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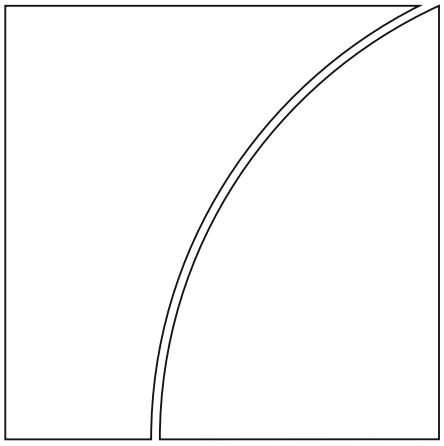

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Is the financial system sufficiently resilient: a research programme and policy agenda

by Paul Tucker

Monetary and Economic Department

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JEL classification: E44, E58, G28

Keywords: regulatory reforms, Basel III, great financial crisis

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Foreword

The 17th BIS Annual Conference took place in Zurich, Switzerland, on 22 June 2018. The event brought together a distinguished group of central bank Governors, leading academics and former public officials to exchange views on the topic "Ten years after the Great Financial Crisis: what has changed?". The papers presented at the conference and the discussants' comments are released as *BIS Working Papers No 790, 791, 792 and 793*.

BIS Papers No 103 contains Panel remarks by Mervyn King (former Governor, Bank of England) and Anne Le Lorier (former First Deputy Governor, Bank of France) and a resulting Panel discussion between Agustín Carstens and them.

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Is the financial system sufficiently resilient: a research programme and policy agenda

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1. Introduction

The hopeless inadequacy of the Basel-centred regime for financial stability exposed by the crises of 2007-8 and, in Europe, 2011-12 must surely count as one the most abject failures of the modern international liberal order, playing its part in calling into question public allegiance to the broader system of global governance that has prevailed since World War II. Given that, notwithstanding such disappointment, the task of redesigning the international financial system was entrusted mainly to officials meeting in Basel, it behoves insiders (current and former policy makers, including me) to cast a sceptical eye over the new construct. Far from declaring 'job done', the need for institutional atonement and legitimacy – plus, it might be added, organisational self-interest – point towards identifying and highlighting sins of omission and commission.

Those opening remarks are intended to jolt the reader. They do, however, capture the spirit in which I have approached the title of this session, "The resilience of the financial system," albeit at the risk of overstating weaknesses given the huge improvements in the regulatory regime since 2007/08.

The essay gives that issue two twists. One is to ask whether the system is as resilient as policymakers *say it is* (which I answer in the negative). The other is to explore what it would mean to operationalize, within a Money-Credit Constitution, recent theoretical discussions of "informationally insensitive" safe assets.[2]

With thanks to Svein Andresen, especially Steve Cecchetti, Darrell Duffie, Bengt Holmstrom, Anil Kashyap and Larry Summers for exchanges and/or discussions on various points; and to Gary Gorton and Nellie Laing for comments at the BIS research conference. I should make clear that I am speaking personally except where I quote from statements made by the Systemic Risk Council.

1 Chair/Systemic Risk Council, and Fellow/Harvard Kennedy School

2 At the BIS research conference itself, I gave greater prominence to the first question as the attendees were mostly in-office policymakers. This published version has been restructured to highlight the quite different strategies for delivering informational insensitivity, and the common question about boundaries they unavoidably all confront. On the idea of a Money-Credit Constitution, see Part IV of my *Unelected Power: The Quest for Legitimacy in Central Banking and the Regulatory State*, Princeton University Press 2018. On informational insensitivity, see Bengt Holmstrom "Understanding the role of debt in the financial system", Working Papers No 479, Bank for International Settlements, January 2015.

The essay has five sections:

1. Is today's financial system as resilient as policymakers say?
2. Informationally insensitive assets within a *Money-Credit Constitution*
3. How we (citizens) need to be able to track the course of stability policy given the current reliance on regulating and supervising capital adequacy
4. The alternative liquidity reinsurance-based strategy
5. The problem of defining the scope of 'banking/monetary intermediation' to which stability policy should apply.

2 How resilient is the system, and how resilient should it be?

In this first section my aim is to persuade the reader that the system was hopelessly feeble before the crisis; that it is now a lot more resilient, but not as resilient as policymakers say; and that our societies do not yet know how resilient the system should be. The focus throughout this section is firmly on equity requirements, because that has remained at the very centre of policy debates and measures.

2.1 A feeble starting point

There is little doubt that the system is a lot more resilient than it was before the crisis. But that is not saying much, as becomes apparent if the pre-crisis Basel 2 minimum requirement for banks' capital are converted into the matric of today's measure.[3] So:

- Basel 2 Tier 1 requirement against risk-weighted assets: 4%
    - of which, equity had to be 'predominant', meaning at least half, so a minimum *equity ratio* of: 2%
    - But intangible assets such as goodwill and deferred tax assets did not need to be deducted from common equity (but only from "Tier 1 capital"), and a Basel supervisors' committee study revealed that such assets typically accounted for around half of common equity. So the *tangible common equity* (TCE) requirement was: 1%
- Taking account of the then zero risk weight applied to 364-day lines of credit, and various other risk-weight deficiencies, the minimum TCE requirement was less than 1%
- The average risk weight across banks was around 50%, so the implicit leverage cap was north of 200x.

Once we recognise that banking's equity base had been allowed to become paper-thin, it is somewhat less surprising that problems in something as small as the US sub-prime mortgage market could bring about the near total collapse of international banking. Second, it helps to underline that this was at root a solvency

[3] Tucker, "Capital Regulation in the New World: The Political Economy of Regime Change", Yale, 1 August 2014.

crisis (incipient and then actual) rather than, as is still argued by some in the US, a liquidity crisis that the monetary authorities failed to check via lender-of-last-resort interventions. Third, it sheds light on the claims that if only we had had 'macro-prudential policy committees' during the 2000s all would have been well because, put broadly, they would have raised capital requirements as the credit boom progressed. Given the starting point, this was not a failure arising from the absence of 'counter cyclical' regulatory policy. It was a failure arising from flaky foundations, which no individual country could have corrected alone without being prepared to set equity requirements massively higher than the then Basel minimum.

That argument is framed in terms of minimum requirements rather than the capital adequacy of real-world banks. It would be good to recalculate bank TCE ratios as at, say, the beginning of 2007 on the basis of today's definitions, in order to discover how many banks were, in fact, operating at the regulatory minimum.[4] This would be expensive for banks and regulators, but without it policy debates that draw on time-series of bank capital ratios are lost in fog. Bluntly, I am amazed by the frequency of presentations that show equity ratios of around 5% or higher before the crisis.

2.2 Is the system now as resilient as policymakers say?

The realization that Basel 2 did not require banking to have much of an equity base at all puts into perspective reports that the Basel authorities have increased the minimum requirement by an order of magnitude. While those reports are strictly true, the question is whether the new TCE requirement of around 10% for big banks delivers as much resilience as policymakers say.

I am going to argue that it does not given changes in the macroeconomic environment since Basel 3 was calibrated. Specifically, I am going to suggest the goal posts for stability policy have been shifted by developments in the rate of technical progress embodied in the neutral real interest rate (r*).

My conjecture can be put crisply as follows:

- The lower the equilibrium real rate of interest (r*), the closer nominal interest rates will be to the effective lower bound, and so the less scope there will be for monetary policy to stabilize the economy. (That much is commonplace.)
- The less macro-economic stabilization there is, the higher loan impairments and defaults will be for a given adverse shock to the economy.
- The implication is that, as r* falls, more equity capital is needed in banks to ensure a given desired degree of system resilience.

Increasing the inflation target to raise the equilibrium nominal rate (i*) and so create more room for cuts is not a complete solution (and, in any case, has not happened). If r* has fallen recently because 'trend' growth is materially and persistently low, that will have two important consequences:

- Loans originated prior to the realisation that growth is low will be riskier than originally believed. As a result, they will be mispriced, and their risk-weights

[4] For a rare firm-specific study, see UK Financial Services Authority, 2011, "The failure of the Royal Bank of Scotland," pp.64-72. In the same vein, I understand that intangibles accounted for roughly half of Citi's pre-crisis common equity.

(based on a misrepresentative historical period) will be too low. Expected losses will be higher. To the extent that those higher expected losses are not written off, more equity is needed to absorb unrecognised 'expected losses' as well as the risk of greater 'unexpected losses'.

- Forbearance would work (even) less well than when growth was high, as there would be little or no scope for borrowers in general to grow out of debt overhang problems.

None of this was taken into account when Basel III was calibrated. The implication is that unless and until the macroeconomic arsenal is restored, bank equity capital requirements should be increased. This is one reason that the banking system is not as resilient as policymakers say: because the ground has shifted underneath their feet.

I will offer just a couple of elaborations on that blunt analysis. There is, as far as I can see, little research on the question of whether the steady state rate of technical progress should affect minimum equity levels for any given desired degree of intermediary resilience, but there is official sector work suggesting that there might well be the 'trade off' I am suggesting.

First, we can, perhaps, find some suggestive insights in the work of the Basel Macroeconomic Assessment Group (MAG) which reported to the Financial Stability Board and the Basel Committee on Banking Supervision on the likely macroeconomic impact of the transition to higher bank capital requirements.[5]

Among other things, its simulations compared the impact of the proposed capital reforms *with and without* an endogenous monetary policy response.

Big picture, the impact was around roughly 50 percent larger in the absence of a monetary policy response.[6] Can we interpret this as suggesting, more generally, that monetary policy can materially reduce the effects on economic output (and, therefore, on defaults) of shocks that drive credit spreads up and lending volumes down? If so, it lends some support to the notion that material constraints on the monetary policy response would reduce system resilience.

Second, and a little more directly, the Bank of England's 2017 stress test provides some useful information. It generated the following results:[7]

[5] Macroeconomic Assessment Group, Final Report, "Assessing the macroeconomic impact of the transition to stronger capital and liquidity requirements", December 2010. Briefly, a group of modelling experts from central banks and regulators in 15 countries and a number of international institutions addressed the following question: what is the impact on interest rate spreads, lending volumes and aggregate output from an increase in required levels of equity capital. The group was chaired by Steve Cecchetti.

[6] The baseline simulations, which allowed for monetary policy easing, predicted that, per percentage point increase in the target ratio of common equity to risk weighted assets, lending spreads would rise 16.6 basis points, lending volumes would fall 1.1 percent in lending volumes, and GDP would decline 0.21 percent in the short run. Without a monetary policy response, the fall in output was on average 0.34 percentage points per percentage point increase in the capital ratio. (These are the GDP-weighted medians at a 35-quarter horizon reported in Table 1 on page 5 and Graph 2 on page 6 of Macroeconomic Assessment Group (2010).)

[7] 'Stress testing the UK banking system: 2017 results', November 2017, available at: https://www.bankofengland.co.uk/stress-testing/2017/stress-testing-the-uk-banking-system-2017-results.

- An increase of 3.75pp in interest rates accounted for an additional asset impairments of some £10bn for the seven participating banks over the first two years of the stress, accounting for around 20% of total losses.[8] My comment: it might be inferred that a cut in rates would reduce impairments by at least as much given that accommodative policy tends to encourage forbearance
- The BoE stress scenario generated impairments roughly in line with those incurred during the Great Financial Crisis even though higher rates were assumed.[9] My comment: given that the starting point for asset quality would have been higher in 2017 than in 2007, this suggests that the substantial monetary policy easing during the crisis had a substantial effect on impairments, and hence that impairments would have been materially higher if monetary policy had been switched off.

Summing up, at the very least, it would be worth researchers exploring whether banks have updated their estimates of expected loss, probability of default and loss-given-default for the prospect or risk of a world characterised by low growth and weaker macroeconomic stabilization policy. But I would urge policy makers to go further, working out how much higher they should set minimum equity requirements in order to achieve the degree of resilience implicit in the Basel 3 calibration. Meanwhile, I suggest that the banking system cannot be as resilient as policymakers say.

2.3 Is there a long-term trade-off between resilience and dynamism?

If it is reasonably clear that the system is not as resilient as claimed,[10] how resilient it should be is a much more difficult question. That is not just for technocrats. If there are important trade-offs, unelected technicians need to help frame the big question in a digestible way for politicians and public debate.

Staying with crisp oversimplification, I think the problem can be put as follows:

- Economists and policymakers do not know much about this. Models and empirics are needed.
- Plausibly, as BIS research suggests, credit and property price booms lead resource misallocation booms?[11] Does that damage long-run growth?
- Even if it does, might those effects be offset by net benefits from greater entrepreneurship during booms?[12]

[8] See Box 6, page 38 in "Stress testing the UK banking system: 2017 results".

[9] See Box 5, page 37 in "Stress testing the UK banking system: 2017 results". The BoE also note that higher rates enhance net interest income. I recall this featuring in prototype stress tests conducted by the IMF with the BoE in the early 200s. Policymakers would do well to treat them with caution: "bad things happen, banks make money" is not a robust or prudent input into resilience stress testing.

[10] Another reason for believing this is set out in a later section of this essay.

[11] Borio, Claudio, E. Kharroubi, C. Upper and F. Zampolli. "Labour reallocation and productivity dynamics: financial causes, real consequences." BIS Working Papers No 534, Bank for International Settlements, December 2015.

