk with a discount factor such as the real interest rate being the only relevant driving variable. The negative discount factor proxies the effect on consumption of intertemporal substitution ("the reward from saving"). While there is extensive empirical work with such equations in the US, it has become increasingly clear that consumption is in practice forecastable using additional lagged variables, notably income changes predicted from lagged information. Furthermore, the Euler approach in its pure sense leaves out long run information on the relationship between assets, income and consumption – and may suffer worse aggregation problems than "solved out" equations incorporating lags (Muellbauer and Lattimore 1995). The theory is also vitiated by its assumption that all consumers are unconstrained in credit markets (Sarantis and Stewart 2003).

Empirically, there has developed a significant literature that has departed from the confines of the life cycle and Euler approaches, investigating the impact of wealth on consumption, albeit mainly focusing on financial wealth and personal disposable income. A recent example is Davis and Palumbo's (2001) study of the US consumption function, which attempted to determine whether changes in wealth affect the growth rate of consumer spending. They examined quarterly aggregate US data from 1960 to 2000 and following the critique of Euler approach above, modelled long-run relationships to investigate whether (logged) consumption (C), income (Y) and wealth (W) share a common trend, using the following equation, which is also the basis of our own work.

$$\ln C_t = c_0 + \alpha \ln Y_t + \beta \ln W_{t-1} + \xi_t \qquad (1)$$

They found that there is a statistically significant long run wealth effect on consumer spending. Ludvigson and Steindel (1999) also examined wealth effects in a loglinear long-run consumption relationship and found a statistically significant wealth and income effect. They also showed that these variables share a common trend, using quarterly US data. More recently Lettau and Ludvigson (2001) also looked for logged long run relationships between consumption, income

and wealth using dynamic least squares, and find that such a relationship is useful for predicting short run impacts of changes in wealth on consumption[3].

Outside the US, Barrell, Byrne and Dury (2003) found evidence of an effect of wealth and income on consumption in the European economies, and tested in a panel context for differences between European countries. They found that it is possible to show that France, Germany, the Netherlands and Austria have similar consumption behaviour, with significant financial wealth effects. Byrne and Davis (2003) analysed the impact of disaggregated financial wealth on consumption for G-7 countries, and found that, contrary to earlier empirical work, illiquid financial wealth, (equities, bonds, life insurance and pension assets less mortgage debt) scaled by personal disposable income, tends to be a more significant long-run determinant of consumption than liquid financial wealth (deposits and money market instruments less other debt) across the G-7. They suggested that this pattern reflects a shift from liquidity constrained to life cycle behaviour following financial liberalisation, and also a more disaggregated pattern of wealth holding.

As regards work using tangible wealth, this has mainly been on a single-country basis, such as Murata (1994) for Japan and Barrell et al (2003) for the UK. The outcomes have nonetheless been promising for an effect of tangible wealth on consumption. One international study worthy of note is Boone et al (2001) who obtained some significant long and short run wealth effects on consumption in the G-7 when disaggregating wealth into financial, housing and other wealth. There is also a strand in the literature on consumption that uses changes in real house prices as an indicator of the potential impact of tangible wealth on consumption (see Ludwig and Sloek (2002)). However, it can be argued that it is clearly better to utilise data on the value of the asset stock, in part because this allows us to test for a long run as well as an immediate impact. It also allows for an effect of accumulation and transfers of wealth that could be expected to impact on consumption, as well as capital-appreciation due to changes in asset prices – or from changes in consumer prices, given we use real wealth measures.

With the exception of Euler equation estimates, most of the empirical literature[4] has not used real interest rates as a determinant of consumption. Indeed, reviewing the earlier literature in the mid 1990s, Muellbauer and Lattimore (1995) suggested that "there is little empirical evidence of a strong and stable negative real interest rate effect on consumption that many economists expect". We would argue this and other less favourable results in the empirical literature on consumption

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[3] Such a relationship is not surprising, as the marginal propensity to consume (m) out of total wealth must itself depend on the wealth to income ratio, as m=1-(W/Y)*(dY/Y) in a steady state. Deviations of wealth to income ratios from their steady state will be corrected by short-term changes in m. If wealth is 'high' and there are costs of adjustment, either from selling assets or changing consumption then the excess consumption is spread over a number of periods. Hence m is a function of W/Y, m=m(W/Y), and if the marginal returns to human and non-human wealth are the same we may write $C_t^* = m(W/Y) * (Y_t)$. An approximation in logs, with an approximation error ξ_t may be written as $\ln C_t = \log k + b \ln(W/Y)_t + \ln Y_t + \xi_t$, and this can be rewritten as $\ln C_t = \log k + b \ln W + (1-b) \ln Y_t + \xi_t$.

