COSTS OF FINANCIAL INSTABILITY, HOUSEHOLD-SECTOR BALANCE SHEETS AND CONSUMPTION

Ray Barrell[1], E Philip Davis[2] and Olga Pomerantz[3]

NIESR and Brunel University

London

Abstract: The literature on costs of financial instability tends to focus on fiscal costs and the impact on GDP of banking crises. In this paper we analyse the effect of a banking or currency crisis on consumption. We show that consumption plays an important role in the macroeconomic adjustment following a financial crisis. Furthermore, the effect of a crisis is aggravated by high leverage, notably as shown by the effect of a high debt-income ratio, despite the benefits of financial liberalisation in easing liquidity constraints. It is also greater in a small open economy than in the G-7. Meanwhile, falling house prices are shown to be part of the transmission process of financial instability, and high nominal interest rates are an indicator of sharp declines in consumption. A simulation for a banking crisis underlines the important role of monetary and fiscal policy in easing the impact of a financial crisis on consumption and other expenditure components. Viewed in the light of growing gearing, or leverage, in recent years, the results imply that a banking crisis taking place now could have a greater incidence than in the past, especially if macroeconomic policy is unable to respond, as for a small country in EMU.

Keywords: Consumption, Cross country panel data, Financial instability
JEL Classification E21, G21

1 Senior Fellow, NIESR, 2 Dean Trench Street, Smith Square, London SW1P 3HE e-mail rbarrell@niesr.ac.uk.

2 Professor of Economics and Finance, Brunel University, Uxbridge, Middlesex, UB8 3PH and Visiting Fellow, NIESR. e-mails: philip.davis@brunel.ac.uk and e_philip_davis@msn.com.

3 Economist, NIESR, 2 Dean Trench Street, Smith Square, London SW1P 3HE e-mail opomerantz@niesr.ac.uk

Introduction

Whereas there is an extensive and growing literature which focuses on predicting the incidence of financial instability (in respect of both banking and currency crises), the literature on the costs of financial instability – the key reason for concern in respect of financial turbulence – is relatively sparse. Most of the literature that does exist is focused either on fiscal costs or aggregate measures of losses in GDP from banking crises, rather than the subcomponents of GDP. Analysis of subcomponents such as investment and consumption is highly relevant for assessing the incidence of crises and devising policy measures to neutralise their adverse impact. Clearly, which subcomponents of GDP crises affect will depend partly on the impact of the crisis itself on incomes and balance sheets, which are components of standard consumption (and investment) functions. But there are also likely to be effects arising from confidence and credit availability whose impact is likely to go beyond the "normal" response of consumption and investment to these variables.

We wish to investigate whether the impacts of crises on consumption have varied by type of country and over time. If there are such differences they may well be explainable by structural factors that have evolved over time or vary across countries. The impacts of crises on components may change over time as financing behaviour and expectations about liquidity respond to financial deregulation. The effect may also vary with balance sheet structure, where growing gearing, or leverage, has been a marked feature of household sectors in recent years. Equally, it is worthwhile to trace the impact of currency crises as well as banking crises on expenditure, whereas most of the literature focuses on banking crises only. In this context, this article seeks to assess the costs of financial instability for 19 OECD countries in respect of consumption, the largest component of GDP.

The article is structured as follows. First we summarise recent estimates of the costs of financial instability. We start our empirical work first on all 19 countries, and then break the 19 countries we study into G7, small open economies and the Scandinavians to see if there are differences across countries. We also investigate whether the financially more liberalised 1990s look different from the preceding period, and for a smaller set of countries we investigate the potential role of house prices in the propagation of the effects of crises. We undertake a statistical and econometric assessment of the costs of crises in terms of consumption, and find that the effects of a crisis are larger in small open economies than in the G-7, suggesting that they may become more vulnerable as liberalisation proceeds. We also find that a higher debt-to-income ratio appears to boost the impact of a crisis, which in the light of high current levels of this ratio (Debelle 2004) implies that past estimates of the impact of a banking crisis may be on the low side. These debt to income effects may explain why we find the 1990s to be different, and we estimate consumption equations over this period with real interest rates in them and test for the effects of crises in a different way in this more liberalised period. Including real house prices in the consumption equation displaces some of the effects of crises, but we also find that developments in real house prices are strongly affected by financial crises, implying that the latter still have a marked impact on consumption.

In a final section we report a simulation of a banking crisis with the macroeconomic model NiGEM and use it to evaluate further the likely impact of a crisis on consumption. It is shown that a monetary policy and exchange rate response can help to alleviate the macroeconomic consequences. Including interest rate effects, we find that the crisis effects remain when real rates are included in the equation, while gearing

dummies with real rates have no separate effect. On the other hand, leveraging with nominal rates shows that crises have a much greater effect on consumption when the nominal rate is high, suggesting a role for income gearing and liquidity problems.

1 Measuring costs of banking crises

Whereas there are many studies which estimate the causal factors underlying financial instability (such as Demirguc Kunt and Detragiache (1998), see the review in Bell and Pain (2000)), those which estimate the costs are rather less common. A key paper is that by Hoggarth and Sapporta (2001), which adopts a number of approaches to measuring banking crises' impact and surveys extant work. We follow the structure of their summary in the first part of this section.

The components of economic losses following crises include the following: First there are losses by stakeholders in the banks which have failed, including shareholders, depositors and other creditors. Taxpayers may also face costs as the public sector seeks to resolve the crisis. Losses may also be incurred by borrowers who lose access to funds and may find difficulty accessing other sources due to asymmetric information on their creditworthiness, (see Bernanke et al (1983) on this issue in the Great Depression). More generally, a banking crisis in the monetarist tradition induces a shrinkage of the money supply that may lead to a recession. Rationing of credit by price or quantity, due to bank failures or bank capital constraints, may impact on expenditure by consumers and business, leading to output contractions. Reduced investment may hit economic growth over the longer term. Deposit rates are likely to fall as banks seek to widen spreads in order to recoup loan losses, reducing the incomes of depositors. Finally, if the payments system is impaired because consumers are unwilling to deposit cash in banks, there may be yet more severe impacts on overall economic activity.

The scope of these costs is likely to depend strongly on the manner and speed of resolution by the authorities. Rapid resolution is often thought better than forbearance which leaves bad loans outstanding and can heighten moral hazard, worsening the eventual costs to the taxpayer while also slowing economic growth. But the fiscal costs of a rapid resolution can be considerable. History (as summarised for example in Caprio and Klingebiel 2003) suggests that comparing crises in Japan and the US Savings and Loans crisis with events in Scandinavian counties seem to bear out concerns over forbearance; the Scandinavian crises were resolved rapidly and economic growth recommenced much more quickly than in Japan, for example.

In estimating the magnitude of costs, a first issue is to assess the timing of a banking crisis. A crisis may be pinpointed as a period when much or all of the banking sectors' capital is exhausted (systemic crisis) or when there are problems such as bank runs, bank closures, mergers or government take-overs (borderline crisis). There are generally fiscal costs. But these can also be transfers of wealth from taxpayers to the current and future stakeholders in the bank. The output costs are also not easy to estimate, because banking crises typically take place during periods of recession, when output would have been weak in any case.

Concerning fiscal costs, Caprio and Klingelbiel (1999) and Barth et al (2000) reported estimates of 12% of GDP for developed countries, 4.5% with a banking crisis only and 16% when there is a currency crisis as well as a banking crisis (defined as at least a 25% depreciation which accelerates by 10% in the crisis

year). Such fiscal costs include recapitalisation of banks and reimbursement of insured depositors. The resolution costs are greater in Emerging Market Economies, possibly due to larger overall shocks, weaker capital adequacy and regulation generally, as well as the role of state banks that are most likely to be bailed out. Costs are also higher where banking intermediation is dominant, as witness higher costs reported in Japan in the 1990s (24% of GDP) than in the US in the 1980s (3% of GDP). Honohan and Klingebiel (2000) suggest that fiscal costs rise with the scope of liquidity support, regulatory forbearance and unlimited deposit guarantees. Taking a broader view of fiscal costs, including costs of bailing out non-financial sectors and losses in tax revenue, Eschenbach and Schuknecht (2002) suggest fiscal costs can be as high as 50% of GDP.

Most studies of output losses due to banking crises have sought to measure them as differences from trend in terms of output growth. In IMF (1998) and Aziz et al (2000) costs were measured relative to the three years preceding the crisis, for Bordo et al (2001) it was relative to the previous five years. The end of the crisis is then defined as being when output growth returns to trend. Hoggarth and Sapporta (2001) note that this method may be less accurate than an approach which sums the levels of output losses relative to trend, where trend is measured over ten years prior to the crisis. The latter helps to adjust for the fact that there may have been growth in excess of trend prior to the crisis. Also levels allow more sensitively for output loses than do growth rates for crises that last more than one year (growth rates do not recognise the reduction in the output level in preceding years). Concerning results, IMF (1998) found that cumulative output losses in OECD countries were 10.2%, with the average length of crises being 4.1 years. Hoggarth and Sapporta (2001) found that crises lasted a similar time in OECD countries (4.6 years) but less in emerging market economies (3.3 years). They also found that cumulative output losses were much greater in OECD countries (23.8%) than in emerging market economies (13.9%). Banking crises alone cost 5.6% and twin crises[4] 29.9%. Bordo et al (2001) did not distinguish between developed countries and emerging market economies, but estimated losses of 6.2% of GDP from banking crises and 18.6% for twin crises. Aziz et al (2000) found 9% for twin crises. Meanwhile, Bordo et al (2001) showed that output losses are greater where there are liquidity support operations (possibly supporting insolvent banks, thus generating moral hazard) and an exchange rate was previously pegged (possibly as it exposes institutions to greater market risk).

An issue arising from this work is why crises apparently last longer in OECD than emerging market countries, and there are often greater output losses, Hoggarth and Sapporta (2001) suggest that shocks needed to destabilise the financial system are larger in OECD countries and hence so are output losses. Higher losses could also link to less flexible real wages in developed countries. As in Japan the authorities may be misled by the initial small effect of a crisis, due to seeming robustness of the financial sector, into taking less radical action. The length of the crisis will also depend upon the inertia in behaviour in the economy, and developed economies generally show more inertia than Asia economies, for instance. The time to recovery will depend on institutions such as the effectiveness of bankruptcy laws in clearing out broken contracts, as these may prevent new relationships being developed.