[12] For example, William H. Janeway, "Doing Capitalism in the Innovation Economy: Markets, Speculation and the State," Cambridge University Press, 2012.

- Would tough resilience policies constrain capital markets in ways that impede the allocation of resources to risky projects and so growth?

If there is a long-run trade off, then where people are averse to boom-bust 'cycles', resilience will be higher and growth lower. By contrast, jurisdictions that care more about growth and dynamism will err on the side of setting the resilience standard too low.

Does the importance of international policy making in this field,[13] mean that the latter are the marginal policy-makers? And if so, does that help to explain the penchant for 'dynamic macropru policy' outside the US (which up to now has been super-equivalent to Basel minima)?

Put another way, is the weight placed upon central bankers and others using regulatory policy (and perhaps even monetary policy) to lean against credit booms a rational consequence of not wanting to constrain finance in the interests of public welfare or a malign consequence of bending to finance's private interests. We cannot get far with these questions until we have a better understanding of what trade-offs policymakers truly face.[14]

3. Information-insensitive safe assets under a Money-Credit Constitution

Pending a research breakthrough, we appear to be stuck. So I want to step back to discuss what it is that policymakers are or should be trying to achieve, beginning, since this is a BIS conference, with a sketch of the broad framework within which unelected independent central bankers should think about their role and responsibilities.

3.1 A tiered payments-monetary system

In our modern economies the payments system, and hence the monetary system, is tiered.[15] Most people hold most of their money in the form of balances held on account with private banks, some big, some international, some local and small. Since people and firms do not all bank with the same bank, those banks need to settle claims amongst themselves. Smaller banks might do so by holding accounts with a bigger bank (*clearing banks* in Britain, *money center banks* in America). Those bigger banks in turn settle amongst themselves across the central bank's books, and so in central bank money, the economy's final settlement asset, making the central bank,

[13] Cecchetti, Stephen G. and Paul Tucker. "Is there Macro-Prudential Policy without International Cooperation?" In *Policy Challenges in a Diverging Global Economy*, Proceedings of the Asia Pacific Policy Conference, edited by R. Glick and M. Speigel, eds., Federal Reserve Bank of San Francisco, November 2015.

[14] In this context, some point to the 19th century as a period when technical progress was high but bank leverage low. But the papers I have seen on this do not take account of off-balance sheet finance provided by banks, notably via the massive bankers' acceptance market. I am not convinced we know much about leverage during that period.

[15] See Tucker, "The Political Economy of Central Banking in the Digital Age." SUERF Policy Notes, No. 13, June 2017. https://www.suerf.org/docx/f_af21d0c97db2e27e13572cbf59eb343d_1105_suerf.pdf

in the words of Francis Baring two centuries ago, the pivot of the system of money and credit.

Households and businesses might be able to overdraw their bank accounts, and similarly the smaller banks might be able to borrow on demand from the bigger banks. But the big banks would have to overdraw with the central bank if they did not hold enough reserves there to settle up with their peers. This defines both the private and public parts of the monetary system:

- banks are in the business of providing liquidity insurance, via demand deposits and committed lines of credit; and
- central banks are in the business of providing liquidity reinsurance to banking.

This multi-tier system of liquidity insurance is socially valuable because it means households and businesses do not have to self-insure, releasing resources for risky projects, some of which help to drive or exploit technical progress.[16]

Under this system of fractional-reserve banking (FRB), it is also trivially true that the monetary liabilities of the private banking system are partly created by their lending. They do not arise solely from members of the public or small shopkeepers going to their bank and handing over central banks' bank notes. More important, in terms of scale, is banks' lending: every bank loan creates a deposit liability somewhere in the system.[17] When a bank's deposits are no longer accepted as money, it cannot function as a lender, liquidity insurer or provider of payments services. When the whole of the banking system is no longer trusted, bank lending ceases and the payments system freezes.

A few things are worth saying about this set up:

- the allocation of credit is (largely) separated from the state (the political choice I take to underlie FRB's existence);
- the private part of an economy's monetary system and its credit system are unavoidably intertwined; and in consequence,
- the central bank is called into existence as the lender of last resort, as recognised by Baring when he referred to Threadneedle Street as the *dernier resort*.

[16] If the likelihood of deposit withdrawals and credit-facility draw-downs are not highly correlated, the aggregate benefits increase, as resources would be released for risky projects. Kashyap, Rajan and Stein, "Banks as Liquidity Providers: An Explanation for the Coexistence of Lending and Deposit-taking." *Journal of Finance* 57 /1. 33–73, 2002.

[17] A 2014 article by my former colleague Ryland Thomas has been welcomed in parts of the US scholarly community as overturning orthodoxy about the very nature of the monetary system. This is, frankly, weird as what Thomas describes was orthodoxy at the Bank of England well before I joined in 1980. McLeay, Radia and Thomas, "Money creation in the modern economy", Bank of England Quarterly Bulletin, 2014 Q1.

3.2 What central banks are for: monetary system stability

All that would have been orthodoxy when I started out in central banking in 1980. As Paul Volcker put it in the siren words of a valedictory lecture to his international peers:[18]

> *"I insist that neither monetary policy nor the financial system will be well served if a central bank loses interest in, or influence over, the financial system."*
>
> *Paul Volcker, 1990*

After becoming obscured during the decade leading up to the 2007 liquidity crisis, that wisdom was firmly re-established as orthodoxy after the system more or less completely collapsed in late 2008. Banking stability is integral to the stability of the monetary *system*. The public policy objective of preserving a stable financial system, able to provide the core services of payments, credit and risk insurance in all weathers, is not completely separable from monetary stability, because it is largely the stability of the private part of an economy's monetary system, the banks, that is at stake.

When thinking about monetary policy, the relevant features of money are its function as a numeraire (unit of account) and as the final settlement asset. When considering financial stability, the relevant feature of money is safety (including liquidity). Indeed, we should think of the social purpose of central banking as *monetary system stability*, with two components:[19]

- stability in the value of central bank money in terms of goods and services; and also
- stability of private-banking system money-like liabilities in terms of central bank money (a public-to-private-money exchange rate of unity).

The former is simply conventional price stability. By contrast, the latter implies that the aggregate supply of monetary services to the real economy (payment transfers, liquidity insurance, credit) remains tolerably intact through distress. That does not mean that individual banking intermediaries cannot be allowed to fail but, rather, that their failure should not materially impede the supply of monetary-like services from the system as a whole. This amounts to *systemic resilience*.

We have, then, a monetary system in which the private part is vital but inherently unstable; and in which the public part, the monetary authority, has both latent fiscal capability and, as regulator, law-setting power. The public policy mission of monetary-system-stability needs to be underpinned, therefore, by constraints not only on private banking but also on central banking.[20]

[18] Volcker, Paul. 1990. "The Triumph of Central Banking?" The 1990 Per Jacobsson Lecture, Per Jacobsson Foundation.

[19] This fed into the UK's post-crisis reforms: Tucker, Paul. 2009. Remarks at the *Turner Review* Conference. Bank of England. London. March 27.

[20] In Unelected Power, I have set out Principles of Delegation to guide the constraints that, given our political values and the need for incentive-compatibility, should bind an independent central bank (and other politically insulated agencies). For the current paper, above all they must include each of the two legs of the monetary mission having an objective, set by elected politicians, that is clear and can be monitored publicly.

3.3 A Money-Credit Constitution

Taken as a package, that bundle of constraints would amount to more than a *monetary constitution* of the narrow kind advocated by the late James Buchanan.[21] We cannot pretend that fractional-reserve banking (and its relatives) does not exist. Instead, each economy needs a *Money-Credit Constitution (MCC)*.[22]

This notion would have been familiar to our 19th century and early-20th century predecessors. Their money-credit constitution comprised: the gold standard; plus a reserves requirement for private banks (an indirect claim on the central bank's gold pool); plus the lender-of-last-resort function celebrated by the mid-19th century British journalist Walter Bagehot. That package was deficient in so far as it did not cater explicitly for solvency-crises as opposed to liquidity-crises. Worse, as our economies moved to embrace fiat money during the 20th century, policymakers relaxed the connection between the nominal anchor and the binding constraint on bank balance sheets so comprehensively that it became non-existent.

At a schematic level, a *MCC* for today would have five components:

- a target for inflation (or some other nominal magnitude);
- a requirement for banking intermediaries to hold reserves (or assets readily exchanged for reserves) that increases with a firm's leverage and/or the degree of liquidity mismatch between its assets and liabilities;
- a liquidity-reinsurance regime for fundamentally solvent banking intermediaries;
- a resolution regime for bankrupt banks and other financial firms; and
- constraints on how far the central bank is free to pursue its mandate and structure its balance sheet, given that a monetary authority by definition has latent fiscal capabilities.

For this paper, the question is what constraints on banking need to be embedded by an economy's MCC in order to deliver systemic resilience. Broadly, they would take the following shape:

- x% of the face value of short-term liabilities (S) to be 'covered' by unencumbered holdings of 'liquid' assets eligible at the central bank Window, discounted to the value attributed to them by the central bank (d.LA);[23]
- residual assets, comprising the discount on the value of assets eligible at the central bank Window ((1-d).LA) plus assets ineligible at the central bank (UA), to be funded by some combination of
    - common equity (K)

[21] For a late statement, see Buchanan, James M. "The Constitutionalization of Money." Cato Journal 30, no. 2 (2010): 251–58.

[22] See Tucker, Unelected Power, chapter 20; and The Design and Governance of Financial Stability Regimes: A Common Resource Problem That Challenges Technical Know-How, Democratic Accountability and International Coordination. CIGI Essays on International Finance, volume 3, 2016.

[23] I will generally refer to these assets as eligible assets rather than as liquid assets, because their defining feature is that they are liquefiable, at a discount, at the central bank rather than that they are liquid in private markets. During the Basel 3 negotiations, some countries wanted all assets eligible at the central bank to be counted as "liquid" for regulatory purposes. That makes sense as a policy only if x = 100%. See below.

- bonded debt that converts into equity when equity ratios fall a little below some prescribed level ('recovery bonds', R)
- bonded debt that can be converted, via a resolution process, into equity without disruption (known as bailin-able debt, B),
- any 'uncovered' short-term liabilities ((1-x).S), and
- other liabilities (L).

- K and B to be in prescribed minimum proportions, which increase with the riskiness and lumpiness of an intermediary's asset portfolio.

The resulting identities are:

- Obviously, total assets equal total liabilities, so LA + UA = E + B + R + S + L
- Discounted eligible assets equal covered liabilities, or d.LA = x.S
- 'Uncovered liabilities', meaning debt liabilities not subject to central bank liquidity insurance, would be equal to (1-x).S +L + B + R.
- The resulting leverage ratio is (LA + UA)/E

The weight placed on each of E, B, x etc effectively characterizes the chosen banking-resilience policy strategy. But how are we to decide? This is where the idea of informational insensitivity proves useful for high-level policy analysis.

3.4 Taking informational insensitivity seriously

According to how I framed the high level purpose of monetary system stability, the regulatory cocktail needs to live up to the following goal: an exchange rate of unity between public and private money-like liabilities. That requires *some* of the liabilities (but not E, R or B) of *some* intermediaries to be regarded as safe as *a matter of shared faith* among the community of holders and users; faith that most of the time is immune to a lot of information, so that actual and potential holders do not spend time and effort seeking and analysing information relevant to the instrument's safety; but faith that is liable to be shattered by a devastating revelation.

Theorists have called that "information insensitivity", and it was the subject of Bengt Holmstrom's paper at an earlier BIS research conference.[24] Plainly, that state of affairs can obtain if (but not only if):

- an instrument is formally backed by the state
- the state is economically strong enough for its backing to be credible financially
- the state is operationally capable of paying up rapidly, and can be trusted to do so.

Those conditions obtain for insured deposits in fiscally sound economies (with trustworthy and competent government). But the first obviously does not apply to any of the uninsured liabilities of banks (the uncovered ((1-x)) part of S, and L above); nor to any of the money-like liabilities of intermediaries that, in law, are not banks. To treat banking and its various relatives as safe is, therefore, to believe either that the state will back (some) uninsured liabilities *ex post* or, alternatively, that they really are

[24] Holmstrom, op cit.

safe. Since the former course was emphatically rejected by the post-crisis reformers, the big question is whether enough has been done to deliver the latter.

Instrumentally, this can seem to amount simply to asking whether, in the terms of the above schema, x, E and B are sufficiently high. But the bigger question is, in fact, one of strategy: whether to place the regime's weight on regulatory requirements that impose intrinsic resilience on bank balance sheets or on credible crisis management that delivers safety *ex post*. It is a choice with very different implications for transparency.

4. Strategy 1: Relying on regulating and supervising the adequacy of banks' equity

4.1 Prophylactic policy and the problem of supervisory opacity

Short of transforming finance by banishing debt, no equity requirement for banks can be guaranteed to suffice in all weathers. Instead, the authorities set a regulatory minimum they think will be adequate in most circumstances and supervise intermediaries to check whether they are exposed to outsized risks.

