CIGI

Essays on International Finance

Volume 3: September 2016

The Design and Governance of Financial Stability Regimes

A Common-resource Problem That Challenges Technical Know-How, Democratic Accountability and International Coordination

Paul Tucker

CIGI

Essays on International Finance
Volume 3: September 2016

The Design and Governance of Financial Stability Regimes

A Common-resource Problem That Challenges Technical Know-How, Democratic Accountability and International Coordination

Paul Tucker

The Design and Governance of Financial Stability Regimes: A Common-resource Problem That Challenges Technical Know-How, Democratic Accountability and International Coordination

67 Erb Street West
Waterloo, Ontario N2L 6C2
Canada
tel +1 519 885 2444 fax +1 519 885 5450
www.cigionline.org

Contents

Foreword	**vii**
Executive Summary	**1**
Introduction	**2**
The Nature of the Problem: Which Social Costs to Prioritize?	**7**
The Nature of the Problem: Which Economic Model for Policy?	**12**
The Purpose and Objective of a Financial Stability Regime	**30**
The Activity Structure of a Financial System Resilience Regime	**39**
The Institutional Architecture of a Stability Regime	**51**
Summing Up	**61**
Acronyms	**65**
Works Cited	**66**
About the Author	**69**
About CIGI	**70**

Foreword

The CIGI Essays on International Finance aim to promote and disseminate new scholarly and policy views about international monetary and financial issues from internationally recognized scholars. The essays are intended to foster multidisciplinary approaches by focusing on the interactions between international finance, global economic governance and public policy.

International finance cannot be properly understood without reference to the global governance arrangements that shape the regulatory environment in which financial actors operate. The rules and playing field of the global financial system — the organizations, regimes, principles, norms, regulations and decision-making procedures that govern everything from banking practices and accounting standards to monetary relations and official cross-border lending — have a profound impact on how that system operates. Even though international finance is commonly conceived of as a largely unregulated domain, it is generally held together by a commitment to a particular set of policy priorities on the part of key global governance actors. In other words, a lack of regulation does not imply a lack of governance.

The principles and practices that have underpinned particular global governance arrangements — such as the earlier classical gold standard, the subsequent Bretton Woods order and the current regime — reflect historically and socially contingent commitments to particular policy priorities. As power, interests and ideas evolve, the priorities that guide global governance do so as well. Changes in governance structures, in turn, result in changes to the functioning of financial markets. Understanding the social, political and historical forces that determine how global finance is governed is, thus, crucial to understanding why financial markets function as they do, and how global financial governance can be improved to become more effective.

In the setting of a highly globalized world economy, there is a temptation to view public policy as the outcome of technocratic decision making. It is important to note, however, that while technical expertise and sound analysis may inform policy, they do not supply or demand it. The supply and demand sides of policy making are essentially determined by a number of interacting social, political and economic factors: the state of ideas, interests and institutions; the distribution of information, financial resources and expertise; and major focusing events, such as crises.

As an area of study, international finance has no natural disciplinary home. Indeed, it is a social, political, historical, economic and even geographical phenomenon. Thus, there are distinct advantages to taking a multidisciplinary approach. By harnessing the comparative strengths of different disciplines — including the different conceptual tools, theoretical insights and methodological techniques on offer — such an approach provides richer, more diverse analytical troves from which to draw. Furthermore, breaking down disciplinary divides can help to establish common ground between different, sometimes competing, perspectives. The intent of the CIGI Essays on International Finance is to encourage productive dialogue and the building of common ground by providing a research-based, policy-relevant venue for high-level, cross-disciplinary contributions to the field of international finance and global financial governance.

Domenico Lombardi
Director of the Global Economy Program, CIGI

Executive Summary

The owl of Minerva spreads its wings only with the falling of dusk.

— Hegel, *Philosophy of Right*

The reforms made to financial regulation regimes around the world since the 2007–2009 crisis have been simultaneously even and uneven — even, in so far as there is a shared core of reforms to banking and some capital markets; uneven, in the extraordinary diversity in the architecture and purposes of national regimes to preserve financial stability. Whereas a few countries have established high-level financial stability authorities with powers over the whole of the system, most have retained a patchwork of sectoral regulators, many of which lack an explicit mandate for stability.

There is also a degree of discord in the orientation of researchers and policy makers. While the former community stresses the serious social costs of booms whether or not they end in the collapse of the financial system, practical reform measures have to date been overwhelmingly focused on maintaining the resilience of the financial system rather than on managing credit and asset-price booms.

This essay examines those issues, arguing that financial system stability is best addressed as a common-resource problem plagued by hidden actions in the form of endemic regulatory arbitrage and innovation. It proposes a benchmark structure for a financial stability regime, centred on a "standard of resilience" to be applied on a functional basis across the system. This would, however, still leave a continuing problem of "missing regimes" for macroeconomic balance and national balance sheet (NBS) fragilities, leaving the international monetary and financial system prone to vulnerability. Addressing those gaps would necessitate grappling with the difficult question of which powers can and cannot decently be delegated to unelected technocrats in central banks and regulators. They are, at root, problems of political economy, not just of technical economics.

Introduction

The chaos that engulfed the world economy and global financial system in late 2008 met with remarkable innovations in central bank macroeconomic policy, sweeping reforms of the financial system and not much in the way of fiscal or structural policy beyond bailing out banks and various favoured industries. That broad-brush description would work equally well in Washington, DC, London and Brussels-Frankfurt. But when, instead, we look at reforms to the structure of government itself and, in particular, to the architecture of the regulatory system, the picture is completely different — more varied; local rather than global.[1]

In the United States, new powers were mostly given to existing authorities and were shaped largely by a pre-crisis conceptual framework for financial regulation. Thus, while the Office of Financial Research was set up to analyze stability issues in the round and the President's Working Group, bringing together the various key regulators, was given statutory identity as the Financial Stability Oversight Council, most powers to preserve stability remained with the existing battery of regulatory bodies. In the European Union, there was rather more architectural action. New European authorities for bank, insurance and market regulation were created, alongside a multi-agency Systemic Risk Board to advise on stability, and were followed a little later in the euro area by a transfer of banking supervision to the European Central Bank (ECB) and the creation of a new European Resolution Board. In ways that echoed the creation of US federal regulators in the 1930s and their subsequent evolution, this was a moment of centralization, driven partly by concerns about regulatory capture in national capitals. In other words, while on the face of it the re-arrangement of regulatory deck chairs in Europe could hardly look less like American post-crisis stasis, that is because the starting points were so different. The end results are rather similar, and have one profound thing in common: in neither of the world's two largest currency areas is there an authority with unambiguous responsibility for preserving financial system stability. By contrast, for better or worse, the United Kingdom gave exactly that responsibility to the Bank of England (BoE), and created separate statutory bodies within the BoE for macroprudential and microprudential policy.

There are all sorts of explanations for these differences, many sourced in the number of veto points in each jurisdiction's legislative system: in the United States, legion; in the United Kingdom, few. But apart from incentives and constraints, there is another possible factor behind the contrast between the different regimes for stability that now exist around the world: ideas, or rather a paucity of debate, about what a decent institutional architecture for financial stability policy would look like.

It could hardly be more different in the monetary policy sphere, where a quarter century or so of debate, analysis and research into monetary institutions led to the broad consensus that crystallized and, in some ways, flourished from the mid-1990s. But perhaps that contrast should not be surprising. In truth, the search for well-designed monetary institutions got going in earnest only after it became apparent that the value of money had been left unanchored by the collapse of the Bretton Woods international system of fixed exchange rates in the early 1970s. Faced with the oil price shocks that peppered the subsequent

1 I am grateful to Steve Cecchetti and Prasanna Gai for comments on earlier versions. The Bank of Canada provided two opportunities to present some of the views expressed here: one at a conference hosted jointly with CIGI, the International Monetary Fund (IMF) and the Peterson Institute, the other at an internal seminar. I am grateful to all the feedback received at those events, and especially to Larry Schembri for his comments and encouragement. Thanks for exchanges on the material in the first two sections of the essay are recorded there. All errors and views are my responsibility.

decade, countries discovered that their capacity to maintain anything resembling price stability depended on the credibility of their domestic monetary regimes. Some had it — but others did not, and they found that it was hard to will into existence. When policy makers and economists set out to pin down what did make a difference, they concluded that it was well-designed institutions, which could perform much of the role of rules while facilitating accountability for the exercise of constrained discretion.

If that period of monetary history is even a rough analogue, we may now be entering a prolonged period of reflection and research on the design of financial stability regimes. As with the earlier debate on monetary institutions, it will be heavily informed by the different realities being tried out by policy makers in the main jurisdictions. While Keynes might, with reason, have regarded practical men (sic) as the slaves of defunct economists and philosophers, Hegel was not so wrong when he observed that Minerva's owl flies only at dusk or, as I would transpose him in reply to Keynes, that economists and philosophers can be unknowing publicists for practical men and women. In other words, just as when in the late 1980s New Zealand put the world on the path toward flexible inflation targeting, we might be able to make sense of innovations in stability regimes only with hindsight.

In writing this essay, I certainly do not have that hindsight. Instead, it is designed to advance some principles for the assembly of financial stability policy regimes, a debate marked more by isolated contributions than by systematic engagement.[2] It is to be regretted that there are more papers and conferences on the "effectiveness of macroprudential instruments" than there are on what the objective of stability policy should be, on how stability regimes should be designed or on which responsibilities can decently lie with independent authorities as opposed to elected governments.

As such, the essay inhabits territory somewhere between the positive and the normative. On the one hand, it seeks to make sense of the shape of the regulatory reforms pursued by the international community. On the other hand, it offers a prescription for the high-level design of a regulatory regime designed to underpin the stability of the financial system itself. It is, thus, *conditionally normative* in so far as it seeks to spell out what ought to be the architectural implications of a decision to concentrate on system resilience in polities that require clear mandates and accountabilities. Where either of those conditioning assumptions do not hold, the normative design propositions might be different.

Eight thematic conclusions are worth highlighting up front.

First, while the debate about financial stability is routinely and rightly conducted in terms of the social costs of various financial system pathologies (negative externalities), more rarely is a clear distinction made between two broad classes of problem: resource misallocation and over-indebtedness among households and businesses resulting from credit and asset-price booms; and the withdrawal of financial services following the more or less complete collapse of financial intermediation. Somewhat different kinds of regimes, lying in different hands, may be warranted to address those two problems. The first shades into management of the national balance sheet and, thus, fiscal policy (broadly conceived as a political enterprise in which distributional choices cannot be ducked), whereas the latter — *financial system resilience* — should be the core concern of delegated regulatory policy.

Second, the problem of financial system vulnerability is best framed in terms of a common-resource problem bedevilled by hidden actions among both regulated and unregulated intermediaries. The *purpose* of a regime for financial system stability is to maintain the supply of core financial services, and the *objective* is the degree of resilience desired in the system as a whole given society's tolerance for crisis and the costs, if any, of making the system more robust. Seen thus, the core of a regime for stability is a *standard of resilience* and mechanisms for maintaining it in the face of endemic regulatory arbitrage, technical innovation and evolving demands from users and

2 An exception in the United States would be Paul Volcker's careful analysis of the stability architecture the country needs. See Volcker (2015).

customers. But how resilient the financial system needs to be is affected by the problem of missing regimes for NBS management and external macroeconomic balance, since real economy inefficiencies and international imbalances make the world a riskier place.

Third, given the internationalization of finance, the problem of financial system stability is a *global common-resource* problem. That means that the standard of resilience needs to be shared and so agreed internationally. And it means that, when applied, the same high-level standard would entail, for example, higher capital levels for banks in economies with a flawed fiscal framework or inflexible product and labour markets, since shocks in such economies are harder to absorb and, thus, lead to higher losses for lenders and investors.

Fourth, centring a stability regime on a standard for resilience points toward an approach to regulation based on functions or services rather than on legal form, since crisis is blind to the latter. Concretely, this poses the question of why open-ended funds invested in illiquid and opaque assets are not subject to anything like the kind of liquid asset requirements imposed on broadly economically equivalent commercial banks.

Fifth, despite widespread discussions of microprudential regulation and macroprudential policy as separate enterprises, neither makes sense, or is even well-defined, as a self-standing activity. Since that would, to put it mildly, seem to be at odds with decades of microprudential supervision around the world, it implies that supervision either lost its bearings somewhere along the way or, alternatively, never had any bearings. Looking back, both of those propositions are uncomfortably close to the truth in many jurisdictions, which would go some way to explain the gravity of the crisis. I will attempt to articulate how both micro- and macrosupervision need to be framed as elements of a broader regime for financial system stability. Microsupervision emerges as a function that warrants greater respect than is often accorded by commentators and researchers.

Sixth, that entails rethinking the relative role of rules and adjudicatory judgments. Given the overwhelming dynamic of regulatory arbitrage, societies need to quit proceeding on the basis that the answer to the riddle of stability lies in ever more rules. But escaping from that delusion raises the spectre of arbitrary power — of unelected regulators checked only by unelected judges.