[4] Defined as cases where a currency crisis occurs within the period of the banking crisis.

As noted, most measures of output losses due to banking crises are based on a measurement of output growth or level relative to that in the past. This could exaggerate costs if recessions would have occurred anyway, thus coinciding with or even causing the banking crisis. Bordo et al (2001) sought to overcome this by comparing recessions with banking or twin crises with those without, in the same country's experience. They found banking crises worsened the downturn in recessions by 5% of GDP and twin crises by 15%. Hoggarth et al (2001) compared output losses cross-sectionally by comparing recessions with banking crises with those for other countries at the same time which were otherwise comparable but did not suffer banking crises. For developed countries they found that output losses in recessions with banking crises were 32% of GDP compared to 6% without a crisis. In emerging market economies the comparative figures are 16% compared to 6%. Thus, banking crises again appear more severe in OECD countries. Complementary regressions showed that banking crises explain most of the output loss difference in high income countries and currency crises in low to middle income countries.

Davis and Stone (2004) sought to deal with the recession problem in two different ways, firstly by taking the trend over 5 years in the past and the future, i.e. allowing for the crisis-induced recession in the average, which may be balanced by growth well in excess of trend in the preceding boom, and secondly, as discussed below, via a regression approach. They also sought, unlike the work cited above, to assess which components of GDP were most relevant to the output contraction in a banking crisis. To ensure comparability, the data for real GDP components were expressed in terms of contributions to deviations of growth from trend, rather than as growth per se.

They estimated that the response to banking crises is a decline in GDP relative to trend of 3.1%[5]. This is lower then in the earlier papers since it only covers the first two years of the crisis and also the trend is lower, taking into account the recession itself which follows the banking crisis. The sample of crises also differs. Domestic demand takes the brunt in these crisis-induced recessions (-5.1% contribution to change in GDP relative to trend). Indeed, on average foreign demand (exports less imports) contributes positively to growth (by 1.9%), probably because the trade balance must shift in a positive direction to offset the sudden cessation of capital inflows that often trigger the crisis, and also there is a significant import component of consumption and investment. The change in public sector demand following the crises (the sum of public sector consumption and investment) is broadly neutral (0.2%). The post-crisis change in real GDP is dominated by the contribution of private domestic demand (-5%). Private investment explains the bulk of the contraction (-3.1% of GDP). Inventory decumulation is also an important drag on economic activity in the wake of a financial crisis (-0.4%). In contrast to these investment effects, consumption is rather robust in the wake of the crises (-1.4% of GDP). Davis and Stone suggested that consumers seek to draw on saving to sustain consumption, while labour income is typically more stable than profits.

In further work, Davis and Stone (2004) also evaluated the impact of financial crises on investment, inventories and financial variables using regression techniques, which has not been undertaken elsewhere in the literature. This is an alternative means of evaluating costs of crises, in effect capturing the excess decline in expenditure or financing in a recession following a banking crisis with a comparable event without one. Their approach was to introduce dummy variables into equations for the relevant variables,

thus seeking to capture effects of the banking or currency crisis which go beyond the normal cyclical patterns that would be captured by the standard right hand side variables for the item in question. So for example in a "Jorgensen" investment function they included variables in GDP, interest rates and lagged investment but still found a further fall of 2% shown by the crisis dummies in the first year (6.5% after 4 years) for OECD countries and 7.3% in the first year (24% after 4 years) for EMEs[6]. By estimating in a panel, this approach captures both the Bordo et al time series approach and the Hoggarth/Sapporta cross sectional approach to estimating the "special effects" of a crisis. We follow a similar regression-based approach in our current exercise.

2 The impact of banking and currency crises on consumption

In order to gauge the impacts of crises on activity we probe the nature and determinants of the reaction of consumption to financial instability over and above the impact of the crisis on real personal disposable income and net financial wealth. This analysis can be seen as a counterpart to earlier work on investment cited above We seek to undertake such an exercise by estimating consumption functions and test for various forms of dummy variable for crisis periods. We consider it of particular interest to assess whether the impact of a crisis on consumption is greater in a financially liberalised economy, and whether that impact is in turn related to the key components of the household balance sheet, namely gross financial wealth and gross debt. It is also feasible to assess whether the fall in consumption is accounted for largely by the "normal" response to declines in house prices, albeit on a more restricted data set than that used for our main tests.

Table 1 shows the list of crises we utilise, which are within the coverage of the dataset for each country we analyse in this paper. We use common definitions of crises in order to ensure comparability with other studies, and our sources are Eichengreen and Bordo (2002) and Caprio and Klingebiel (2003). These crises exclude chronic and continuing problems with the banking sector that will have put pressure on consumption, such as the period of sustained liquidity constraints in the UK in the early 1990s, or French banking sector problems in the wake of the 1968 events, as in these cases there are no specific crises to examine. Currency crises are defined as entailing a forced change in parity, abandonment of a pegged exchange rate, or an international rescue. Banking crisis involve bank runs, widespread bank failures and the suspension of convertibility of deposits into currency, or significant banking sector problems that result in the erosion of most or all of banking system capital. It can be seen that we have 14 banking crises and 43 currency crises, with the banking crises evenly distributed between G-7 and small open economies, while currency crises are more common in SOEs. Banking crises have become more common over time, while currency crises are more evenly distributed. There were only currency crises in the 1960s for these countries. Note that banking crises are dispersed over time, reflecting their mainly domestic origins, while currency crises are often grouped, reflecting international contagion (in 1971, 1976 and 1992 for example)[7].

---

[5] Meanwhile currency crises are milder than banking crises (GDP falls 1.1% on average) and for all crises in OECD countries (fall in GDP of 0.9%) compared with Emerging Market Economies (decline of 3.2% in GDP).

[6] Note that these figures are defined in terms of real investment itself and not its contribution to GDP growth.

[7] There are of course other crises we could include, but these would reduce the comparability of our results with those of Davis and Stone (2004), Hoggarth and Sapporta (2001)

Table 1: List of crises

	Banking crises	Currency crises
US	1984	1971, 1985
UK	1974	1964-7, 1976, 1982, 1992
Germany	1977	
Japan	**1992**	1979
France	1994	1992
Sweden	**1991**	1971, 1992
Italy	1990	1976, 1992, 1995
Netherlands		1971
Canada	1983	1962, 1981, 1986
Belgium		1971, 1982
Spain	1977	1971, 1976, 1982, 1992, 1995
Portugal		1976, 1978, 1983
Finland	**1991**	1986, 1991, 1993
Denmark	1987	1971, 1976, 1992, 1993
Ireland		1976, 1986, 1992
Austria		
Australia	1989	1976, 1983, 1985
S Korea	**1998**	1980, 1998
Norway	**1987**	1986
Total	***14***	***42***
1960s	***0***	***2***
1970s	***3***	***15***
1980s	***5***	***13***
1990s	***6***	***13***
G-7	***7***	***14***
SOEs	***7***	***28***

Source: Caprio and Klingebiel (2003), Bordo and Eichengreen (2002); systemic banking crises shown in bold

Following Byrne and Davis (2002), the specification adopted for the consumption function is based on the Life-Cycle Hypothesis of Ando and Modigliani (1963) as derived in Deaton (1992). In this model, planned aggregate consumption (C_t^*) is a function of total resources. Total resources are the sum of human wealth (H_t) and net financial wealth (W_{t-1}). Planned consumption can accordingly be expressed as a function of H_t and W_{t-1}

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

where *m* is the (average and marginal) propensity to consume out of total resources on average across the population. If we assume that planned consumption does not always equal actual consumption and that human wealth can be proxied by some function k of current labour income (i.e. $H_t = kY_t$) we can derive the following relationship for actual consumption (C_t)

$$C_t = aY_t + bW_{t-1} + \varepsilon_t \qquad (2)$$

However, this approximation to a description of consumption behaviour has problems in describing consumption, income and wealth relationships especially in growing economies As suggested by

Campbell and Deaton (1989), 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. Campbell and Deaton (1989) argue that most logarithmic specifications fit the data much better than estimating the linear relationship between the ratio of consumption to income and the ratio of wealth to income. Consequently we adopt a logarithmic approximation for equation (2) to ensure that income, in natural logs, is difference stationary and hence that our long-run relationship can be non-spurious. The logarithmic approximation is as follows

$$\ln C_t = c_0 + \alpha \ln Y_t + \beta \ln W_{t-1} + \xi_t \qquad (3)$$

This is the approach also adopted in recent work on the US consumption function by Ludvigson and Steindel (1999) and Davis and Palumbo (2001). Both papers use Stock and Watson's (1993) dynamic least squares and find a statistically acceptable long run relationship in the logs of consumption, income and wealth as well as an error correction mechanism taking consumption back to its long run. More recently Lettau and Ludwigson (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[8]. Barrell and Davis (2004) argue that the error correction version of this equation can, under some restrictions, have the real interest rate added to it, and we can then test to see if we have an Euler equation describing unconstrained consumers or some combination of Euler and error correcting consumers at an aggregate level. We test for real interest rate effects on the growth of consumption later in the paper, but do not find a role for them over our full data period.

All regressions are estimated in panel form, with an unbalanced panel to allow full use of the dataset. In the presence of non-stationary data, we avoid using a static regression approach by utilising a dynamic error correction model, as advocated by Banerjee et al. (1993). Consequently, the estimated models feature a common error-correction formulation, with the long run derived from (3), having terms in consumption, real personal disposable income and real net financial wealth, and short run dynamics added. We estimate by panel GLS[9] with fixed effects and imposed common coefficients across countries.

---

[8] 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' then the excess is consumed instantly if there are no costs of adjustment. If there are such costs, 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 (k) to human and non-human wealth are the same we may write $C_t^* = m(W/Y) * \left(k\ Y_t\right)$. 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 re-written as $\ln C_t = \log k + b \ln W + (1-b) \ln Y_t + \xi_t$ which we estimate.

[9] Given we have 19 countries, we are unable to use seemingly unrelated regression techniques (SUR) given shortage of degrees of freedom, since SUR estimates the full cross equation error variance covariance matrix. However, cross equation residual correlations for consumption are not common, as Barrell and Mitchell (2004) show...

All variables are I(1) or difference stationary in logarithms, as shown in Table 2 by Augmented Dickey Fuller tests of unit roots.