Implicitly (and, as I have argued elsewhere, in the interests of legitimacy, much better explicitly), this requires authorities to specify a *standard of resilience*: broadly, the polity's tolerance for crisis.[25] In a way, that is what the G20 Leaders did when they endorsed Basel 3. Then what?

How did we know that firms are really satisfying the standard: is it enough that they say so? And how do we know that the authorities themselves have not quietly diluted or abandoned the standard?

4.2 The problem of opacity in sup and reg

Transparent stress testing of intermediaries certainly helps, and is the first major advance in prudential technology for a couple of generations. But my work at the Systemic Risk Council has left me feeling that it might be insufficient.

My concern can be summarised thus:

- It is very hard to know what stability policymakers are up to compared with, say, monetary policymakers, as what they do is so detailed and intricate
- Therefore, whereas the industry will make a noise if policy is tightened, it is hard for anyone outside the regulated community to know whether regulatory and

[25] Unelected Power, chapter 21. That is a more limited role than some advocate or hope for. In the current state of knowledge, no one knows how to set an objective for dampening credit or leaning against asset-price booms that is likely to be both worthwhile and monitorable. The view that central banks should actively manage the credit cycle is, for the moment, to make a case for ending the independence of central banks. This does not preclude dynamic regulatory policy to maintain a desired degree of system resilience in the face of shifting vulnerabilities, but it does preclude tweaking policy when the resilience of the system (maintaining the private/public monetary exchange rate) is not in doubt.

supervisory policy is being materially relaxed over any period, impairing the resilience of the system

- To the extent that regulators/supervisors or their political overseers are captured by the industry, they have incentives to exploit this, softening policy in ways that will not be detected
- This creates a risk of the system's resilience being undermined by a thousand small cuts.
- Over time, people learn about that risk, relying less on supervisory effectiveness than on the prospect of being bailed out by the state.
- That undermines the public policy purpose of a Money-Credit Constitution: to deliver safe assets without a state safety net beyond insured deposits.

This problem, which it should be said a few policymakers occasionally allude to, is now linked in my mind with the absence of an active lobby for financial stability of the kind that exists for, say, the environment. In consequence, outside the industry and the authorities, almost nobody has the resources to detect whether a tweak to one rule here and another there, to obscure parameters in stress-testing models or in supervisory practices can, when taken together, add up to something that matters.

My proposal is as follows:

- each year central bank staff (not policymakers) should publish a complete statement of all relaxations and tightenings of regulatory and supervisory policy (including in stress testing models, rules, idiosyncratic requirements, and so on)
- the integrity of such assessments should be subject to external audit of some kind (possibly by the central auditor for the state).

I do not expect this idea to be welcomed by serving policy makers. More important given this essay's themes, such transparency seems necessary to give credibility to the assertion the regulatory and supervisory policy are making ostensibly safe assets safe. Otherwise, having in our discussion of the first strategy put questions of safety-net policies aside, liability holders are left simply having to trust the professional skill-cum-integrity of prudential supervisors. I assert that, once we open our eyes to the risk of capture, that is more likely if we can see what they are doing.

5. Strategy 2: making assets informationally insensitive via crisis-management regimes

The second strategy family starts at the opposite end of the problem: whether information insensitivity can be delivered by a formal and credibly delimited safety net without resorting to blanket fiscal bailouts of fundamentally insolvent intermediaries.

5.1 Strategy 2a: Relying on x (integrating LOLR and liquidity policy)

Perhaps the biggest question for central bankers (and their political overseers) is whether, as the suppliers of emergency liquidity assistance, they want to make short-

term liabilities informationally insensitive by requiring intermediaries to hold reserves or eligible collateral against all runnable liabilities.

This would be a special version of the MCC set out above, which involved banks having to cover x% of short-term liabilities with reserves and/or eligible collateral. Where x is set at 100%, the result is full liquid assets cover for short-term liabilities.[26]

Under such a scheme, ongoing industry lobbying (and associated political pressure) would be directed at the definition of 'short term liabilities', the population of instruments eligible at the Window, and the level of haircuts set by central banks.

Certainly, haircut policy would be absolutely central under this regime. If longer-term and so uncovered debt liabilities (L, B and R) were banned, the amount of tangible common equity (tangible net worth) a bank had to carry would be equal to the value of the excess collateral required by central banks plus the value of any assets that were not eligible at the Window (UA).[27] In other words, central banks' haircut policy plus the value of a licence to hold ineligible assets would determine the level of equity.

Where banks were also barred from holding assets ineligible at the Window (zero UA), the policy strategy would amount to allowing money-financed maturity transformation and credit intermediation only into those assets deemed sufficiently comprehensible and/or socially useful to be eligible at the central bank.[28]

Haircuts would obviously need to take account of the riskiness of the various eligible assets, as otherwise the central bank would be granting a subsidy and would be overly exposed to the risk of incurring losses. A major policy question, therefore, would be the level of confidence the state would want that they would prove sufficient *ex post*.

Since haircuts matter only where a borrower has defaulted, they would need to be set for stressed circumstances. Further, where spill-overs from a firm's failure would exacerbate problems in the economy and markets, there would need to be an add-on to the haircut. Haircut policy thus becomes the broad analogue of the existing risk-weighted equity requirement based on stress testing and systemic-risk

[26] An idea of this kind was first floated in the Bank of England when, before the Great Financial Crisis, we were thinking about contingency plans for a 9/11-type disaster. A permanent version, structured as a public facility, is advocated by Mervyn King in his End of Alchemy, chapter 7, pp. 269-281. My analysis of how it would work differs somewhat, but the broad thrust is similar.

[27] Repos in ineligible assets would be banned. This would not rule out allowing banks to conduct private-market repos in central-bank-eligible assets at haircuts below the central bank's haircut (d) provided that the excess borrowing was subject to the unencumbered coverage requirement. Haircuts would need to be kept under review for material news on the economy. A major policy question would be the level of confidence the state would want that they would prove sufficient ex post.

[28] The so-called US Volcker Rule banning banks from proprietary trading and investing in hedge funds can be thought of as a partial bar on UA. Letting collateral haircuts determine equity requirements is, in broad effect, one of the policy proposals in Jeremy Bulow and Paul Klemperer, "Equity Recourse Notes: Creating Counter-Cyclical Bank Capital." Economic Journal, Feature Issue, Vol. 125, Issue 586, pp. F131-F157, 2015. Their paper is more specifically about a special version of R-type capital instruments.

surcharges. It would need to be kept under review for material news on the economy.[29]

5.1.1 The insufficiency of x=100%

It is easy to fall into the trap of thinking that making x=100% renders insolvency irrelevant. In fact, a policy of completely covering short-term labilities with central bank-eligible assets would leave *uninsured* short-term liabilities safe only when a bank was sound. They would *not* be safe when a bank was fundamentally *un*sound.

That is because central banks should not (and in many jurisdictions cannot legally) lend to banks that have negative net assets (since LOLR assistance would allow some short-term creditors to escape whole at the expense of equally ranked longer-term creditors). This is the MCC's financial-stability counterpart to the "no monetary financing" precept for price stability.[30]

Since only insured-deposit liabilities, not covered but uninsured liabilities, are then safe *ex post*, uninsured liability holders have incentives to run before the shutters come down, making their claims information sensitive after all.[31]

More generally, the lower E, the more frequently banks will fail when the central bank is, perforce, on the sidelines. This would appear to take us back, then, to the regulation and supervision of capital adequacy, but in a way that helps to keep our minds on delivering safety *ex post* and so information insensitivity *ex ante*.

5.2 Strategy 2b: Relying on x and B

5.2.1 Resolution policy: making operational liabilities info insensitive via structure

This brings us to resolution policy. The objective of resolution regimes can reasonably be described as to make informationally insensitive the *operational* liabilities of operating banks, dealers and others. By "operational liabilities" I mean those liabilities that are intrinsically bound to the provision of a service (eg large deposit balances, derivatives transactions) or the receipt of a service (eg trade creditors) rather than liabilities that reflect a purely risk-based financial investment by the creditor and a source of funding/leverage for the banker or dealer. This separation of operational

[29] Given international and cross-border banking, some kind of international accord would be needed on minimum-haircut policy. The lower the confidence interval that underpinned the international minimum, the more there would need to be dynamic adjustment of haircuts in response to economic news. That would replicate the conditions for dynamic macro-prudential policy discussed earlier in the main text.

[30] The important distinction between fundamentally sound and unsound borrowers arises because time-subordination exists while a firm is alive but not when in bankruptcy. Upon entry into bankruptcy, some debt claims are accelerated by their contractual terms and, more generally, liquidators are not permitted to pay out to short-term creditors if longer term creditors of the same seniority would be left worse off as a result. On the "no lending to fundamentally unsound firms" precept and the insufficiency of good collateral, see Unelected Power, chapter 23, and Tucker, "The Lender of Last Resort and Modern Central Banking: Principles and Reconstruction." BIS Papers, No. 79, Bank for International Settlements, 2014.

[31] King, op cit, effectively argues, p. 269 onwards, that setting x=100% gets over the problem of assessing solvency. That is not so because, as summarised above, term creditors have improved claims in bankruptcy precisely because there is no time-subordination.

from purely financial liabilities is made feasible through a combination of bail-in powers for the authorities and, crucially, restructuring large and complex financial groups to have pure holding companies that issue the bonds to be bailed-in. Here is how I put it a few months after leaving office:[32]

> *"Bonds…issued from pure holding companies [are] a device to achieve structural subordination..., putting beyond doubt that they absorb losses after group equity holders but before anyone else. Everybody else would be a creditor of one or other of the various operating subsidiaries. They would have a prior claim on the cash flows generated by the underlying businesses."*

In other words, provided that the ailing operating companies (opcos) can be recapitalised through a conversion of debt issued to holdco (ie the B is big enough), the opcos never default and so do not go into a bankruptcy or resolution process. While there might be run once the cause of the distress is revealed, the central bank can lend to the recapitalised opco: ie *a high x and B combine to generate information insensitivity*.

This turns on creditors and counterparties of opcos caring only about the sufficiency of the bonds issued to the holdco; they do not especially care about any subsequent resolution of the holding company. That is not achieved, however, where the bonds to be bailed in (B) are not structurally subordinated. In that respect, some major jurisdictions seem to have fallen short:

- Many European countries have opted not to adopt structural subordination, but instead have gone for statutory subordination (eg Germany) or contractual subordination (eg France).
- In consequence, a failing opco will go into resolution
- This entails uncertainty for opco liability holders given the risk of legal challenge etc
- Therefore, opco liabilities under those regimes will not be as informationally insensitive as would have been possible.

While high liquidity coverage (high x) would enable the central bank to absorb a creditor run on an opco restored to solvency through the conversion/write down of stutory/contractual bail-in bonds, that would not directly address the risk of a run by derivative and other market counterparties from an entity in a special legal proceeding.[33]

Given the huge inter-connectedness of the international financial system, this is another reason for concluding (see above) that banking might well not be as resilient as implied by policymakers. But the point of emphasising this point in a discussion of options for delivering 'safe' assets is that the choice between structural, statutory and

[32] Tucker, "The Resolution of Financial Institutions without Taxpayer Solvency Support: Seven Retrospective Clarifications and Elaborations", European Summer Symposium in Economic Theory, Gerzensee, Switzerland, 3 July 2014. http://paultucker.me/wp-content/uploads/2015/06/Berne-Switzerland-The-resolution-of-financial-institutions-without-taxpaer-solvency-support.pdf. While in office, I chaired the FSB steering group on resolution.

[33] Discussion of crises tends to neglect counterparty runs (as opposed to liquidity runs), even though counterparty runs were a big deal in the crisis of autumn 2008.

contractual subordination should be seen not narrowly in terms of simply being able to write down and/or convert deeply subordinated debt into equity, but rather more broadly in terms of rendering the liabilities of operating intermediaries informationally insensitive. The information that investors and creditors need is not the minutiae of the banking business but the corporate finance structure that enables resolution without opcos formally defaulting or going into a resolution process themselves.[34]

If, therefore, some jurisdictions stick with contractual or statutory subordination of bonds (B) that, after equity, provide gone-concern loss-absorbing capacity, they ought also to adopt policies that constrain the creditor hierarchy of operating banks with much greater granularity. The EU's introduction of insured-deposit preference after the Cyprus crisis muddle is a useful step in the right direction. But it seems likely that when politicians and policymakers confront future bank failures, they will realise that they are not indifferent to the treatment in bankruptcy of other liabilities.[35]

Albeit in more remote circumstances, the same goes for jurisdictions that have mandated pure holdco structures, as even there operating companies will go into resolution if ever loses are too big for the conversion/write down of internal TLAC instruments (B) to recapitalize a distressed bank or dealer.

The policy conclusion of this part of the discussion, then, is that in order to deliver information insensitivity for some of the liabilities of operating banks and dealers, policymakers should:

a. move towards requiring that all short-term liabilities be covered by assets eligible at the central bank; and, given that that alone cannot banish bankruptcy,

b. be more prescriptive about corporate structures and creditor hierarchies since they matter hugely in bankruptcy and resolution.[36]

Against that background, I can turn to the very thorny question of which intermediaries should be regulated in that broad way.