A seventh conclusion, therefore, is that great care needs to be taken to avoid handing plenipotentiary powers to unelected expert technocrats in the interests of preserving stability. We need to identify the minimum set of powers necessary to that end and, also, which parts of a regime for stability need a democratic pedigree in order to be legitimate. Broadly, we should be wary of moving big distributional choices out of the arena of democratic politics.

In consequence, a final conclusion that warrants highlighting up front is the imperative of harnessing the technocrats to the goals given to them by elected legislators. Solving that principal-agent problem requires more effort from legislators to articulate objectives and mandates carefully. Since that might very easily cut across their own incentives to shed blame but take credit, it underlines the importance of forging an intellectual but practical consensus on purposes, in order to mitigate the separate background principal-agent problem between the legislators themselves and the electors they represent. Above all, that means societies resolving whether they want to try to cure the social costs of booms as well as of busts, and whether that requires more than a regime, delegated to technocrats, for the resilience of financial intermediation.

Structure of the Essay

The essay is structured as follows. It opens with a discussion of the nature of the financial stability problem, distinguishing between the social costs of boom and of bust. Like policy makers, the essay gives more weight (and space) to the costs of collapse in the financial system than it does to the resource misallocation and over-indebtedness of the household and business sectors that can result from credit booms. Broadly, this is to make a distinction between "financial system stability" and wider notions of "financial market efficiency." I share the view that collapse entails larger socioeconomic disruption and, thus, poses a *greater* threat to the shared values, conventions and

accommodations that underpin democratic governance. But this prioritization might leave "regime gaps," including leaning against booms that do not threaten the viability of the financial system itself. Subsequent sections take "system resilience" as their main theme, but repeatedly return, as to an irritation or itch, to whether this is omitting something that matters.

The second section reviews how the stability problem fits into the standard economics framework for addressing social costs. It concludes that guarding against bust is a particular kind of common-resource problem: one of global scale, one rooted in hidden actions by market participants and one exacerbated by hidden actions among regulators themselves. A contrast with the more familiar public good of price stability is underlined, and the insufficiency of the standard repertoire of solutions for externality problems, such as taxes or liability rules or "cap and trade," is explored. None of the standard approaches provides the whole answer given the specificities of the stability problem. Much of the discussion compares and contrasts financial system instability with the problem of chemical pollution. The pollution metaphor, while illuminating, could lead us astray if we rely upon it too heavily. The financial system can be a "self-poisoner," consuming the common resource of resilience that it itself creates. There seem to be private inefficiencies as well as social inefficiencies here.

The third section sets out how the core of a regime for financial system stability must be a standard of resilience for the system as a whole that, in effect, both reflects and specifies society's tolerance for crisis. The degree of resilience required of individual intermediaries turns, in part, on how, and how tightly, they are connected to each other, which opens up a discussion of the financial system's plumbing (infrastructure) and structural policy. This approach to stability policy is contrasted with adopting an objective of managing or smoothing the credit cycle, which returns to the regime gap around NBS vulnerabilities and imbalances that do not materially threaten the stability of the financial system itself but which do sometimes entail efficiency losses for the economy as a whole.

The section's advocacy of a standard for resilience for the financial system provides the basis for articulating, in the fourth section, the high-level structure of a policy regime comprising, at the apex, operationalizing the resilience standard consistently but appropriately for each part of the financial system; a system of micro- and macro*supervision* to detect and deter the hidden actions that could undermine system resilience; and a regime of macroprudential *policy* that, where necessary, dynamically adjusts core regulatory parameters in order to sustain the desired degree of system resilience in the face of a changing environment. Each component of the overall resilience regime, as well as the gap it leaves around NBS management, is described, including some implications for institutional design.

That, in turn, becomes the core subject of the fifth section, which addresses the allocation of responsibilities between elected representatives and independent agencies that are insulated from day-to-day politics.[3] The section accordingly opens with a summary of general principles for legitimate delegation to unelected technocrats in democracies, and goes on to highlight the implications for central banks, prudential supervisors, securities regulators and finance ministries. Important conclusions are that independent central banks are not the solution to all financial system pathologies or excesses, and should not be allowed or induced to try; that prudential supervisors should become either more focused on system stability or subordinate, in some way, to a higher-level stability authority; that the mandates and cultures of securities regulators need fairly radical reform if the world is to be safe; and that finance ministries need to take up the burden of explaining the gaps in the current post-crisis settlement, and prompting public debate on whether or not they merit a response. Thus, it is only when political economy considerations are introduced that the challenges of the regime gap issue start to become clearer.

The essay concludes with some thoughts on the lack of consensus, conceptual and practical, on the design of regimes that, in a haltering and perhaps usefully experimental way, are emerging around the world for preserving financial stability, and on what might be done to encourage rich debate in this area. Apart from

3 This section draws on broader forthcoming work on the legitimacy of unelected power, to appear in a book to be published by Princeton University Press.

making a plea for more consideration of objectives and fewer papers on the effectiveness of various instruments in "managing the credit cycle," the default mindset and skill set of macropolicy researchers, it calls for renewed efforts by legislators to oversee the execution of stability policy and increased vigilance among commentators and the media to ensure that legislators actually do so. It also flags, without resolving, the lack of a lobby or constituency for stability. This neglected issue matters, given pervasive and intense industry lobbying and capture strategies. The essay accordingly concludes with a qualified plea for more public engagement on stability before Minerva's owl signals that we left it too late.

Finally, I should explain that at various points examples of specific problems or reforms are deployed to illustrate the argument, but without elaboration. This is not a essay that seeks to explain the actual reform program, but rather attempts to provide a framework for evaluating stability regimes in the round.[4] No country that I know of has a regime that entirely conforms to my prescriptions, and some important jurisdictions would fall far short.

4 The substance of the reform program itself was outlined and evaluated in Tucker (2014a). One important conclusion of that paper was that policy makers lacked a framework for stability policy on markets. This essay's concern with regime gaps is in a similar spirit.

The Nature of the Problem: Which Social Costs to Prioritize?

The standard way into *public* debates about financial stability is to highlight the costly spillovers to the economy as a whole from crises in the financial system.[5]

In other words, the social costs of instability in the financial system are greater than the private costs to the managers, creditors and shareholders of the failing or distressed firms. Economists range more widely, however, highlighting the social costs of boom as well as of bust. In headline terms, that more technocratic debate seeks to understand and address two broad kinds of social cost:

- a misallocation of resources and, in particular, over-accumulation of debt during booms, which matter whether or not boom ends in bust; and
- a collapse in asset values and a withdrawal or severe tightening in the supply of essential financial services following crises, which together bring about a macroeconomic downturn.

Both are products of negative externalities: the private benefits of the socially destructive behaviour exceed the private costs, so society cannot sit back and rely on private virtue, prudence or incentives to ensure allocative efficiency or intertemporal stability.

Economists have three standard ways of remedying or mitigating the social costs of negative externalities, which in public discussion today are perhaps typified by pollution and environmental degradation. The first two strategies are designed to cause market participants to internalize the costly spillovers to third parties, and the third one simply restricts the unpriced socially costly activity. They are:

- creating property rights over the socially costly activity, thereby providing the basis for a market that was previously missing;
- taxing the socially costly part of the activity; and
- introducing regulatory limits on the socially costly activity, possibly via tradable permits.

In the field of stability, public policy is overwhelmingly based upon a battery of regulatory limits: on individual financial intermediaries' leverage, maturity mismatches, portfolio concentration and so on, which is to say non-tradable limits on the riskiness of their balance sheet structure and composition. But conceived and defended as such, the externalities lying behind the social costs that warrant regulatory intervention are liable to disappear from view.

Multiple Frictions but Tribal Mindsets

In fact, it is striking that different professional communities give varying weight to the underlying frictions and to the socioeconomic problems they drive.

The market failures that give rise to the first type of social cost — misallocated resources and over-indebtedness — are, arguably, grasped in only broad or qualitative terms. For example, possible drivers include myopia or herding due to relative-performance measurement and rewards: the problem of a party that has slipped into drunkenness. These explanations typically involve some violation of "rationality" and so, today, are hard to predict or model.

5 My thanks to Darrell Duffie for comments on this section.

The second type of social cost — severe economic downturn — is not only more salient, but also rather better understood, the driving externalities or frictions being rather more concrete and operating without any suspension of rationality, requiring only incomplete markets or imperfect information (Greenwald and Stiglitz 1986).[6]

Those frictions are typically thought to be:

- the fire sale of assets by financial intermediaries facing a withdrawal of on-demand funds or an erosion of solvency margins in leveraged balance sheets that are marked-to-market;
- the densely complex and opaque interlinkages among intermediaries, through direct or indirect credit exposures, service-dependencies or perceived similarities, that impede efficient pricing for risk and propagate losses across firms and funds in ways that make sense only after the event;
- the destruction of value, and thus amplified cascade of losses across the system, consequent upon entry into bankruptcy, when service provision must cease and borrowers' incentives to repay on time are reduced;
- the weak incentives for investors to recapitalize ailing but still-solvent firms, given that equity infusions will transfer value to debtholders, leaving such intermediaries to cut the supply of services as they retrench or wind down; and
- the costs for customers of finding substitute providers of certain types of financial services, and the informational barriers impeding new entrants without a track record coming into the market.

Arguably, the last three frictions are redundant, the burden of the work in explaining the social costs of financial system distress being carried by the depression of asset values, and consequently of economic activity, caused by fire sales and by the contagion unleashed by interlinkages that are too complex or opaque to figure in private choices. That, indeed, is where many accounts would end. But the costs of bankruptcy and of dormancy have historically been sufficiently grave that I believe these frictions warrant a place in our account.

When distressed, banks and others often choose to cut back lending, as well as to sell assets, in order to save liquidity and reduce leverage. If, as in late 2008 and early 2009, working-capital financing is rationed, the transmission into economic activity can be rapid and pronounced.

In a regular bankruptcy, however, it is worse. While the fire sales cease, since there are no longer any at-call liabilities, the cuts in new lending become absolute, since no new business can be put on. And if many banks fail, large sections of the community may be locked out of the payment system itself — alongside contract law, the deepest part of a market economy's plumbing.

It will already be clear that the five frictions are not independent. The interlinkages within the system can prompt individual firms to take desperate efforts to stave off bankruptcy and its attendant costs, if others seem to be ailing. But such measures may have perverse effects for the system as a whole when the mitigating action is fire sales that depress asset values, reducing household wealth and increasing businesses' cost of capital.

Notwithstanding those connections, it is striking how different communities prioritize the various frictions or problems. Concerned mainly with systemic collapse, elected politicians tend to be most focused on the third and fifth: how to support citizens in distress and, to a lesser extent, how to lower barriers to entry so as to ameliorate the dearth of substitutes when large or otherwise significant firms fail. Their creation of safety nets to help citizens through the twentieth century's greatest crises — notably, 100 percent backing for retail deposits — changed the face of banking, helping to lower barriers to entry but also exacerbating some of the underlying incentive problems and so diluting market discipline.

Where the risk-averting behaviour of the insured cannot accurately be observed, there is a problem of "moral hazard," with more risk liable to be taken than when terms were agreed. This is a further type of externality. It is typically associated

6 Of course, cognitive biases might exacerbate the problems.

with deposit insurance and solvency bailouts for intermediaries judged, *ex post*, to be too big or otherwise important to fail. But this essay will argue that the roots of hidden actions go deeper and wider than the provision of an official safety net, problematic though that is.

While active in designing and implementing the safety net, technocratic policy makers have tended to be more preoccupied by the second and third problems: contagion through the system and the non-linearities of bankruptcy. Traditionally, their lodestar was prevention of distress, via regulation and supervision of individual entities. That was seen as necessary to preserve the provision of the core financial services of payments, credit and risk transfer (insurance), and to "balance" the moral hazard problems implicit in the standard approaches to crisis management. Since the 2008-2009 phase of the latest crisis, that model has been transformed into an agenda around resilience during *both* normal and distressed conditions. There is recognition that failures cannot be ruled out, making it vital that distressed intermediaries can be resolved in an orderly way. In other words, there is a greater determination to cure moral hazard externalities by finding non-fiscal means to maintain the flow of core services even when firms fail.

By contrast, most analytical discussions, particularly in the macrofinance community, focus on the first friction, the consequences of fire sales. In their dynamic manifestation, if not in their underlying drivers, these are the mirror image of the herd-like purchases that fuel the misallocation of resources during the upswing of the credit cycle, and so macro-oriented researchers wish to cure both the first and second of the two types of social cost — boom as well as bust.

It is striking that researchers are typically more focused on the fire-sale (and what I shall call "endless-summer-day") externalities, but practical policy makers are more focused on the interlinkage externalities. This must say something about which is more interesting to the former, and which is more tractable for the latter. But I think it is more than that. To caricature, the macrofinance crowd see the problem as one of how to achieve a sustainable intertemporal equilibrium, whereas the regulatory crowd see it as a problem of underpinning systemic stability in each period. For the moment, the result is a struggle to claim intellectual-ownership rights to the term "macroprudential policy," which is really neither here nor there (and somewhat disorienting for those who belong to both communities).