Our econometric approach hence involved the following consumption specification:

$$\Delta \ln C_t = \alpha_0 + \alpha_1 * \ln C_{t-1} + \beta_1 * \ln Y_{t-1} + \beta_2 * \ln W_{t-1} + \gamma_i * \Delta \ln W_{t-j} + \gamma_i * \Delta \ln Y_{t-k} \qquad (4)$$

Our data set uses total consumption, C_t , Real Net Financial Wealth (*Wt*) and Real Personal Disposable Income, Y_t).[10] The data cover 19 countries, namely the UK, US, Germany, Japan, Italy, Canada and France (the G-7) and also Australia, South Korea, Finland, Norway, Denmark, Sweden, Belgium, Netherlands, Spain, Portugal, Austria and Ireland ("small open economies" or SOEs). Data periods are as shown in Table 2, generally quarterly over 1970-2002 although shorter in some countries and longer in others. The usual constraint is availability of net financial wealth data.

Table 2: Regression data period and ADF tests

	Data sample	LC	LRPDI	LRNW	DLC	DLRDPI	DLRNW
US	61q2-03q2	-3.14	-3.55	-1.87	-6.47	-8.68	-8.4
UK	64q2-02q4	-1.47	-2.3	-2.1	-7.8	-9.0	-8.5
Germany	71q1-02q4	-1.4	-1.5	-3.9	-9.0	-8.5	-10.1
Japan	71q1-02q4	0.5	0.7	-1.2	-11.0	-13.9	-8.4
France	70q1-01q4	-2.6	-1.8	-2.9	-5.9	-11.2	-6.5
Sweden	61q2-01q4	-2.6	-2.0	-1.75	-5.4	-6.6	-7.1
Italy	72q1-01q4	-2.2	-1.4	-0.4	-4.9	-9.8	-7.8
Netherlands	70q2-01q4	-1.0	-3.13	-3.8	-6.6	-9.5	-8.5
Canada	61q2-02q4	-2.1	-1.6	-2.3	-7.6	-8.8	-9.2
Belgium	70q2-01q4	-3.4	-2.2	-3.6	-5.7	-8.5	-7.1
Spain	70q2-01q4	-1.5	-1.5	-2.4	-4.0	-10.0	-5.2
Portugal	80q3-01q4	-2.0	-3.0	-2.1	-3.9	-4.6	-5.6
Finland	79q2-02q4	-1.6	-2.8	-1.3	-4.3	-5.5	-4.6
Denmark	71q2-01q4	-2.1	-4.3	-2.0	-7.0	-7.1	-6.8
Ireland	77q2-97q2	-1.0	-1.1	-3.0	-2.5	-5.9	-5.5
Austria	70q2-01q4	-4.4	-2.8	-2.5	-11.2	-8.0	-5.8
Australia	88q3-03q3	-2.3	-2.6	-1.2	-4.6	-6.8	-4.9
S Korea	76q1-03q3	-1.2	-1.4	-0.9	-5.9	-3.0	-6.8
Norway	81q1-03q3	-1.1	-1.7	-3.8	-5.3	-3.8	-9.3
Panel Unit Root		-1.9	-2.1	-2.3	-6.3	-7.9	-7.2

Key: LC is the log of real consumption; LRPDI the log of real personal disposable income, LRNW the log of real personal net financial wealth (deflated by the consumers expenditure deflator), a "D" prefix indicates the difference of the relevant variable. Critical value for a unit root at 95% level is -2.9. Panel unit root is based on the approach of Im, Pesaran and Shin (1995) who suggest that the average of the ADF test statistic can be used.

The results of panel estimation using the simplest possible specification are shown in Table 3, column 1 and all the variables are significant at 95%. The short run effect of a 1% increase in income is a rise of 0.23% in consumption, while the real wealth effect in the short run is smaller at 0.04%. In the long run the income effect is 0.77% (the ratio of the income term to the error correction coefficient) while the

[10] All data series are quarterly, seasonally adjusted and from OECD National Accounts or national sources.

corresponding wealth effect is 0.11%[11]. These values are well in line with existing estimates (such as those of Barrell and Davis (2004)). According to the F tests, the equality of slope coefficients as well as the fixed effects are accepted relative to Leamer's (1978) diffuse prior. This is an F test where the critical value has a size which becomes smaller as the number of observations grows, an alternative to the conventional testing procedure, which is certain to reject all point null hypotheses when sample sizes become large. It is based on a Bayesian flat prior. The diagnostics imply no heteroskedasticity or autocorrelation.

The table also shows the estimates for the different sub samples chosen because of their inherent interest. We break the panel into the G-7 where crises have not been common, Small Open Economies (SOEs) where openness may increase the vulnerability to crises, and Scandinavia because of the scale of crises experienced there following on from rapid financial liberalisation in the late 1980s. We also split the time period into pre and post 1990 to allow for the impacts of increased liberalisation in financial markets. These results show that the specification is indeed remarkably stable. The main difference is a larger long run wealth effect in the 1990s after financial liberalisation, consistent with earlier results of Byrne and Davis (2003). We can find no role for real interest rates in our full sample, and hence our first set of results do not depend upon its presence. A Chow test for parametric stability over a break in 1990 is passed.

.Table 3: Consumption functions for 19 OECD countries

	Full sample	**G-7**	**SOEs**	**Scandinavia**	**1961-89**	**1990-2003**
LC(-1)	-0.036 (7.7)	-0.037 (5.5)	-0.0378 (5.0)	-0.0426 (3.5)	-0.0447 (6.3)	-0.0468 (4.4)
LRPDI(-1)	0.0277 (5.8)	0.0278 (4.6)	0.0291 (3.8)	0.033 (2.7)	0.0356 (5.1)	0.0354 (2.9)
LRNW(-1)	0.00396 (8.0)	0.00487 (3.6)	0.00388 (6.7)	0.00416 (5.8)	0.0042 (6.7)	0.0093 (6.2)
DLRPDI	0.229 (13.6)	0.262 (11.5)	0.205 (8.6)	0.184 (4.1)	0.217 (10.7)	0.253 (7.5)
DLRNW	0.0037 (3.7)	0.021 (3.3)	0.0033 (3.0)	0.0030 (2.9)	0.0033 (3.2)	0.0024 (4.3)
F (pooling)	(90,2204) 3.9 [8.6]	(30,957) 6.1 [7.3]	(55,1247) 3.1 [7.9]	(15,448) 2.2 [6.5]	(90,1278) 3.5 [8.5]	(90.812) 3.3 [8.5]
F (fixed effects)	(18,2292) 7.7 [7.9]	(6,987) 5.6 [6.9]	(11,1302) 6.9 [7.3]	(3,463) 2.0 [6.1]	(18,1378) 5.5 [7.5]	(18,902) 3.4 [7.1]
R-bar sq	0.15	0.17	0.15	0.12	0.17	0.14
LM het	0.14 [0.91]	0.006 [0.94]	0.005 [0.982]	6.6 [0.01]	0.32 [0.574]	0.15 [0.696]
DW	1.98 [0.31,0.39]	2.1 [0.941,0.970]	1.9 [0.063,0.106]	1.89 [0.077,0.17]	2.05 [0.805,0.871]	1.88 [0.022,0.046]
Implicit long run:- income effect	0.77	0.75	0.77	0.77	0.80	0.76
wealth effect	0.11	0.13	0.10	0.10	0.09	0.20

Note: Square brackets after F tests show critical value for Leamer diffuse priors, square brackets after LM heteroskedasticity test and DW show P-values.

[11] The sum of these could be constrained to equal 1 if so desired, but we do not do that here in order to be able to estimate crises effects without that constraint. Consumption, income and wealth cointegrate even without enforcing the sum of coefficients to be one as saving (the difference between income and consumption) cumulates onto wealth, and this acts as an error correction mechanism.

2.1 Assessing the cost of crises in the base model

As we have a well specified equation, our tests for the effects of crises have to be designed to pick up patterns in the residual components of these equations experiments. We undertook some experiments with the baseline equations that were designed to uncover how persistent the effects of crises might be, whether the costs of crises differ depending on their nature or on the structure of gross debt and also whether housing markets bubbles added to the impacts of crises and if the liquidity constraint effects associated with crises were above those indicated by the effects of interest rates. We first add separate dummies for the first three years of banking crises and currency crises (four quarters of year of crisis, fourth and eighth lags). We use levels dummies which themselves have a persistent effect on consumption via the lagged dependent variable which allows for the effects of crises to persist around four years as in Hoggarth and Sapporta (2001). We find that here are some country and time period differences and we investigate whether these are associated with the severity of crises by assessing the costs of systemic and twin crises as defined in the literature. We also investigate balance sheet effects by adding further dummies which leverage the effect of the crisis by the level of the household debt/wealth and debt/income ratio.

