

COMMENTS ON THE CONSULTATIVE DOCUMENT “COUNTERCYCLICAL CAPITAL BUFFER PROPOSAL”

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The BIS Countercyclical Capital Buffer Proposal (henceforth referred to as the proposal) states four objectives all of which assume capital in excess of minimum requirements is necessary to counteract cyclical systemic risk arising from excessive credit growth. Although there are theoretical reasons as to why excessive credit growth can generate systemic instability we believe the proposal is flawed because empirically there is no conclusive evidence that credit variables cause banking crises directly.

This note aims to elaborate on our view by discussing our recently developed banking crisis logit model and our causality tests between credit and residential property prices (Barrell et al, 2010a,b). In a further paper (Barrell et al, 2010c) we have used our model to propose changes to capital adequacy ratios which may mitigate future increases in crisis probabilities: we suggest raising countries' existing capital ratios by 3.7 percentage points which is close to the BIS proposed optimal capital structure.

Requirements for further capital provisioning should pass a cost-benefit analysis if they are to be efficient. Our corollary paper (Barrell, Holland and Karim 2010) examines the long-term costs of banking crises, taking into account that increases in capital will be costly as they raise the user-cost of capital, which will reduce sustainable real output. The supplementary countercyclical requirements as outlined in the proposal have to have benefits larger than the costs they impose.

We start by outlining the robustness tests which an analysis of the causes of crises should pass. We show that the Signal Extraction methodology which underpins the proposal's recommendations is inadequate in terms of these tests and contrast it to our multivariate logit model which performs extremely well against robustness checks. Next we discuss our causality tests between credit and property price growth since according to our results the latter directly cause banking crises but the former do not. We do not discuss the limitations with the credit-to-GDP gap variable on which the BIS proposes to condition countercyclical capital rules, but we do append a paper by Garratt, Mitchell and Vahey on the related topic of output gap uncertainty. Trend credit is no more observable than trend output, and the uncertainty bounds around the gap will be as large as those around the output gap.. Our papers which we refer to are provided as part of the Annex to this note. The proposal depends upon Borio and Drehmann (2009), henceforth BD, and Borio et al (2010). Our results are almost directly comparable to BD since we use the same estimation period (1980 – 2003) and countries bar Australia, Ireland, New Zealand and Switzerland, and we discuss the much wider country selection in Borio et al (2010).

Problems with Signal Extraction Robustness

The signal extraction methodology (henceforth SEM) is non-parametric so optimal indicators are chosen by minimising variants of loss functions which are dependant on the noise-to-signal ratio (NTSR). However for countercyclical provisioning against credit to be valid we suggest that SEM models should be able to pass these three resilience tests:

- (i) out-of-sample performance
- (ii) variable exclusion (testing down procedure)
- (iii) sample selection and country exclusion tests

(i) *Out-of-Sample Performance*

The decisive test of model validity is its out-of-sample performance; if credit really is robustly associated with banking crises, this relationship should also be stable out-of-sample. As far as we can see out-of-sample tests are only given by BD. If a signal is emitted, it is classed as correct provided a crisis materialises within 1, 2 or 3 years of the signal. Clearly, allowing for a longer horizon will raise the number of correctly called crises and in this sense improves model performance. In Barrell et al. (2010b) we assess out-of-sample accuracy using a one year horizon. However for direct comparison with BD, Table 1 gives our out-of-sample performances over all horizons.

Table 1: Comparison of Out-of-Sample Performances (Barrell et al. (2010b) vs. BD (2009)

1 year forecasting horizon		
	% Crises Correctly Called (1-Type I error)	% False Alarms (Type II error)
BD	29	38
Barrell et al (2010b)	75	2
2 year forecasting horizon		
	% Crises Correctly Called (1-Type I error)	% False Alarms (Type II error)
BD	57	36
Barrell et al (2010b)	75	16
3 year forecasting horizon		
	% Crises Correctly Called (1-Type I error)	% False Alarms (Type II error)
BD	57	35
Barrell et al (2010b)	75	6

Note: Out-of-sample period for both models is 2004 - 2008.

In terms of correctly called crises our model which excludes credit always outperforms BD over any forecasting horizon. Even if we allow for the most generous (3 year) horizon, our model calls 18% more crises correctly. This superiority also translates to the false alarm rate where the differences in model performance are even more dramatic. At best, the model using the credit-to-GDP can identify 57% of crises out-of-sample but more than one in three times the signal will be a false alarm. In contrast, a model which excludes credit can correctly predict 75% of crises out-of-sample with comparatively negligible cost: only 6 in 100 signals will be false alarms.

(iii) *Variable Exclusion (testing down procedure)*

Conventional hypothesis testing shows that credit growth and credit-to-GDP ratios do not directly raise the odds of a banking crisis in the OECD in our model. In contrast,

DBJT surmise that the credit-to-GDP gap outperforms their other indicators in terms of explaining crises. This conclusion is based on visual inspection of data and ranking of NTSRs (subject to identification of two thirds of crises in-sample).