The difference in perspective leads, inevitably, to differences in emphases on what should be done. On the one hand, regulatory policy makers have tended to focus on comprehending and addressing characteristics of "the system"; for example, mapping shadow banking or gauging flaws in the plumbing that leave large intra-day credit exposures between parties settling transactions.

On the other hand, macrofinance researchers have drawn attention to the pervasiveness of herding and fire-sale dynamics: to the pecuniary externalities that drive the erosion in asset values. Their concerns are not limited to those intermediaries that fund illiquid assets with runnable liabilities, nor even to leveraged investors who are forced to sell to protect their solvency when assets are marked down. It seems plausible that herding could be virulent among funds that have no leverage or liquidity risk, due to inefficiencies in performance measurement and rewards.[7]

The consequent swings in asset prices and, thus, in collateral values and the supply of credit might well amplify business cycles in aggravating ways. But it is not obvious that these are problems of systemic stability, as normally understood by regulators and central bankers.

A Monolithic Reliance on Regulation of the Safety and Soundness of Financial Intermediaries

Those differences in analytical orientation make the emerging set of "instruments" all the more striking. Orthodoxy would suggest a response to fire-sale externalities centred on taxes applied to short-term debt and leverage, in order to incentivize

7 See, notably, Feroli, Kashyap, Schoenholtz and Shin (2014), and Shek, Shim and Shin (2015).

intermediaries to heed the social costs of their balance sheet choices. But, in fact, the core of the reform package does not rest on such Pigouvian taxes, named after the early twentieth-century British economist Arthur Pigou. It comprises prescriptive regulatory measures to strengthen intermediaries and to simplify the complex network of exposures among them, via large-exposure, netting and collateral rules.

This might simply be efficient. As others have pointed out, reasonably well-designed equity-capital requirements can serve multiple purposes (De Nicolò, Favara and Ratnovski 2012). By reducing the probability of default, they both strengthen the network and make defensive fire sales less likely. And if raised during booms, such equity requirements might sometimes dampen the upswing of the credit cycle.[8]

But, while true and certainly convenient, efficiency feels somewhat thin as a rationalization of these policy choices. In the first place, there was not deep debate among policy makers about which of the three standard approaches — taxes, property rights or quantity constraints — should be employed. Second, it is not clear that the emerging regime does address — or is understood by political principals in all key jurisdictions as being intended to address — the system's tendency to exuberance. In some jurisdictions, end-users of the financial system still have tax incentives to favour debt over equity finance. And relatively few, if any, jurisdictions are clear about who, if anyone, should act to remedy any misallocation of resources that does *not* present a serious threat to systemic stability.

Broadening out, the problems of microeconomic resource misallocation and of macroeconomic imbalances are by no means limited to individual economies.

They are replicated in, and sometimes driven by, imbalances in the global economy. The reforms to the regime for internationally active or significant financial intermediaries have not been matched by an equally clear set of reforms of the international monetary system's regime for *net* capital flows or of the international financial system of *gross* capital flows. In consequence, two pathologies remain within the international monetary and financial system (IMFS) that can leave financial intermediation more vulnerable than otherwise.

One is a proclivity for global current account imbalances and their counterpart *ex ante* savings/investment imbalances, which, on the now orthodox view, drove down the world real interest rate and, thus, drove up asset prices, providing the collateral for the West's debt-fuelled consumption binge. And, moving from net to gross capital flows, the other is a tendency for "hot money" to flow into medium-sized economies with an open capital account and full currency convertibility, leaving NBS vulnerabilities that are exposed when the tide turns.

This suggests that, by concentrating on the most pressing issue of financial system resilience, policy makers might not have remedied the problem of "missing regimes" that has preoccupied them since price stability proved insufficient on its own. It is familiar enough that distinct externalities need distinct remedies and, following Tinbergen, that if distinct public policy objectives are to be exactly met, each objective requires its own instrument. What needs to be added to that technical mix is that individual national regimes need to fit into a coherent IMFS that covers intermediaries, national balance sheets and the connections among them.

A Regime of Regimes

To jump ahead a bit, in the interests of signalling where I am going, specific regimes might be needed, adding up to a coherent whole, directed toward the following goals:

- monetary stability, in the sense of nominal stability;
- systemic stability, in the sense of a resilient financial system;
- internal macrofinancial stability, in the sense of avoiding debt overhangs and other resource misallocations; and
- global macroeconomic balance.

8 That this would only be "sometimes" is discussed below, drawing on Tucker (2013).

The first is familiar, the second was missing but is being built, and the third and fourth remain elusive. Those gaps help to explain the pressure, including from within the policy community, for monetary policy to diverge from its goals of, pre-eminently, nominal stability and, subject to that, short-to-medium term economic stabilization. But with monetary policy makers typically regarding that as a last resort, the burden placed on regimes for systemic stability becomes clearer.

We had better be able to make sense, therefore, of the approach taken to stability policy and the stress it has placed on quantity controls to buttress resilience. Unless the choices made and the consequences of the continuing fault lines in the IMFS can be understood, it will be a struggle to design institutions capable of delivering the legislatively mandated goal of financial system stability.

The Nature of the Problem: Which Economic Model for Policy?

I hope that I have said enough in the extended scene setting to make us wonder why regulatory limits seem to be the ubiquitous solution to the various frictions that plague finance, rather than a market-based approach founded on creating new types of property rights or taxation of the underlying drivers of the social costs we care about. In this section, I want to argue that the first type of solution — property rights — cannot work given the nature of the problem, that uncertainties in calibrating the second approach, taxation, make it less appealing than the third approach, quantity constraints and, crucially, that all three face formidable obstacles in the form of avoidance and evasion.

This will prepare the ground for a wider evaluation of financial stability as a global common-resource problem bedevilled by hidden actions, which is compared and contrasted with chemical pollution. The purpose of this section is, therefore, gradually to reveal different features and dimensions of the stability-policy problem as a precursor to debating the essential elements of and design principles for a stability regime.[9]

Impediments to the Standard Approach to Missing Markets: Coasian Solutions

If the essence of the financial instability problem is a bunch of externalities, an important question is whether they could be remedied by the creation of property rights over the polluting activity that could be adjudicated and enforced via the courts and/or which could provide the basis for private transactions which lead to an efficient level of production. That is to say, why not address this as a problem of social costs in the spirit of the Coase theorem?[10]

If feasible, this would be attractive since it would, in principle, sidestep the problems of government failure that confront remedies based on taxation or regulation. In other words, if we could make financial markets work more safely by creating new markets, we should try to do so.

In fact, on one vital front, that was part of the inspiration for the course charted and pursued by policy makers: the resolution of distressed financial intermediaries without taxpayer solvency support. The central idea is to make clear (or at least much clearer) the order in which creditors will absorb losses (in the jargon, be bailed in) once a firm's equity is exhausted or it is otherwise unviable. The holders of bonds are put at the front of the queue, and so have incentives to charge, ration and monitor — and thus to demand more information on — financial firms' risks. All of that is about changing the pecking order

9 I am grateful for comments from and/or exchanges on material in this section with John Cochrane, Bengt Holmstrom, Paul Klemperer, David Scharfstein, Andrei Shleifer, Jeremy Stein and Luigi Zingales. I was prompted to set out my analysis of the financial stability problem by Anil Kayshap, who challenged me to explain why the debate is enriched by the "common-resource-with-hidden-actions problem" perspective that I first set out at a conference on macroprudential policy held by the Boston Fed in the autumn of 2015. Anil did me a favour, but has landed the reader with a longer essay than I intended. My view of the importance of the stability commons has not changed one bit. But I have been moved to be more open about gaps in the regimes for stability that I was involved in designing after the worst of the crisis.

10 See Coase (1960).

of creditors' claims in order to reduce obstacles in the way of enforcing the property rights of undifferentiated creditors.[11]

That is one, probably the most important, example of policy makers taking a broadly Coasian approach. I shall return to resolution policy below, but, more generally, the creation of property rights and new markets has not been seen as sufficient to solve the stability problem, for reasons that are quite fundamental.

A pure Coasian approach, harnessing the forces of the market, works only when transaction costs can be reduced materially. But financial instability — broadly, the collapse or seizing-up of the system as a whole — is associated with two of the ultimate types of transactional obstacle.

The impediment varies according to how the property right is framed: as a liability rule enforced *ex post* via the courts or as a pre-emptive rule applying *ex ante*, both of which could, in principle, provide a basis for private (or market) transactions.[12] I shall briefly review each in turn.

Rights to Compensation: The Problem of the Scale of the Problem

One option, in theory, would be to give households and regular businesses "rights," which, in the event of a systemic crisis, could be enforced, via the law of torts (or some other type of claim), against the banks and others whose imprudence had eroded the system's resilience, facilitated chronic over-indebtedness or otherwise led to the meltdown. But quite apart from the potential difficulty of demonstrating liability — was it the fault of bank A or B or C, or of all banks collectively, or of some other type of intermediary — there is a deeper difficulty. In the states of the world that characterize a systemic crisis, the banks and dealers are bust: they are not there to pay compensation.

Worse, the wider economic disruption brought on by systemic collapse can be so deep that the economy moves onto a (persistently) lower path of output and aggregate incomes. In consequence, there is not enough redistributable wealth that could leave everybody where they "should" have been — for the "winners" to compensate the "losers" — as society is simply poorer. The state could set up arrangements for today's losers to be fully compensated only by taking wealth from future generations, leaving them with losses unless economic vitality was thereby revived.

Pre-crisis Transactions in Stability Property Rights: Dispersion of the Victims and Short-termism

Nor are pre-crisis transactions in property rights likely to lead to an efficient level of stability pollution. In the textbook examples of Coasian solutions, it does not matter for allocative efficiency whether the rights are held by the perpetrator or the victim, since in either case the parties have incentives to meet in the market at what would be the same clearing price: in the one case, to pay the firm not to pollute; and in the other, to pay the victims to let them pollute.[13] The standard reason, familiar to regulatory economists, why this does not work in a case of the kind we are concerned with is that since the victims are dispersed across the whole of society, formidable costs would impede efficient trade between households and financial intermediaries in stability pollution rights.

Beyond that, economists and central bankers have their own reason to oppose a wholehearted Coasian policy regime given the substance of the stability problem. Whereas no one (normal) gains welfare from chemical pollution, many members of the public and many businesses are not averse to the exuberant credit conditions that typically precede financial crises; indeed, they not infrequently enjoy and support them. Thus, even

11 See Tucker (2014b).

12 See Kaplow and Shavell (1996). Their title, "Property Rules versus Liability Rules: An Economic Analysis," is a bit misleading, as liability rights are, broadly, a form of property right.

13 The allocation of the property right does matter for distributional purposes, of course.

if stability property rights could be designed and a low-cost marketplace for trading them established, it is not clear that members of the public or business community would choose to exercise their rights at anything approaching a socially efficient price.

That lays the stage for more intrusive government intervention on behalf of the people. But what broad kind of intervention should it be: taxation, cap and trade, or quantity-based regulation?

Pigouvian Taxes on Systemic Risk

If externalities originating in private sector behaviour are the beginning and end of the problem of stability, the benchmark approach, going back to Pigou, is to tax the socially costly parts of the behaviour.[14] That entails trying to pin down the underlying drivers of society's problem.

We have seen that, in the field of financial stability, views appear to differ as to whether, at least at the level of symptoms, the problem revolves around, on the one hand, panic, runs, herding and forced sales of assets or, on the other hand, insolvency and the social costs of bankruptcy given interlinkages within the system and impediments facing alternative suppliers. This matters because the two views tend to give priority, respectively, to liquidity policy and capital policy. But we do not have to choose. Indeed, it would be mad to do so.

Why We Cannot Rely Solely on Mitigating Liquidity Risks

Imagine a policy regime that, taking the fire-sale externality as its point of departure, revolves around runs and panics as *the* problem and, accordingly, stipulates that all short-term or otherwise runnable liabilities must be covered by assets against which the central bank will lend at a discounted (or haircut) value.[15] Is that enough? It is not!

Assume that such intermediaries hold no, or next to no, equity capital, funding the rest of their balance sheets with long-term debt. In consequence, when assets become impaired, as they inevitably do in bad states of the world, some intermediaries must close and go into bankruptcy, with the destruction of value and the withdrawal of services that this entails. Runs will still occur when insolvency is feared, *and* the central bank will not be able to lend when it shares the belief that an intermediary is fundamentally bust or unviable, because to do so would make the longer-term debt holders worse off.[16] Liquidity assistance works as a remedy only if the distressed intermediary is sound or, if barely sound, as a bridge to a more fundamental solution that will restore the bank to viability. The moral of the story is that it is not enough to cure the problem of self-fulfilling runs if the withdrawal of financial services matters.

