FINANCIAL LIBERALISATION, CONSUMPTION AND WEALTH EFFECTS IN 7 OECD COUNTRIES[1]

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Abstract: We estimate the impact of financial liberalisation on consumption in 7 major industrial countries, and find a marked shift in behaviour, notably a decline in short run income elasticities and a rise in short run wealth and interest rate elasticities. A corollary is that consumption equations estimated over both pre- and post-liberalisation regimes may be misleading, and either a form of testing as presented here or a shortening of the sample period may be appropriate for accurate forecasting and simulation.

Keywords: Consumption, Cross country comparative estimation, Financial liberalisation
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Introduction

We assess the impact of financial liberalisation on consumption for seven OECD countries – the United States, the United Kingdom, Germany, France, Japan, Canada and Sweden - utilising a dynamic error correction model featuring both tangible and financial wealth, and allowing liberalisation to impact differentially on the determinants of consumption and in the short and long run. Our prior view is that the removal of liquidity constraints during liberalisation may reduce the response of consumption to real personal disposable income, and may boost wealth effects correspondingly. Estimates of the significance of leveraged dummies for liberalisation are consistent with these priors.

1 Consumption, wealth and liquidity constraints

We follow the tradition of empirical work based on the life cycle model, whereby planned consumption is a function both human and non-human wealth (Deaton 1992). A recent example is Davis and Palumbo's (2001) study of the US consumption function, which attempted to determine whether changes in wealth as well as income affect the growth rate of consumer spending. Ludvigson and Steindel (1999) also examined wealth effects in a quarterly loglinear long-run US consumption relationship and found a common trend and a statistically significant wealth and income effect. We adopt the same relationship based on the cointegrating vector containing logs of the non-stationary variables - consumption, income and net wealth measures. Campbell and Deaton (1989) point out that income in levels is unlikely to be difference stationary. Hence we adopt a log approximation to ensure income, in natural logs, is difference stationary and hence that our long-run relationship can be non-spurious. Meanwhile, to capture dynamics we complement the cointegrating relationship with differences of the I(1) variables.

There is a separate strand of the literature 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 consumption should be a random walk, with a discount factor (the real interest rate) being the only relevant driving variable. However, empirical work such as those cited above have shown that consumption is in practice forecastable using additional lagged variables, notably income changes predicted from lagged information. Nevertheless, it is appropriate to allow for Euler effects by including real interest rate levels in the consumption function, which in the absence of other variables is the inverse of the intertemporal elasticity of substitution. Financial liberalisation may be expected to move the system closer to the Euler equation, if the theory is correct.

We assume that planned consumption does not always equal actual consumption and we can derive the long run relationship (1) for desired consumption (C_t), and then set this into an equilibrium correction form (2).

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

The relationship between consumption (C) income (RPDI) and aggregate real net wealth (NTW) in the long term can be augmented by a split between changes in tangible wealth (NHW) and financial wealth (NFW) in the short term. We can also test for a real interest rate effect (RR), consistent with the Euler approach. Since it is I(0), the real interest rate set in levels also stands outside the cointegrating relationship. We express these ideas as the standard equilibrium correction consumption function, which nests the Euler approach:

$$\begin{aligned} d\log(C_t) = a + b*(\log(C_{t-1} - c*\log(RPDI_{t-1}) - (1-c)*\log(NTW_{t-1})) + d*RR_t \\ + d1*d\log(RPDI) + d2*d\log(NFW) + d3*d\log(NHW) + other-dynamics \end{aligned} \qquad (2)$$

When financial liberalization takes place, the coefficient on human wealth (i.e. income) may be reduced, as scope for borrowing means consumption is less closely tied to current income. Furthermore, the weights on financial and non financial nonhuman wealth could change with liberalisation. When households are constrained in their borrowing, direct liquidity of the components of wealth will be crucial for their effect on consumption. A lower weight would be anticipated for less liquid assets and especially for tangible wealth. When there are no credit constraints, as in a liberalised financial system, consumers can borrow to cover shortfalls in income and the ability to consume out of wealth, and in particular illiquid wealth, is enhanced. Higher wealth effects, especially in the short run dynamics of adjustment, are thus likely both for illiquid financial assets (equities, bonds, pension assets) and non financial tangible wealth.