Table 4: Dummy variables for financial instability

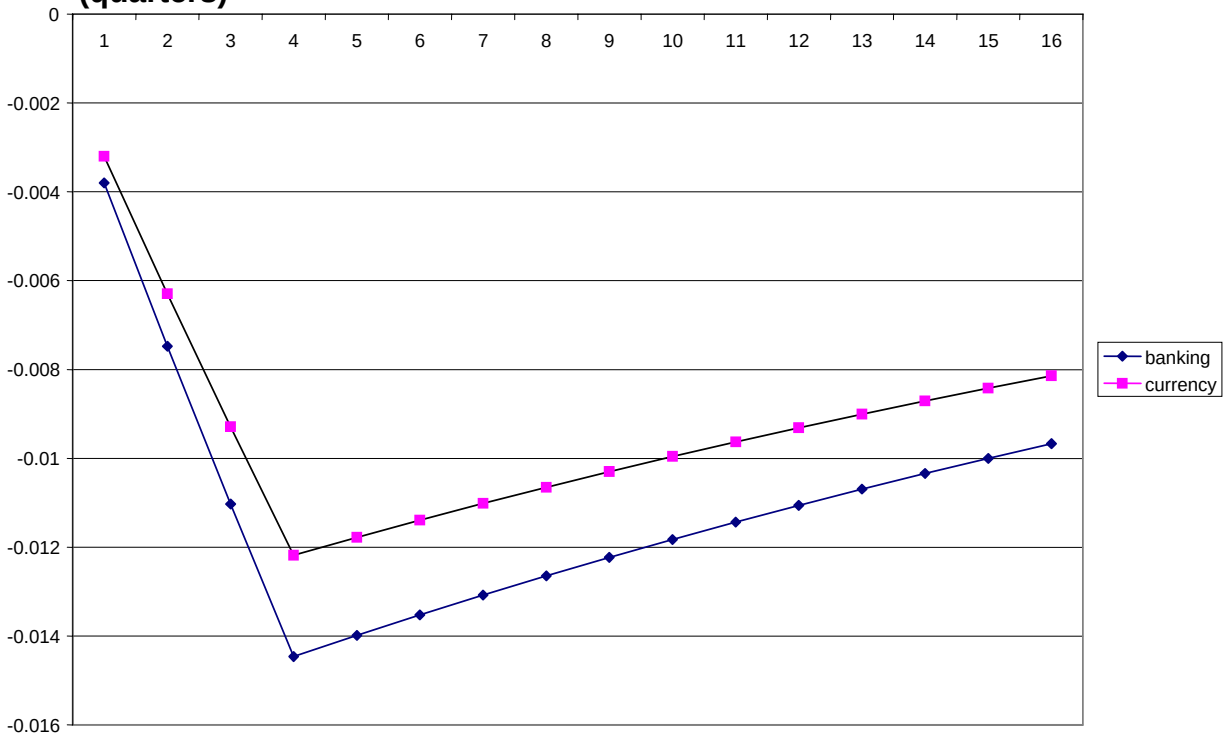
	Full sample	**G-7**	**SOEs**	**Scandinavia**	**1961-89**	**1990-2003**
BANK	**-0.0038 (2.7)**	-0.0004 (0.2)	**-0.0069 (3.2)**	-0.0022 (0.8)	0.0007 (0.4)	**-0.0081 (3.9)**
CURR	**-0.0032 (3.6)**	-0.0013 (1.1)	**-0.0043 (3.4)**	-0.0021 (1.2)	-0.0014 (1.2)	**-0.0047 (3.1)**
BANK	**-0.0037 (2.7)**	-0.0004 (0.3)	**-0.0072 (3.3)**	-0.0034 (1.2)	0.0009 (0.4)	**-0.0084 (4.0)**
CURR	**-0.0031 (3.6)**	-0.0013 (1.0)	**-0.0042 (3.4)**	-0.0014 (0.9)	-0.0013 (1.1)	**-0.005 (3.3)**
BANK(-4)	-0.0012 (0.8)	0.0003 (0.5)	**-0.004 (1.8)**	**-0.01 (3.5)**	-0.0008 (0.4)	-0.00035 (0.2)
CURR(-4)	-0.0009 (1.1)	-0.0019 (1.6)	-0.0002 (0.2)	0.0002 (0.1)	-0.0009 (1.2)	-0.0019 (1.3)
BANK	**-0.0038 (2.78)**	-0.0006 (0.3)	**-0.0074 (3.4)**	-0.0038 (1.4)	0.0009 (0.5)	**-0.009 (4.2)**
CURR	**-0.0031 (3.5)**	-0.0014 (1.0)	**-0.004 (3.2)**	-0.0011 (0.6)	-0.0014 (1.2)	**-0.0044 (2.9)**
BANK(-4)	-0.0014 (1.0)	0.0009 (0.5)	**-0.0046 (2.1)**	**-0.011 (3.7)**	-0.0011 (0.5)	-0.006 (0.3)
CURR(-4)	-0.0008 (0.9)	-0.0019 (1.5)	-0.00002 (0.0)	0.0006 (0.4)	-0.0009 (0.8)	-0.0017 (1.1)
BANK(-8)	-0.0018 (1.3)	-0.0011 (0.6)	-0.003 (1.4)	**-0.0048 (1.7)**	-0.00003 (0.0)	-0.0028 (1.5)
CURR (-8)	0.0011 (1.3)	0.0014 (1.1)	0.001 (0.9)	0.001 (0.6)	0.0013 (1.1)	0.0019 (1.4)
Memo items for dummies at level and (-4)						
Implicit long run income effect	0.77	0.75	0.79	0.81	0.80	0.90
Implicit long run wealth effect	0.10	0.12	0.09	0.07	0.09	0.12

Note: Coefficients in bold are significant at 90% or more

Crises Dummies are analysed in Table 4, starting with the dummies in the full panel (col 1), and the coefficients on the basic consumption equation are little changed by the addition of the dummies (as witness the long run effects in the memo items at the bottom of the table). Given that this is the case we otherwise we only report the latter, as the impacts of crises are our main concern. The result for the single dummy in the year of the crisis (one for each quarter) is for a coefficient of -0.0038 for banking crises and -0.0032 for currency crises. When extra dummies are added, for the fourth lag (second year) and eighth lag (third year) they are not significant.

The implied path for consumption in the full sample is shown in Figure 1, with a falloff of around 1.3% in the first two years before easing to -1% in the third and fourth years. The integral loss over 4 years is around 4.5% of annual consumption in the case of banking crises and 3.7% for currency crises. The path remains below base even after 16 quarters. It may be plausible that consumers would save more over a prolonged period, given the shock to assumptions they make about credit availability following the liquidity problems consumers may face in banking crisis. A rise in saving would in turn drive down long rates and boost investment above base, leaving GDP (which might fall less than consumption) to return to baseline after 4 years.

Chart 1: Response of consumption to financial crises (quarters)

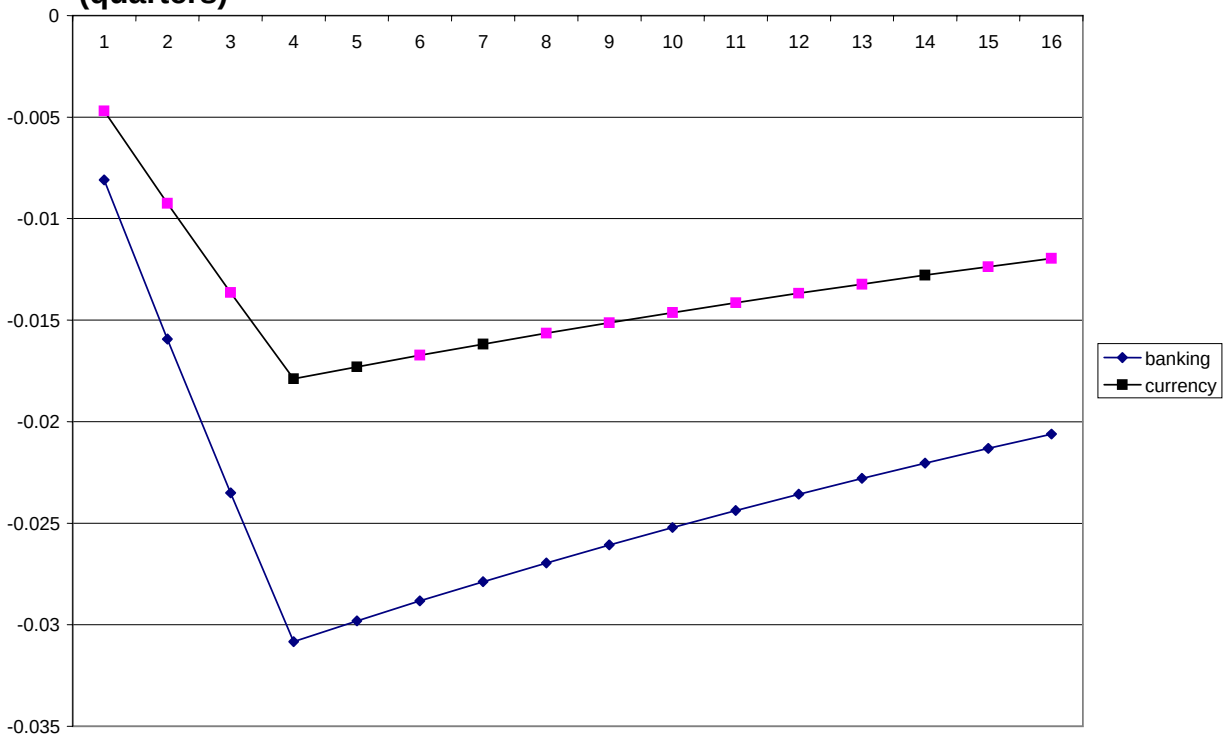


Country sub-samples, are also revealing. The estimates for the G-7 show that the banking and currency crises that occurred there did not have a major effect on consumption, with the coefficient being insignificant. We note that according to the classification of Caprio and Klingebiel (2003) only Japan had a systemic crisis in this group. In contrast, the small open economies are shown to have suffered greatly from banking crises and currency crises, with both of the dummies being significant in the first year, and

the second year banking crisis dummy is also significant. Accordingly, effects of banking crises are shown to be both sizeable and prolonged. Interestingly, the first year effect seems to stem from countries other than Scandinavia, although the latter have featured major banking crises. In Scandinavia it is the second year banking crisis dummy that is significant at 5% and the third year at 10%, adding up to a very sizeable impact on consumption.

Splitting the data period makes it clear that the results arise largely from the period since 1990, over which the dummies are highly significant, whereas in the earlier period they are not. Banking crises may have been less severe before 1990, but also the impact of heightened liquidity constraints that follow from the crisis may have been less with low household leverage and in the absence of financial liberalisation. As shown in Chart 2, the 1990s dummies of 0.81 for banking crises and 0.47 for currency crises imply a major effect on consumption. After banking crises in the 1990s, consumption fell on average by up to 3% relative to baseline, with the integral over 4 years being 9.5%, and 5.5% for currency crises.

Chart 2: Response of consumption to financial crises in the 1990s (quarters)



Systemic and Twin Crises may have more impact than more limited crises, and we can use our estimates to find out whether there is a smaller group of financial crises that are in a sense more severe and would give rise to markedly different results. As shown in Table 1, Caprio and Klingebiel (2003) subdivide banking crises into those which are systemic (defined as cases where much or all of bank capital being exhausted) and those which are non-systemic. In the top half of Table 5, we restrict the crises from Table 3 to those which are systemic in this sense (bold in Table 1). It can be seen that the size of the impact is rather larger but the pattern of significant coefficients is comparable. Equally, there is a literature on twin crises, defined as cases where a currency crisis occurs within up to 48 months of a banking crisis (Kaminsky and

Reinhart 1999). Again, these crises are shown to be larger than average in terms of their impact on consumption, but the cross country and temporal distribution is in line with the full dataset. The main shift is that a first year effect emerges for Scandinavia, and a third year effect for the full sample and since 1990. In each case, the G-7 and the 1961-89 periods are not marked by significant effects on consumption arising from crisis events or banking sector problems, for example. Given the wider sample of crises events that is available, we consider it on balance best to continue with the full dataset shown in Table 1.