Now imagine a system in which intermediaries are partly financed by equity, but where every intermediary's equity is fully invested in the equity of their peers.[17] Losses equivalent to just one firm's equity will put the whole system into bankruptcy. The broader moral, therefore, is that, while necessary, it is not sufficient to cure the problem of liquidity runs. Interlinkages

14 See Pigou (1920).

15 This was being debated in the Bank of England, in the years following 9/11 and in the run-up to the 2007 liquidity crisis, in the context of the possibility that central banks might have to intermediate the whole of the money markets if disaster brought down the payments and settlements infrastructure — a pure liquidity crisis, since banks' capital would not be directly impaired. The thought is captured in the "Pawnbroker of Last Resort" model set out in Mervyn King's *The End of Alchemy: Money, Banking and the Future of the Global Economy* (2006). King does not make the mistake I describe in this essay.

16 This highlights a dangerous canard in the purported precept, occasionally peddled by central banks, that they can lend so long as they have good quality collateral. The muddle and immorality of this view are set out in Tucker (2014c).

17 At least one intermediary has to have raised equity from outside the circle in order to comply with the company law of some jurisdictions.

matter, in part because bankruptcy carries significant social costs, especially if a material part of the system fails at much the same time, which it would if firms were thinly capitalized or invested in each other.

That account would hold even if there were no direct or indirect *credit* exposures among the intermediaries. Once those more concrete and prevalent interlinkages are introduced, the position is still more precarious. In the 2007 phase of the crisis, the United Kingdom confronted such cross-exposures when it turned out that the then regulatory regime had, bizarrely, permitted the liquidity portfolios of medium-sized banks to comprise debt securities issued by their peers. At the 2008 nadir, a somewhat similar problem arose, this time for the whole world, from the counterparty-credit exposures among firms active in the capital markets.

But that later episode also illustrated a relatively undiscussed problem: counterparty runs. This phenomenon does not involve withdrawing money balances but, rather, declining to trade. If firm A is ailing, firm B might refuse to engage in any transactions that entail the possibility of having to grant collateral or, if A failed when B was in the money, of having to realize collateral just as others were doing so, generating effects similar to a defensive fire sale. But with B and similar firms declining to trade with it, A's problems will get worse if its business model relies upon continuous trading and hedging. Its demise is, therefore, liable to accelerate as counterparties flee and demand to close out existing positions. This is an interlinkage-driven "business run" or "business fire sale." Thus, in the autumn of 2008, some US dealers could not even borrow against US Treasuries. Whereas a liquid but ailing commercial bank can lie in a semi-dormant state, doing no new business, a trading operation cannot do so very easily. If not fully alive, it is dead. In other words, like a funding run, a counterparty run can be self-fulfilling.

Pigouvian Taxes in the Regulatory Reform Program

If they follow only what has already been discussed, our notional social planner already has a series of problems to address. They want to lean against the presumption of taxpayer bailouts of the regular creditors of insolvent firms, and so incentivize creditors and customers to monitor and price bank risk rationally, *given their private interests*. They want to be able to absorb and so deter runs on sound firms, through a credible lender-of-last-resort (LOLR) regime. But they also want banks to internalize social costs that do not flow exclusively through fire sales, including imprudent lending, and so restrain excesses throughout both the financial system and the real economy. Not knowing which of the underlying pathologies is most devastating for society, we end up with a familiar (but not exhaustive) list of inefficiencies that a Pigouvian tax scheme would need to disincentivize:

- excessive leverage, liquidity mismatches and interconnectedness, genuflecting toward the second social cost introduced in the previous section; and
- underpriced lending that leads to excessive indebtedness among households and firms and so to impaired asset portfolios.

Such taxes could take two broad forms: pay x to the state for each unit of leverage, liquidity mismatch and so on, or combine the polluting activity of leverage/liquidity mismatch with an activity y, which would carry private costs and so disincentivize the socially costly activity. In either case, the tax rate could, in principle, rise with increasing levels of leverage, liquidity mismatch or portfolio concentration. And in either case, taxing intermediary balance-sheet variables might disincentivize excessive real-economy indebtedness if the costs of the tax were passed on to end-users, thereby addressing both types of social cost.

This broad Pigouvian approach is orthodoxy for some, not all, physical pollution problems and, as I have suggested, it is the starting point for many macrofinance research-based proposals for addressing the social costs of running risk in the banking system by taxing on-demand or other short-term funding structures.[18]

18 See Cochrane (2014).

As with the Coasian approach, it *is* reflected in the regime for stability. Notably, the new Basel Liquidity Coverage Ratio for internationally active banks is an instance of the second variant of such taxes. By requiring very short-term liabilities to be covered by holdings of high-quality bonds or central bank reserves, which offer a low yield, it incentivizes banks to term out their debt to the extent that any running losses on funding liquid assets with short-term funds exceed any private benefits from doing so. And by requiring higher liquid-assets cover for wholesale liabilities than for insured retail deposits, banks are incentivized to reduce inter-bank and other intra-system linkages.

The "systemic capital surcharges" applied to those intermediaries whose distress or failure would unleash most havoc might be thought of as applying taxes on, for example, size and interlinkages. But while the probability and expected costs of bankruptcy are reduced, it is less clear that the equity surcharges raise the designated intermediaries' total cost of funding, just as it uncertain whether minimum equity requirements for the generality of firms and funds do so. If the cost of debt finance is artificially low due to beliefs that bondholders will be bailed out by government, then raising the proportion of a balance sheet that must be financed by equity *will* raise total costs and so acts as a tax. But if, due to the new resolution policies, debt is perceived as risky, then raising equity requirements reduces the probability of creditors incurring losses, and so total funding costs might not change much. Under the latter conditions, the famous Modigliani Miller theorem on the invariance of total costs to funding structure would, broadly, hold, and minimum equity requirements and surcharges would not work as a tax.[19]

This is not a crazy position. The less moral hazard is cured, the more the equity surcharge works as a tax and this affects incentives. Conversely, the more progress is made in solving the moral hazard problem, it will be that, rather than the prescribed capital structure, that increases intermediaries' total funding costs.

Taxes versus Quantity Controls

Given the uncertainty about whether some of the core regulatory reforms do deliver a meaningful tax, we need to ask why the authorities have *not* made Pigouvian taxes even more central to their strategy to preserve stability. Nor, in general, have they adopted a pure quantity-control approach based on structural policies, such as banning or putting a limit on, for example, the combination of investment banking and commercial banking, or prohibiting cross-border or inter-state banking. We shall come back to structural policy in the next section. What matters for now is that, as we have seen, policy has been framed to operate mainly via quantity constraints on balance-sheet structure and portfolio composition, which, while having some features of taxes, is not quite the same.

In the first place, it leaves regulators with the burden of tailoring the controls to each producer. Specifically, as well as the standard minimum requirements applying to all firms, some jurisdictions apply so-called Pillar 2 capital requirements to individual banks, and a systemic surcharge to those firms whose distress or failure would be especially disruptive. This requires the authorities to make judgments on what is warranted for specific firms, case by case.[20] By contrast, a tax would be simpler in conception, since each firm would adjust its balance sheet structure endogenously, depending on the private costs entailed. That might be thought to be a major attraction in going down the Pigouvian route.

Of course, if we knew exactly the costs to producers of imposing the tax(es) and the social benefits of reducing the harmful externality, it would make no difference which of taxes or quantity controls was adopted. The authorities would choose one, and predict with accuracy the effect on its counterpart. We do not remotely live in such a world. In particular, we are uncertain about the (marginal) costs to financial firms of their taking less risk by carrying a greater equity or liquid-assets buffer. That being so, the authorities do not have the

19 This ignores the tax subsidy to debt finance.

20 Stress testing can be equivalent in jurisdictions that do not apply firm-specific Pillar 2 requirements. See below.

luxury of indifference, simply choosing whichever is cheaper to administer (although we shall come back to that).

Lobbyists for the industry might — indeed, do — argue that financial firms' marginal costs increase if they finance themselves with more equity relative to debt and/or with more long-term debt relative to short-term debt; further, those costs increase quite steeply once a fairly minimal threshold of resilience has been passed. They might also be expected to argue that the marginal (social) benefits of restraining leverage-production are pretty flat, on the grounds that it is the level (stock) of leverage that matters rather than increments to leverage. If the stock of leverage (or maturity mismatch) is akin to the stock of chemical pollution in the atmosphere, then, under standard economics, that would make a case for taxation being the better policy: the social benefits would be obtained with lower private-efficiency costs than otherwise, as each firm would be free to choose its balance sheet structure in the light of the tax.

On the other side of the debate, some would argue that the marginal (private) costs to firms of incrementally reducing leverage, maturity mismatches and so on are pretty flat on the grounds that, if we believe that the Modigliani Miller theorem holds even approximately, financial firms' *total* costs will not be much affected by shifts in the liability structure of their balance sheet (that is, their equity/debt ratio, short-term/longer-term liabilities ratio, and so on). Rather, if the overall cost of capital increases, it is down to the new Coasian resolution regimes that, by making debt risky, seek to return finance to the realm of the market economy, with a reduced wedge between private and social efficiency.

Stability advocates might also point to an important curvature in the marginal (social) benefits curve. At high levels of leverage, losses that are small in terms of total assets cause big increases in leverage. In those circumstances, incumbent management and equity holders have weak incentives to recapitalize the ailing firm, since a great chunk of the benefits flow to debtholders — a reluctance observed during 2008-2009. Further, at impaired levels of capitalization, longer- term debt is likely to be materially more expensive than short-term debt, as we saw during the 2007 phase of the crisis when available funding became shorter and shorter, creating a liability snowball. Since we are uncertain about the point at which levels of equity capitalization are regarded as *so* low that runs occur, the argument would go that the authorities should impose a quantity restriction on leverage (and/or maturity mismatch) in order to make firms resilient to loss and so reduce the probability of runs.

The industry lobbyist case rests on perceptions of a steep marginal private-cost curve and a flattish social-benefits curve, while the stability policy-maker case, as I have described it, rests on the converse.[21]

Arguably, the more interesting case is where both the key schedules are thought to be steep (or if policy seeks to be robust, it is thought that there is a decent probability that each is steep). This goes some way toward explaining why, within a quantity-based approach, the authorities did not impose even higher equity requirements. More precisely, given the possibility of steeply rising private costs, the authorities could not rule out that there would be longer-run social costs if the capital committed to financial services became rationed. This turns on the possibility of finance being socially useful, in the sense that privately efficient transactions might have positive externalities if, for example, they create incentives to innovate in ways that enhance scientific knowledge or technical know-how.

But if a social welfare trade-off was a consideration, why did policy makers not equivocate more over the choice between quantity controls and taxes, given that the latter are, in principle, more conducive to allocative efficiency? Perhaps they were simply convinced, in their gut, that the social benefit curve is the steeper of the two.

There are also two other possible explanations: implementation costs, and policy robustness. They are not mutually exclusive, so policy makers probably felt that they had a compelling case for the adopted course.

21 See Weitzman (1974).

Implementation Costs

One quite different explanation might be differential costs in implementing tax and quantity-based policies, including (actual and potential) political and reputational costs.

On the Pigouvian tax approach, the authorities would choose a tax rate, observe the "result," and if they did not like the result, reset the tax. I put result in scare quotes because, at least using traditional supervisory technology, the authorities would not be able directly to measure the reduced probability of crisis, but would assess the results on the basis of whether leverage and/or liquidity mismatches had fallen to broadly where they wished.[22] Since they would, I believe, have little idea where to set the tax in order to achieve desired balance sheet ratios, this might easily end up being a protracted process of trial and error. There would likely be political and reputational costs ("you don't know what you're doing"), so they prefer to set quantified balance sheet restrictions and observe the effects on the efficiency of financial intermediation.

That line of argument is obviously open to the criticism that the authorities no more know the "safe" level of firm leverage or maturity mismatch or interlinkages than they know the rate of tax that, if set, would deliver that safe level. The point, rather, is that, rightly or wrongly, pretty much everyone in this field thinks in terms of quantities, so that is the easier medium in which to debate and explain policy, which in a democracy is valuable in and of itself.

To sum up, such is the uncertainty about the marginal private costs of cutting systemic risk, such is the conviction about the increasing social costs of increasing financial system vulnerability and so embedded are the terms of regulatory policy discourse, that a quantity-based approach is preferable both politically and technically.

22 The "traditional supervisory technology" qualification is made because the post-crisis innovations in stress testing may change this. See below.

But this overlooks something central to our story. A separate, and deeper, obstacle to simply taxing the socially costly risk-taking behaviour is the difficulty of pinning down that behaviour. Wherever there exist broad moral hazard problems — that is to say firms disguising their actions — a vanilla Pigouvian tax scheme is going to struggle because financial intermediaries will seek to avoid or evade the tax. This is the problem of "hidden actions" that will, after one more round of excavation, be central to our story of the "resilience commons," and not just because of a public safety net.

Policy Robustness

That further preliminary enquiry will also highlight a separate merit of a quantity-based approach: policy robustness. Irrespective of whether the balance sheet regulations apply taxes that shift intermediaries' incentives toward internalizing social costs, they constrain intermediaries' degrees of freedom by putting limits on how far short-term liabilities can be invested in illiquid assets and on how far balance sheets can be funded by debt. This amounts to mandatory self-insurance, the merits of which will become apparent once we have discussed the impediments of applying a cap and trade policy in this field.