2 Empirical work on consumption and financial liberalisation

As noted above, financial liberalisation is likely to impact on consumption behaviour by reducing liquidity constraints on borrowing. Byrne and Davis (2003) highlighted that illiquid as well as liquid financial wealth is likely to become important in determining consumption in the G-7, and indeed showed in rolling regressions that there has been a rise in the long run impact of illiquid financial wealth on consumption. Modelling the G-5, Barrell and Davis (2004) highlighted that absence of credit constraints also affects non-financial tangible wealth. The incidence of liquidity constraints was considered to be shown inter alia by the relative size of income and wealth terms in the consumption function, which was a crucial difference between their estimates over 1980-2001 for less liberalised countries such as

Germany and Japan vis a vis France, the UK and US[2]. Meanwhile, tangible wealth was generally significant in both the short and long run.

Some studies have probed the evolution of consumption behaviour as financial liberalisation proceeds and its effects filter through. One method is to split the sample at the point of liberalisation, (Brechetta and Gerlach (1997) and Miles (1994)). This obviously allows all of the coefficients to vary, at a cost of missing continuing long run behaviour patterns with relatively short samples. Some other tests have been rather restrictive in terms of allowable changes in behaviour. For instance Miles (1994) introduced a flow variable, housing equity withdrawal, to proxy for financial liberalisation, which is defined as new borrowing secured on housing that is not invested in the housing stock. Zero-one dummies for financial liberalisation are employed by Bayoumi (1993) with a path that rises with consumer credit, and in Sefton and In't Veld (1998).

Single-country empirical studies provide mixed evidence of the impact of financial deregulation – positive evidence is mainly in the Anglo Saxon countries in the 1980s. For example Bayoumi (1993) and Miles (1994) provide evidence of an effect for the United Kingdom; for Canada and the United States Williamson and Mahar (1998) and Freedman (1998) also give evidence of such effects. For France, it is commonly considered that financial deregulation has had little effect (Williamson and Mahar 1998). In Japan, limited effects of financial deregulation have been visible and there is a consensus that the increased availability of consumer credit has not contributed to lower private savings (Hayashi, 1986).

In the closest-related work to ours, Boone et al (2001) estimated directly for financial liberalisation effects in consumption functions using dummies which rose above zero at a rate tied to the growth in the value of the mortgage stock. However, they only allowed the long run coefficients to be affected by liberalisation, which we extend to the dynamics by separate dummy variables (they were actually unable to find short run effects). Also we differ in terms of our specification, as they imposed a 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. Furthermore, they use the nominal interest rate, whilst we consider the real rate more appropriate, against the background of work on Euler equations.

[2] Consistent with Barrell and Davis, 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 so 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 a similar proportion unconstrained at the start of the 1990s.

3 Results

Results for the baseline consumption functions without liberalisation effects are given in Table 1. Stylised facts include a significant lagged consumption (error correction) term consistent with cointegration, and a balance between long run income and wealth terms. Real interest rate effects with the correct negative sign are present in all countries except Sweden. There is a significant short run income effect, except in Sweden. Short run wealth effects, which are present in all countries except Germany and Japan, are larger for tangible than financial wealth, except in Canada where they are identical.

We sought to test for financial liberalisation effects by leveraging coefficients with dummies. The dummies are based on the dates of liberalisation provided in OECD (2000), as shown in Table 2, using judgement as to which is the key date, at times selecting from a number of successive measures. The dummies are distributed from 0.0 prior to liberalisation to 1.0 five years after, with the transition being in the form of an ogive imposed to conserve degrees of freedom.