[4] One exception is De Bondt (1999) who includes real interest rates as well as the difference of real income in a hybrid "modified Euler model" giving a purely short-term specification for EU countries (i.e. with no long run cointegration). Real rates were only found significant in two of six countries, Germany and the Netherlands. His main focus is to test for a "credit channel" effect arising from the household sector "external finance premium", the difference between relevant mortgage borrowing rates and bank deposit rates.

in part results from the use of data sets including the financially constrained 1970s with little data from the less constrained 1990s.

2 Estimation results

Against the background of earlier work cited above, we aimed to assess international experience, using both disaggregated tangible and net-financial wealth and also a real interest rate. We extend the long run specification (1) of Byrne and Davis (2003), Ludvigson and Steindel (1999), Lettau and Ludvigson (2001) and Davis and Palumbo (2001) to allow for tangible as well as net financial wealth and also test for a separate effect of real interest rates to allow for intertemporal substitution. This means we adopt a relationship based on the cointegrating vector containing logs of the non-stationary variables - consumption, income and net wealth measures (for Phillips-Perron unit root tests showing virtually all of these variables are I(1) in the G-5, see Appendix).

Deaton and Campbell (1989) inter alia have argued that relationships of this nature help explain asset market behaviour through their impact on the equity premium, besides their qualities for data description. They also point out that income in levels is unlikely to be difference stationary. In particular, the first difference of the level of income does not display constant variance: earlier increases in the level of income, in any reasonable sample of data, are likely to be substantially less than increases later in the sample. This non-constant variance would mean any long-run relationship for consumption would be potentially spurious, given that not all of our variables are difference stationary, and a short run error correction model (ECM) for consumption would have non-stationary dynamics. This is why we adopt a logarithmic approximation to ensure that income, in natural logs, is difference stationary and hence that our long-run relationship can be non-spurious. Note that in all cases we include wealth per se (drawn from national balance sheet or flow of funds data) and not a proxy based on asset prices. Meanwhile, to capture dynamics we complement the cointegrating relationship with differences of the I(1) variables. Since it is I(0) (see Appendix), the real interest rate set in levels also stands outside the cointegrating relationship.

Accordingly, we assume that planned consumption does not always equal actual consumption, so taking into account the above discussion of the necessity of taking logs we can first derive the following long run relationship (2) for desired consumption (C_t), which depends on real personal disposable income (RPDI), and total wealth NW which can be defined as the sum of financial wealth (NFW) and tangible wealth (TW)

$$\log C_t = a * \log RPDI_t + b * \log(NFW_{t-1} + TW_{t-1}) + \varepsilon_t \qquad (2)$$

and then set this into an equilibrium correction form (3).

$$d\log(C_t) = a + b*(\log(C_{t-1} - c*\log(RPDI_{t-1}) - (1-c)*\log(NFW_{t-1} + TW_{t-1})) + d*RR_{t-1} + d1*d\log(RPDI) + d2*d\log(NFW) + d3*d\log(TW) + other - dynamics \qquad (3)$$

Our equilibrium correction contains a split between changes in real tangible wealth (TW) and real net financial wealth (NFW) in the short term but common coefficients on both components

of real net total wealth (NW) in the long term. The equations also include a real interest rate effect (RR), consistent with the Euler approach. If the error correction term b were to be zero, and the other coefficients except that on the real interest rate were also zero, then we would have uncovered an Euler equation, and the coefficient on RR_{t-1} could be interpreted as the inverse of the intertemporal elasticity of substitution. For the long run, we constrained the income and wealth coefficients (a and b above) to sum to one[5]. The validity of this restriction is assessed below, as is the validity of the restriction that financial and tangible wealth have the same impact on consumption in the long run. We need to instrument the real interest rate terms, given possible measurement error with the proxy used for this unobservable variable.

