

Financial Stability and Aggregate Credit: Session Discussion

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The views expressed here are my own and do not necessarily reflect the views of the Board of Governors or the staff of the Federal Reserve System.



Session papers

- Predicting distress in European banks
Presented by: Tuomas Peltonen, European Central Bank
- The credit-to-GDP gap and complementary indicators for macroprudential policy: Evidence from the UK
Presented by: Oliver Bush, Bank of England
- Equilibrium credit: The reference point of macroprudential supervisors
Presented by: Martin Melecky, The World Bank



Common themes

- Papers investigate forward-looking variables that:
 - Reflect building financial-system vulnerabilities; and, thus,
 - Might serve as leading indicators of episodes of financial stress/crisis or as yardsticks for policy actions.
- Peltonen *et al.* examine indicators of the distress at individual banks – in particular, European banks over 2007 to 2011.
- Bush *et al.* examine indicators of U.K. financial crises over the past half-century, with a focus on guiding the deployment of CCBs.
- Melecky *et al.* propose a method – alternate to the credit-to-GDP ratio gap – of measuring “equilibrium credit” and thereby gauging excess credit extension.



Common themes, continued

- Peltonen *et al.* and Bush *et al.* use some similar early-warning-indicator evaluation techniques – *e.g.*, AUROCs.
- To evaluate the usefulness of the indicator Peltonen *et al.* also take a loss-function based approach in which a policymaker assigns weights of μ and $(1-\mu)$ to types I and II errors.
 - Peltonen *et al.* consider all possible values of $\mu \in [0,1]$.
 - Bush *et al.* consider the extremes ($\mu=1$ and $\mu=0$) of this exercise.
- Bush *et al.* consider early-warning-indicator variable by variable, while Peltonen *et al.* consider an aggregate model-based variable.
- Peltonen *et al.*'s indicator variable is a model-based estimate of a bank's probability of distress based on conditions (i) at the bank; (ii) in the banking sector, and (iii) in the macrofinancial sector.



Macrofinancial variables and bank distress

- Peltonen *et al.*'s set-up allows them to consider the usefulness of different sets of variables in predicting a bank's future distress.
- They find that macrofinancial variables improve notably the ability of the model with only bank-specific-variables to predict distress.
- But cannot account for why macrofinancial variables (*e.g.*, asset-price and credit gaps) help predict distress. Do variables proxy for:
 - Loans at the bank being written with laxer underwriting?
 - More loans at the bank being tied to the overvalued asset?
 - A build-up of risks in the country's banking system to which the bank is then interconnected?
- The policy response will very likely differ depending on the reason.



Macrofinancial variables and bank distress, continued

- Stress tests are an alternative way to examine how macrofinancial variables can affect the financial condition of a bank.
 - They are more resource intensive.
 - They are more informative: They will illustrate how a macrofinancial risk will boost a given bank's distress probability.
 - However, if feedback across banks is not a feature of the stress test, they will miss the increased probability of distress that comes via interconnectedness with other banks in the country.
- Peltonen *et al.*'s model would still capture increased probability of distress coming from interconnectedness, even if the channels for macrofinancial variables affecting distress are not parsed out.
 - But if interconnectedness intensified, it would not predict well.



Structural change and focus on the recent crisis

- Structural change is an issue with any reduced-form analysis.
 - The model coefficients embed a lot of underlying features of banks and the banking-system.
 - If these change, the model may not predict distress very well.
 - Example: Hong Kong house prices and LTVs in the Asian crisis.
- Peltonen *et al.*'s model is quite oriented to the recent crisis.
 - This governs the choice of macrofinancial variables.
 - Given the specification of the model, it is then estimated in real-time and its out-of-sample predictive usefulness is evaluated.
 - Focusing the model on the recent crisis could limit its future predictive power: Could more crisis episodes be considered?