[34] For the same kind of reasons, creditors of the UK's "Vickers ring-fenced retail banks" can be largely indifferent to information concerning the health of the rest of the group. That at least is the underlying principle. Elsewhere I explained that while in office I supported ring-fencing because it acts as a scorched earth fall back if SPE resolution of a group as a whole does not work for some reason. Independent Commision on Banking, "Final Report: Recommendations," September 2011. The Commission was chaired by Sir John Vickers.

[35] Given the legislative constraint on resolution leaving creditors no worse off than in bankruptcy (NCWO), it is not unusual to hear European bank regulators and supervisors lament the state of bankruptcy law across the continent. The solution lies partly in their own hands since they could be much more prescriptive and/or proscriptive about the creditor hierarchy of operating banks.

[36] There is a lot more to be said about the current state of resolution policy. See Tucker, "Resolution Policy and Resolvability at the Centre of Financial Stability Regimes?" IADI/BIS FSI conference, Basel, 1 February 2018. http://paultucker.me/wp-content/uploads/2018/04/Resolution-Policy-And-Resolvability.pdf

6. The unavoidable boundary problem

Earlier, when articulating the social purpose of central banking within a Money-Credit Constitution, I said that for financial stability, the relevant feature of 'money' is safety. This means that the scope of 'banking intermediation' relevant for financial stability is the class of intermediaries whose liabilities are treated as safe and liquid (and, hence, as info insensitive).[37]

This has a number of implications. One is that cyber threats to e-money should be taken seriously by central banks if digital money comes to be used as a store of value by a material part of society (rather than as a punt by the starry eyed or delusional).

6.1 Shadow banking: the scope of financial intermediation relevant to stability policy

More profoundly, it implies that it is mistake to focus policy on banks and dealers (and some of the infrastructure they use). The combination of issuing liabilities treated as safe with credit intermediation is not politely confined to intermediaries that take the legal form of banks. This is the problem of *shadow banking*, and at its root are issues of political economy and incentives. I would summarise them as follows:

- Any particular manifestation of shadow banking matters only if it is big enough.
- It is hard to know in advance which manifestation(s) will be material; a truth that led the authorities to adopt a policy of 'monitor and respond'
- But by the time a particular form of shadow banking is big enough manifestly to matter to the system's resilience, the intermediaries (and maybe the people) involved will have commensurate lobbying power (eg via campaign finance), which will impede a timely policy response
- 'Monitor and respond' is, therefore, a flawed policy given the difficulty the authorities face in binding themselves to their strategy.

If that is even approximately right, it leaves an uncomfortable question about why a general policy was not adopted.[38] But whatever the positive explanation for the gap, normatively a general policy is needed.

[37] Holmstrom, *op cit*. Also, Gary Gorton (2010): *Slapped by the Invisible Hand: The Panic of 2007*, Oxford University Press.

[38] This is one of many areas where political scientists could usefully study how incentives affect the outputs of Basel-based standard setters. For example, outside observers might wonder whether these formidable incentive problems crossed the minds of those at the Basel table, and hence whose interests drove the resistance to a general policy. arguably, continental European and, perhaps, some Asian economies had incentives to go for a general policy as a way of binding the US, the capital of regulatory arbitrage. But, equally, uncaptured US policymakers arguably had incentives to seek some kind of international agreement in this area in order to shield domestic policy, and the American people, from local lobbyists. That would fit with Governor Tarullo (as he then was) being one of the few leading figures to countenance the advantages of a general policy. (Tarullo, Daniel K. "Shadow Banking and Systemic Risk Reduction." Board of Governors of the Federal Reserve System, November 22, 2013.)

In that spirit, some commentators have urged the state to move into rating instruments treated by money market participants and investors as safe and liquid (or, at one remove, rating the underlying credit instruments backing financial claims treated as safe and liquid).[39] I worry that if the state labelled an instrument as 'safe', it would find itself having to back its assertion with a guarantee. Sensing that, others argue for some form of regulation of Asset-Backed Securities *without* the imprimatur of state backing.[40] But this still leaves open how to avoid an *ex post* fiscal solvency backstop.

Following the earlier discussion of banking, I think the broad answer would involve some combination of liquidity re-insurance and minimum loss-absorbency requirements cast in terms of the creditor hierarchy. Thus, a set of underlying instruments would become eligible in central bank liquidity-reinsurance facilities subject to conditions. Those conditions would include the authorities requiring structures that, analogous to the policy for *de jure* banks discussed above, (a) stipulated the minimum loss-absorbing capacity that had to stand in front of the most senior tranche of liabilities, and (b) a threshold condition for orderly wind down that would be triggered decently before that capacity was completely exhausted. The aim would be, therefore, to prioritise the senior tranche's unqualified entitlement to the vehicle's underlying cash flows without declaring unqualified safety.[41] (I return below to the broader implications of this for the role and responsibilities of central banks.)

Crucially, however, none of those substantive policy options would overcome the boundary problem: the market participants would have strong incentives to produce 'near safe' instruments that were not covered by the policy *ex ante* but might become eligible in central bank operations *ex post*. This problem is formidable, as I tried to describe a few years ago:[42]

> *"[The system is characterized by] endemic regulatory arbitrage. The financial services industry is a shape-shifter. As insurance firms have shown, with disastrous results in the case of AIG, anybody holding low-risk securities can build their own shadow bank by lending-out ("repo-ing") their securities for cash and investing the proceeds in a riskier credit portfolio. That is, in principle, still amenable to the regulation of institutions. But banking-like fragility can be generated through Russian doll– like chains of transactions or structures, via which aggregate leverage and/or liquidity mismatches gradually accumulate, but which don't involve a financial firm which could be re-labelled and regulated as a bank; for example, in the run up to the crisis conduits funded by short-term paper invested in tranches of securitisations themselves invested in securitized paper."*

[39] A prominent variant, involving a bolder project to replace banks with mutual funds, would involve the state regulating the rating of the underlying instruments: Lawrence J. Kotlikoff, *Jimmy Stewart is Dead: Ending the World's Ongoing Plague with Limited Purpose Banking*. John Wiley & Sons, 2010, pp.126-128.

[40] Gary Gorton and Andrew Metrick, "Regulating the Shadow Banking System". *Brookings Papers on Economic Activity*, Fall 2010.

[41] To recap, for *de jure* bank groups, this policy combines requiring minimum loss-absorbing capacity for opco banks, a pure holdco structure for the group as a whole, and a 'viability' condition for going into special resolution.

[42] Tucker, "Regulatory Reform, Stability and Central Banking." Brookings Hutchins Center on Fiscal and Monetary Policy, 2014. http://paultucker.me/wp-content/uploads/2015/05/Hutchins_Tucker_FINAL.pdf

6.2 Is resilience policy relevant for 'market-based finance'?

This is related to the line of argument, pushed vigorously by the biggest asset managers among others, that for years after the crisis policymakers got the subject wrong, focussing overly obsessively on whether specific intermediaries are systemically important rather than on activities and markets. But that begs the question of whether resilience policy is irrelevant for markets.

My take on the current situation can be summed up as:

- Policymakers are moving away from designating non-banks as SIFIs, on the grounds that what matters is activities.
- But if it is services, functions, markets etc that matter, why aren't policies needed to ensure their resilience?
- For economists, can financial activities generate serious externalities irrespective of the institutional vehicle through which they are delivered?
- For policymakers, what would a regime for 'systemic markets' look like?

Here is what the Systemic Risk Council (SRC) said about this general issue a few months ago in our published response to a US Treasury report on capital markets:[43]

> *"The broad thrust of [current policy] is that the focus should be on 'activities' rather than on 'institutions'…That finds expression in [growing use of] the term 'market-based finance',… 'shadow banking' ha[ving] developed a pejorative connotation that impedes balanced analysis. Be that as it may, the label 'market finance' is no less a rhetorical device, but one intended to convey something positive irrespective of substance. To give only one example from the many vulnerabilities that contributed to the 2007 phase of the Great Financial Crisis, Structured Investment Vehicles (SIVs) were plainly manifestations of market finance since they funded themselves in the capital markets and invested their resources via the markets.*
>
> *Part of the problem is that there are no neat lines between de jure banks and other forms of intermediation. Anyone with a high-quality bond portfolio can, in effect, construct ("roll their own") banking business by using the repo or securities-lending markets to loan out their bonds against cash at call and investing the proceeds in a portfolio of illiquid, opaque credit instruments such as loans or low quality bonds. The fragility of the consequent structure was on display during AIG's problems in late-2008.[44]*
>
> *For essentially the same reasons, the SRC disagrees with the UST that the SEC should abandon its plans to introduce quantitative constraints on funds' liquidity risks. The principles-based approach advocated by the UST Report would risk amounting to nothing much, as is evident from the approach to banking entity liquidity in the years before the crisis. Introducing minimum*

[43] Systemic Risk Council letter of February 23rd 2018 to the US Treasury Secretary. https://4atmuz3ab8k0glu2m35oem99-wpengine.netdna-ssl.com/wp-content/uploads/2018/02/SRC-Comment-Letter-to-Treasury-Dept-2.23.18.pdf

[44] Federal Reserve Bank of New York, "Shadow Banking", Staff Report No. 458 (July 2010, Revised February 2012).

requirements does not preclude their being sensitive to the opacity and illiquidity of funds' portfolios.

But the problem is not limited to specific non-banks becoming bank-like in their functions and significance. The SRC wants to suggest that the…authorities should be bothered about the resilience of markets themselves…

In framing any such policy, it is important to distinguish: (i) between markets that serve end users and those on which intermediaries themselves depend; and (ii) between social costs that build over time and those that are severe and occur immediately when a market breaks down.

For example, while the social costs of an equity market being closed for a single day would not compare with the social costs of the payments system breaking, they would obviously mount the longer the market was closed. At the other end of the spectrum, the banking system could barely function without the continuous availability of the short-term wholesale interbank money markets which allow individual banks to balance their books with each other and so enable competition in banking services. The policy response to the latter kind of problem has become familiar over the past two centuries: the availability of lender-of-last-resort assistance from the central bank to sound banking institutions. The policy response to fractured or frozen capital markets is still less well established.

For capital markets important to end users (businesses and households), the costs of closure depend in part on the availability of ready substitutes, including resorting to banks. The fewer the substitutes --- and thus, among other things, the more constrained banks are --- the more important it is that capital markets stay open. This is a matter of both ex ante design and ex post mitigants.

In summary, the aim should be to identify what might be termed 'systemically significant markets' that need to be especially resilient, and to pin down the particular vulnerabilities in any such markets that need to be addressed. Such vulnerabilities might lie in market structure, its physical or legal infrastructure, the underlying instruments, or the institutions acting as intermediaries."

Against that background, questions for policymakers include:

- should market regulators, using their powers over securities registration and disclosures, step up and take responsibility for the safety of capital-market instruments treated as 'safe'?[45]
- how should central counterparty clearing houses be made informationally insentive?
- should the monetary authority be called upon to underpin the liquidity of some markets by acting as market maker of last resort (MMLR)?

[45] I have now been making this point for a decade with, so far as I know, no response from securities regulators or IOSCO. It is worth remembering is that the paperwork for virtually every ABS or CDO that caused difficulties during the 2007-08 phase of the crisis crossed the desks of market regulators.

- should stability policy makers be using powers to set minimum haircut (or initial margin) levels for some repo markets?

As this is a central banking conference, I shall say something about only the third and fourth of those questions.

6.3 MMLR v. relaxing the leverage constraint on dealers: incentives to invest in market infrastructure

Among those who think markets *do* matter to stability policy, not a few argue that some constraints on intermediaries have impaired market liquidity and should be relaxed, implicitly because the system as a whole is rendered less resilient. But how much do we know about incentives to invest in infrastructural enhancements?

My response can be summed up as follows:

- There is concern that the Leverage Ratio and Liquidity Coverage Ratio are reducing bond-market liquidity.
- But in the pre-crisis world, where dealer balance sheets were infinitely elastic, no one had any incentive to invest in developing trading infrastructure for fixed income markets.
- By reducing the state's subsidisation of bond-market liquidity (TBTF dealers), there might be stronger incentives for the private sector to invest in improving the infrastructure of these markets.

As one asset manager said recently to the FT:[46]

> *"Before the crisis the technology [for FICC markets] was pretty archaic. But the liquidity available was so good that we didn't care. Then 2008 happened."*

Taking a medium-term view, there is a case for letting those forces play out rather than relaxing the leverage-ratio constraint on dealer liquidity-provision and accepting the erosion in dealer resilience. The implications for central banks are striking:

- If the current regulatory constraints are relaxed, weaker dealers would more likely to stop making markets in adverse circumstances (viz 2007/08), prompting the central bank to step in as market maker of last resort (MMLR)
- Maintaining tighter leverage restrictions might lead to circumstances where a MMLR is needed occasionally in only mildly stressed conditions if enhanced trading infrastructure underpinning market liquidity is slow to come on stream.

Either way, central banks would do well to articulate ex ante principles for MMLR operations.[47] Those conditions should be tough, and not only for familiar 'moral hazard' reasons. The bigger point is that few if any capital market instruments are meant to informationally insensitive, because they are mechanisms for allocating risk capital. By contrast, money markets, and especially *secured* money markets, are mechanism for intermediaries to balance their books and for agents of all kinds to

[46] Douglas Peebles, AllianceBernstein, quoted in the FT Big Read, Thursday 10 May 2018, "The Future of Trading."