Panel methods have become popular in cross sectional macro data sets since they provide a greater and more varied information set, and hence greater efficiency, than individual country studies. There are two traditional methods for estimating panel models: averaging and pooling. The former involves running N separate regressions and calculating coefficient means (see for example the Mean Group Estimator method advanced by Pesaran and Smith, 1995). A drawback to averaging is that it does not account for the fact that certain parameters may actually be equal over cross sections. Alternatively we could pool the data and assume that only the slope coefficients and error variances are identical (as in the traditional fixed-effects approach). However, whereas there may be theoretical and empirical reasons to presume that the long-run coefficients are homogenous over the cross-section, there are very few practical cases in which the short-run dynamics and error variances would be homogeneous too. For example, in the case of consumption, it can be argued that differences in consumer preference and financial structure such as exists between the major economies would be likely to affect short run rather than long run behaviour. We would more generally argue that there is common life cycle behaviour in the long run, while in the shorter term institutions may play a role (such as scope of credit availability), leading to differing dynamics.

Following this point, we consider it appropriate to use the Pesaran, Shin and Smith (1999) Pooled Mean Group (PMG) method, which is an intermediate case between the averaging and pooling methods of estimation and involves aspects of both. The method restricts the long-run coefficients to be equal over the cross-sections, but allows for the short-run coefficients and error variances to differ across cross-sections. We can therefore obtain pooled long-run coefficients and averaged short run error correction dynamics as an indication of mean reversion.

The PMG is based on an Autoregressive Distributive Lag *ARDL(p,q,…,q)* model

$$y_{it} = \sum_{j=1}^{p} \lambda_{ij} y_{it-j} + \sum_{j=0}^{q} \delta_{ij}' \mathbf{x}_{it-j} + \mu_i + \varepsilon_{it} \qquad (4)$$

where $\mathbf{x}_{it}$ ($k\times1$) is the vector of explanatory variables for group i, μ_i represents the fixed effects, the coefficients of the lagged dependent variables (λ_{ij}) are scalars and δ_{ij} are ($k\times1$) coefficient

5 The discussion in footnote 3 provides a theoretical justification for wealth-income homogeneity. It this regard we differ from Boone et al (2001), who impose long-run unit elasticity between consumption and income. We would regard this as a misspecification for our consumption functions, although it might be appropriate if one were to investigate the factors affecting the saving ratio. In addition Boone et. al. (2001) use the nominal interest rate, whilst we would consider the real rate to be more appropriate, against the background of work on Euler equations.

vectors. *T* must be large enough so that the model can be estimated for each cross section. Equation (4) can be re-parameterised in error correction form as:

$$\Delta y_{it} = \phi_i y_{it-1} + \beta_i' \mathbf{x}_{it} + \sum_{j=1}^{p-1} \lambda_{ij}^* \Delta y_{it-j} + \sum_{j=0}^{q-1} \delta_{ij}^{*\prime} \Delta \mathbf{x}_{it-j} + \mu_i + \varepsilon_{it} \qquad (5)$$

where $\phi_i = -\left(1 - \sum_{j=1}^{p} \lambda_{ij}\right)$, $\beta_i = \sum_{j=0}^{q} \delta_{ij}$, $\lambda_{ij}^* = -\sum_{m=j+1}^{p} \lambda_{im}$ and $\delta_{ij}^* = -\sum_{m=j+1}^{q} \delta_{im}$

In addition we assume that the residuals in (5) are independently distributed across *i* and *t* with zero mean, variance greater than zero and finite fourth moments. Secondly, the roots of equation (5) must lie outside the unit circle. The latter assumption ensures that ϕ_i<0, and hence that there exist a long-run relationship between y_{it} and $\mathbf{x}_{it}$ defined by

$$y_{it} = -\left(\beta_i' / \phi_i\right)\mathbf{x}_{it} + \eta_{it} \qquad (6)$$

The long-run homogeneous coefficient is equal to $\theta = \theta_i = -\left(\beta_i' / \phi_i\right)$, which is the same across groups. For our purposes, the key feature of the PMG is to make the long-run relationships homogenous while allowing for the heterogeneous dynamics and error variances. We test for long-run homogeneity using a Wald test.[6]

We initially estimated unrestricted consumption functions (not illustrated) with the relationship between real consumption (C) and real personal disposable income (RPDI), total wealth NW and the real interest rate (RR) augmented by dynamics including a split between changes in real tangible wealth (TW) and real net financial wealth (NFW) in the short term. Given that we are working with N (number of cross section observations) far below T (time series observations) we can employ SUR or 3SLS as a regression method, and given likely contemporaneous correlations due to common economic shocks we are likely to improve our estimates as a result. As we need to instrument the real interest rate terms, given possible measurement error with the proxy used, we use 3SLS with three further lags of real interest rates.