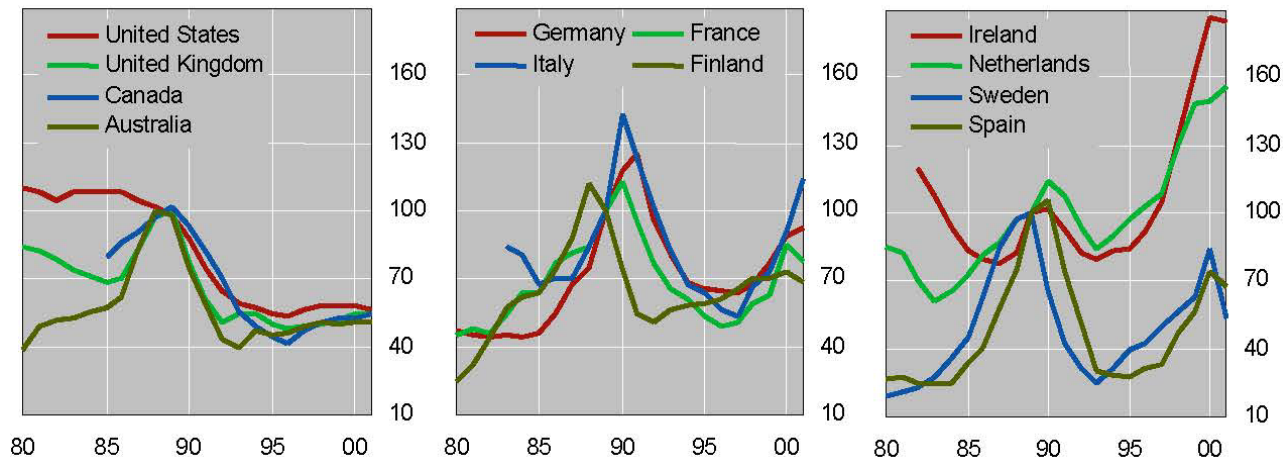


Structural change and focus on the recent crisis, contd.

- CRE prices are not included in the model.
 - These were important in many European countries in the early 1990s' banking crises and could be important in future crises.

Real commercial property prices

1989 = 100



Sources: Catella; Frank Russell Canada Ltd; Investment Property Databank Ltd (IPD); Jones Lang LaSalle; Ministère de l'Équipement, des Transports et du Logement; National Council of Real Estate Investment Fiduciaries (NCREIF); Nomisma; Ring Deutscher Makler; national data. Graph 1

- Question: Are the standard errors for the country-specific variables adjusted for clustering? If unadjusted, aren't they biased down?

Structural change from new policies

- Structural change is also a relevant issue for Bush *et al.*
 - Their indicator evaluation analysis is undertaken to inform the use of a new type of policy – countercyclical capital buffers.
 - They note the likely applicability of Goodhart's Law.
- How the signal ratio/noise ratio trade-off for an indicator variable will change if CCBs respond to the indicator is a critical question.
 - Addressing this will require a stochastic structural model.
- There are models linking indicator variables to financial distress.
 - In Adrian and Boyarchenko (2012) intermediary-sector leverage is linked to subsequent episodes of financial distress.
 - (Admittedly this is Bush *et al.*'s second poorest indicator.)