[47] See Unelected Power, chapter 23; Tucker, BIS Papers, No. 79, 2014, op cit; and Mehrling, Perry. The New Lombard Street: How the Fed Became the Dealer of Last Resort. Princeton, NJ: Princeton University Press, 2010.

hold a store of liquid (safe) assets. Money markets are the key link between banking and capital markets, and they are especially important to central bankers.

6.3 Money markets: central banks as manager-overseers of collateral markets

Thinking in terms of informational insensitivity helps us to refocus on the historic role of central banks in markets. As I said in 2014 (emphasis added):[48]

> *"What is clear, then, is that collateral management is a core central bank function. Having banks pre-position collateral with the central bank helps operationally, as it gives the central bank time and space to evaluate it, as well as providing insights into the banks' portfolios and risk management.*
>
> *But this is about more than protecting the central bank against risk, vital though that is. It is also about surveillance of valuation practices in the market and of the infrastructure for clearing and settling the instruments eligible in central bank operations. If the supervision of critical market infrastructure did not already exist, central bankers in their role as LOLR, and thus as contingent holders of assets, would need to invent it (as, in fact, they largely did in many countries).*
>
> *As public authorities, this gives central banks wider responsibilities to society. What they do to protect themselves as actual or contingent lenders gives them information that can and, I believe, should be used for wider macro-prudential purposes. Just as many central banks got into the prudential supervision of banks through managing their counterparty risks, so the control of their collateral risks makes them a de facto monitor of the state of the underlying asset markets. In particular, as and when a repo market becomes large, as ABS repo surely did in the run up to the 2007 liquidity crisis, central banks can't really avoid taking a view on whether the supposedly "safe assets" being used as collateral are indeed safe. If they're not safe enough for the central bank, then the authorities should be worried about whether the money market's liquidity is sustainable.*
>
> ***On this view, the central bank's LOLR function makes it a de facto monitor of "safe" assets and of some systemically significant markets. That's exactly the role played by the Bank of England in the old bill market over the century or more in which it operated primarily by buying and lending against bankers' acceptances. It is an issue that remains neglected in the post-crisis reform programme."***

On this view, the challenge is how to leave central bankers as guardians of money market liquidity via their conditions for liquidity reinsurance without their straying into the design and regulation of the capital markets themselves.

[48] Tucker, BIS Papers, No. 79, 2014, op cit.

7. Summary and conclusions

This essay amounts to a plea to policymakers to work with researchers to re-examine whether enough has been done to make the financial system resilient.

We start from a position where the financial system is much more resilient than before the crisis but, for the reasons I have set out, is less resilient than claimed by policymakers. This is partly due to shifts in the macroeconomic environment. While much post-crisis debate has centred on how best to protect the real economy from financial system pathologies, regulatory policy now needs to respond to unexpected constraints on monetary policy. Specifically, until and unless monetary (or fiscal) frameworks are adapted to create more room for stabilization policy in a world of subdued underlying growth, regulatory policymakers need to increase equity requirements in order to deliver the degree of system resilience that was implicit in the G20's Basel 3 reforms.

Not that equity requirements can be enough in a monetary system that has fractional-reserve banking near its core. Maintaining a resilient system cannot sanely rely on crushing the probability of distress via prophylactic regulation and supervision: a strategy that confronts the Gods in its technocratic arrogance. Instead, low barriers to entry, credible resolution regimes and crisis-management tools must combine to ensure that the system can keep going through distress. That is different from arguing that equity requirements (E) can be relaxed if resolution plans become sufficiently credible. Rather, it amounts to saying that E would need to be much higher than now if resolution is not credible.

More broadly, policymakers have not found a way of articulating how money-like liabilities can be safe without either extending the fiscal safety net or bringing decisions on the allocation of credit under state control. While a Money-Credit Constitution is plainly needed in order to secure the benefits of a stable monetary environment, some of its core parameters are still unclear. To give only the most obvious example, while we are once again clear that central bankers are the stewards of monetary system stability, there is not yet a consensus on whether their responsibilities (rather than just their latent capabilities) should extend beyond de jure banks to other banking-like intermediaries or, even, as I have suggested, to the money markets.

This is where, I have tried to suggest, theoretical work on 'informational insensitivity' can be turned to practical use. I am not saying that focusing on 'safety' will provide answers to all the problems banking can bring to the economy. For example, banks could be just about adequately capitalized but chronically unprofitable and, therefore, moribund, impairing the supply of credit. But to make progress, it is important to distinguish between the various different problems.

On 'safety', I have been arguing that the central insights of the 'information insensitivity' theorists can be operationalized. In particular, I have suggested five concrete things central bankers could do:

- Move towards requiring all banking-type intermediaries to cover *all* short-term liabilities with assets eligible for discount at the Window
- Insist upon structural subordination of bailinable bonds so that the liabilities of operating subsidiaries are more nearly informationally insensitive

- Be more prescriptive about the permitted creditor hierarchy of operating intermediaries
- Establish frameworks for overseeing and regulating collateralised money markets, with more active use made of setting minimum haircut requirements to ensure that widely used money market instruments are safe in nearly all circumstances
- Articulating restrictive principles for market-maker of last resort operations.

Throughout, those policies should err on the side of maintaining resilience. Financial crises bring massive costs: economically, socially, culturally, and maybe even again (echoing Europe's deepest 20th-century calamity) constitutionally. Our societies do not need to delegate stability policy to independent agencies in order to adopt policies that err of the side of softness or laxity. Politicians could do that well enough themselves.

Meanwhile, for the moment the resilience of the system continues to rest largely on the regulation and supervision of capital adequacy (on E, more than on x and B). Since that cannot deliver information insensitivity without much higher equity ratios (lower leverage) being required, there is a need for transparency in the discretionary policy actions of the authorities. Stress testing definitely helps. But central banks (and other regulators) should also publish an annual review by staff of all the technical easings and tightenings of regulatory and supervisory policy and practice. Only then can we be confident that crucial information is not concentrated among industry insiders and lobbyists, giving the authorities incentives to stick to their publicly mandated course: stability, stability, stability.

Comments on "Is the financial system sufficiently resilient: a research programme and policy agenda"

By Gary Gorton[1]

The question posed to Paul Tucker for this session – Is the financial system more resilient, resilient enough? – is surely a difficult question to answer. But, it is also *the most important question* ten years after the financial crisis. Has enough been done? Too much? Or, like Goldilocks, is it just right? How do we think about answering these questions? What is the answer?

In the ten years since the crises in the U.S. and Europe, the list of changes to financial regulations in various countries is enormously long. A partial list includes: more required bank capital; required total loss absorbing capacity; leverage restrictions; enhanced prudential standards; the Volker rule; the swaps pushout rule; living wills; orderly liquidation authority; stress tests; compensation regulation; SIFI, G-SIFI designations; a G-SIFI surcharge; the liquidity coverage ratio; the net stable funding ratio; bail-in rules; money market mutual funds reforms, etc., etc.[2] Countless acronyms have come into existence. These changes were adopted in haste and to a large extent were not coordinated across agencies or countries. There was a rush to "fix the problem". The Lucas critique be damned.

The usual explanation or defense for all these changes is "we had to do something" and "we did the best we could". Perhaps so, but that doesn't make the above question of resilience less important. Such explanations do not inspire confidence. Indeed, if we got it wrong, then either a new shadow banking system will develop during the next 20 or so years and/or the financial system will be crippled and be a drag on growth.

I will evaluate the resilience question in two ways. First, I will discuss intellectual resilience. Do we understand what a "financial crisis" is such that we will be able to detect when another one is brewing? Second, I will propose two ways of quantitatively evaluating the question.

1. Intellectual Resilience

To say that economists and bank regulators were unprepared for the recent financial crises is an understatement to say the least. Paul Tucker describes this state of affairs as "one of the most abject failures [of the modern era]" and I agree.[3] It was an intellectual failure. We can see now the source of the failure. Macroeconomics was

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[1] Yale and NBER

[2] As an example, one can visit the European Banking Authority website: http://www.eba.europa.eu /regulation-and-policy

[3] Tucker was talking about Basel, but I think the characterization applies more generally.

born in the Great Depression, but subsequently evolved without regard to financial crises. Ironically, Lucas and Prescott essentially dismissed the Great Depression as inexplicable with equilibrium methods, and there was no attention paid to the previous 150 years of crises in the U.S. or U.K or any other country.[4] The Great Depression was essentially viewed as a weird, one time, nonstationary event and macroeconomics proceeded without thinking about financial crises.

Without a clear theoretical view of what a financial crisis is, there will be no way of thinking about how another one could happen and thus no way to understand its likelihood of occurring. To paraphrase Einstein: Theory determines what you see. How else to explain Figure 1?

Figure 1, from Gorton, Llewellyn, Metrick (2012), uses U.S. Flow of Funds data to calculate the amount of privately-produced safe debt and its components since 1952. The figure shows the components as a percentage of the total amount of privately-produced safe debt. The figure makes several important points. First, the figure shows that a very significant transformation of the U.S. financial system has occurred, starting at the end of the 1970s. Demand deposits, the lowest dark area of the figure, were nearly 80 percent of the total amount of privately-produced safe debt in the early part of the period and then in the late 1970s start to plummet, as shown by the red arrow. The decline in demand deposits (as a percentage of the total privately-produced safe debt) was accompanied by a rise of short-term money market instruments, the next category moving up from demand deposits. These include repo, commercial paper and money market funds. And what was the collateral for these instruments? The next category, again moving upwards, is AAA/Aaa securitization tranches. This transformation reflects a number of larger forces a work in the world economy, exponentially increasing wealth, the rise of contractual savings, the global demand for safe debt, huge cash holdings of corporations, and so on. It should be apparent that this change is not a transient one. There is no going back.

Secondly, it is apparent that the shadow banking system, consisting of money market instruments and AAA/Aaa securitization tranches was larger than the traditional, regulated system. One might then ask: why didn't anyone notice this in publicly-available Federal Reserve data? The answer is that theory determines what you see. With macroeconomics have been given a free pass to not worry about financial crises, there was no concept of safe debt or any real idea about what banks actually do. Financial intermediation simply was not in macro models. So, no one thought to construct this figure and the changes went unnoticed. Bank regulation was microprudential not macroprudential.

Banks produce short-term debt, private money, as their product (Diamond and Dybvig (1983) and Gorton and Pennacchi (1990)). This short-term debt is an *inherent* feature of market economies. It is a fact that the output from real production happens at longer horizons than agents want to transact. In other words, maturity transformation is a built-in feature of a market economy. And there is an inherent problem with short-term debt. Such private money is designed to be informationally-insensitive. In other words, for transactions efficiency it is best if the perceived value of such money does not change. Ten dollars is ten dollars. It is difficult for society or

[4] Lucas (1980, p. 706): "… the magnitude of the Great Depression dealt a serious blow to the idea of the business cycle as a repeated occurrence of the 'same' event … The Depression continues, in some respects, to defy explanation." Lucas' thoughts were more measured, not so Prescott. Prescott (1983, 120): "The answer to [the] question … is simply that competitive equilibrium theory is not suited to modeling economic fluctuations in periods of great political and financial instability."

banks to produce such debt. See Gorton (2017). Information-insensitivity means that agents find it too costly to produce private information about the backing collateral for the sort-term debt. They are simply willing to accept it at face value. The best way to make short-term debt informationally-insensitive is to back it with long-term debt (debt-on-debt in the nomenclature of Dang, Gorton, and Holmström (2015)). So banks back deposits with loans that are hard to value (see Dang, Gorton, Holmström and Ordoñez (2017)).

An important way to summarize debt-on-debt as the method for producing information-insensitive private money is to say that short-term debt is the one case in a market economy where we *do not want the price system to work*. And, societies have gone to great lengths to achieve this. But, obviously there is a problem: what if the price system suddenly works? A public signal arrives and agents begin to worry that someone is producing information about the underlying collateral. Then there can be a run.

Financial crises are runs on short-term debt (or there would have been a run had the central bank not responded). A run is an *information event* in which holders of short-term debt no longer want to lend to banks because they receive information leading them to suspect the value of the backing for the debt, so they run. When such public information arrives, e.g., house prices are falling, the price system with regard to short-term debt may suddenly work. And this problem is true of many forms of bank debt, not just demand deposits. Going back to Figure 1, the financial system can evolve with other forms of short-term debt becoming very large and important - - and vulnerable to runs.

Is there theoretical clarity on financial crises now? The idea that crises are runs is not a fact that is widely agreed. The run on repo in the U.S. was not publicly observed. Nevertheless it occurred (see Gorton and Metrick (2012) and Gorton, Laarits, and Metrick (2018)). It occurred on trading floors and most people on trading floors did not know what they were seeing. Without actually seeing the run other explanations were resorted to in order to explain how large financial firms could be in trouble. There is a large laundry list of explanations (bonuses, rating agencies, greed, mortgage underwriting standards, too little bank capital, etc. etc.), but the main problem was that it appeared that the crisis was an idiosyncratic event, a "perfect storm" of bad luck. The idea that market economies have an *inherent structure* that includes short-term debt that is vulnerable to runs is not part of thought process.