Auctioning "Instability Rights": Why Cap and Trade Will Not Work for Stability

If, as is the case, stability policy is overwhelmingly based on quantity constraints, why do the financial authorities not seek to mimic the structure of cap and trade for chemical pollution of the physical environment, auctioning off "instability permits"? Such a policy model would reintroduce some Coasian elements to quantity controls, and so would have the potential virtue of harnessing the market to the goals of allocative and intertemporal efficiency.

The nub of the question is whether financial instability externalities and pollution externalities are structurally similar. I am not sure that they are *sufficiently* similar for cap and trade to work in this field.

When the state auctions emissions rights, it does not sell rights to destroy the world, it sells rights to emit so many toxic particles per thousand (or million or whatever). In other words, the state relies on statistical estimates of the effects of emissions on things society ultimately cares about; it decides the total number of toxic particles that may be emitted given what it takes (or deems) to be society's tolerance for pollution, and it then auctions the right to emit them. To auction instability rights, the state would need scientific views on: (a) what kinds of thing individual financial firms do that are socially hazardous, which would constitute the auctioned right; (b) how and with what probability the auctioned right threatens bouts of financial instability that would be socially costly; and, thus, (c) the aggregate amount of instability rights that should be auctioned.

A Complex Instability (or Vulnerability) Bundle

As already discussed, the broad answer to (a) above is known: a mix of maturity mismatches, leverage and, loosely expressed, credit exposures to other intermediaries. The first thing to note is that this answer is more than one thing. A system of this kind would not amount to a simple cap-and-trade regime for, say, only liquidity risk.[23] If each component were auctioned and tradable separately, individual firms would be free to assemble highly toxic bundles. The instability rights would need to be framed as a complex bundle. That would make the auction design quite complex, but as a general matter, auction theorists know how to do that kind of thing.

But look more closely at the third component of the instability rights bundle: the network of counterparty credit exposures and dependencies. The riskiness of the system will turn on whether firms with high liquidity risk and/or high leverage risk are exposed to other firms with similarly high risks or only to firms with low risks. In other words, the potential social costs of a firm's activities do not depend only on its own activities. So the auctioneer might do better to sell bundles of instability rights that distinguished between exposures to high-risk and low-risk counterparties — i.e., a four-component bundle that recognizes more explicitly that what each bidder "wins" affects the welfare of other participants through the maze of counterparty credit exposures.

It is, however, even more complicated than that. The riskiness of each firm and, therefore, of the system as a whole might depend not just on each firm's balance sheet structure and the network of within-system exposures, but also on the riskiness of each firm's claims on the rest of the economy and on how correlated those risks were. That could change over time, including for deep reasons such as shifts in the underlying rate of technical progress or simpler things such as bad one-off events in the rest of the world. Thus, it would not be sufficient for our social planner to auction off instability rights. They might also need to be able to buy in some instability rights in riskier states of the world, acting as a kind of Coasian macroprudential market maker.[24]

Self-pollution

If that first set of observations about a cap-and-trade strategy concerned the complexity of the instability rights bundle, the following set penetrates what might be a deeper problem.

A standard cap-and-trade scheme is, in principle, indifferent to whether one firm buys up all the pollution rights in the secondary market. As a general matter, atomized industries are preferred for reasons of competitive efficiency, but that is different from the social costs of the pollution itself. Indeed, in polluting industries, the marginal costs of reducing pollution might sometimes even be lower in large firms. Big picture,

23 For a paper that focuses solely on a cap-and-trade regime for liquidity vulnerabilities and externalities, see Milne (2013).

24 In the mid-1980s, a group in the BoE's then prudential policy unit wrote a note to their bosses, as an April Fools' Day joke, advocating that the system of bank authorizations introduced in 1979 be replaced with a system of auctions for tradable banking licences, with monetary control effected through official open market operations in the permits. (I hope the note is in the BoE archive.) Former US Treasury official Morgan Ricks, now a professor at Vanderbilt Law School, has advocated something like this as part of a broader reform program. See Ricks (2016).

what matters is that the pollution is felt externally and *only* externally.

But finance is not like that. Imagine that one firm bought all the instability rights so that only it could be illiquid, leveraged and so on. If the firm failed, the provision of financial services would, for a while, cease, with grave consequences (spillovers) for the economy as a whole. It is plainly desirable that instability rights be highly dispersed.

Fundamentally, that is because the instability rights to pollute the economy as a whole are rooted in the right to undertake activities that leave intermediaries *themselves* vulnerable. The most serious social costs come not from financial firms polluting the external environment while continuing to produce goods and services that are privately valuable to customers, but from their *failure* through a form of *self-poisoning*: they *cease* to produce the privately (and socially) valuable services because they have killed themselves.

And broadening from one firm to the reality of lots of firms, the shifting interconnections among intermediaries mean that, to maintain the metaphor, each pollutes the others. So, when things go bad, they do not just commit suicide, they kill each other. *In good states of the world*, however, the "pollution" within the system takes the form of a vulnerability rather than a cost that is immediately or inevitably felt. Policy makers are dealing with something like a contingent pollutant or, perhaps more accurately, a pollutant whose toxicity is state contingent.

Four things emerge from that account: self-poisoning; peer-poisoning; uncertainty as to *whether* the production of a financial service will, *ex post,* generate material social costs; and long and variable lags in the event that an externality/social cost is generated.

The contrasts with the chemical emissions world will be obvious. The first — self-destruction — would be equivalent to the toxic pollutants killing the polluters' workforce or corroding its physical capital. The second — peer-pollution — would risk the economy's supply of steel or other goods drying up, which, of course, is not something we worry about with pollution, where the social costs of the activity are visited on the public rather than, reflexively, on the industry itself.

The transmission mechanism of that reflexivity is important, underlining the lags and uncertainties in the costs of systemic vulnerability. Taken in isolation, each individual financial firm's self-poisoning works partly through within-industry contagion. But taken in aggregate, financial firms' self-poisoning works through "poisoning" customers, in the form of over-indebtedness, whose demise through defaults inflicts reciprocal harm on the banks themselves, and on other intermediaries. (That is why the potential tax element in the regime of quantity controls is important: we want the tax to be passed on to end-borrowers and others so as to disincentivize over-consumption of financial services by end-users.)

Stepping back, we have found our way back to both the types of social cost discussed in the first section of this essay: the misallocation of resources that tends to accompany booms and is often, but not always, characterized by over-indebtedness among households and businesses; and the economic downturns that follow the implosion of the banking sector or broader credit system.

The costs of systemic collapse are, by revealed preference, regarded by the authorities as being greater than the former, but crystallize only if the system's self-pollution becomes fatal. While that might be driven by induced over-indebtedness in the real economy — the better analogue of chemical pollution — it can also be triggered by a self-fulfilling crack in confidence. So there are questions of strategic interaction among the polluters, and among polluters and their customers, as well as of vanilla pollution here — that is, issues of agency rather than of mechanics (or physical chemistry).

For all of these reasons, designing and operating a cap-and-trade policy in instability rights would be an ambitious endeavour. Figuring out the size of the externality, and thus the volume of instability rights to auction or allot, would be formidably complicated as it would depend on the portfolios of failing firms, the portfolios of other firms, incentives to herd, the tendency to myopia, prospects for contagion and more.

I want to suggest, therefore, that while the pollution metaphor captures *something* of the financial stability problem, it is *only* something and, therefore, tends to be overused. On the one hand, it gets at the over-indebtedness and more general misallocation of resources in the real economy that can be induced by credit and asset-price booms. That is important, because it raises the question of why more has not been done to address the externalities associated with booms, which later I will suggest turns partly on problems of political economy.

On the other hand, the pollution metaphor seems too thin or weak to capture the central issue of self-poisoning and, therefore, of system resilience and the very great costs of an evaporation of confidence in the system's resilience.

Put another way, the discussion of Pigouvian taxes and cap and trade reveals that there is more going on here than in a standard negative externality of the kind where industry X's activities hurt the rest of the community. For finance, the first-round spillovers are *within* the system itself, and therefore the system is contingently *self-harming*.

Regulatory Policy as Mandatory Self-insurance

This socially costly propensity to self-harm is reflected in how the authorities cast the quantity controls that bind some types of intermediary: as a form of enforced *self-insurance* against bad states of the world by holding equity and liquid assets rather than, as under a pure Pigouvian-tax approach, relying entirely upon tax-induced incentives to take and generate less risk.[25]

In other words, we do not just want to incentivize each intermediary to curtail the externalities it generates in the upswing through the misallocation of resources and over-indebtedness, and in the downswing through fire sales or the rationing of credit and other services. We also, more specifically, want each firm to be able to withstand stress and fail in an orderly way, with minimal contagion to other intermediaries and minimal adverse effects on the supply of financial services to the real economy. Mandatory minimum-equity and resolvability requirements seek, jointly, to address those concerns, which is why I introduced bankruptcy costs and entry barriers when cataloguing the key frictions in the previous section.

But, given the element of peer pollution, how much self-insurance each intermediary needs depends on the rest of the system. Indeed, I want to argue that, in some respects, it helps to think about this as a *common-resource problem* within the industry. It is a special type of common-resource problem because, unlike fish in the sea or grass on the village common, the valuable resource — resilience — is not only destroyed by firms but also generated by them. *The common resource is, in some sense, the intermediaries themselves.*

The remainder of this section accordingly takes a somewhat different tack from much analysis of financial stability. I describe how financial stability is a common good plagued by hidden-action problems. This puts the construction of financial-stability regimes in a somewhat different light, among other things placing a premium on mitigating some private inefficiencies, and so far as social costs are concerned, leaving us somewhere between Coase, Pigou and a third figure, Elinor Ostrom. Further, once we lift our eyes from national settings, as we must, Ostrom gains still more traction given the incentives for government failure through free-riding. So now, at last, we get down to business.

Stability as a Common Good

It is often said that, like price stability, financial stability is a public good. That misses something important.

25 It might be suggested in defence of a pure tax policy that if financial firms nevertheless chose to take lots of leverage and liquidity risk, which is to say if the tax was too low to deter the production of the externality, at least it would have increased the revenues of the state, which could, in principle, use the proceeds to mop up the mess created by systemic collapse. That assumes, however, that the government has not already spent the proceeds on projects that were popular with their supporters (for example, higher public spending or lower taxes). And even if they had not spent the proceeds, there would be large political costs to bailing out finance, again. If a policy is cast as a Pigouvian tax, it needs to work as such, suggesting *ex ante* clarity about how much systemic risk is meant to fall.

Price stability *is* a public good. No one can be excluded from the benefits of low and stable inflation, and nobody can consume those benefits leaving less for others. Put another way, no economic agent can easily undermine price stability provided that the monetary regime remains intact. It is not quite the same with the stability of the financial system. It is non-excludable: no one can be prevented from benefiting. But it is not non-rivalrous.

In an environment of stability, individual firms can be tempted to take more risks. More to the point, they have incentives to do so, so as long as they are not spotted. If they increase the riskiness of their portfolio, their leverage or their maturity mismatch in ways that the market cannot or does not spot; they will be undercharged for risk.

If each firm succumbs to the incentive to increase its risks in opaque ways, in aggregate some of the resilience of the system as a whole is consumed, invalidating the assumption of stability upon which their private risk appetites were predicated.

What lies behind this is a familiar collective-action problem, sourced in striking private incentives and in a capacity to generate opacity.

System Resilience as a Common Resource

Lest the attribution or metaphor of common good seems odd, let me unpack it a bit. If the good is stability, think of the common resource as system resilience, and the flow of benefits as coming via, for example, a lower systematic risk premium for borrowing in the capital markets, because collapse is improbable.

I am saying that firms eat the system-resilience grass. But why can each firm or fund not stand on its own feet, an island of resilience? Crudely, the answer lies in the interlinkages already discussed. This common resource is *common* or shared in two, related senses.

First, firms are exposed to each other, directly or indirectly. This is almost impossible to avoid: as customers, we do not all use the same intermediary, so they have to meet on our behalf via settlement systems and the money markets through which an economy's financial transactions are effected and intermediaries' books are balanced. Second, smaller firms depend on those larger firms that provide quasi-infrastructural services to the rest of the system, such as clearing, custody and liquidity insurance.

We would not want to eliminate such interdependencies, as we would then all have to use the same bank and broker. Efficiency is served through the competition that the interdependencies permit. But where those dependencies entail risk exposures, the system's resilience might be impaired.

Given this network of exposures and dependences, the common-resource — resilience — can be thought of as a property of the fabric of the system. Crises are more likely when the fabric has worn thin. Its resilience relies on the exercise of restraint by the firms. That is to say, restraint "produces" the common good, and lack of restraint at a later period "consumes" it. Putting state intervention to one side, participants in the market are, through their conduct, either producers or consumers of stability. We might call the posited restraint "prudence," to use the traditional language of the authorities.