We then allow for up to four separate coefficients on the liberalisation dummy to assess different aspects of the evolution of consumption behaviour following liberalisation. The dummy is set in terms of a proportionate change to the relevant coefficients, i.e. coefficient * (1+dummy). We allow a first dummy to change the error correction term (b in equation (2)), thus affecting the speed of adjustment to long run desired levels of consumption. A second dummy is allowed to change the long run balance between the income and wealth coefficients (c in equation (2)). A third is allowed to change the dynamic coefficients on income (d1), financial wealth (d2) and real wealth (d3) as well as the interest rate (d), with opposite signs for d1 versus the others. A fourth is permitted to change the lagged difference of consumption where this effect was significant.

Effects of financial liberalisation can accordingly be discerned in Table 3 from the significant dummy coefficients. Liberalisation has coincided with a significant rise in the speed of adjustment to the long run (dummy D1). This is plausible, since borrowing is more feasible after liberalisation to maintain consumption when there are shortfalls in income. This result holds except in Germany, where the ECM dummy is insignificant, and Japan, where the speed of adjustment decelerated. The Japanese result may relate to the prolonged recession following the banking crisis. The dummy D2 for shifts between income and wealth effects in the long run indicates a significant rise in the long run wealth effect in the US, Sweden and France, giving the expected increase in the relative importance of wealth in the long run. On the other hand, in the UK and Germany it is insignificant, implying stable long run behaviour.

In Japan there is a positive effect, implying a relative shift from long run wealth to income effects. Again, the “wealth destruction” in the financial crisis may help to explain this last result.

The key result is D3, the short run adjustment dummy which is applied with opposite signs to the income effect on the one hand and to the wealth and interest rate effects on the other. This is negative and significant, in the UK, US, Japan, Canada and Sweden. This in turn implies that the size of the difference of income term declines as financial liberalisation takes place and gathers influence within the economy. At the same time, the heightened liquidity of wealth and reduction of liquidity constraints generally leads to an increase in the effects of short run changes in asset values and in real interest rates. Finally there is some adjustment to the lagged consumption difference term (D4) in Sweden only. Note that in Japan and Canada we constrained the dummies D1 (error correction) and D3 (short run adjustment) to be equal in absolute size in order to obtain sensible results in the non-linear estimation procedure.

The results are summarised in Table 4, which shows 1980 and 2001 values for key coefficients. The acceleration in the speed of adjustment as well the decline in the importance of the change in income in all countries except France and Germany are of note, as are the larger wealth and smaller income effects in the US. We should also note the opposite results for Japan.

Conclusion

We detect a marked shift in consumers’ expenditure behaviour following financial liberalisation. This typically entails a more rapid adjustment of consumption to its long run equilibrium value, a shift from long run dependence on income to more influence of wealth, a decline in short run income elasticities and a rise in short run wealth and interest rate elasticities. The corollary is that consumption equations estimated over samples including both the pre- and post-liberalisation regimes may be misleading and either a form of testing as presented here or a shortening of the sample period may be appropriate for accurate forecasting and simulation.

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Table 1: Baseline estimates of consumption function with total wealth and real interest rates (non-linear least squares estimation)