In fact, modern crises (those that occur in the presence of a central bank) all appear to be idiosyncratic. The reason is that pre-central banks, agents always ran with discernable timing (as they did say in the U.S. National Banking Era, see Gorton (1988)). In the presence of a central bank, agents run late or they do not run, typically because there is a blanket guarantee of bank dent, nationalization of the banking system, or some other similar policy. Agents wait to see what the central bank or government will do, so the run may be slow, quiet, or latent. Crises then appear to be chaotic evens with no common structure.

Is it the case that crises are not understood, and that this is a problem going forward? Some evidence that this is a problem is seen by observing the one glaring omission from all the changes that have occurred post crisis: measurement. No new measurement system was seriously thought about, much less adopted, after the crisis. The Great Depression spurred the building on national accounts, but no similar

initiative happened after the last crisis.[5] Why not? Because the "explanations" of the crisis that were proposed did not require any new measurement.

Figure 2, also from U.S. Federal Reserve Flow of Funds data, shows the net repo assets of major repo holders in billions of dollars during 1999-2014. The run is apparent (even with this incomplete data). Who were the major parties who ran: Rest of world (ROW) and Statistical discrepancy (i.e., the amount needed to make the flows balance out). The other category shown is money market funds. They did not face runs, as shown in the figure. After Lehman they were insured. The point is that we have not even successfully fought the last war since we do not know who actually ran.

The idea that "the problem" has been fixed requires knowing what the problem is. This does not appear to be the case.

2. Quantifying Resilience

How can we make sense of all the myriad changes that have occurred? We need quantitative measures that summarize the aggregated effects. I propose two such measures. Tobin's Q summarizes the view of the stock market with regard to the health of banks. Measures of the convenience can tell us if there is currently a shortage of safe short-term and long-term privately-produced safe debt. These measures, while imprecise, can help determine whether Paul Tucker is right when he writes that the financial system is "less resilient than claimed."

2.1 Tobin's Q and Bank Charter Value

An essential feature of bank regulation is that "banks" and "banking" need to be defined and non-banks must kept out of banking. As a result, all bank regulations since the late 18th century in England, have limited entry into banking. This has the result that it creates a special value for banks, the present value of some monopoly rents coming from the entry limitations, called the bank's charter value. See Gorton (2018b). This is manifested in banks' Tobin's Q ratio being above one. And, importantly, this creates an incentive for banks to behave and abide by the bank regulations. It is a counterbalance to moral hazard concerns. This is one reason that the U.S. financial system did not experience a financial crisis from 1934-2007.

Chousakos and Gorton (2017) computed Tobin's Q for U.S. banks and calculated two indices of asset-weighted Tobin's Q. One covered all U.S. banks and the other focused on a specific set of banks that included Bank of America, Citigroup, Goldman Sachs, JP Morgan, Morgan Stanley, and Wells Fargo. For Europe, Tobin's Q's for banks in each country were used to form an asset-weighted index and for the EU these country indices were weighted by share of EU GDP. The indices were then lined up at the start of the crisis, 2007 in the case of the U.S. and 2009 in the case of the EU.

Figure 3 shows the results. Prior to the crisis, in each case, Tobin's Q was above one, reflecting charter value. After the crisis, Tobin's Q is below one and has remained below one for the subsequent ten years! This is basically saying that the market does

[5] Brunnermeier, Gorton, and Krishnamurthy (2012, 2014) proposed measuring risk and liquidity in new ways, but these proposals were not adopted.

not believe that banks have viable business models going forward. No doubt there are many explanations for this pattern, but it is very troubling nevertheless. It suggests that perhaps the sum total of all the new regulations has produced an unhealthy banking system. And, even if it is not due to the new regulations – as many will no doubt argue – it is still troubling.

2.2 Convenience Yields

Banks produce short-term debt, which they back with long-term debt. And safe long-term debt is also in demand as a way to store value through time. Prior to the crisis there was a shortage of long-term debt. Prior to the financial crisis, there was a scarcity of high-quality collateral. For example, the BIS (2001) warned of the problems of a scarcity of collateral, concluding that "Current issuance trends suggest that shortfalls of the stock of preferred collateral may eventually lead to appreciable substitution into collateral having relatively higher issuer and liquidity risk" (p. 2). The question is whether there is currently a shortage of short-term and long-term safe debt. The ECB and the Federal Reserve have engaged in buying large amounts of safe long-term safe debt. And some sovereign debt that was safe pre-crisis is no longer safe.

Safe debt has a convenience yield, that is, some of the benefits of holding such debt accrue in non-pecuniary ways. The obvious example is cash. We hold cash although it has no interest accruing to it. The convenience yield is a measure of moneyness in the case of short-term debt and safety in the case of long-term debt.

Short-term measures of the convenience yield are the one and three-month spread between the general collateral (GC) repo rate and the U.S. Treasury bill rate. Another measure of the short-term convenience yield is constructed comparing rates from a fitted yield curve to the actual rates on 4 to 26 weeks remaining maturity Treasury bills.[6] Measures of the convenience yield on long-term debt includes the spread between AAA corporates and U.S. Treasury bonds and the spread between Baa corporates bonds and U.S. Treasury bonds.

Using these measures of the convenience yield as left-hand side variables, Gorton and Laarits (2018) estimate a simple regression with a constant (the baseline), a dummy variable that is turned on starting in July 2007 (the start of the crisis), and another dummy variable that is turned to one from 2012 to the present. The coefficient on the first dummy explains how much the convenience yield level changed during the crisis compared to the baseline while the coefficient on the second dummy explains how the convenience yield has changed since the crisis.

The results are reproduced here in Table 1. The interpretation is as follows. The first row of the table shows that convenience yields rose during the crisis, that is, there was a shortage of short-term and long-term safe debt. Indeed, a crisis is a period where previously information-insensitive debt has become sensitive and has no convenience yield. The second row of coefficients shows that since then convenience yields have come down. However, adding these two coefficients together shows that overall convenience yields have not returned to pre-crisis levels – the sum of the two dummies is positive in all cases. The p-values how that the hypothesis that the crisis plus post-crisis dummies sum to zero is strongly rejected in all cases. In other words,

[6] See Greenwood, Hanson and Stein (2015) and Gürkaynak et al. (2007).

we have not returned to pre-crisis convenience yield levels, a period when there was already a shortage of safe debt. There is a larger shortage now.

This conclusion is not heartening.

3. Conclusion

I agree with Paul Tucker that regulators are overconfident. And it is not just regulators. The situation we are in is understandable because the financial crises were surprises that economists and regulators did not expect. Expertise cannot be developed overnight. Economic models cannot simply be patched up. The insidious fact is that crises do not happen with enough regularity to keep the impetus to learn going. And there is no interest in financial history.

The idea that we do not want the price system to work when it comes to privately-produced money runs counter to everything economists have been taught about market economies. Such economies work via markets where prices balance supply and demand. These prices are informative, a point Hayek (1945) stressed.[7] And, it is desirable that stock markets be efficient, that is prices reflect information. This overall gestalt makes transparency appear to be a sort of golden rule of economics, a principle to be followed to ensure success. But, this is not a theorem or a welfare result. See Holmström (2015).

In the rush to impose regulations, the role of charter value seems to have fallen by the wayside. This is unfortunate because simply imposing regulations on banks ignores the fact that banks can exit by disinvesting or by not growing as fast they otherwise would. Such exit is shown in Figure 1. The development of the shadow banking system was a massive exit from traditional banking. Some pejoratively can this "regulatory arbitrage", but it is well to remember that banks are private companies. Regulators cannot make them do things. Regulators can only determine where the banking system is located. And, without theory to tell us what to see we will be in trouble.

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[7] Hayek (1954): "Fundamentally, in a system where knowledge of the relevant facts is dispersed among many people, prices can act to coordinate the separate actions of different people . . . " (p. 526).

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Tables and figures

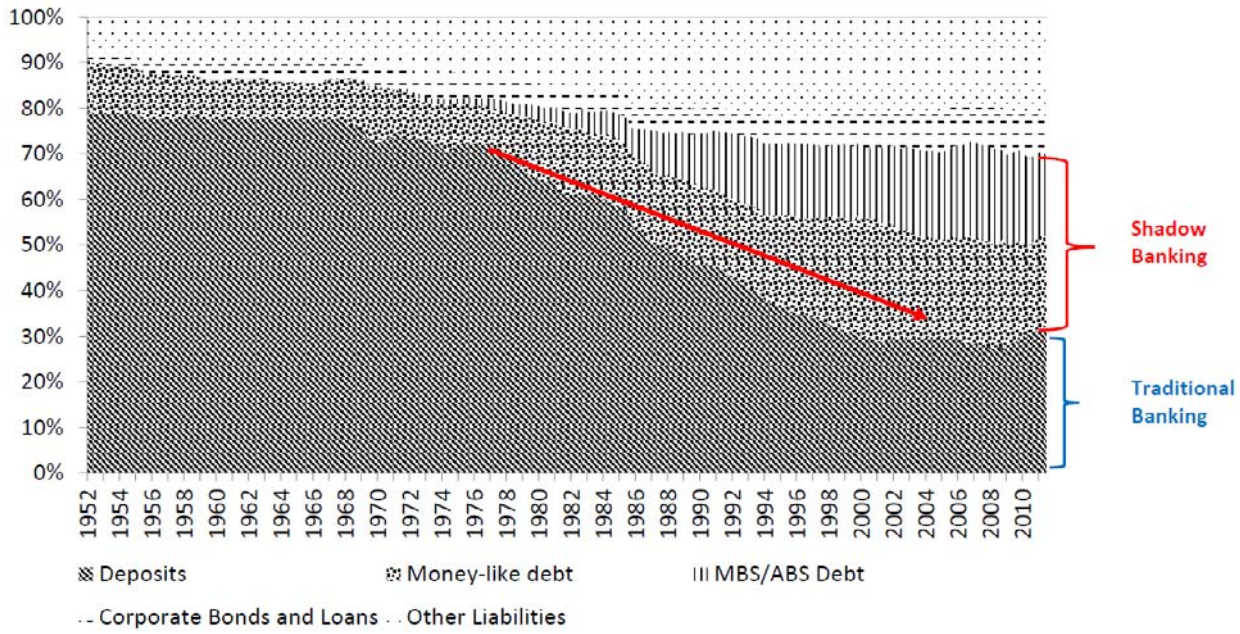
Has the Convenience Yield Gone Down? Table 1

	GC-Tr 1m	GC-Tr 3m	Z-spread	AAA-Tr	Baa-Tr
I (July 2007-present)	0.135***	0.131***	0.0987***	0.425***	0.885***
I (2012-present)	-0.0958***	-0.0654***	-0.0260***	-0.0204***	-0.432***
Constant	0.109***	0.0596***	0.0749***	1.391***	2.348***
P(crisis + post = 0)	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
#Observations	3840	3985	3983	3931	3931
R^2	0.0728	0.0874	0.108	0.202	0.213

[1] *** p< 0.01

Source: Gorton and Laarits (2018)

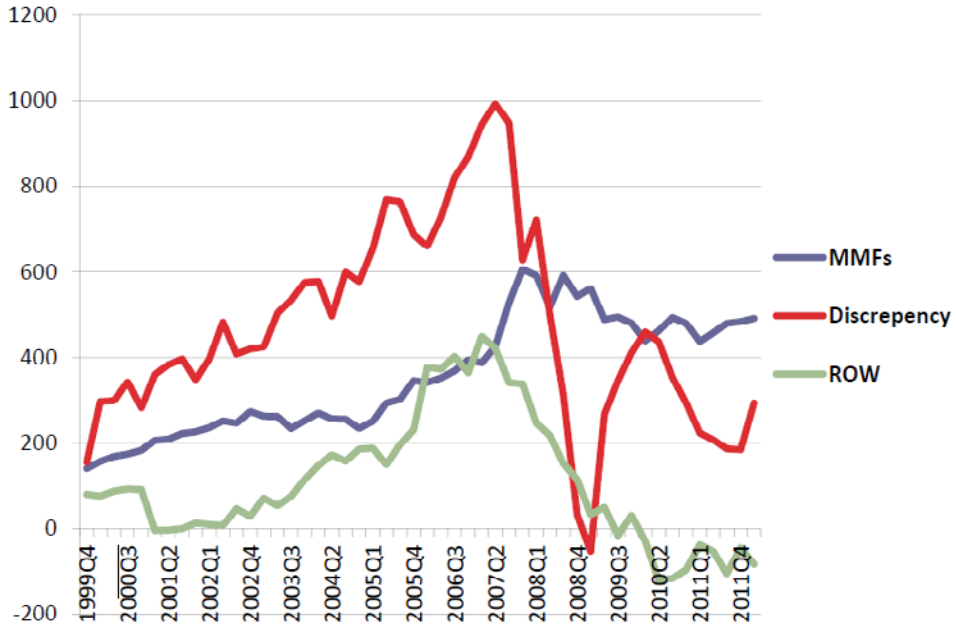
Components of Privately-Produced Safe Debt as a Percentage of Total Privately-Produced Safe Debt Figure 1



Sources: Gorton, Llewellyn, Metrick (2012), using Flow of Funds data, Federal Reserve Board.