Table 5: Dummies for subsets of crisis events

Dummy variables for systemic banking crises						
	Full sample	**G-7**	**SOEs**	**Scandinavia**	**1961-89**	**1990-2003**
BANKSYS	**-0.0089 (4.1)**	-0.002 (0.4)	**-0.01 (4.0)**	-0.004 (1.3)	-0.0022 (0.6)	**-0.01 (4.2)**
BANKSYS	**-0.0086 (4.0)**	-0.002 (0.4)	**-0.01 (4.0)**	-0.005 (1.7)	-0.0007 (0.2)	**-0.01 (4.2)**
BANKSYS (-4)	-0.0005 (0.2)	0.0013 (0.3)	-0.0016 (0.6)	**-0.009 (2.6)**	0.0002 (0.1)	0.0019 (0.7)
BANKSYS	**-0.0087 (4.0)**	-0.002 (0.4)	**-0.011 (4.0)**	**-0.006 (1.9)**	-0.0007 (0.2)	**-0.011 (4.2)**
BANKSYS (-4)	-0.0006 (0.3)	0.0013 (0.3)	-0.0018 (0.7)	**-0.01 (2.9)**	0.0005 (0.1)	0.0016 (0.6)
BANKSYS (-8)	0.0007 (0.2)	0.0008 (0.2)	0.0017 (0.4)	-0.0027 (0.4)	0.002 (0.5)	0.0014 (0.4)
Dummy variables for twin crises						
	Full sample	**G-7**	**SOEs**	**Scandinavia**	**1961-89**	**1990-2003**
TWIN	**-0.0096 (4.6)**	-0.0018 (0.7)	**-0.018 (5.6)**	**-0.0073 (2.0)**	-0.0004 (0.1)	**-0.014 (5.3)**
TWIN	**-0.0098 (4.6)**	-0.0018 (0.7)	**-0.018 (5.6)**	**-0.008 (2.2)**	-0.0004 (0.1)	**-0.014 (5.2)**
TWIN(-4)	-0.001 (0.5)	0.0011 (0.4)	-0.0033 (1.0)	**-0.013 (3.6)**	-0.0001 (0.0)	0.0003 (0.1)
TWIN	**-0.01 (4.7)**	-0.0019 (0.7)	**-0.019 (5.7)**	**-0.0086 (2.3)**	-0.0005 (0.2)	**-0.014 (5.5)**
TWIN(-4)	-0.001 (0.6)	0.001 (0.4)	-0.0037 (1.1)	**-0.014 (3.8)**	-0.0002 (0.1)	-0.0006 (0.2)
TWIN(-8)	**-0.0045 (2.1)**	-0.004 (1.5)	-0.0055 (1.7)	**-0.0082 (2.2)**	-0.003 (0.8)	**-0.0048 (1.9)**

Note: Coefficients in bold are significant at 90% or more

Household sector balance sheets may well have a significant role in determining the impact of crises because the higher the level of gearing the greater the impact of changes in liquidity constraints, as higher levels of borrowing give these constraints more leverage on consumption. Hence we test the effects of banking and currency crises conditioned on the state of balance sheets and ask whether the situation is worse for a highly leveraged household sector, or does financial liberalisation that permits high gearing also provide a buffer even in the presence of a banking or currency crisis? Table 6 shows the result of extending the use of dummies to allow for a leveraged effect from the personal sector gross debt to personal disposable income ratio. We enter the dummy for the crisis and also the dummy multiplied by the

debt to income ratio, which varies over the sample. The mean level of the annualised debt to income ratio is 0.74 and the median is 0.65. Generally, the debt to income ratio tends to increase in all countries during the sample, reflecting financial liberalisation and income growth, being 0.65 on average in the 1961-89 period and 0.84 in 1990-2003. We tried as in Table 4 with (i) just first year, (ii) first and second year and (iii) first to third year dummies, but the second case was the most promising, given the significance of the second year as well as first year dummies, while the third year dummies were always insignificant. Accordingly we only report results for case (ii).

We see that the first year dummies for the whole sample remains negative, while the second year dummy for banking crises has a positive sign and the currency crisis dummy is insignificant. The gearing dummies have offsetting signs from the levels dummies, with the bank crisis dummy multiplied by the debt-income ratio in the first year being positive and in the second year negative. For the currency crisis dummies, the second year effect is again insignificant. Evaluated at the mean of the debt-income ratio, there is a net quarterly negative effect from bank and currency crises in the first year, of -0.004 and -0.0025 respectively. There is also a smaller quarterly effect for banking crises in the second year of -0.001.

The leveraged effects suggest that in the first year the banking crisis effect is ameliorated by a high debt-income ratio. This is consistent with the relationship between high debt-income ratios and financial liberalisation, where the lack of credit constraints may be expected to ease falls in consumption. However, by the second year of a banking crisis, when the macroeconomic as well as financial situation has worsened, the effect of a high debt-income ratio is to worsen the effect of a banking crisis considerably. Banks may be rationing credit, while the personal sector may be seeking to reduce debt directly (although note that a pure wealth effect is already captured by the short and long run wealth effect in the consumption function). In 2002-3, actual levels of debt-income ratios are well over 100%, with a ratio of 135% in the UK. Calibrating the full sample results using this debt-income ratio implies that the effects of a banking crisis in the UK today would be -0.0003 per quarter only in the first year and a sizeable -0.007 quarterly in the second year.

Table 6: Dummy variables for financial instability, level and leveraged by the debt to personal disposable income ratio

	Full sample	**G-7**	**SOEs**	**Scandinavia**	**1961-89**	**1990-2003**
BANK	**-0.0083 (3.2)**	-0.0018 (0.4)	**-0.015 (3.9)**	-0.0086 (1.5)	-0.0006 (0.2)	**-0.028 (5.2)**
CURR	**-0.0066 (3.7)**	0.0015 (0.4)	**-0.01 (4.0)**	-0.005 (1.2)	-0.0038 (1.4)	**-0.0092 (3.1)**
BANK(-4)	**0.0057 (2.2)**	0.0045 (0.1)	0.004 (1.1)	-0.0053 (0.9)	0.006 (1.6)	**0.0086 (2.0)**
CURR(-4)	-0.0021 (0.1)	-0.0033 (1.0)	0.0016 (0.6)	0.0039 (0.8)	0.0013 (0.5)	**-0.0065 (4.2)**
BANKDY	**0.0059 (2.1)**	0.0019 (0.3)	**0.0088 (2.6)**	0.0043 (1.1)	0.0016 (0.5)	**0.026 (4.2)**
CURRDY	**0.0054 (2.3)**	-0.0047 (0.9)	**0.0083 (2.9)**	0.0041 (1.1)	0.0037 (1.0)	**-0.0072 (2.3)**
BANKDY(-4)	**-0.0091 (3.3)**	0.0008 (0.1)	**-0.0098 (3.0)**	-0.0042 (1.1)	**-0.0082 (2.4)**	**-0.01 (2.1)**
CURRDY(-4)	-0.0016 (0.7)	0.0023 (0.4)	-0.0032 (1.1)	-0.0034 (0.8)	-0.0038 (1.0)	0.0045 (1.5)

Looking at the other columns of Table 6, we can see that both the G-7 and Scandinavia show no significant coefficients. There are, however, some results for the small open economies as a whole, where the sample-average debt-income ratio is again 74%, as for the full sample. Again, there is a negative dummy for crises in the first year, offset by a leveraged dummy. Here the net quarterly effect at the sample mean is -0.008 for banking crises and -0.004 for currency crises. In the second year, only the leveraged dummy is significant giving a quarterly effect of -0.007, similar to the first year. Both effects are much larger than for the full sample. For the period 1961-89, there is a significant banking crisis effect in the second year, which is aggravated by a higher debt-income ratio, implying credit rationing and/or balance sheet adjustment.

In the later period (1990-2003) a variety of effects are detectable. In the first year, the effect of currency crises is reinforced by a high debt-income ratio while for banking crises there is again an offset. Using the sample mean of 0.84 for the debt-income ratio, we have a first year effect of -0.006 for banking crises and -0.015 for currency crises. In the second year, the additional effect of a banking crisis is close to zero at the sample mean (0.0086-(0.01*0.84)) while the effect of currency crises continues to increase. However, a higher debt-income ratio than the sample mean will imply an additional negative effect of banking crises in the second year.

Table 7 shows corresponding results for the gross debt to gross financial wealth ratio. The denominator is now affected by asset price falls, notably in the equity market, that may accompany a crisis. Note that we already have net financial wealth in the equation; the estimate poses the question whether the average distribution of net financial wealth between gross financial wealth and gross debt makes a difference. The mean value of the debt-wealth ratio is 0.34 across the full sample, 0.4 in SOEs, 0.33 in the period up to 1989 and 0.36 in the 1990s. An upward tendency is less marked for this variable than for the debt-income ratio, reflecting accumulation and rising asset prices as well as growth in debt.