Data period 1980q1 - 2001q4

	US	UK	Germany	Japan	France	Sweden	Canada
Constant	-0.143 (2.3)	-0.092 (2.6)	-0.083 (1.3)	-0.131 (2.7)	-0.038 (0.7)	-0.0078 (0.5)	0.0046 (1.9)
ECM	-0.117 (3.0)	-0.12 (4.0)	-0.18 (3.2)	-0.101 (3.6)	-0.058 (2.2)	-0.046 (2.1)	-0.03 (2.2)
ln RPDI (-1)	0.798 (22.5)	0.899 (26.1)	0.951 (21.6)	0.842 (22.6)	0.912 (7.6)	0.9 (8.1)	0.998 (110.9)
ln NTW (-1)	0.202 /	0.101 /	0.049 /	0.158 /	0.088 /	0.1	0.002
D ln RPDI	0.161 (3.4)	0.122 (2.5)	0.759 (15.2)	0.469 (3.1)	0.336 (3.4)	0.192 (2.5)	0.096 (1.8)
D ln RPDI (-1)	0.149(2.9)						
D ln C (-1)	-0.267 (3.2)		-0.133 (2.2)		-0.393 (4.7)	0.22 (2.6)	-0.157 (1.9)
D ln NFW	0.049 (4.3)						
D ln NFW (-1)		0.02 (2.1)			0.021 (2.2)	0.029 (3.9)	0.262 (3.1)
D ln NHW	0.247 (5.0)				0.141 (4.3)	0.107 (2.9)	0.271 (3.3)
Dln NHW (-1)		0.21 (6.8)					
RR	-0.0013 (5.1)		-0.00077 (2.0)				
RR(-1)		-0.0006// (1.8)		-0.0015 (3.7)	-0.001// (4.3)		-0.0011 (4.1)
R-bar-2	0.705	0.62	0.83	0.68	0.57	0.62	0.512
SE	0.0034	0.0052	0.005	0.0056	0.0043	0.0051	0.0053
DW	2.38	2.08	2.29	2.11	2.13	2.0	2.3
LM (4)	6.7	5.5	5.5	9.4	2.7		10.0**
RESET (1)	2.9	0.9	3.3	3.1	0.8		2.5
NORM (2)	1.9	1.4	0.4	2.1	0.8		1.1
HET (1)	1.1	1.6	1.4	2.3	0.1	0.6	2.7*
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	83Q1, 93Q1, 97Q2, 97Q3, libdum	80Q1-83Q4, 91Q1, 91Q3-93Q4

Notes: ECM error correction term on lagged log of consumption; C consumption, RPDI real personal disposable income, NTW total net wealth; NHW tangible wealth; NFW net financial wealth; RR real short term interest rate; LM Lagrange multiplier test for serial correlation; NORM Jarque Bera (2) test for normality; HET ARCH (1) test for heteroskedasticity; RESET Ramsey's RESET test for parameter stability. Libdum: dummy for Swedish financial liberalisation, phased from 0 in 1985 to 1 in 1990.

/ 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

Table 2: Dating of Financial Liberalisation

Country	Date	Event
US	1980	Start of interest rate deregulation and elimination of portfolio restrictions for thrifts
UK	1980	Elimination of the "corset" restrictions on bank lending.
Germany	1992	EU Second Banking Directive
Japan	1993-4	Bank specialisation requirements reduced, interest rate deregulation completed
France	1987	Elimination of credit controls
Sweden	1985	Interest rate deregulation and abolition of lending ceilings for banks
Canada	1980	Banks allowed to have mortgage loan subsidiaries

Source: OECD (2000). Note that interest rates were deregulated in Germany and Canada in 1967

Table 3: Estimates of consumption function with total wealth and real interest rates (non-linear least squares estimation) and dummies for financial liberalisation

Data period 1980q1 - 2001q4; **figures in bold** are dummies significant at 90% or more.