Wald tests show that the unrestricted country-by-country results estimated by 3SLS could be validly restricted to a Pooled Mean Group panel as reported in Table 1, but not to a full fixed effects panel. This shows that while long run behaviour is similar across countries, short term dynamics are not. Meanwhile a number of variables can be removed from the PMG equation in a simplification search, as shown in the third column of Table 1.

Table 1: F Tests for restriction of unrestricted 3SLS equation

Restriction	Pooled mean group panel (PMG)	Fixed effects panel	Exclusion restrictions on PMG
Wald test	(8) 12.9	(36) 261	(19) 21.6
P value	0.12	0.00	0.31

It is the restricted PMG equation that it is useful to discuss in detail. Coefficients are shown in Table 2 with a common data period for estimation from 1981q2 to 2001q4. The common long

[6] We note also that Pesaran and Shin (1998) present Monte Carlo evidence that ARDL approach based on the delta method can be reliably used in small samples to estimate and test hypotheses on the long run coefficients in cases whether there is a mixture of I(1) and I(0) regressors.

term specification which is accepted by the Wald test has a highly significant error correction term of -0.07, suggesting the presence of cointegration. Long run total-wealth effects are 0.13, with income effects being 0.87.

Table 2: Estimates of consumption function with total wealth and real interest rates (three stage least squares estimation with Pooled Mean Group long run restrictions)
Data period 1981q2 - 2001q4

	US	UK	Germany	Japan	France
Constant	-0.056 (3.4)	-0.075 (3.8)	-0.082 (3.9)	-0.082 (3.8)	
ECM	-0.074* (6.1)	-0.074* (6.1)	-0.074* (6.1)	-0.074* (6.1)	-0.074* (6.1)
ln RPDI (-1)	0.867* (32.9)	0.867* (32.9)	0.867* (32.9)	0.867* (32.9)	0.867* (32.9)
ln NW (-1)	0.133 /*	0.133 /*	0.133 /*	0.133 /*	0.133 /*
D ln RPDI	0.129 (3.0)	0.078 (1.8)	0.687 (13.1)	0.276 (1.8)	0.295 (3.6)
D ln RPDI (-1)	0.141 (3.0)				0.155 (2.9)
D ln C (-1)	-0.302 (3.7)		-0.169 (3.2)		-0.401 (5.2)
D ln NFW	0.039 (3.8)				
D ln NFW (-1)		0.028 (3.2)			0.025 (2.7)
D ln TW	0.218 (5.0)	0.2 (7.6)			0.086 (1.7)
Dln TW (-1)	0.115 (2.6)				
RR	-0.00132 (6.0)	0.0007 //(2.9)	0.0006 (1.9)	0.0013 (2.5)	
RR(-1)		-0.001 //(2.9)	-0.0006 (1.8)	-0.00181 (4.7)	-0.001 //(5.6)
R-bar-2	0.71	0.63	0.83	0.71	0.62
SE	0.003	0.0048	0.0046	0.005	0.0039
DW	2.2	2.1	2.3	2.2	2.0
Dummies	81Q4, 82Q4, 83Q1-Q4, 87Q1, 90Q4, 91Q1, 91Q4	86Q1, 88Q3, 92Q2	86Q1-Q2, 88Q1, 83Q1, 87Q2 90Q3 93Q2, 99Q1	87Q1, 89Q2, 97Q1, 97Q2, 99Q1	83Q1, 83Q3, 84Q4, 96Q1, 96Q4-97Q3

Notes: ECM error correction term on lagged log of consumption; C real consumption, RPDI real personal disposable income, NW real total net wealth; TW real tangible wealth; NFW real net financial wealth; RR real short term interest rate * Long run terms constrained to be equal / coefficients on ln RPDI (-1) and ln W (-1) constrained to sum to one; // UK and French interest rate terms are for the 1990s only

The short run effect of income growth is small in the US and UK compared with the other countries, consistent with an absence of liquidity constraints. The impact of changes in current income is highest in Germany, where the proportion of liquidity constrained consumers may be larger than elsewhere. In the US, Germany and France, additional dynamic term in the lagged dependent variable were significant, but were found to be absent elsewhere.