Structural change from new policies, continued

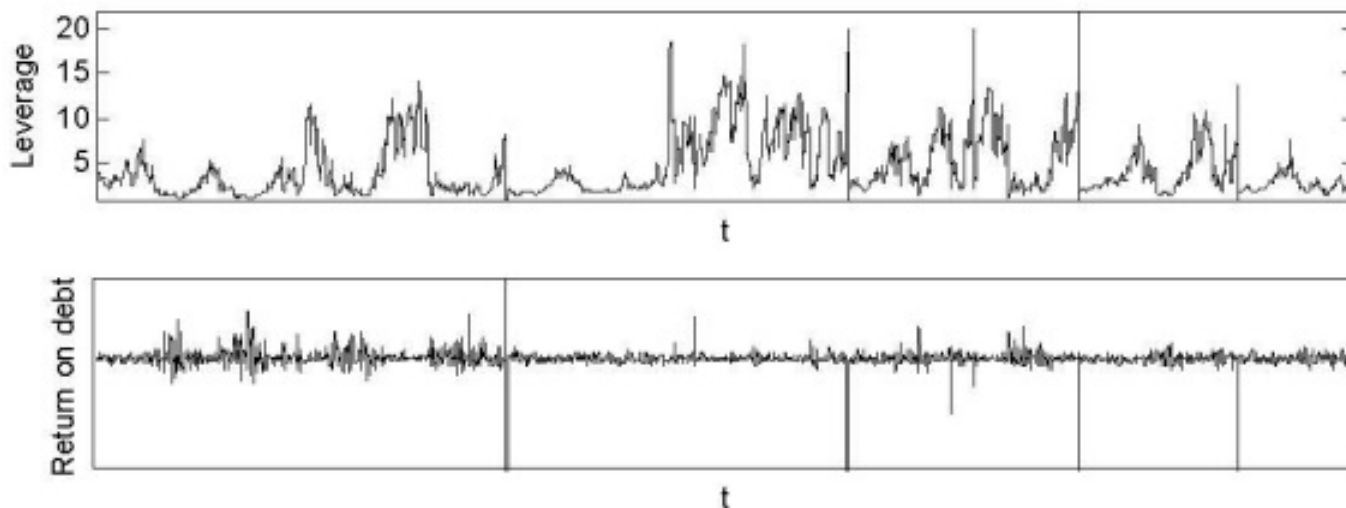


Figure 9 from
Adrian and
Boyarchenko
(2012, p. 24)

- Adrian and Boyarchenko note that while intermediary distress is usually preceded by high intermediary leverage ...
 - ... distress can occur even when intermediary leverage is relatively low (*i.e.*, type I errors)
 - ... intermediaries can maintain high levels of leverage without becoming distressed (*i.e.*, type II errors)



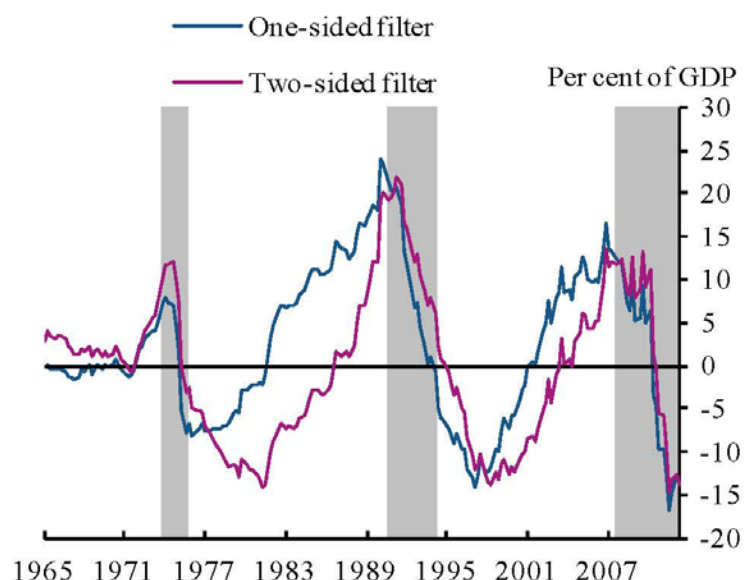
Structural change from new policies, continued

- A desirable trait for a structural stochastic model – parameterized to the current structure of the economy – is for it to be able to replicate signal ratio/noise ratio trade-offs like those in the data.
- Structural changes – including the introduction of new policies – could then be introduced to the model and implications for signal ratio/noise ratio trade-offs and thresholds could be analyzed.
- Once the policy was in place for a while – such that the indicator’s ability to predict crises was reduced – the policy reaction could be removed as a reminder of the contribution from policy.
- Knowing how a policy change, like CCBs, will alter the instructiveness of an indicator variable is a question of chief importance.



Real-time credit-to-GDP gap and CCB policy

- Bush *et al.* find that credit-to-GDP ratio gaps revise a lot in the U.K.
 - But argue that this is not an issue because real-time estimates in the past would still have served as useful indicators for policy.