The Run on Repo

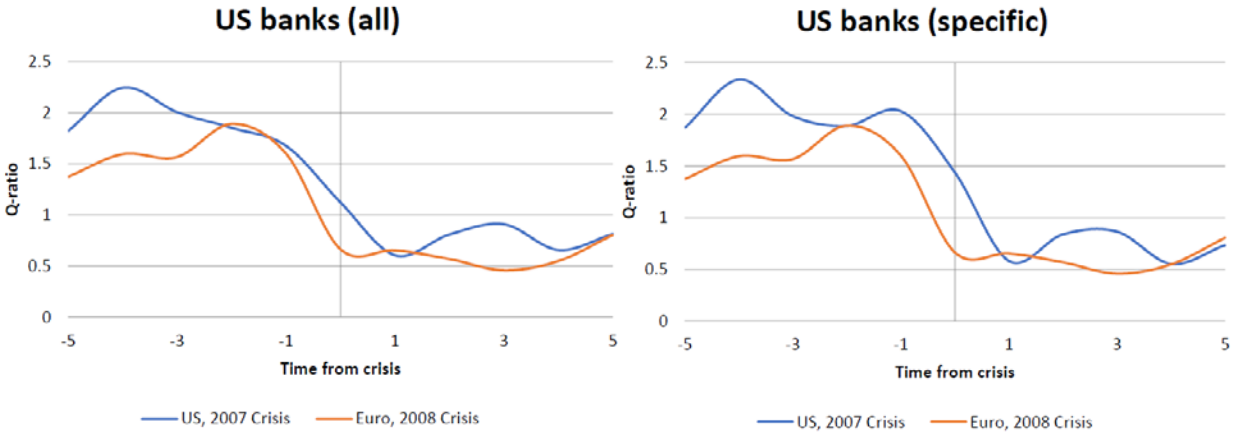
Figure 2



Sources: Gorton, Metrick (2018), based on Flow of Fund data from the Board of Governors of the Federal Reserve System.

Tobin's Q Before and After the Crises

Figure 3



Source: Chousakos and Gorton (2017).

Comments on "Is the financial system sufficiently resilient: a research programme and policy agenda"

By Nellie Liang[1]

Paul Tucker provides an insightful assessment of the state of financial resilience and the financial regulatory framework 10 years after the peak of the global financial crisis. I will expand on where we are 10 years after the crisis peak on progress toward establishing responsibility and accountability for macroprudential policies. Responsibility and accountability are critical to a regulatory framework to improve the resilience of the financial system to help prevent the next crisis. The need for strong accountability is increasing with time, as memories of the crisis have been fading, and financial institutions and regulators alike have begun to revert to previous practices.

The first area I will discuss is progress on measuring financial stability risks – what are policymakers aiming for? So far, financial stability has resisted a clear target. I will propose a measure of risk to financial stability—GDP growth-at-risk–that can be a target to be monitored over time to determine the need to implement macroprudential policies. The second area is governance for macroprudential policies – who is responsible for taking actions and accountable for financial stability? I will present summary information about new financial stability governance arrangements in 58 countries, and a preliminary evaluation of whether newly-established financial stability committees are set up to be effective and take macroprudential actions.

I will conclude that progress on measurement and establishing strong governance has been made, but much work remains to be done to establish rigorous frameworks to implement policies. As Paul has highlighted here, and in his recent book, better accountability for macroprudential policy is necessary for it to become a permanent feature of countries' macro policymaking, separate from microprudential financial policy and monetary policy, to help prevent another costly financial crisis.

1. Measuring financial stability risks

In a new working paper, we propose a target measure of financial stability risks, GDP growth-at-risk (GaR), measured as downside risks to future expected GDP growth conditional on financial conditions.[2] This measure fills an important gap. As Paul says, "[It is] hard to know what stability policymakers are up to compared to monetary policymakers." This measure builds on a monitoring framework where easy financial conditions affect risk-taking behavior and can lead over time to a buildup of financial imbalances and vulnerabilities. We define GaR to be a low percentile, specifically the

[1] Brookings institution

[2] Adrian, Tobias, F. Grinberg, N. Liang, S. Malik (2018), "Term Structure of Growth-at-Risk," Hutchins Center Working Paper #42, Brookings Institution, Washington, DC, August; and International Monetary Fund Working Paper 18/180, August.

5th percentile, of the future GDP growth distribution conditional on financial conditions. Two important benefits of GaR are that it is transparent and is expressed in terms that are common to many macro policymakers.

To measure GaR, we estimate the effects of financial conditions on the full distribution of expected growth, not just its central tendency. The equation below describes what we estimate. GDP growth for period t+h is average cumulative growth out to period h at an annual rate. It is estimated on financial conditions (FCI), current growth $\Delta y_{i,t}$, inflation $\pi_{i,t}$, and an interaction term $\lambda_{i.t}$ to capture nonlinear effects of financial conditions. We estimate with quantile regression methods and use local projections techniques to estimate coefficients for up to 12 quarters ahead. We apply this model to 11 advanced economies (AEs) and 10 emerging market economies (EMEs) in two panels with country fixed effects. We have about 20 more years of data for the AEs than the EMEs.

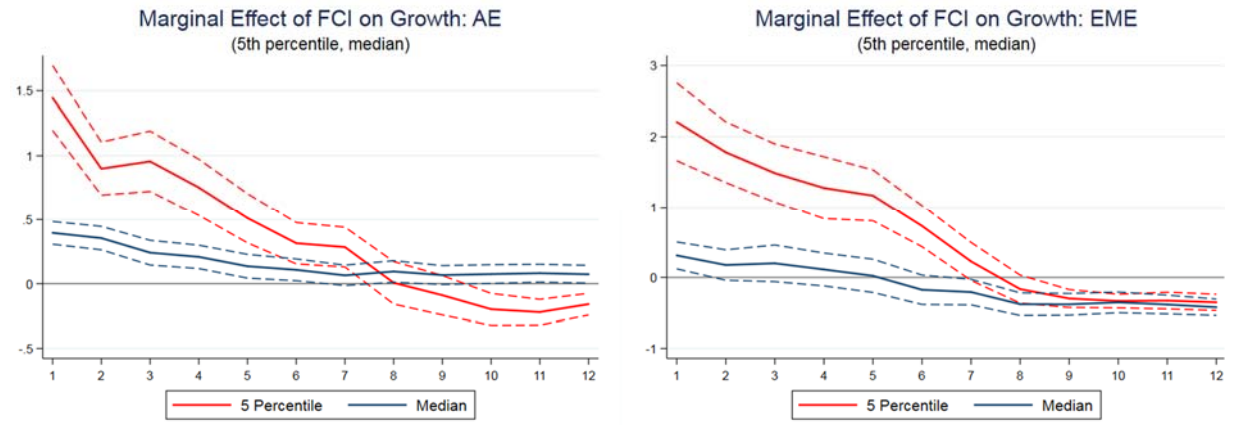
$$\Delta y_{i,\alpha,\, t+h} = \gamma_0^{(\alpha,h)} + \gamma_1^{(\alpha,h)} FCI_{i,t} + \gamma_2^{(\alpha,h)} \Delta y_{i,t} + \gamma_3^{(\alpha,h)} \pi_{i,t} + \gamma_4^{(\alpha,h)} \lambda_{i.t} + \varepsilon_{i,t}$$

α = percentile, h=1 to 12 quarters

Financial conditions indexes (FCIs) are calculated for each country and are designed to capture the market price of risk. They are based on up to 17 variables, including corporate debt spreads, sovereign spreads, equity prices, volatility, and foreign exchange, using a method to control for current growth and inflation (Koop and Korobilis, 2014). The interaction term $\lambda_{i.t}$ is defined to measure credit boom conditions and is included to determine whether the effect of financial conditions on expected future growth distribution depends on whether or not the economy is in a credit boom.

The basic intuition of the empirical results is shown in the next chart. It shows that the estimated coefficients on FCI for two moments of the growth distribution for quarters h=1 to 12, for the AE and EME panels. For near-term quarters, the blue line shows positive coefficients for median (50th percentile) growth, and the red lines show large positive effects on the 5th percentile (GaR). The coefficients are significantly different, with looser financial conditions having a larger impact on the 5th percentile than the median in the near term. Coefficients decline for both percentiles as the projection period lengthens, and the coefficients on GaR become negative for both AEs and EMEs.

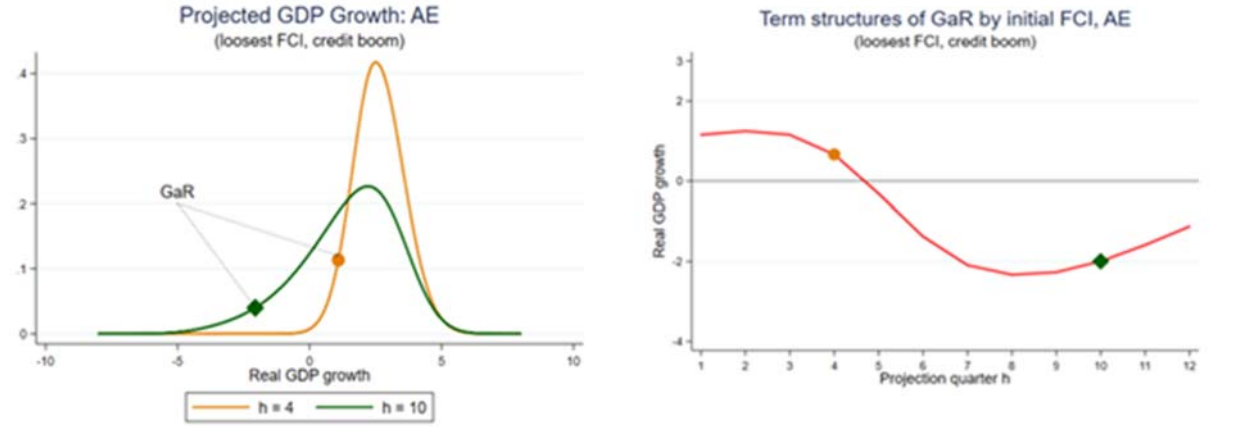
Estimated coefficients on FCI for GaR and median growth, AEs and EMEs — Graph 1



We can translate these coefficients into an expected growth distribution by fitting the quantile estimates to a skewed-t distribution. To illustrate, we show the density for when FCIs are very high, top 1 percent, and there is high credit – high growth and high FCI – based on the panel of AEs. The density at one-year ahead (h=4), shown by the gold line, indicates expected growth is positive and the variance is not especially large. But the density at 10 quarters ahead, the green line, shows a big shift leftwards, suggesting greater downside risks, while the median and right tail are little changed. That is, the distribution changes over the projection horizon: the expected 5th percentile measure of downside risk (GaR) varies a lot more than the median or the 95th percentile with financial conditions.

Probability density functions for projected real GDP growth conditional on loose financial conditions and high credit

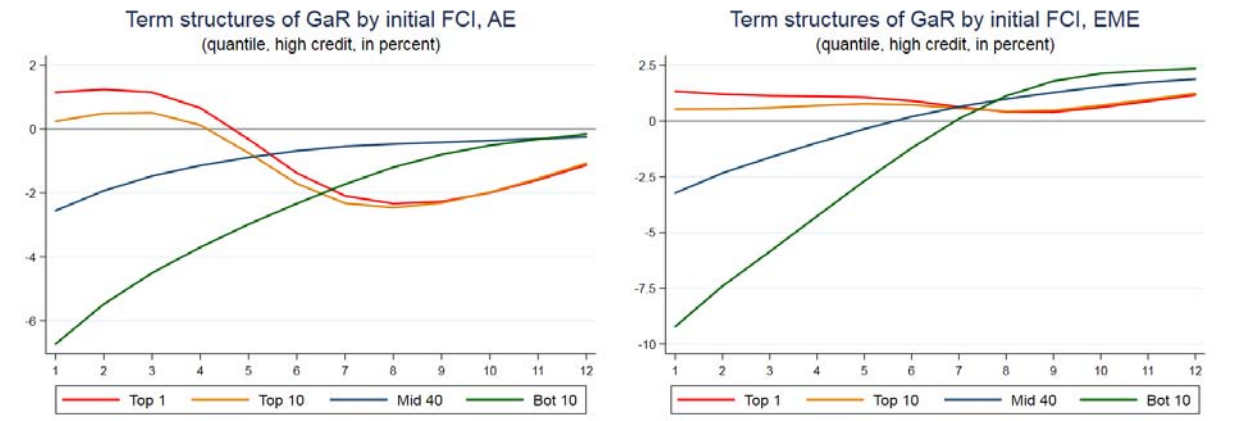
Graph 2



The 5th percentile of the expected growth distribution over the projection quarters h=1 to 12 are what we plot as the term structure of GaR (although we use actual quantile estimates, not smoothed values from the skewed t distribution). The term structure of GaR shows that GaR conditional on high credit is high (ie, indicating low tail risk) in the near term, but then drops fairly steeply at around six to eight quarters ahead, as the expected growth distribution shifts and downside risks to growth increase.