The argument presented in Section 1 suggests that dynamic terms in wealth can be expected to be stronger in countries where markets are financially liberalised, and hence changes in illiquid financial and (also illiquid) non-financial wealth can be transformed into liquid form quickly. This is what we find. Notably, the change in tangible wealth enters positively, except for Germany and Japan where it is insignificant. This implies that there is a short as well as long run effect of house prices on consumption, which especially in the US and UK is sizeable - the elasticities are around 0.3 and 0.2 respectively, whereas in France the effect is only 0.1. The change in net financial wealth enters with a significant positive effect, again for the UK, US and France. In all of these three countries, the short run tangible wealth effect exceeds the financial

one by a considerable margin. One reason may be that housing wealth is more widely distributed than financial wealth. We note that there may be institutional reasons for the cross country differences, as households in Germany are less likely to own their houses[7] than in the UK, US or France, while in Japan "equity extraction" is not common. Meanwhile, it is in the US that households are most aware of changes in their financial wealth, leading to an immediate and relatively sizeable response of consumption compared with the UK and France.

In terms of the implications of the above results for liquidity constraints, our results are consistent with previous estimates. Blundell-Wignall et. al. (1995) found that 66% of German consumers were liquidity constrained at the start of our data period, and that figure did not decline in the 1980s. They also found that 32% of French consumers were constrained at the same time as compared to 17% in the UK. Campbell and Mankiw (1991) found similar results on the evolution of liquidity constraints over time, and suggest that the UK and the US had similar numbers unconstrained at the start of the 1990s.

Negative real interest rate effects, implying intertemporal substitution, are also significant at the current level or first lag in all countries, contrary to earlier work summarised as noted above in Muellbauer and Lattimore (1995). In some countries, there are offsetting positive effects but the long run net effect is always negative, except in Germany where the estimated effect is zero. The real interest rate effects vary between around -0.0003 and -0.0013, implying that a sustained 1% rise in real interest rates reduces consumption by 0.4% to 1.8% in the long run. The most powerful effects are in the US and France. Note that in the UK and France, interest rate effects were only found to be significant in the period from 1990 onwards. This is consistent with an effect of financial liberalisation on intertemporal substitution, which emerges after the initial adjustment of balance sheets to liberalisation is complete. The negative interest rate effect in Japan contrasts with earlier work suggesting a positive coefficient (Murata 1994). Dummies have been included for specific events, and the German data has been adjusted to allow for the impact of unification.

The homogeneity restriction on income and wealth, which is imposed in Table 2, warrants testing. Furthermore, in the light of the differences in liquidity and other characteristics outlined in Section 1, it is also of interest to assess whether the implicit restriction that tangible and financial wealth have the same effect on consumption in the long run, is accepted. Accordingly, we used the statistically acceptable Pooled Mean Group specification to experiment with the long run, first freely estimating and then splitting out the long run wealth term.

Hence the first column of Table 3 shows the Pooled Mean Group equation shown above. The second column shows that when the wealth term is freely estimated, it has a significant coefficient of 0.174, comparable to the constrained value. The restriction in the estimates of Table 2 that the income plus wealth term equal 1 is easily accepted (the coefficients add to 0.944, with the standard error on the income term being 0.08 and that on the wealth term 0.04). The third column seeks to test in a non-nested manner the equality of coefficients between financial and tangible wealth in the long term. We do this by producing a specification that has a separate term for financial assets and also one plus the log of the ratio of tangible to financial wealth.

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[7] Owner occupation in Germany is well below the proportion of the housing stock owned by the personal sector as a whole, given the prevalence of rental homes also owned by households.

Algebraically, the log of total wealth (with testable coefficients included) can be divided as follows. If

$$\ln NW = \ln(NFW + TW) = \ln(NFW(1 + TW / NFW)) \quad (7)$$

then we may set out the separation of the two wealth terms in a testable form as

$$B1 * \ln NW = B1 * [\ln NFW + B2 * \ln(1 + TW / NFW)] \quad (8)$$

We embedded our nested long-run equation within our PMG specification and tested for the value of the coefficients B1 and B2 where B1 indicates the long run wealth effect. If B2=1 the long run effects of real and financial wealth are identical. On the other hand, if B2=0 then only financial wealth matters in the long run. Intermediate values of B2 indicate a lower but still positive effect of real non financial wealth in the long run.