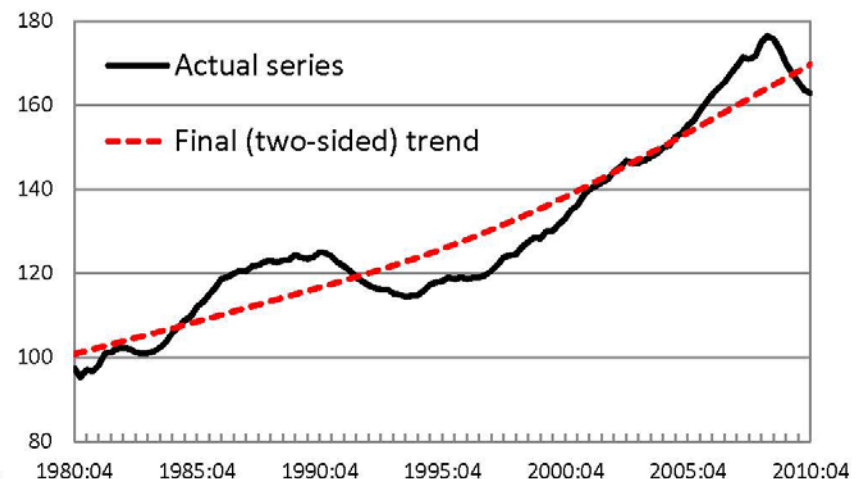
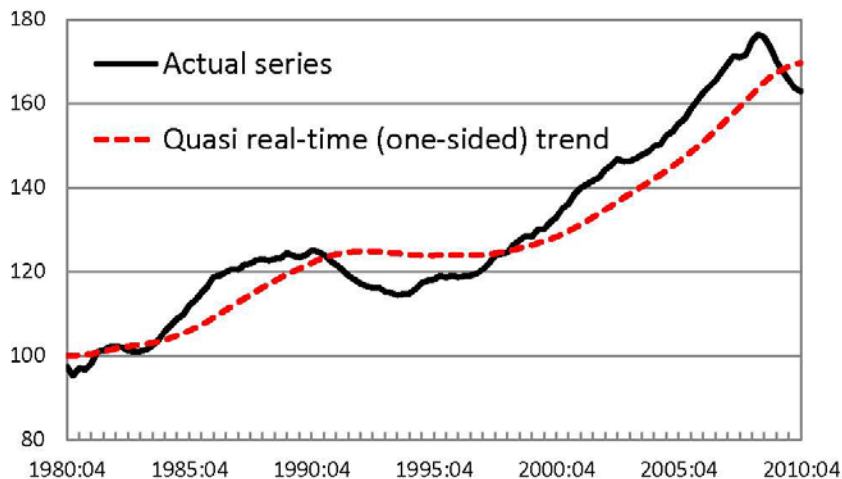
- The real-time credit-to-GDP gap is not the credit-to-GDP gap due to the HP filter's “unideal” real-time properties.
- One is really just looking at correlations between some transformation of the credit-to-GDP ratio and crises.
 - It seems risky to base policy on correlations.



Structural change from new policies, continued

- Bush *et al.* – citing Borgy *et al.* – suggest that the real-time gap is a better leading indicator.
- Since the real-time trend lags the actual series:
 - The actual series will cross the real-time trend earlier than the final trend; and,
 - The real-time gap will change its sign earlier.

US Credit-to-GDP Ratio



Real-time credit-to-GDP gap and CCB policy, continued

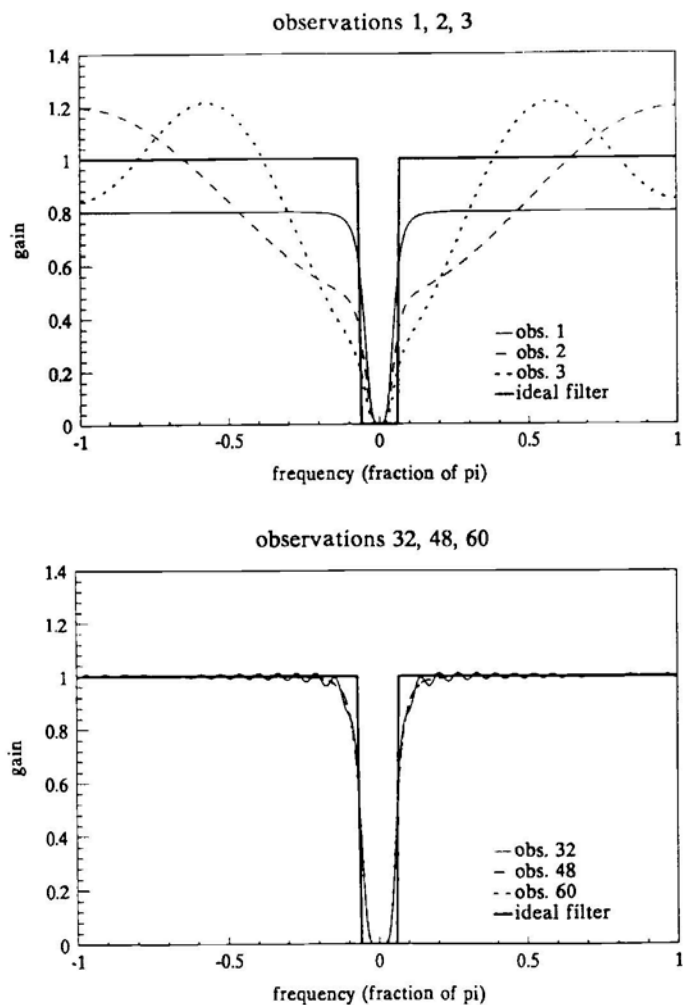


Figure 7 from Baxter and King (1995)