But why should intermediaries want to undermine the system, and how do they get away with it?

Incentives

If a firm believes that everyone else is choosing to be sound and hence the system as a whole is and will remain robust, it has an incentive to free ride and choose to be less sound. If, on the other hand, it thinks others are choosing to be unsound and are making hay, it has incentives to join the party in a world of short-term relative-performance assessment — the problem of "leaving the dance floor" made famous by one pre-crisis Wall Street boss.

That is at the level of firms, but firms as such do not think or act. They are managed and controlled by people, and owned and financed by investors, which themselves are managed by people. The collective action problem is, therefore, partly sourced in

and exacerbated by striking problems of managerial control that are not fully understood.

There is the standard problem that a manager's interests may diverge from those of the firm's equity holders if they are paid a fixed salary or have diversified any performance-related pay away from claims on the firm. Crudely, if management have become rich, they might not care much about the *private* costs to owners and creditors of the firm's failing due to the elevated risks they have elected to take. This familiar source of private inefficiency has not obviously been remedied by remunerating management with locked-in equity. There might remain a wedge between inside and outside equity holders, or perhaps their collective interests diverge from those of debt holders. If that were so, one would expect bond investors to charge a risk premium. The Coasian resolution regimes, under which they will be bailed in, are designed to incentivize them to do so, but whether those incentives will bite on the real people who manage money remains to be seen.

Capabilities: Pervasive Hidden Actions, Regulatory Avoidance and Evasion

Financial system resilience as a common-resource problem has a central feature that must be heavily underlined: hidden actions, also known as general moral hazard.

This is not true of all negative externality problems. It is not true when I play loud music and ruin my neighbour's evening. Nor is it true of the chemicals billowing out of industrial chimneys or car exhausts, where the challenge is to figure out the density of pollutants. It is much harder to spot whether financial firms are going too far in eating the stability grass.

I do not want to say that the only problem is hidden action. There is plainly a tendency toward underestimating observable risks: myopia.[26] But we do not know the cause of the myopia, and we cannot rule out willful blindness playing a part, given the collective action problem in leaving the dance floor once the party is in full swing and the system's resilience is fatefully eroded.

In any case, with or without myopia, regulatory arbitrage is endemic in finance. Finance is a shape-shifter.

If an external agent, the state, sets rules and/or standards for prudent behaviour and balance sheet variables, the problem of private sector incentives manifests itself as rules avoidance or evasion: regulatory arbitrage, in letter and spirit.

At its most perverse, this happens through regulators handing discretion back to the regulated community, as in risk-based capital requirements structured so that each intermediary can control the regulatory calibration of its risk exposures. Since this undermines the purpose of an external agency seeking to mitigate the wedge between private and social costs, it has to be accompanied either by intense monitoring or constraints (floors) on firms' choices.

Imagine, instead, that the chosen instrument for addressing the problem of the financial stability commons is a specific constraint on intermediaries' balance sheets; for illustrative purposes, I shall use a cap on leverage, but a maturity-mismatch constraint or other constraints would serve just as well to make my point. The latent logical structure is as follows: first, leverage is banned in the financial services industry, none of which is allowed onto the commons; then "private rights" to leverage up to i times are granted via permits or licenses to just part of that population (let's call them "banks"). Two things, I suggest, can be guaranteed.

First, some firms, funds or structures outside the regulatory perimeter (non-bank banks, as they used to be called; today they are known as "shadow banks") will take on leverage in a form that does not fall within the formal definition of leverage. In other words, they manage to eat the resilience grass when that had not been envisaged at all. "Then apply the regime to all such intermediaries," comes the answer.

26 See Gennaioli, Shleifer and Vishny (2010).

Second, even though compliance with the letter of a simple leverage cap is relatively straightforward, monitoring whether the cap's policy purpose is delivered is anything but.[27] Regulated intermediaries will choose to hold riskier asset portfolios (or take more liquidity risk) than was factored into the quantity constraint. The cap's calibration should reflect those incentives, which is why a stand-alone leverage-ratio cap would have to be a lot tighter than a leverage-ratio that acts as a backstop to a risk-weighted asset-ratio cap.[28] But so long as the basis of the calibration is known, intermediaries have incentives to go further, invalidating its assumptions. Assuming public transparency, they will opt to hold the riskiest assets that are not thought to be risky, as, for example, when US banks loaded up on lending to developing-country sovereigns during the late 1970s and early 1980s.

It is central to this problem that the authorities have not, as yet, devised incentives for regulated and unregulated firms to reveal their true state and the true risks of their activities. In consequence, the intermediaries are liable to eat more of the resilience grass than had been assumed.

With everybody facing these incentives and enjoying those capabilities, the common resource of systemic resilience is easily depleted without anybody appearing to notice. To take only the most recent example, the common resource of systemic resilience had been depleted some time *before* the crisis of 2007-2008 was ignited. On this way of thinking about things, the crisis was waiting to happen. That it was triggered by the relatively small US subprime-mortgage market revealed that the system's resilience was wafer thin. It had been consumed by the dynamics of the system itself.[29]

The Problem of System Stability in a Common-resource Environment

What I have been describing has significant implications for the design of stability-policy regimes. To begin with, it points toward the importance of policies on the financial infrastructure since they shape the network of exposures and dependences. Likewise, it highlights the inherent importance of those big firms providing quasi-infrastructural services to the rest of the system. And it alerts us to the risks to the system when groups of medium-sized intermediaries are similarly exposed.

But beyond all of that, it suggests a flaw in much stability analysis and, more important, in the inherited regulatory-design construct. It is typical to think of financial stability as being jeopardized primarily by beneficiaries of government support (for example, through deposit insurance or LOLR) losing their incentive to control risk. That is true enough, but the underlying problem of stability-threatening risk taking goes much wider. Financial intermediaries with no access to the safety net share the incentive to take more risk than is identified. If they provide critical services that could not easily be substituted or if they owe large amounts to other critical parts of the system or if they would be forced sellers in order to stay alive, their imprudence weakens the system as a whole.

Another way of thinking about this is that everybody can "eat the stability grass": not only de jure banks but also shadow banks and others, such as unlevered funds that load up on risky

27 Even monitoring compliance with the letter of such a rule is not completely straightforward, as, for example, financial options can have terms that make them de facto funding instruments.

28 Thus, when commentators call for a leverage cap of, say, 10x, they are implicitly assuming that the risk-asset ratio constraint is dropped, with the leverage cap doing all the work. That is not always made clear.

29 Just how thinly capitalized is described in Tucker (2014d). The explanation for this would have to bring in lobbying, capture and an ideational failure that flowed from not thinking carefully about the resolution of large and complex firms, the special challenges of which were flagged in an early 2000s report to Group of Ten (G10) ministers and governors.

securities but are rewarded on the basis of short-term "mark-to-market" performance.[30]

Quite a lot of what follows later in the essay flows from this, but the points I want to underline here are that:

- the problem of regulatory arbitrage entails that any regime for stability needs to be capable of being applied to any class of firm, fund or vehicle that could contrive to eat sizeable parts of the stability grass; and
- it is essential to be able to detect and deter hidden actions, in isolation and in combination.

A Global Commons

If the problem of financial system stability lies in hidden actions by firms and funds undermining official policies to maintain the common resource of resilience, we have to ask what the authorities can do. This opens up another dimension of the challenge of designing an effective regime.

My discussion of the common-resource problem proceeded as though each country faced only its own local problem or, equivalently, as if there were only one jurisdiction in the world. That is not true, of course, so it matters greatly that the real-world multiplicity of regulators exacerbates the challenge of preserving stability. National state actors — the authorities charged with guarding the stability grass, and their political overseers — have incentives to indulge in hidden actions, too.[31] To see this, we have to broaden the canvass.

Whether it is the collapse of CreditAnstalt in Austria in the 1930s, Bankhaus Herstatt in Germany in 1974, Lehman Brothers in the United States in 2008 or swings in the flows of funds across borders, we are occasionally reminded of how risk is transmitted by internationally active and connected firms in a global financial system. With open capital markets, large cross-border financial flows and multinational financial institutions, no country can be safe on its own. *No country's stability grass is entirely its own.* If that is obvious for an international centre such as London, it is no less true of the US financial system serving a massive domestic economy.

Maintaining my metaphor, the shared resource of system resilience is a *global commons*. And as Stephen Cecchetti and I have discussed elsewhere, the immediate implication is that, excepting any countries that adopt financial autarky, regimes to preserve stability are unavoidably at root global, not local.[32]

Once international agreements and accords are introduced, however, we have a second order hidden-action problem — among the national regulators that are party to the collective global policy. Each might find themselves tempted or under pressure from powerful local interest groups to allow "their" industry to take more risk than is consistent with the international accord.

Even if they do not set out with that intent, they might acquiesce in a *fait accompli*. In the face of hidden actions by local firms to get around or take more risk than permitted under the internationally agreed regime, local authorities might not act as they should when, at last, they grasp the truth. Rather than meeting their international commitments, they might be concerned that returning their industry to base would exacerbate a macroeconomic downturn.

So, the global financial system's stability is a global common good, but one riddled with hidden actions by both private and public sector actors. This has implications for the availability of remedies and, our core subject, the design of stability regimes.

30 See Feroli, Kashyap, Schoenholtz and Shin (2014), and Shek, Shim and Shin (2015).

31 The concept of "hidden actions" employed here goes beyond actions taken by intermediaries that are not reflected in the price of market transactions. It includes the incentives to depart from promises or agreements in any principal-agent or contractual relationship. I am grateful to an anonymous reviewer for suggesting that I make this clear. The classic reference is Holmstrom (1982).

32 See Cecchetti and Tucker (2015).

Box 1: Applying the Ostrom Precepts to the Global Stability Commons

1. Define clear group boundaries.

This condition would be hard to meet in the private sector, since nearly every firm or fund might be involved, which stretches the practical meaning of community.

It can be met for the official sector. The boundary is the set of countries whose financial systems could have systemic effects on others. The "Group of Twenty (G20) plus" membership of the Financial Stability Board (FSB) — the "plus" incorporating important centres such as Hong Kong and Singapore — is an attempt at defining this group for current circumstances.

This leaves open the possibility that, in aggregate, jurisdictions outside the G20 could materially affect the stability commons. The IMF has the job of monitoring that risk.

2. Match rules governing the use of common goods to local needs and conditions.

Here the local is the global, but the precept is relevant in so far as the rules need to be tailored to global and cross-border finance in all of its varieties. Part of the challenge is to identify which local variations have only local costs and benefits and which are a ruse that could deplete the global resilience commons.

Agreement on a good common standard may be hardest to reach where a major jurisdiction has local weaknesses (for example, inflexible labour and product markets or fiscal vulnerabilities) that warrant its financial intermediaries being more insulated against losses.

3. Ensure that those affected by the rules can participate in modifying the rules.

The stability authorities of members of the international community sit at the policy table and can, through consensus, adjust the rules of the game.

4. Make sure the rule-making rights of community members are respected by outside authorities.

This is somewhat more demanding, as, in effect, it requires that the various international standard setters — the Basel Committee on Banking Supervision (BCBS), the Committee on Payments and Market Infrastructure, the International Organization of Securities Commissions, the International Association of Insurance Supervisors, the FSB and some others — should be regarded as legitimate by national authorities and legislatures. It is aided by the reporting line of the FSB being to G20 leaders. But meeting this Ostrom principle requires the leaders' engagement to remain meaningful, and to extend to domestic explanation and support.

5. Develop a system, carried out by community members, for monitoring members' behaviour.

This is not feasible for the private sector, which is too heterogeneous for mutualized monitoring outside of narrowly constructed settings such as clearing houses with membership restrictions.

Official sector monitoring, therefore, needs to cope with both layers of the hidden-action problem: by firms and funds, and by the national regulators themselves. Accordingly, this is a major preoccupation for the remainder of the essay's discussion of regime design and operation.

6. Use graduated sanctions for rule violators.

Again, outside restricted settings such as mutualized clearing houses, it is hard to see how the private sector itself could do this today.

While regulators have sanctions of various kinds over firms, they are relatively unexplored territory in the field of international financial regulatory standards. If one jurisdiction implements a watered-down version of a global standard, others could retaliate by requiring "their" firms to hold more capital against exposures to the subpar competitors, but that risks slipping onto the slope toward financial protectionism. An even bigger question might be whether regulators who do not themselves cheat are capable of spotting cheating by foreign firms, funds and regulators.

7. Provide accessible, low-cost means for dispute resolution.

The informal nature of international agreements aids this, perhaps especially for the Basel-based standard setters as the numbers around the table are relatively small and central bank governors can be involved personally. This is, however, an under-researched area.

8. Build responsibility for governing the common resource in nested tiers from the lowest level up to the entire interconnected system.

For the Basel-based standard setters, this should be possible because the broad "Basel process" revolves around a series of concentric circles, from the entire membership to the inner circle of the G14 (the G10 plus Brazil, China, India and Mexico) at the other, with formal decisions lying in between. For other fields, such as the regulation and supervision of dealers and funds, it is less clear that the international machinery is designed to deliver this.