We next group FCIs by deciles (for each country) and show a set of term structures for GaR based on initial FCI groups. In particular, we show GaR based on the top decile FCI (representing looser conditions), the middle four deciles as a group (representing neutral or typical financial conditions), and the bottom decile. Higher FCI (top decile) has higher GaR in the near-term but is associated with lower GaR in the medium term, suggesting some inter-temporal tradeoff. That is, higher FCI that achieves high GaR in the near-term may incentivize lower GaR in the medium term. We do not find an inter-termporal tradeoff for average FCI (mid 40 group), and the differences in the term structures between the top decile and mid 40 group are statistically different based on bootstrap techniques. The bottom decile is the tightest FCI group, likely reflecting the realization of a crisis of large downside tail risks, but these risks recede fairly quickly and approach the GaR for typical FCIs in the third year of the projection. We also find a tradeoff for EMEs, and while the GaR estimates for the top decile and mid 40 group are statistically different, the slope of the term structure of GaR for loose financial conditions is less steep than for the AEs.

Term structures of GaR Graph 3



To interpret, the estimated term structures of GaR indicate there is an inter-temporal tradeoff for loose financial conditions, especially when there is also high credit. The estimations show that looser financial conditions reduce downside risks in the near term and can increase downside risks in periods further out. These results are consistent with models where loose financial conditions affect risk-taking decisions and can lead over time to a buildup of macrofinancial imbalances and higher downside risks to growth.

In the paper, we also consider what happens to expected future median growth conditional on financial conditions, since higher downside risk may be more acceptable to policymakers if expected median growth also were higher. We showed earlier, however, that median future growth generally is less affected and higher downside risk is not offset by higher expected growth.

To summarize, the estimated term structure of GaR can fill an important gap and provide a useful metric of risks to financial stability (risk measure that is expressed in terms of downside risks to expected future growth conditional on financial conditions). An important benefit of this measure is it expresses financial stability risk in the same units – GDP growth – that are of primary concern to other macro policymakers. Countries could track this growth at risk measure over time. It has the potential to provide a regular gauge of risks to indicate when macroprudential policies may be needed and to evaluate the success of those policies.

2. Governance for macroprudential policies

Turning to the second topic, what governance arrangements are in place to take macroprudential policies and are they effective? These questions are important for accountability and maintaining financial stability. In this area, Paul says "Central banks actively managing the credit cycle is, in the end, a case for ending independence of central banks." But he goes on "if elected politicians are in charge, I doubt they would stick to the declared resilience standard given the popularity of loose credit." So it appears that the macroprudential authority should not be a central bank, but elected officials in charge may not be effective. Chairman Carstens also commented on this issue recently – "to achieve financial stability, the central bank cannot be the only

game in town." He made these comments in the context of financial stability mandates, which challenge models of agreed goals and independent operations.

What is the problem for governance? It is not an issue of just technical risk-management, but it is a political issue, even for a tool like the countercyclical capital buffer (CCyB) that would apply only to banks. Because macroprudential policies need to be forward looking, they could be politically unpopular. This issue is the same issue for tightening monetary policy – to take away the punch bowl – just when the party is getting going. Macroprudential policies that work by restricting credit may also conflict with other objectives, like expanded homeownership.

In terms of the tradeoff for governance, the primary argument for the central bank to be the prominent authority is that it has some political independence (in its appointment of Chairs and Governors) and may be able to better set time-consistent policies. But for macroprudential policies to have political legitimacy, the government, most often the Ministry of Finance (MoF), should be involved to set the broad mandate, if not to be actively involved.

In ongoing work with Rochelle Edge, we constructed a new dataset of macroprudential authorities for a sample of 58 countries to answer the question of who makes decisions about dynamic macroprudential policies.[3] The set of 58 is based on a study that looked at countries that actually adjusted their tools in a dynamic way – for example, not just adopted higher structural capital requirements under Basel II. We used public official documents to create the database but have cross-checked it against some surveys, and it now reflects information through the first half of 2018.

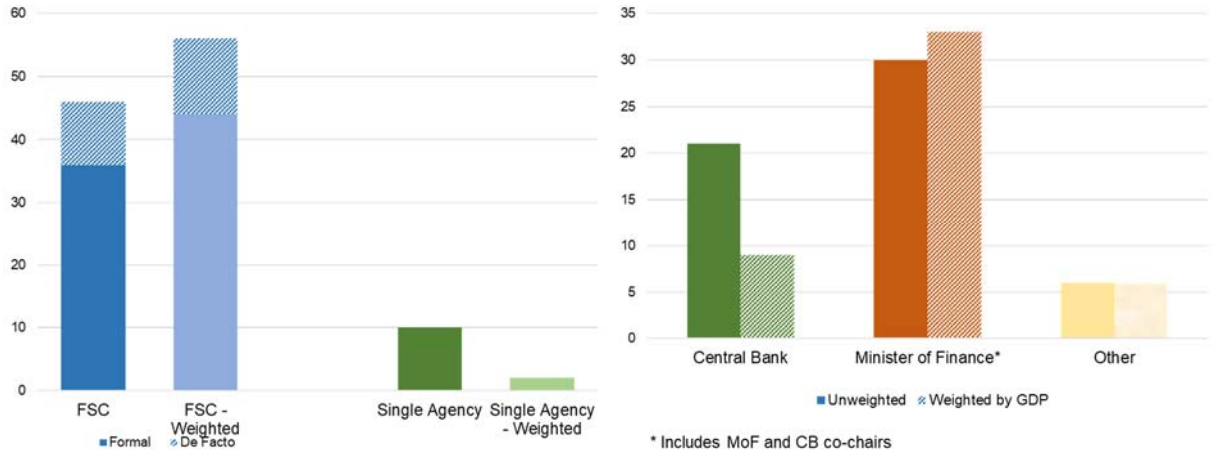
There are some first-order summary statistics that provide the bottom line of our analysis to date. Many countries, 46 of 58, have established inter-agency financial stability committees (FSCs). Most were created since 2008. In other countries, 10 have designated a single entity to be the macroprudential authority, and the single entity is the central bank in 9 of the 10 countries (the central bank is also the prudential regulator). These statistics indicate committees now are the norm, especially in terms of global activity. Most committees are established in legislation, though some are de facto.

Most committees have three to five agencies, typically the central bank, prudential regulator, a market regulator, and sometimes the MoF, and some have independent members. Countries largely built on their existing regulatory structure, and it is not at all clear if the individual member institutions each received new mandates for financial stability. In the US, for example, most agencies do not think they on their own have a mandate for financial stability and it is the multi-agency FSC that is responsible for financial stability. In terms of leadership, we find that the MoF is most often the chair. Central banks are second, but the weighting by GDP shows that they are more often the leaders in the smaller countries.

[3] Edge, Rochelle and Nellie Liang (2017). "New Financial Stability Governance Structures and Central Banks." Hutchins Center Working Paper #32, Brookings Institution, August 10.

Governance Structure

Graph 3



In terms of what the multi-agency committees do, nearly all state explicitly they meet to share information and coordinate. But in terms of actual new tools, there seem to be precious few. Only three councils – in the UK, France, Malaysia – have hard tools, that is, they can direct an action of its members. Another seven FSCs have "comply or explain" powers, which means the FSC can publicly express a view that an agency should take an action, though the agency can choose whether or not to comply and explain why it did not. That indicates that most FSCs (in 36 countries) meet just to share information.

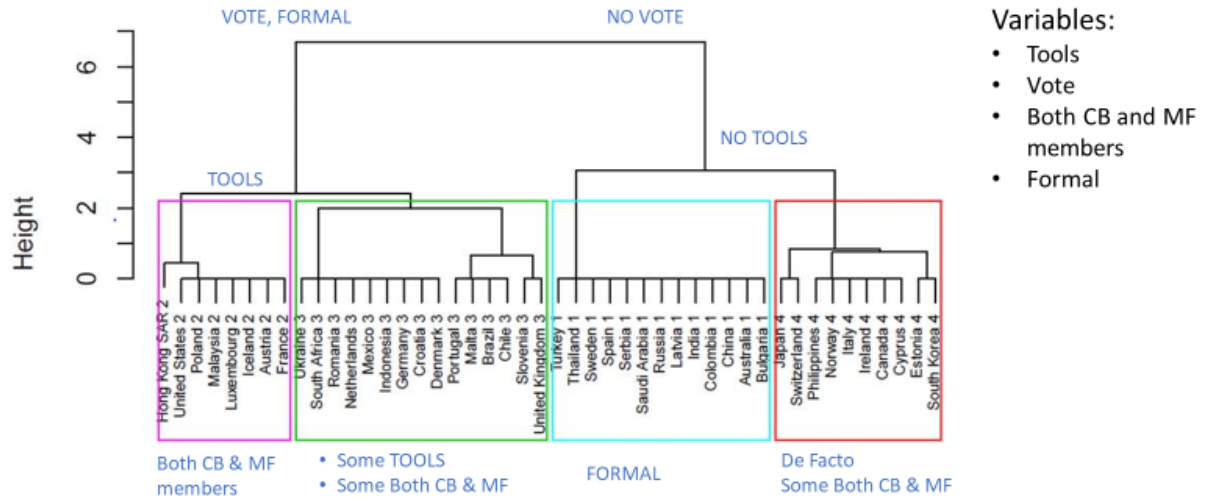
We did find that many FSCs have voting processes. In 24 countries, there is a voting process, often for a public statement they might release rather than to direct an action. Of course, the individual agencies often have the authority to set policies. Looking specifically at central banks in FSCs, we found that central banks regardless of whether they are the chair of the FSC have the authority to implement tools; in particular, they can set the CCyB in 22 countries and loan-to-value ratios for mortgages in 16 countries. This configuration illustrates there may be a disconnect between the authority over tools and the responsibility for financial stability. While there are advantages to this arrangement where central banks on their own can set tools because they may be less swayed by politics, it may make them more susceptible to political oversight and risk their independence for monetary policy, and may fog up the landscape to the public and to the regulators themselves about who is responsible for what.

In some preliminary analysis, we try to define a summary measure of strength of FSCs, based on authorities, and time consistent policies with political legitimacy. We turned to cluster analysis to define the strength of the FSC. We have tried a few alternatives and we show one result which is highly representative. We chose four characteristics about the FSC: (i) hard or semi-hard tools, or none; (ii) voting process or not; (iii) whether or not both CB and MF are members, and (iv) if the FSC is formally created in legislation or is defacto through MOUs. The cluster analysis indicates based on significance tests that these characteristics define four distinct groups. It appears the groups split distinctly on voting, then tools, and then CB and MF both as members.

The cluster analysis reveals eight countries in the strongest group. The FSCs in these countries tend to have a voting process, some tools, both CB and MF as

members, and was created in legislation. Another 15 countries are moderately strong (including the UK). But 23 FSCs can be classified as weak because they tend not to have a voting process, not have any tools, and are not formalized in legislation. The primary takeaway is that there are not many strong FSCs. Again, it is possible the central banks or prudential regulator can take macroprudential actions, but that type of arrangement is less transparent about responsibility for these actions and accountability for financial stability.[4]

Define FSC strength with Cluster analysis — Graph 4



Finally, we look at whether country characteristics can explain the choice of these new arrangements. We tabulate characteristics across the four clusters and find that the strongest FSCs tend to be in advanced economies, with higher per capita GDP, stronger rule of law, and a CB that is politically independent (as defined for monetary policy). We also found that the MoF was almost always the chair in the strongest FSCs. These preliminary results suggest tentatively that FSCs were set up with political considerations in mind, and independent CBs were not given more significant powers.

3. Conclusion

Most analyses of antecedents of the global financial crisis point to the lack of a rigorous regulatory and supervisory regime for the financial system, including the lack of a macroprudential approach that considered the effects of financial firms' risks on the broader financial system and economy. In this discussion, I have focused on progress toward creating a strong macroprudential policymaking regime in terms of providing a good measure of financial stability risks that can be a target and evaluating new governance arrangements for setting macroprudential policies. Building on ongoing research, I argue first that estimates of GaR based on 21

[4] Note that the US is in the strongest group and the UK is in the next strongest group, which may run counter to common perceptions. But we think that a FSC will be more sustainable if the MF plays a strong role, to provide political legitimacy, which we defined by whether the MF is on the committee. Future work to clarify the operating frameworks for FSCs may lead to different cluster results.

countries suggest that it is a promising new metric of financial stability risks. GaR is measured as downside tail risks to future expected GDP growth conditional on current financial conditions. It is expressed in terms that are common to other macro policymakers and thus should help to improve communication and coordination. However, more work is needed to develop structural models before specific policy prescriptions could be made if GaR measures were to suggest high future risks to financial stability.

Second, many countries have established multi-agency committees to be the macroprudential authority. However, most FSCs appear to be set up mainly to meet regularly and exchange views on financial stability, and many do not have voting processes in place. Our preliminary evaluation suggests that FSCs were created with political considerations in mind, perhaps to avoid concentrating too much power in central banks. The strongest FSCs are chaired by the ministry of finance but most do not have the power to direct actions, suggesting there is some obfuscation of what entity is responsible for taking actions and therefore pose a greater risk of inaction. One implication is that monetary policymakers should not assume that some other entity is empowered to address financial stability risks.

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