- These outcomes result from some fairly “unideal” properties of the HP-filter around its end points (see Baxter & King).
 - There is a phase shift at t near 1 and T .
 - The gain at the cyclical frequencies is different from one at t near 1 and T .
- The real-time leading indicator property is more of a “bug” than a “feature.”
- It is not clear why the unideal properties of the real-time HP filter are optimal from a forecasting perspective.
- Question: Might stochastic volatility trend-extraction models be helpful?



Motivation for the credit-to-GDP ratio

- Question: What is the motivation for the credit-to-GDP ratio?
- One interpretation is that it represents an economy-wide debt service ratio ...
 - ... Although, it includes the stock of credit and not the payments (interest and share of principal) implied by the stock of credit.
- Another interpretation is that it reflects the credit needed to support economic activity where ...
 - ... Anything below means credit acting as a drag on activity; while,
 - ... Anything above means credit is likely also fueling speculation.
- Melecky *et al.* consider the appropriate amount of credit given economic activity and propose a method – alternate to the credit-to-GDP ratio gap – to measure “equilibrium credit.”

Thinking about equilibrium credit

- Melecky *et al.* motivate their modeling of equilibrium credit by:

- Drawing parallels with transactions-based money demand:

$$M \times V = T \times P$$

- Noting the importance of credit-based transactions in the economy:

$$CR \times V = T \times P$$

- Linearizing and relaxing the unit elasticity on transactions (real GDP) and prices and specifying an equation for velocity:

$$cr_t - (\beta^{gdp} \cdot gdp_t + \beta^{defl} \cdot defl_t) = v_t, \text{ where } v_t = \beta^{rates} \cdot rates_t$$

- So giving a credit demand equation, later embedded in an ECM:

$$cr_t = \beta^{rates} \cdot rates_t + \beta^{gdp} \cdot gdp_t + \beta^{defl} \cdot defl_t$$

- They estimate this for many countries and examine β^{gdp} and β^{defl} .



Parallels with transactions demand for money

- There are similarities between money balances and credit that could justify the modified transactions demand for money set-up.
 - Both are stock variables with ties to economic transactions.
- But there are some salient differences too.
 - Credit seems much more tied to specific purchases.
 - Once used for a purchase, it is harder to see how credit can be re-used – would it not be capped by how much savers save?
 - The stock of credit in any year/quarter may reflect purchases made much earlier so weakening the link with current activity.
- The paper moves quickly from “ $M \times V = T \times P$ ” to “ $CR \times V = T \times P$.”
 - Further discussion on suitability of the parallel would be helpful.



Issues faced with money demand estimation

- The late 1970s/early 1980s literature estimating money demand wrestled with a number of issues that Melecky *et al.* are silent on with regard to their credit demand function.
- Major issue: When can money demand functions estimated with single-equation techniques yield identified elasticities?
 - Goldfeld-Sichel (1990): When money supply variables are independent of the money demand variables and of the money demand disturbance.
 - Cooley-LeRoy (1981): Without “incredible” identification stories, nothing is identified, everything is endogenous/simultaneous.



Issues faced with money demand estimation, contd.

- It is hard to see how the conditions for money demand identification will be satisfied by the credit demand function given that credit supply is likely not exogenous.

- Recall the credit demand function is:

$$cr-d_t = \beta^{\text{rates}} \cdot \text{rates}_t + \beta^{\text{gdp}} \cdot \text{gdp}_t + \beta^{\text{defl}} \cdot \text{defl}_t + \eta_t$$

- Although not explicitly specified, credit supply:
 - Almost certainly depends on interest rates and the price level.
 - Could very likely also depends on the strength of the economy given FIs' greater profitability, ability to build more capital, *etc.*

$$cr-s_t = \alpha^{\text{rates}} \cdot \text{rates}_t + \alpha^{\text{gdp}} \cdot \text{gdp}_t + \alpha^{\text{defl}} \cdot \text{defl}_t + \varepsilon_t$$

- Some discussion on identification seems warranted given the paper's structural interpretations of β^{gdp} and β^{defl} .