Implications for Institutional Design: Addressing Common-resource Problems

Here we return to the differences between public goods and common goods. For public goods, each actor faces private costs of production that exceed their private benefits of consumption, creating a problem of how to *generate or incentivize* action. The classic feature of a common-good problem, by contrast, is that each actor's private benefits in eating the grass exceed their private costs, creating a challenge of how to *deter* action. We shall see in the next section that solving the stability problem involves both, but for now I want to concentrate on the question of how to avoid financial actors destroying what they build.

A quarter of a century ago, Nobel Laureate Elinor Ostrom famously proposed a set of governance principles for addressing common-resource problems.[33] Broadly, these included:

- the definition of clear group boundaries;
- the matching of rules governing use to local needs;
- ensuring that those affected by rules can participate in modifying them;
- developing a system for monitoring behaviour;
- graduated sanctions for violators; and
- low-cost means of dispute resolution.

Whether Ostrom's precepts are germane to, and, if so, can be met in, addressing the problem faced by a group of national financial stability authorities sitting around a table together is a major question that informs the rest of this essay.

The maintained assumption, backed up in Box 1, is that the private financial system is far too scattered and diverse, in almost every sense, for club-like solutions to be feasible, even if they were acceptable to public opinion. Enforcement would lack credibility. By contrast, Ostrom's precepts retain some purchase over the coordination problem confronting national authorities in seeking to work together in preserving the global stability commons. This is because they are relatively few in number, and know that their mutual dependence is not transient.

But their incentives would be healthier if that mutual dependence were more broadly understood by their political overseers and by the public.

Summing Up: A Common-resource Problem Plagued by Hidden-action Problems, with Two Kinds of Social Cost for Society as a Whole

Let me try to summarize the argument of the first two sections. In a nutshell, I am describing the financial stability problem as having the following characteristics:

- there are two kinds of social cost, concerning resource misallocation/over-indebtedness and economic collapse;
- there is a collective-action problem involving financial firms eroding the system resilience that they themselves depend upon;
- hidden actions by firms are endemic, and more than possible among regulators given international competition;
- the stability problem cannot be solved simply by creating property rights, nor entirely by simple Pigouvian taxes, and not easily by cap and trade;
- regulation, combining each of those approaches, and more, including the enforced provision of public good-like infrastructural services, is therefore needed; but
- the greatest costs do not flow smoothly, erupting only when risk crystallizes, while the attractions of booms are immediate and widely enjoyed, creating problems of credible commitment for any policy regime; and
- this leaves open whether we can design credible regimes for both of the social costs that concern us.

33 See Ostrom (1990).

A few points warrant underlining.

Unlike many other negative-externality problems, inefficiencies in financial services are such that intermediaries are *self-harming*, individually and, more important, collectively through the web of interlinkages and common exposures to the real economy.

As part of this being a common-resource problem, each firm has incentives to take risks that end up being more risky than calculated — including to itself — if its choices are mirrored in the behaviour of its similarly incentivized peers. That erodes the stability grass, potentially dangerously.

Unless the participants in financial markets are few and relatively homogenous, we cannot rely on the kind of cooperative solutions pursued in other areas.[34] A century or so ago, such homogeneity was the principled basis for the New York clearing house and, in the United Kingdom, for the club steward-like role played by the BoE in supervising the soundness of the City firms at the core of London's money markets.

This matters because the incentive of system members to free ride is socially destructive. The costs are borne by society as whole, not only by the financial system itself. Just as not all negative-externality problems concern common resources, this is distinct from many common-resource problems, where the costs of perverse collective actions are visited upon only the perpetrators. In a pre-modern village that did not trade with outsiders, the main immediate victims of overuse of its common grazing land were the villagers themselves. But the financial stability-commons problem has costs for the end-users of financial services and, thus, for the economy as a whole. The near-term costs are not neatly confined to the denizens of the financial community and their families.

For some, this suggests that the analysis should begin and end with the identification of Pigouvian taxes that address the externalities. The underlying objective of public policy in this field is, of course, to mitigate those externalities for society as a whole, by internalizing them to market participants or containing the spillovers from failure, and so on. Thus, regulatory regimes incorporate measures that operate as Pigouvian taxes (liquid-assets requirements), that reduce the probability of bankruptcy costs (equity requirements), and that harness markets (special resolution regimes). But the spillovers to the economy as a whole are what makes financial stability important rather than why it is so formidably difficult to maintain. If only it were as straightforward as introducing new Pigouvian taxes or Coasian property rights. That would be a task in mechanics. What makes it so very difficult is detection.

Unlike the simplest types of chemical pollution, observed billowing out of chimneys or in the smog engulfing some towns and cities, the social costs of financial system pathologies do not announce themselves so demonstratively. The difficulty of sustaining stability lies in the pervasive hidden actions via which market participants seek to avoid or evade any regime and, crucially, the fact that the common resource of resilience is a *global* common resource.

Of course, not all standard pollution problems are easy to detect; the Volkswagen emissions case demonstrated that regulatory avoidance is not limited to finance. But while the Volkswagen case has some similarities with finance, its actions were not intrinsically self-harming (until caught) and they did not directly weaken its peers.

In finance, there are hidden actions harnessed to financial externalities that weaken and harm the system itself. But the social costs of this do not flow smoothly or evidently, until crisis hits. Avoidance or evasion of controls is not only easier, it can even be enticing for the authorities to tolerate while the going is good: a problem of credible commitment.

In consequence, the problem of hidden actions is not confined to the private sector, but infects the public sector too. The problem that bedevils financial stability is how to design a regime that is incentive-compatible for governments scattered across the globe.

34 Ibid.

In other words, it is incentive problems intrinsic to making and enforcing policy that are central to devising a credible regime that makes financial stability so intractable, not only the externalities internal to finance itself. A central issue, therefore, is how easy it is to detect and deter free riding. I believe that in finance and financial regulation, it becomes formidably difficult if the regime relies heavily on writing detailed rules. In short, the problems of credible commitment (sticking to a stable policy) are compounded by, even more basically, problems of credible enforcement (whether the extant rules and regulations are in fact enforced).

Against that background, we now embark on an effort to construct a high-level framework that will help make sense of the strengths and weaknesses in the strategy/ies adopted by the international authorities.

At the heart of the framework is a need to define and maintain the degree of resilience desired in the financial system as a whole. Definition, the subject of the next section, needs to address both the resilience of intermediaries and the connections between them. Once the high-level objective has been outlined, the fourth section "The Activity Structure of a Financial System Resilience Regime" gets to the meat of what a financial system stability regime needs to cover in order to deliver and maintain resilience. Following from the discussion of the pervasive hidden-action problem, supervision will turn out to be anything but a matter of enforcing rules.

This will underline the importance of forensic skill sets, adjudicatory judgments and, therefore, a problem of how properly to constrain discretionary powers, which drives the discussion of the institutional division of labour within government in the fifth section "The Institutional Architecture of a Stability Regime." Once political economy constraints are introduced, we find that, relatively speaking, we might be better equipped to preserve a resilient financial system, formidably hard though that is, than to head off the social costs of resource misallocation and over-indebtedness that are inflicted by financial exuberance. As such, we end with the problem of missing regimes.

The Purpose and Objective of a Financial Stability Regime

This section has four purposes: to offer a brief explanation and defence, in the current state of knowledge, of designing a stability regime around the problem of resilience; most important for what lies ahead, to set out the high-level drivers of a standard for resilience *for the financial system*; to address the role of structural policy and, in particular, infrastructural policy within a policy regime for resilience; and to say a little bit more about the gap that this leaves around real-economy inefficiencies sourced in or exacerbated by financial system pathologies.

Prioritizing the Two Types of Social Cost

Of the two types of social cost itemized in the first section ("The Nature of the Problem: Which Economic Model for Policy?"), policy makers have prioritized the costs of financial system collapse over the costs of resource misallocation during financial booms. The assumption is that whatever the inefficiencies during the upswing, the destruction of wealth, jobs and productive capacity during busts matters more.

The dotcom bubble helps to illustrate the judgment. No one doubts that resources were misallocated during the bubble in technology company equities in the late 1990s, but few would argue that those costs compare with those of the 2007–2009 crisis. If that is obvious, it ought to be recalled that even in the early 2000s, many policy makers were far more troubled by the bursting of the telecommunications *debt* bubble than of the dotcom *equity* bubble, because banks were overexposed to the former.[35] In a world in which, partly to reduce the risk of government failure, societies must prioritize the problems the state should seek to mitigate, "bust" ranks ahead of "boom."

But that is not the same as saying that boom should be neglected.

Of course, financial system pathologies are not themselves the origin of all booms, which might be sparked by over-optimistic assessments of technical change or demand shifts, or by the risk-channel of monetary policy. But irrespective of how they begin, the financial system can magnify and spread booms, so policy makers face the question of whether the social costs of busts are better headed off by concentrating on preventing or dampening booms.

In other words, how should policy makers spread their efforts over, on the one hand, reducing the probability of busts by reducing the incidence of booms and, on the other hand, reducing the severity of busts?

Big picture, their de facto choice has been to work on both by improving the resilience of the system. Of course, a resilient system would be less likely to collapse and, crucially, in the event of crisis would be better at resuming the provision of core services, which would reduce the severity of the economic downturn and place less reliance on macroeconomic policy to generate recovery. That is true almost by definition: it is what "resilient" means. Perhaps more speculatively, policy makers have judged that a resilient system would be less likely to generate stability-threatening booms in the first place, since intermediary balance sheets would be more constrained. If so, the social costs of booms would be felt less frequently.

That makes the important implicit assumption that the population of intermediaries that needs to be resilient is more or less co-terminous with that driving the cost of credit and

35 The "near miss" of 2002, when it is possible some major intermediaries were badly stretched, remains peculiarly under researched.

insurance. Be that as it may, it is clear that, notwithstanding the prevalence of papers devoted to assessing the "effectiveness of macroprudential instruments" in dampening credit growth or asset-price appreciation, the approach adopted by policy makers is *not* a regime for *actively managing* the credit cycle.[36]

System-stability Policy Is Not about Managing the Credit Cycle

I concur with that choice, insofar as I believe that a system designed to fine-tune credit and asset-price dynamics would be too ambitious.

Although this is barely acknowledged in the literature, it is hard to know whether temporarily raising, say, capital requirements for banks would tighten or relax the supply of credit in the short run. Any such measure would reveal (or signal) not only the action itself, but also information about the state of the financial system. In contrast to monetary policy, where the data on the economy are in the public domain, a prudential policy maker has lots of private information about vulnerabilities in individual financial institutions and the linkages among those institutions. If the market were surprised that a policy maker was concerned enough to act, credit conditions might tighten sharply if market participants concluded, on the basis of the information newly available to them, that the actions taken were insufficient. If, by contrast, the market had been ahead of the authorities in spotting a lurking threat to stability and so was relieved that the policy maker was finally awake and acting, credit conditions generally might even ease. There are many scenarios in between.[37]

Another way of thinking about it is that, in contrast to monetary policy, the underlying frictions are not sufficiently well understood for policy makers to tune their policy settings through an error-correction strategy that feeds back from conjunctural data. It is true that, for monetary policy makers, the equilibrium risk-free real rate is as unobservable as the various equilibrium risk premia that an ideal financial stability policy maker might seek to have actual premia track. But whereas, so long as long-term inflation expectations remain well anchored, a monetary policy maker knows they have made a conjunctural mistake if they observe productive-capacity pressures (or slack) followed by rising (falling) nominal wages and/or prices (and expectations), a financial stability policy maker would not, as yet, know which variables to treat as indicators of miscalibration. As put here, that takes the wind out of the sails of those who espouse a kind of dynamic Pigouvian tax regime, with tax rates or the tax base adjusted in order to manage credit quantities and prices.

In summary, for all the talk of macroprudential policy as a form of credit-cycle management, few advanced-economy authorities have been given powers to act, except where there is a threat of losses that the system could not absorb. The point of departure for designing the core of stability regimes is, therefore, to ask what it means to have a policy directed to the goal of the financial system being sufficiently resilient to continue providing the core financial services of payments, credit and insurance in the face of big shocks, and whether that leaves gaps that should be addressed by other policy regimes.

The Core of a Stability Regime: A Standard for Financial System Resilience

If the objective is continuity of services from the system as a whole, and thus avoiding the worst costs of a bust, the core of a stability regime must be a *standard of resilience*. That is to say, just how resilient should the system be?

Roughly speaking, policy makers need to determine the severity of shock the system should be able to withstand. The articulation of such a standard for resilience would be driven by three things:

36 This means, incidentally, that the Basel III "counter-cyclical buffer" is ambiguously named. "Buffer" is good, but "counter-cyclical" is misleading as it draws staff and policy makers in the authorities into the illusion that macroprudential policy is a close analogue of macroeconomic stabilization policy.