Originally a univariate approach, the SEM models in the literature use indicators which are composites of three variables at best (BD) and at worst rely on a single indicator such as credit-to-GDP gaps in the case of the proposal (see also DBJT).

In the Barrell et al (2010a,b,c) series of papers, a wide set of variables are tested against each other to leave a model where variable *interdependencies* crucially determine the propensity to banking crises. In logit models the marginal effect of any explanatory variable is necessarily conditioned on the simultaneous behaviour of all other explanatory variables. For example, as Table 2 suggests, it is not the behaviour of property prices alone that matters, rather it is imbalances in property markets in conjunction with anomalies in current accounts that predispose economies to crises. By not taking such variable interdependencies¹ into account when advocating provisioning against credit, the proposal is essentially flawed and could result in sub-optimal regulation.

Table 2 OECD Crisis Determinants in Barrell et al (2010b)

Predictor	Coefficient	Predictor	Coefficient
Capital Adequacy	-0.34 (-4.1)	Real House Price Growth	0.08 (2.4)
Narrow Liquidity	-0.11 (-3.3)	Current Account Defecit (% of GDP)	-0.24 (-2.8)

Note: estimation period 1980-2008; z-statistics in parentheses; Narrow Liquidity-banks' net liquidity ratio, Capital Adequacy- banks' unweighted capital adequacy ratio.

We suggest that the best regulatory solution would condition capital against the primary macroeconomic drivers of crises which, like credit, are subject to business cycle effects. The advantage of this approach is that estimating the business cycle effect is unnecessary (this should be implicitly captured when explanatory variables behave sufficiently abnormally to raise crisis probabilities). Hence the first best solution would be to prevent house price bubbles and the second best solution would be to provision against bubbles themselves or against variables that drive house prices; credit availability would only be one of the set of such variables.

(iv) *Sample Selection and Country Exclusion Tests*

Borio et al (2010) use a wider range of countries to evaluate their credit gap, and they include mature and emerging markets. The same upper and lower buffer thresholds (U and L respectively) are applied to Latin American countries such as Brazil, Argentina and Mexico and Asian countries such as Indonesia. The proposal also includes Islamic banking systems (Saudi Arabia) alongside fundamentally different non-

¹ Moreover, variable interdependencies may be non-linear yet the SEM methodology cannot handle such interdependencies very well. typically NTSR functions behave like step functions which means the same NTSR may hold for a wide range of variable thresholds. This problem is compounded if composite indicators are constructed using variables that have different NTSR functions.

Islamic banking systems. It is not possible to test the presumption that behaviour is the same across these types of markets when SEM is used. In Davis, Karim and Liadze (2010) we have shown that crisis determinants differ across regions and banking system types: the causes of crises in Asia are not the same as those in Latin America². Consequently, average variable effects obtained by pooling heterogeneous economies can be misleading.

Causality Tests Between Credit And Property Price Growth

The suggestions in the proposal may stem from the observation that rapid credit growth precedes banking crises during a phase when collateral values are high and credit risk is improperly processed. Empirically many studies appear to find credit growth to be a leading banking crisis indicator: Demirguc-Kunt and Detragiache (1998, 2005) and Borio, Furfine and Lowe (2001) amongst others. However we argue that such estimations are incomplete because:

- (1) property prices and current account deficits were often not tested alongside credit growth which means (according to our results) that coefficients on the latter may have suffered from omitted variable bias;
- (2) many such studies relied on heterogeneous samples. Consequently estimations may have identified detrimental impacts of credit growth where property price bubbles were not a problem.

Besides our own estimates, other papers also do not find conclusive evidence for the role of credit growth in generating financial instability. Mendoza and Terrones (2008) found that credit booms often link to banking crises in emerging market economies but less often in OECD countries. In a study based on the Euro area and the US, Kaufmann and Valderrama (2007) note that “The mutually reinforcing effects of lending and asset prices contributing to the build-up of financial imbalances during boom periods is not confirmed in our model” for the Euro area³. Boyd et al (2001) investigate the behaviour of credit/ GDP ratios in 22 economies that experienced a single banking crisis and find unusual credit growth in only 6 of them whilst in 10 out of 21 economies rapid credit growth was not always followed by a crisis. For multi-crisis countries they also found that credit/GDP does not decline during crises.

As a consequence of our results which suggest house prices are more significant than credit growth and the ambiguous role of credit in the literature, in Barrell et al (2010c) we tested for relationships between real residential property prices and real domestic credit by looking for Granger causality around any cointegrating relationships and Granger causality in the first differences if cointegrating relationships are absent.

We found that a long-run relation exists between credit levels and property price indices in Denmark, Finland, France, Sweden and Italy but only in Finland is there any evidence that credit has recently caused property prices.

The Granger causality results in first differences for those countries where there is no cointegration⁴ show that credit growth leads property prices in Belgium and Canada. More commonly property price growth appears to Granger-cause credit growth as we would expect in liberalised financial markets. We therefore feel it is difficult to justify the provisioning rules contained in the proposal.

² see Table 11 therein

³ although reinforcement occurs to an extent in the US market based banking system.

⁴ see Table 11, Barrell et al., 2010c

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