Table 7: Dummy variables for financial instability, level and leveraged by the gross debt to gross financial wealth ratio

	Full sample	**G-7**	**SOEs**	**Scandinavia**	**1961-89**	**1990-2003**
BANK	-0.0028 (1.1)	-0.0069 (1.5)	**-0.013** **(2.2)**	-0.004 (0.4)	-0.0037 (0.1)	-0.0082 (1.5)
CURR	-0.0022 (1.4)	0.0021 (0.6)	**-0.0048** **(1.9)**	0.008 (1.3)	-0.0016 (0.8)	**-0.0096** **(3.2)**
BANK(-4)	0.0035 (1.3)	-0.0028 (0.6)	0.0041 (0.7)	-0.018 (1.6)	0.0011 (0.3)	0.0062 (1.4)
CURR(-4)	**-0.0035** **(2.2)**	-0.0002 (0.1)	-0.0036 (1.4)	-0.0037 (0.7)	-0.0023 (1.1)	**-0.0085** **(2.9)**
BANKDW	-0.0023 (0.4)	0.026 (1.5)	0.0087 (1.0)	0.0017 (0.1)	0.0024 (0.3)	-0.002 (0.2)
CURRDW	-0.003 (0.8)	-0.017 (0.9)	0.0009 (0.2)	-0.013 (1.5)	0.0007 (0.1)	**0.011** **(1.7)**
BANKDW(-4)	**-0.012** **(2.1)**	0.016 (0.9)	-0.014 (1.6)	0.009 (0.6)	-0.004 (0.6)	-0.016 (1.6)
CURRDW(-4)	**0.007** **(1.8)**	-0.009 (0.5)	0.007 (1.4)	0.006 (0.7)	0.004 (0.5)	**0.017** **(2.6)**

Generally, the results in Table 7 are weaker statistically than with the debt to income ratio, underlining the greater importance of the debt-income ratio for macro prudential analysis as an indicator of default risk

and potential financial distress (Davis (1999), Carson and Ingves (2003), Debelle (2004)). We suggest that the debt-wealth ratio is more dispersed across the population than debt-income also. Nevertheless, there remains a consistent pattern of a negative effect of banking crises on consumption, leveraged by debt-wealth ratios in the whole sample. There is also a significant unleveraged effect in SOEs. As regards currency crises, since 1990, the effects are offset by a high debt-wealth ratio in the second year, while still entailing a negative effect at the sample mean for the debt-wealth ratio.

2.2 Are the 1990s different – the role of real interest rates

The evidence above points to a significantly increased effect from financial crises after 1990 when more liberalised markets were common, and we re-estimate our equations over that period. During our whole sample financial liberalisation became more common and reduced the effects of quantity rationing of credit which was prevalent in both the earlier and in the combined period. We estimated the equations with lagged real short term interest rates included to see if they play a significant role in this period and we can see from Table 8 that they do so[12]. Higher interest rates accompany crises, and they have an independent influence on consumption after 1990. Hence we might find that including interest rates excludes the separate role for crises dummies unless those dummies pick up non-price related credit rationing during a crisis.

We sought to assess the role of interest rates in respect of financial instability first by asking whether inclusion of real interest rates in the consumption function will eliminate the effect of banking and currency crises with the effects being largely subsumed in higher (real) interest rates. Second, we can assess the impact of leveraged dummies on real rates which would indicate whether crises are worse or better with high real interest rates accompanying them. We assess the effect of the banking crisis dummies in this new specification in the second column of Table 8. The level banking and currency crisis variables remain highly significant suggestion that the average consumption response to high real interest rates does not encompass the effect of banking crises. The rest of the equation is stable. The third column shows that we can also not subsume the effect via leveraged dummies multiplied by real interest rates. All of the leveraged dummies are insignificant while the level dummies retain significant (note that we omit real rates from the equation in this case). The final column shows however that nominal rates are significant in determining the effect of a banking or currency crisis. It is when nominal rates are high that the consumption response is much larger. Evaluated at the mean nominal rate for the period of 6.2%, the initial impact of a crisis is quite low but at 14%, two standard deviations higher, it is -0.02. Over four years the cumulative loss of consumption with interest rates 1 standard deviation above the mean for the 1990s is 7% and at 2 standard deviations higher it is 19%. Note that nominal rates indicate the scope of liquidity problems that borrowers meet in respect of cost of finance relative to cash flow.

[12] Muellbauer and Lattimore (1995) survey the evidence to that date on the role of interest rates in determining consumption, and report that few researchers had found a role for real or nominal rates. As we can see, the 1990s do look different, and there is a role for real interest rates in this period.

Table 11: Consumption function for 19 OECD countries with interest rate effects Period 1990-2003

	Without dummies	**Crisis dummies only**	**Dummies leveraged by real rates**	**Dummies leveraged by nominal rates**
LC(-1)	**-0.0556** **(5.1)**	**-0.0622** **(5.5)**	**-0.063** **(5.1)**	**-0.066** **(5.9)**
LRPDI(-1)	**0.0436** **(3.5)**	**0.0555** **(4.3)**	**0.052** **(3.6)**	**0.058** **(4.5)**
LRNW(-1)	**0.008** **(5.2)**	**0.0063** **(3.9)**	**0.0085** **(4.7)**	**0.0092** **(5.5)**
DLRPDI	**0.25** **(7.5)**	**0.24** **(7.0)**	**0.24** **(6.9)**	**0.23** **(7.2)**
DLRNW	**0.023** **(4.2)**	**0.02** **(3.6)**	**0.02** **(3.1)**	**0.019** **(3.2)**
RR(-1)	**-0.00044** **(3.6)**	**-0.00041** **(3.2)**		
BANK		**-0.0083** **(4.0)**	**-0.014** **(3.5)**	**0.026** **(5.5)**
CURR		**-0.0045** **(2.9)**	**-0.0092** **(3.0)**	**0.022** **(4.6)**
BANK(-4)		-0.00003 (0.1)	-0.0043 (1.1)	-0.0036 (0.7)
CURR (-4)		-0.0016 (1.1)	0.0001 (0.1)	0.0025 (0.5)
BANKR			0.001 (1.6)	**-0.0034** **(7.3)**
CURRR			0.00055 (1.5)	**-0.0022** **(5.2)**
BANKR(-4)			0.001 (1.6)	0.0005 (1.3)
CURRR(-4)			-0.0004 (1.0)	-0.0004 (1.1)
F (pooling)	2.8 (8.9)			
F (fixed effects)	3.4 (7.1)	3.3 (7.1)	3.3 (7.0)	5.3 (7.0)
R-bar sq	0.15	0.17	0.17	0.31
LM het	0.09 (0.77)	0.061 (0.8)	1.5 (0.22)	336 (0.000)
DW	1.88 (.021, .051)	1.87 (.009,.055)	1.82 (.001, .016)	2.03 (.494, .891)

Note: Square brackets after F tests show critical value for Leamer diffuse priors, square brackets after LM heteroskedasticity test and DW show P-values.

2.3 Finding a role for house prices in crises

Our model specifications have consumption responding to income, net financial wealth and to crises dummies. There are good reasons to presume that we should include tangible assets in our consumption functions, but if we do so our panel is restricted to 12 countries, and we feel that these do not allow us a sufficient cross section domain to test for the impacts of crises on consumption. However, we can utilise house prices in the dynamics of adjustment of consumption (rather than as one of its long run determinants) in 16 of our 19 panel members. Including real house prices in the consumption function may well pick up additional crises effects and allows us to test whether the effects of financial instability are subsumed by the normal effects of falling house prices in such periods. These are omitted from our baseline specification because of its greater country coverage. As shown in table 9, the log-difference of real house prices is highly significant in each equation, while the other coefficients are also significant and

of comparable magnitudes to Table 3. The income growth effect is smaller, however, as we might expect strong house price growth to be correlated with strong income growth.

House price effects clearly matter in this sample, and a rise in the growth of house prices increases consumption everywhere. However, it is clear that the effects are larger in the small open economies and in Scandinavia. This may reflect the fact that these economies have liberalised their financial markets generally rather earlier than some others, in part because of their openness. More liberalisation means that individuals can realise the capital gains on their housing stock by increasing their debt, and they have clearly done so. This may also mean that asset price bubbles are more common in these economies, and that the banking system may be more vulnerable to crises. In addition, house price effects seem to be about 50 per cent larger in the 1990s than in the 1970s and 1980s in our smaller sample. This again reflects the greater degree of liberalisation in the latter period, and it may also be an explanation of the increased frequency of crises that we observe in Table 1 above.

Table 9: Consumption functions for 16 OECD countries with real house prices

	Full sample	**G-7**	**SOEs**	**Scandinavia**	**1961-89**	**1990-2003**
LC(-1)	-0.041 (8.2)	-0.04 (5.4)	-0.05 (6.1)	-0.058 (4.5)	-0.05 (6.2)	-0.045 (4.4)
LRPDI(-1)	0.032 (6.0)	0.0277 (3.9)	0.04 (4.9)	0.046 (3.7)	0.041 (4.8)	0.037 (3.6)
LRNW(-1)	0.0039 (7.6)	0.0058 (3.4)	0.0035 (5.9)	0.0025 (3.1)	0.004 (6.2)	0.0052 (3.6)
DLRPDI	0.18 (10.3)	0.24 (10.4)	0.113 (4.5)	0.13 (2.9)	0.174 (8.0)	0.214 (6.8)
DLRNW	0.0033 (3.5)	0.0017 (2.7)	0.0028 (2.8)	0.002 (1.9)	0.0031 (2.9)	0.015 (2.9)
DLRHP	0.088 (9.4)	0.061 (5.1)	0.123 (8.6)	0.17 (8.0)	0.077 (6.6)	0.12 (5.6)
F (pooling)	4.0 [8.5]	6.1 [7.4]	2.7 [7.7]	0.9 [6.5]	3.5 [8.5]	2.8 [8.6]
F (fixed effects)	8.4 [7.7]	4.4 [6.9]	8.7 [7.0]	5.6 [6.0]	5.1 [7.2]	3.1 [6.9]
R-bar sq	0.18	0.18	0.19	0.23	0.17	0.2
LM het	0.012 [0.973]	0.0008 [0.993]	2.3 [0.128]	0.01 [0.919]	1.4 [0.251]	0.05 [0.823]
DW	2.2 [1.0,1.0]	2.3 [1.0, 1.0]	2.2 [0.997,0.999]	2.2 [0.936,0.983]	2.2 [0.999,1.00]	2.2 [0.992,0.998]

Note: DLRHP is the difference of the log of real house prices.

House prices reflect the amount of tangible collateral that individuals can offer to banks when they wish to borrow. If a crisis is associated with a fall in house prices it is also associated with a fall in collateral available to consumers. If this were the only factor to consider we would expect house price effects to knock out crises dummies. .We then take these new baseline specifications and add our crises dummies to them in order to test whether asset price bubbles and associated housing market developments capture the effects of banking crises. As shown in Table 10, fewer dummies are significant than when house prices are omitted. Inclusion of house prices appear to render the early effects of the crises insignificant but not those in the second year, where dummies remain significant in a number of samples, notably for banking crises in SOEs and Scandinavia and currency crises in the G-7, as well as currency crises in the second year and banking crises in the third year over 1990-2003. Hence the liquidity constraints that are associated with banking crises still seem to operate independently of the collateral use of house values for borrowing.