Table 3: Panel (Pooled Mean Group) estimates of consumption functions with unrestricted dynamics (using SUR estimation)

Data range 1980q1 – 2001q4

	Equation 1	Equation 2	Equation 3
Fixed effects			
ECM	-0.074 (6.1)	-0.074 (6.1)	-0.074 (5.9)
ln RPDI (-1)	0.87 (32.9)	0.77 (9.8)	0.769 (8.8)
ln NW (-1)	[0.13]	0.174 (4.2)	
B1 (NW)			0.175 (4.1)
B2 (TW/NFW)			0.98 (5.3)

Notes: see Table 2 and equation (2)

As can be seen, B1 is comparable to the freely estimated long run wealth term, while B2 is significantly different from zero, and whilst it is slightly below 1, at 0.98, it is not significantly different from 1.0. Hence on average we can conclude that real tangible wealth does have an impact in the long run, and it is comparable on average in the G5 to that of financial wealth.

3. Conclusions

Using data from 1981 to 2001, we have shown that within the context of SUR/3SLS based Pooled Mean Group panel estimation it is possible to impose the same structure and parameters on the long run determinants of consumption in the US, the UK, France, Germany and Japan. We have also shown that in the UK, US and France, short-term effects of changes in tangible wealth on consumption can be detected separate from and typically larger than those of changes in financial wealth. The logic may be that tangible wealth is larger and more evenly distributed than financial wealth, which in the short run more than offsets the negative effects of house prices on consumption of those who are not owner occupiers.

There are, however, significant differences in dynamics across the G-5, which may link to institutional differences in credit and housing markets. The short term wealth effects are absent in Germany and Japan, and in these countries, and especially in Germany, the impact effect of changes in income are larger than in the more financially liberalised UK and US, much as we would expect. France exhibits both impacts from dynamics in assets that follow from liberalisation itself and larger effects from income growth than we see in the relatively more

financially liberalised economies such as the UK and the US. The pattern of results is congruent with estimates of the proportion of liquidity-constrained consumers in earlier work.

Panel estimation reveals that there is a significant long run wealth effect in all countries, within which financial wealth has a comparable effect to tangible wealth. In both single country and panel estimates, we also find strong negative real interest rate effects consistent with intertemporal substitution. However, the strong significance of the income and wealth terms shows again that the simpler versions of the approach suggested by Hall (1978) based on an Euler equation specification are an inadequate description of the determination of consumption. In particular the existence of the error correction term and dynamic terms in disposable income along with a real interest rate effect suggests that this approach can be questioned, in part because liquidity constraints still plays an important part in consumption decision making in the economies we study.

The accuracy of assessing and forecasting consumption is of course paramount, notably for central banks in their inflation forecasting. We argue that in this work, by using the most recent data and omitting the 1970s when credit constraints were marked – and diverse - in most countries, we have obtained the most relevant estimates for current conditions. Furthermore, the significant negative real interest rate effect suggests a more direct leverage for monetary policy over consumption than is typically envisaged.

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Appendix: Data and Phillips-Perron Unit Root Tests

	US	UK	Germany	Japan	France
RR Real interest rate	-3.6*	-8.2*	-7.0*	-6.0*	-4.8*
LC	0.6	0.9	0.1	-2.2	0.7
LRPDI	-0.2	1.2	-0.2	-2.5	1.4
LNW	-0.4	-0.9	-3.8*	-1.9	1.0
LNFW	-0.7	-1.3	-1.0	-1.8	-1.5
LTW	0.5	-0.7	-5.7*	-1.7	1.1
DLC	-9.1*	-9.0*	-12.1*	-11.3*	-11.4*
DLRPDI	-11.1*	-12.9*	-10.4*	-6.4*	-7.8*
DLNW	-9.3*	-8.6*	-7.7*	-4.1*	-6.1*
DLNFW	-9.5*	-10.9*	-10.1*	-7.5*	-6.9*
DLTW	-5.9*	-2.6	-4.9*	-2.1	-3.8*

D denotes change, L denotes log, RR is the real interest rate, C is consumption, RPDI is real personal disposable income, NW is total net wealth, NFW is net financial wealth, TW is tangible wealth. Data sources are national accounts of the countries in question. The data period is restricted by the availability of tangible wealth.

Stationary variables denoted *. Critical values at 95%: -2.9, at 99%: -3.5.