	US	UK	Germany	Japan	France	Sweden	Canada
Constant	-0.158 (2.4)	-0.133 (2.1)	-0.132 (1.5)	-0.217 (3.1)	-0.104 (1.3)	-0.05 (2.5)	-0.044 (1.0)
ECM	-0.086 (2.3)	-0.108 (3.2)	-0.146 (1.9)	-0.161 (3.3)	-0.066 (2.1)	-0.06 (3.3)	-0.0415 (2.2)
D1 (ECM)	**0.454 (2.3)**	**0.369 (1.8)**	0.151 (0.6)	**-0.227 (3.2)***	**0.408 (1.7)**	**0.458 (1.7)**	**0.69 (1.9)***
ln RPDI (-1)	0.706 (12.1)	0.834 (11.3)	0.895 (8.4)	0.842 (36.7)	0.792 (5.2)	0.634 (6.8)	0.731 (2.7)
ln NTW (-1)	0.294	0.166	0.105	0.158	0.208	0.366	0.269
D2 (long run)	**-0.119 (1.9)**	-0.056 (1.3)	-0.018 (0.5)	**0.066 (2.7)**	-0.086 (1.6)	**-0.24 (1.9)**	0.066 (0.3)
D ln RPDI	0.46 (2.8)	0.32 (1.7)	0.745 (9.6)	0.55 (3.6)	0.268 (2.2)	0.52 (2.7)	0.268 (1.5)
D3 (dyna-mics)	**-0.75 (5.0)**	**-0.6 (1.9)**	-0.017 (0.1)	**-0.227 (3.2)***	0.05 (0.1)	**-0.83 (4.6)**	**-0.69 (1.9)***
D ln RPDI (-1)	0.447 (1.9)						
D ln C (-1)	-0.2 (0.5)		-0.205 (3.1)		-0.373 (2.8)	0.44 (2.4)	0.095 (0.3)
D4 (D ln C (-1))	-0.47 (1.2)		0.62 (0.9)		0.06 (0.1)	**0.85 (3.7)**	
D ln NFW	0.028 (3.6)					0.02 (4.1)	
D ln NFW (-1)		0.009 (1.2)			0.027 (2.3)		0.195 (2.6)
D ln NTW	0.142 (4.2)				0.117 (0.7)	0.054 (2.2)	0.175 (2.7)
Dln NTW (-1)		0.114 (3.2)					
RR			0.00028 (0.6)				
RR(-1)	-0.00065 (2.9)	-0.00058 (2.2)		-0.00118 (2.9)	-0.00051 (1.1)		-0.00075 (3.2)
R-bar-2	0.613	0.434	0.764	0.694	0.504	0.63	0.514
SE	0.0035	0.0063	0.0054	0.0055	0.0045	0.0047	0.0053
DW	2.4	2.3	2.3	2.1	2.1	1.8	2.2
HET (1)	0.51 (0.48)	2.8 (0.094)	2.8 (0.09)	2.0 (0.16)	0.6 (0.44)	0.85 (0.36)	2.8 (0.095)

Notes: See Table 1. * coefficients constrained to be equal in absolute size. Dummies for events are as Table 1 except Swedish liberalisation dummy and Canadian dummy for 80-83 omitted.

Table 4: Changes in key coefficients over the sample

		US	UK	Germany	Japan	France	Sweden	Canada
ECM	1980	-0.086	-0.108	-0.146	-0.161	-0.066	-0.06	-0.0415
	2001	-0.125	-0.148	-0.146	-0.124	-0.092	-0.087	-0.07
ln RPDI (-1)	1980	0.706	0.834	0.895	0.842	0.792	0.634	0.731
	2001	0.622	0.834	0.895	0.9	0.792	0.48184	0.731
ln NTW (-1)	1980	0.294	0.166	0.105	0.158	0.208	0.366	0.269
	2001	0.378	0.166	0.105	0.102	0.208	0.518	0.269
D ln RPDI	1980	0.46	0.32	0.745	0.55	0.268	0.52	0.268
	2001	0.115	0.128	0.745	0.425	0.268	0.0884	0.083
D ln NFW	1980	0.028	0.009	0	0	0.027	0.02	0.195
t or t-1	2001	0.049	0.0144	0	0	0.027	0.036	0.33
D ln NFW	1980	0.142	0.114	0	0	0.117	0.054	0.175
t or t-1	2001	0.249	0.182	0	0	0.117	0.098	0.296
RR (-1)	1980	-0.00065	0	0	-0.00118	0	0	-0.00075
	2001	-0.00114	-0.00093	0	-0.00145	0	0	-0.00127