Table 10: Dummy variables for financial instability with real house prices

	Full sample	**G-7**	**SOEs**	**Scandinavia**	**1961-89**	**1990-2003**
DLRHP	**0.0864 (9.2)**	**0.06 (5.1)**	**0.12 (8.5)**	**0.17 (8.0)**	**0.077 (6.6)**	**0.1 (5.4)**
BANK	-0.0009 (0.6)	-0.0007 (0.4)	-0.0008 (0.4)	0.0025 (0.9)	0.0007 (0.4)	-0.0013 (0.7)
CURR	-0.0011 (1.3)	-0.0012 (0.9)	-0.0005 (0.4)	-0.0014 (0.8)	-0.0005 (0.4)	-0.001 (0.8)
DLRHP	**0.0857 (9.2)**	**0.059 (5.0)**	**0.12 (8.2)**	**0.16 (7.6)**	**0.077 (6.6)**	**0.1 (5.0)**
BANK	-0.0009 (0.6)	-0.0007 (0.4)	-0.001 (0.4)	0.0013 (0.5)	0.0009 (0.4)	-0.002 (1.0)
CURR	-0.001 (1.1)	-0.0011 (0.9)	-0.0005 (0.4)	-0.0008 (0.5)	-0.0004 (0.3)	-0.0015 (1.1)
BANK(-4)	-0.002 (1.4)	0.0006 (0.4)	**-0.006 (2.5)**	**-0.007 (2.3)**	-0.0014 (0.7)	-0.0017 (0.9)
CURR(-4)	-0.0014 (1.6)	**-0.0021 (1.7)**	-0.001 (0.9)	-0.0003 (0.2)	-0.0012 (1.0)	**-0.002 (1.7)**
DLRHP	**0.0852 (9.1)**	**0.059 (5.0)**	**0.12 (8.1)**	**0.16 (7.4)**	**0.078 (6.6)**	**0.11 (5.1)**
BANK	-0.0009 (0.7)	-0.0008 (0.5)	-0.001 (0.4)	0.001 (0.4)	0.001 (0.5)	-0.003 (1.3)
CURR	-0.0009 (1.2)	-0.0011 (0.8)	-0.0003 (0.2)	-0.0007 (0.4)	-0.0003 (0.2)	-0.001 (0.8)
BANK(-4)	-0.0022 (1.5)	0.0006 (0.4)	**-0.0066 (2.6)**	**-0.0072 (2.3)**	-0.0014 (0.7)	-0.002 (1.2)
CURR(-4)	-0.0013 (1.5)	**-0.002 (1.6)**	-0.0009 (0.8)	-0.0002 (0.1)	-0.0013 (1.1)	**-0.002 (1.7)**
BANK(-8)	-0.0008 (0.6)	-0.0012 (0.7)	-0.0005 (0.2)	-0.0013 (0.5)	0.0011 (0.5)	**-0.004 (1.8)**
CURR (-8)	0.0008 (1.0)	0.0006 (0.5)	0.001 (1.0)	-0.0009 (0.5)	0.0005 (0.4)	0.16e-15 (0.3e-13)

Note: DLRHP is the difference of the log of real house prices.

Including real house prices in the consumption equation raises the issue of endogeneity, namely, to what extent are developments in real house prices affected by banking and currency crises? While a comprehensive analysis of the determinants of real house prices is beyond the scope of this paper, we sought to address whether and to what extent banking and currency crises help to explain the movements in real house prices. The format is of Granger Causality, testing for an additional effect of banking and currency crisis dummies in a 10-period autoregression of log-differences of real house prices. (The autoregression was extended till no further lags were significant.) The results for crisis effects only, which are reported in Table 10, indicate that banking crises are significant determinants of house prices in the second year for the small open economies and in the later time period as well as for the full sample at a significance level of at least 90%. For the subsample 1990-2003, the currency crisis dummy is also a significant determinant of house prices. The results of this exercise support the notion that banking and currency crises affect consumption directly, apart from their impact on the movement of real house prices, and that they are one of the drivers real house prices, and hence the role of role banking crises in the determination of consumption remains strong even when we consider the housing market.

Table 11: Testing for an impact of financial instability on changes in real house prices

	Full sample	**G-7**	**SOEs**	**Scandinavia**	**1961-89**	**1990-2003**
BANK	**-0.005 (1.9)**	-0.006 (1.5)	-0.005 (1.5)	**-0.006 (1.7)**	-0.004 (1.0)	**-0.006 (2.4)**
CURR	-0.003 (1.6)	-0.004 (1.3)	-0.002 (0.9)	-0.0007 (0.3)	-0.0007 (0.2)	**-0.004 (2.7)**
BANK(-4)	-0.004 (1.6)	0.00004 (0.01)	**-0.01 (3.1)**	**-0.01 (2.8)**	-0.002 (0.5)	**-0.004 (1.9)**
CURR(-4)	-0.0005 (0.3)	-0.004 (1.1)	0.0013 (0.7)	0.003 (1.0)	0.0024 (0.8)	-0.002 (1.4)

Note: the equation also includes ten lag-differences of the log of real house prices

2.4 Conclusions on the impacts of banking and currency crises on consumption

We have undertaken extensive tests of the impacts of banking crises on the level of consumption using structural models of the determinants of consumption and augmenting them with crisis effects. In our baseline model we find that banking (and currency) crises take time to impact on consumption, and that the effects build up over time. The effects seem larger in small open economies, and they also seem to have increased in the more financially liberalised 1990s. This is not surprising as we find a role for debt to income ratios in increasing, or leveraging, the impacts of crises. Crises appear to be associated with increases in credit rationing above that driven by changes in real interest rates, and the effects of credit rationing on consumption appear to be greater in economies and time periods where consumers are more dependent on debt. Hence in open economies with liberalised financial markets and high levels of debt a banking crisis is likely to have a very noticeable effect on consumption. Part of this might work through the effects of the crisis and the subsequent credit rationing on the housing market and on house prices, but there seems to be a role for crises in affecting the level of consumption above and beyond that given by the effect of crises (and other factors) on house prices.

3 NIGEM simulation of a banking crisis in the UK

To seek to further calibrate the macroeconomic outworkings of a banking crisis, we prepared simulations using the NiGEM Global Model[13]. NiGEM is an estimated model, which uses a 'New-Keynesian' framework in that agents are presumed to be forward-looking, but nominal rigidities slow the process of adjustment to external events. All countries in the OECD are modelled separately. All economies are linked through the effects of trade and competitiveness. There are also links between countries in their financial markets via the structure and composition of wealth, emphasising the role and origin of foreign assets and liabilities. Consumption depends on income and wealth in an error correction framework, much as is described above, with house prices and housing wealth playing a role in the larger economies. There are forward-looking wages and exchange rates, while long-term interest rates are the forward convolution of short-term interest rates. The model has complete demand and supply sides and there is an extensive monetary and financial sector. Financial markets are linked between countries both by flows and by cross holdings of assets. Domestic wealth depends on equity prices, bond prices and the value of foreign assets.

[13] See NIESR (2003) for a description of the model, and Barrell, Kirsanova and Hurst (2003) for a brief description. Barrell and Davis (2003) discuss the financial linkages at length as well as describe the model structure.

The simulation was designed in the light of the estimated costs in Sections 1 and 2. For purely illustrative purposes, the country selected for the crisis was the UK. The main imposed changes to the model run were:

- The spread between personal borrowing and lending rates increased by 8 percentage points in the first quarter, declining over 3 years, with most of the decline in the second and third year
- The spread between business sector borrowing and lending was increased also by 8 percentage points in the first quarter declining over 3 years, with most of the decline in the second and third year
- The split between higher borrowing and lower deposit rates was 0.5 each
- Corporate sector profits were cut by 17% (£5 bn a quarter) mainly to reflect loan losses by banks.
- House prices were reduced endogenously by 2.5% in each of the first 2 quarters, leading to a sustained but temporary fall in house prices
- Equity prices were reduced by 6% initially but declining impact using a declining endogenous shock on the forward looking equation. This effect is in addition to any risk premium and profit related reasons for a fall in equity prices
- The increase in the equity risk premium of 8 percentage points was spread into investment (half) in the same proportions as Barrell and Davis (2003)
- Interest rates were lowered immediately by 1.5 for 5 quarters ahead of the fall in inflation ("emergency liquidity assistance").

The key driver of the macro impact of the crisis is the widening spread between borrowing and lending rates, which captures the increase in credit rationing to be anticipated as a result of the crisis, and correspondingly of banks' efforts to raise profitability to offset loan losses and recapitalise. This might entail higher interest rates from the same borrower, borrowers being driven to more costly forms of credit (e.g. from mortgages to credit cards) or simply proxying unavailability of credit. This effect changes the cost of borrowing and hence personal income and corporate profitability, given loans are at flexible rate for the most part. The effects on asset prices are those to be expected during a financial crisis and they mainly affect consumption via wealth effects but also investment via the cost of equity capital. Meanwhile, monetary policy is assumed to react immediately to the crisis with a loosening, as emergency liquidity support is provided. Although the cut is in advance of the fall indicated by the standard interest rate reaction function which responds to deviations of output and inflation from target, it achieves the same level after 6 quarters, and the cumulated extra cut is 1.0 in the first 5 quarters.

As shown in Table 12, the impact is greatest on fixed investment – both housing and non residential – which fall by up to 16% owing to higher interest rates and risk premia affecting the cost of capital, as well as declines in overall output. Consumption is hit by a maximum of 7% reflecting lower real personal disposable income (which falls more than consumption) and by falls in wealth as asset prices decline (Table 13). On the other hand, the current balance improves, largely due to the recession caused by the banking crisis, albeit also helped by a currency depreciation (Table 12). Hence the fall in GDP is around 4% at maximum and the total shortfall over four years just over 10%.

Note that this outturn is comparable to the falls recorded in Davis and Stone (2004) but are below estimates by Hoggarth and Sapporta (2001). No additional confidence effects have been assumed that might drive consumption and investment below their equation projections, although the work with dummies in the section above suggest this would clearly be the case in a full-blown banking crisis. However, we might describe the additional impact of the crises on equity prices as reflecting confidence in some sectors, whereas the additional fall in house prices is presumed to reflect rationing above that indicated by the increase in spreads. The fiscal deficit rises for cyclical reasons – we have not assumed large expenditures on recapitalisation, although again this could be a consequence of these events.

Table 12: Impact of a banking crisis on expenditure and sector balances

	Consumption	Business Investment	Housing investment	GDP	Current balance	Fiscal deficit
	% Diff from base	% Diff from base	% Diff from base	% Diff from base	% of GDP diff from base	% of GDP diff from base
2003	-3.17	-5.22	-5.26	-0.92	1.70	-1.90
2004	-6.90	-16.10	-16.09	-3.56	4.00	-1.70
2005	-7.30	-15.09	-15.10	-3.63	3.91	-0.06
2006	-5.47	-6.74	-6.74	-1.95	2.57	1.87

As noted, there is a sharp easing of monetary policy which attenuates the recession – rates are held down by 1.5 percentage points for 5 quarters until such a cut is itself warranted by lower inflation projections. This additional cut in rates absorbs 0.2 percent of the potential fall in output in the first two years. Long rates, which are the rational expectations forward convolution of future short rates, are lower by 1% at the start, which tapers off. As regards the detailed effects on asset prices, exchange rates depreciate by around 7% for monetary policy reasons. Both long rates and the exchange rate also help to attenuate the effect of the crisis on the economy. More contractionary effects come from equity prices and house prices which fall because of the impacts of other shocks and by residual, driving equity prices down 8% initially and house prices by an eventual 14%, as can be seen from Table 13. Equity prices being forward looking soon recover, aided by the cut in interest rates. The relatively gradual response of house prices is plausible given the more sluggish adjustment of that market.

Table 13: Effects of a banking crisis on asset prices and yields

	Exchange rate	Equity prices	House prices	Long rate	Short rate
	% Diff from base	% Diff from base	% Diff from base	% points difference from base	% points difference from base
2003Q1	-6.80	-8.17	-2.31	-1.05	-1.50
2003Q4	-5.89	-2.21	-11.57	-0.88	-1.50
2004Q4	-4.79	5.57	-13.92	-0.65	-1.80
2005Q4	-3.46	9.41	-12.12	-0.38	-1.86
2006Q4	-2.16	8.49	-10.80	-0.13	-1.67

It may be added that France and Germany would suffer a fall in GDP as a consequence of the UK recession, as can be seen from Table 14. The impacts on the Euro Area are around 10% of the size of the

effect on the UK, and largely come from the decline in import demand in the UK reducing export growth in the first two years of our analysis by about 1% a year The impact of the depreciation of the UK exchange rate on the Euro Area is largely absorbed by a cut in euro interest rates of 0.5 per cent by the end of two years, and the appreciation of the euro is less than half the fall in sterling.. The US would be much less affected because its trade links with the UK are weaker, and exports are a noticeably smaller proportion of output. All countries will be affected by the fall in UK asset prices, as wealth in the US, France and Germany is affected by the change in the value of holdings of overseas equities.

Table 14: Spillover Effects: Impact of a banking crisis on output

	Euro Area GDP	French GDP	German GDP	US GDP
	% Diff from base	% Diff from base	% Diff from base	% Diff from base
2003	-0.16	-0.14	-0.13	-0.02
2004	-0.38	-0.34	-0.34	0.01
2005	-0.32	-0.32	-0.22	0.10
2006	-0.08	-0.15	0.08	0.20

A separate simulation addressed the differences likely to occur if the banking crisis occurred in the UK were it to be a member of EMU. We accordingly fixed the interest rate and exchange rate of the UK to the euro, and included UK inflation and nominal output in the targeting system for the (expanded) ECB. The effect on GDP in the UK was around 50% greater than those discussed above, because country specific monetary policy shock absorbers were absent. This underlines the need for adequate arrangements for regulation to prevent crises and also mechanisms for resolving banking crises in EMU countries.

Conclusions

The literature on costs of financial instability tends to focus on fiscal costs and the impact on GDP. In this paper, we have analysed the effect of a crisis on consumption over and above the impact of the crisis on real personal disposable income and net financial wealth. We have shown that consumption plays a key role in the macroeconomic adjustment following a financial crisis. Furthermore, the effect of a crisis is aggravated by high leverage, notably as shown by the effect of a high debt-income ratio, despite the accompanying benefits of financial liberalisation in easing liquidity constraints. The impact is also greater in a small open economy than in the G-7. Meanwhile, falling house prices are shown to be part of the transmission process of financial instability, being themselves strongly influenced by banking crises and to a lesser extent currency crises, while high nominal rates aggravate the impact of a financial crisis. A simulation for a banking crisis underlines the important role of monetary and fiscal policy in easing the impact of a financial crisis on consumption and other expenditure components. Viewed in the light of growing leverage in recent years, the results imply that a banking crisis taking place now could have a much greater incidence on consumption than in the past, especially if macroeconomic policy is unable to respond, as for a small country in EMU.

Bibliography

Ando, A. and Modigliani, F. (1963). "The Life-Cycle Hypothesis of Saving: Aggregate Implications and Tests", *American Economic Review*, 103, 55-84.

Aziz, J, Caramazza, F and Salgado, R (2000), 'Currency Crises: In Search of Common Elements', International Monetary Fund Working Paper 00/67, March.

Banerjee, A., Dolado, J.J., Galbraith, J.W. and Hendry, D.F. (1993). "Cointegration, Error Correction and the Econometric Analysis of Non-Stationary Data", Oxford University Press, Oxford.

Barrell R and Davis E P (2003) "Shocks and Shock Absorbers: The International Propagation of Equity Market Shocks and the Design of Appropriate Policy Responses", presented at the NIESR conference "Macroeconomics and the Policy Process", 14 May 2003, London Chamber of Commerce & Industry,

Barrell R and Davis E P (2004) "Consumption, Financial and Real Wealth in the G-5", Discussion Paper no 232, NIESR, London

Barrell R, I Hurst and T Kirsanova (2003) 'Choosing the Regime in an Uncertain World, the UK and Monetary Union' National Institute Discussion Paper No. 209

Barrell, Ray and James Mitchell (2004) 'Cyclicity and International Financial Developments: Cycles and systemic risks, contagion and globalisation and institutions and financial stability', Monetary Policy, Economic Cycles and Financial Dynamics, *Bank of France Bulletin*

Barth, J R, Caprio, G and Levine, R (2000) 'Banking Systems Around the Globe: Do Regulation and Ownership Affect Performance and Stability?', Conference on Prudential Supervision: What Works and What Doesn't, National Bureau of Economic Research Inc, January.

Bell J and Pain D (2000), "Leading indicator models of banking crises – a critical review", Financial Stability Review, June 2000, 113-129, Bank of England, London

Bernanke B S (1983), "Non monetary effects of the financial crisis in the propagation of the Great Depression", American Economic Review, 73, 257-76

Bordo, M, Eichengreen, B (2002), "Crises Now and Then: What Lessons from the Last Era of Financial Globalization" NBER Working Paper No. w8716

Bordo, M, Eichengreen, B, Klingebiel, D and Martinez-Peria, M S (2001), 'Is the Crisis Problem Growing More Severe?', Economic Policy, 32, pages 51–82.

Byrne, J.P. and Davis, E.P. (2003). "Disaggregate Wealth and Aggregate Consumption: An Investigation of Empirical Relationships for the G7", *Oxford Bulletin of Economics and Statistics*, 65, 197-220

Campbell J and Deaton A (1989), "Why is consumption so smooth?", *Review of Economic Studies*, 56, 357-373

Caprio,G and Klingebiel,D (2003),'Episodes of Systemic and Borderline Financial Crises ',mimeo, World Bank.

Carson C S and Ingves S (2003), "Financial soundness indicators", IMF Board Paper, May 14 2003

Davis E P (1999), "Financial data needs for macroprudential surveillance: what are the key indicators of risk to domestic financial stability?", Lecture Series No 2, Centre for Central Banking Studies, Bank of England.

Davis E P and Stone M (2004), "Corporate financial structure and financial stability", forthcoming IMF Working Paper and in Journal of Financial Stability

Davis, M.A. and Palumbo, M.G. (2001). "A Primer on the Economics and Time Series Econometrics of Wealth Effects", *Finance and Economics Discussion Paper*, Federal Reserve Board Washington.

Deaton, A.S. (1992). *Understanding Consumption*, Oxford University Press, Oxford.

Debelle G (2004), "Household debt and the macroeconomy", BIS Quarterly Review, March 2004, 51-64

Demirguc-Kunt A and Detragiache E (1998), "The determinants of banking crises in developing and developed countries", IMF Staff Papers, 45, 81-109

Eschenbach F and Schuknecht L (2002), "The fiscal costs of financial instability revisited", ECB Working Paper No 191

Hoggarth G and Sapporta V (2001), "Costs of banking crises, some empirical evidence", Financial Stability Review, June 2001, 148-161, Bank of England, London

Honohan, P and Klingebiel, D (2000), 'Controlling Fiscal Costs of Banking Crises', World Bank Policy and Research Working Paper 2441.

Im, K S; Pesaran, M H; Shin, Y (1995)., "Testing for Unit Roots in Heterogeneous Panels", University of Cambridge, Department of Applied Economics Working Paper, Amalgamated Series: 9526. June 1995

IMF (1998), 'Financial Crises: Characteristics and Indicators of Vulnerability', World Economic Outlook (Chapter 4), May.

Kaminsky, G and C M. Reinhard (1999), "The Twin Crises: The Causes of Banking and Balance-of-Payments Problems," *American Economic Review*, 89(3), 473-500.

Leamer, E E (1978), Specification Searches: Ad Hoc Inference with Nonexperimental Data, Wiley, New York.

Lettau, M., and Ludvigson, S., (2001) 'Consumption, aggregate returns and expected stock returns' *Journal of Finance* vol 56 pp 815-849

Ludvigson, S. and Steindel, C. (1999). "How Important is the Stock Market Effect on Consumption?" *Economic Policy Review*, Federal Reserve Bank of New York, July.

Muellbauer, J. and Lattimore, R. (1995). "The Consumption Function", in Pesaran, M.H. and Wickens, M. (eds.), *Handbook of Applied Econometrics: Macroeconomics*, Blackwell, Oxford.

Stock, J.H., and Watson, M.W., (1993) 'A simple estimator of cointegrating vectors in higher order integrated systems' *Econometrica* vol 61 pp 783-820