37 See Tucker (2013).

a. a tolerance for systemic crisis;
b. a picture (or model) of the structure of the financial system through which losses or shocks are transmitted around the system and via which substitute service providers emerge; and
c. a view of the underlying stochastic process generating those shocks or first-round losses.

While all three are unavoidably part of the makeup of those existing regulatory regimes, such as the Basel III Accord for banks, designed to ensure resilience, they have tended to be implicit. I want to argue that they should be as explicit as possible, in the interest of both effectiveness and legitimacy.

That legitimacy is at stake can be seen by observing that the three components are different in kind. Inputs (b) and (c), the model/picture of the system and the loss-generating process, are properly objects of scientific inquiry. That inquiry would have to be wide ranging. For (b), it would include the effects of the system's structure and infrastructure (see below), and judgments about the likely ferocity of macrofinancial feedbacks. And for (c), the necessary inquiry has to address whether flaws or gaps in the regime of regimes — for macroeconomic balance, and for NBS vulnerabilities — make the world riskier. But input (a) is different as society's tolerance for systemic risk needs, somehow, to reflect a view of the people's preferences.

Politicians Must Bless the Resilience Standard

This marks an important difference from monetary policy. Perhaps the central belief of monetary economics relevant to the design of monetary institutions is that there is no long-run trade-off between growth and inflation. In consequence, orthodoxy favours a lexicographic objective that prioritizes low inflation. Further, although we have good democratic reasons for the people's elected representatives to set the nominal-variable objective (in today's regimes, the inflation target), we generally do not think it outrageous if "price stability" is defined by central bankers themselves, as in the euro area and the United States.[38]

Things are different in the financial stability field. We do not yet know whether or not prosperity could be damaged by totally eliminating the risk-taking behaviour that can threaten periodic bouts of instability.[39] Concretely, therefore, policy makers have not banned any of leverage, maturity mismatches or short-term debt, and those calling for such action remain at the margins of public debate.

For these reasons, a goal of systemic stability is not quite the same as the established goal of price stability. Some residual risk of instability is tolerated *even when the regime is working as intended*; the question being, how much? That is why elected politicians must choose or bless the standard of resilience that the financial stability authorities are required to maintain.

In Europe, something like that happens, through the European Council and European Parliament's formal endorsement of the incorporation into EU law of the Basel standard for banking. In the United States, where the standard is effected via agency rule making, through processes complying with the Administrative Procedures Act, a majoritarian imprint comes indirectly via the elected executive branch's participation in the G20, which signed off on the post-crisis Basel standard at a leaders' summit.[40]

This last point is important beyond the United States. As stressed in the previous section — "The Nature of the Problem: Which Economic Model for Policy?" — a global regime in which each

38 That is so only if the target is set broadly in line with embedded medium-term inflation expectations. As such, unelected technocrats should not make abrupt changes in their inflation target. This is discussed further in a forthcoming work on the legitimacy of unelected power, to appear in a book to be published by Princeton University Press.

39 For what, I believe, is a comparatively rare paper exploring possible long-run trade-offs, see Ranciere, Tornell and Westerman (2008).

40 See "The G20 Seoul Summit Leaders' Declaration," November 2010, paragraph 29.

jurisdiction unilaterally chose its own standard of resilience would not be sustainable given the spillovers from problems in one country's financial system to other countries. Either we have degrees of financial autarky or we reconcile ourselves to the stability commons being a global commons and we need a common minimum standard for resilience. Absent cosmopolitan democracy, any such standard needs endorsement collectively from national democratic leaders.

Unpacking "Tolerance for Crises"

"Tolerance for crises" needs a bit of unpacking. Crisis/non-crisis is not binary but, rather, is more akin to Dante's Circles of Hell: graduated awfulness. If the generation of policy makers in office during the great financial crisis avoided a repeat of the Great Depression of the 1930s, the essential objective of the reform program is to materially increase the probability of future crises ending up in better (meaning, less bad) circles of hell.

We accordingly need to think of tolerance for crisis as tolerance over a vector of bad states of the world. In very broad summary, the vector would include all core services ceasing and, less devastating, severe impairment of each broad type of core service.

In the spirit of the previous section — "The Nature of the Problem: Which Economic Model for Policy?" — this is about services (or activities or functions), rather than simply being about specific intermediaries or legal forms. It is about *types* of intermediary only in so far as they happen, as a fact of the world, to dominate the provision of a particular type of service (broadly, payments, credit, insurance and so on). In a nutshell, the tolerance vector specifies normative probabilities or thresholds, determined in the light of estimates of the medium-to-long-term costs, if any, of reducing the incidence of the different types and degrees of crisis. For example, does society place greater weight on the payments system staying open at all times than on the continuous availability of credit or insurance?

Once the thresholds (ends) are chosen, there is the question of means. If a resilience regime defines "withstanding" a crisis as the system as a whole being able to maintain core services, that could be achieved by: (i) intermediaries being able to survive the prescribed shock-severity and so continuing to operate; (ii) a capacity to revive the provision of services by failed intermediaries; or (iii) easing the way for replacement capacity to enter the market. By and large, pre-crisis regimes put all their chips on (i), with resort to taxpayer bailouts when intermediation collapsed, seized up or atrophied. The exception was the resolution regime for medium-sized domestic commercial banks in the United States, the broad success of which, tragically, had not prompted wider interest in how to revive intermediation when firms fail (as in (ii) above). All that has changed since 2008, with an international commitment that *every single* intermediary should be resolvable without government solvency support and in ways that preserve the flow of services. As such, resolution is *not* simply about shutting down failed firms: it is about reviving and so maintaining the flow of services.

None of this means that the beginning and end of resilience policy is a set of unconditional standards for individual firms, funds and other intermediaries. Rather, for any given high-level resilience standard, what is demanded for individual entities is, in line with (b) above, conditional on the structure of the financial system and, specifically, how viciously or mildly shocks are propagated and how easy or hard it is for new entrants to substitute for failed or badly distressed firms. This means that policies on the financial infrastructure, on the structure of the industry and on competition all matter. The first of those seems to be given greatest weight by modern policy makers, even though the financial plumbing is hardly salient for the wider public.

Infrastructural Policy: Reducing and Channelling System Interlinkages

Compared with structural policy — for example, whether to reintroduce the 1930s Glass-Steagall Act separation of banking and markets — technocratic policy makers and, in particular, central bankers have traditionally been more focused on infrastructural policy. The broad generation spanning Paul Volcker, Jerry Corrigan, Eddie George and Alexandre Lamfalussy

was particularly active. After a lull before the crisis, today's incumbents are renewing their interest.[41]

We care about the interconnectedness of the financial system because it can transmit and amplify losses and, thus, foster contagious panic. But we probably would not want to rely entirely on a simple tax on, say, interbank exposures to mitigate this source of vulnerability. That is because the economy would face increased transaction costs if, in order not to incur the tax, bank A refused to accept payments from or make payments to bank B on behalf of its customers due to consequent unsecured credit exposures. A better solution than taxes or limits is to design the financial infrastructure so as to *remove*, as far as technically possible, those network exposures that are an *incidental by-product* of mechanics rather than a desired financial position, provided that it can be done without impairing operational efficiency. In principle, such innovations might, as a general matter, be left to the private sector. But private actors face a collective-action problem in making the necessary technical and financial investments, each having incentives to free ride on the contributions of their peers.

In other words, we have a public goods-type problem woven into our baseline problem of the resilience commons. The financial infrastructure is akin to finding a member of the community who will take time out to water and fertilize the grass. For each community user, the private costs of taking on the role exceed the private benefits. If the network of users is small, with excludable but, for those admitted, not rivalrous consumption, there might be a club-like coordination solution, where each pays toward a gardener or, in our case, an infrastructure builder.

But even that is not guaranteed. If competition policy reduces barriers to entry, later participants might escape the upfront investment costs. And where the purpose is system resilience, intermediaries might underestimate the prospective private costs to them of vulnerabilities in the unreformed system. When, in the late 1980s, the BoE proposed real-time collateralized transfers in the sterling wholesale payments system, the big banks initially resisted. Only after the Midland Bank wobbled, just a few months later, did the other banks approach the BoE to say that, on reflection, the proposed overhaul was a good idea after all!

For these reasons, vital resilience-enhancing infrastructural reforms have tended either to be spearheaded by the authorities or forcibly mandated by them, the most recent example of the latter being obligatory clearing of certain derivatives via central counterparties (CCPs).

CCPs simplify the network of counterparty credit exposures in the system, reducing the interlinkages externality. But they do so at the cost of making CCPs too important to fail, since they become infrastructure almost as essential as the central banks at the apex of the payments system.[42] If it goes through, would a merged LSE-Deutsche Boerse clearing house be the most important point of singularity in the global financial system?

In a nutshell, while some infrastructural innovations remove credit exposures, others reshuffle them, leaving system interlinkages simplified and less opaque, but alive.

Is Structural Policy a More General Solution to the Hidden-action Problem?

That makes it all the more interesting that modern policy makers have been bashful about structural policy for intermediaries themselves. I want to try to make sense of this, because it could be argued that structural policy would reduce the difficulty of enforcing the standard for resilience that I maintain is central to solving the problem of the stability commons.

Quantity-type controls are often regarded as easier to enforce than taxes because, quite simply, non-compliance is more readily observed. Thus, in a typical example, a ban on Sunday (or other holy day) trading by shops is easier to enforce than a tax on Sunday trading, because anyone can see whether shops

41 Former Bank of Japan Governor Masaaki Shirakawa maintained interest in the plumbing throughout.

42 See Paul Tucker (2014e).

are open, whereas shopkeepers might seek to evade a tax by making out that transactions had occurred on another day of the week, which is much harder to refute.[43] This essay has put hidden actions to avoid and evade balance sheet and other controls at the heart of the problem of designing robust stability policy regimes. Crudely, banking might be dressed up as capital markets activity or as insurance, and so on. But this merely begs the question of why sectoral boundaries are not rigidly defined via structural policies that put clear water between different types of financial intermediation.

Compartmentalizing Finance

That, essentially, is the case made by those calling for the United States to reintroduce (and for other jurisdictions to introduce) a Glass-Steagall Act-like separation between banking and the securities markets. Three arguments have, I believe, weighed against doing so, rooted in political economy, technology and the global nature of the resilience commons.

My own belief is that, in our modern democracies, laws and rules effecting structural policy are much more likely to be watered down and even repealed after a decade or so than non-structural rules and regulations. The fact that they seem easier to understand makes it correspondingly easier for industry lobbies to stay united and to convey their complaints simply to commentators and elected politicians. When economies recover and the public mood changes, structural policies would be vulnerable to attacks that they restrain trade, impede efficiency, create a bureaucracy with arbitrary powers and so on.

Further, the compromises inherent in any legislative project, particularly in presidential systems, are liable to leave gaping loopholes. It is well known that, despite its apparent brevity and simplicity, a mountain of creative interpretation left Glass-Steagall dead and buried years before Congress administered last rites. My assertion, which of course I cannot demonstrate, is that today the unravelling would be more rapid.

Separately, the technological impediment to structural policy is that, compared with the world in which Glass-Steagall was framed, underlying product types have become blurred over the intervening 80–90 years. Loans are traded singly, as well as in the tranched bundles known as securitizations. Insurance is provided and acquired via insurance-linked bonds sold in the capital markets. Instruments and exposures of all kinds are hedged and traded via derivatives. In short, the boundaries between banking, securities and insurance are no longer well-defined, existing only in law and regulatory rules.

To work, the reintroduction of clearly distinct types of financial intermediary would require abolishing many products and services used widely by businesses and, indirectly, by many households. It seems fanciful to imagine that any such legal prohibitions would be rigorously and consistently enforced.

Finally, there is the global commons. Industry structures are often local and path dependent. Continental Europeans almost cannot comprehend American beliefs that universal banking makes the system more vulnerable; many Americans cannot grasp German aversion to hedge funds and so on. If, as the global nature of the commons requires, shared minimum standards were to be reforged in the wake of the 2007–2009 crisis, structural solutions were off the table.

Functional versus Institutional-form Regulation: Liquidity Transformation

The three explanations for the revealed aversion to structural policy do not, however, necessarily point toward a sector-based regime. Indeed, if product and service types are, today, inextricably blurred, one of the biggest questions is whether the resilience standard should be effected via functional rather than institution-type policies.

An obvious starting point would be to ask which financial intermediaries are subject to the risk of liquidity runs, and to impose on them, whatever their extant de jure type, the same package of regulatory measures implementing the standard for resilience. For example, any intermediary financed by uninsured

43 The example is taken from Glaezer and Shleifer (2001).

liabilities would have to cover short-term obligations by assets that can be discounted at the central bank.

The absence of a functional approach is, perhaps, the most striking thing about the post-crisis regulatory-reform program as it has evolved to date. While there has been a lot of hand-wringing about shadow banking — financial intermediation that mimics or replicates the economic substance of banking without its legal form — policy has been piecemeal rather than systematic.[44] It is not too late, however, and will never be too late, to consider whether the Pigouvian tax applied, via the liquidity coverage ratio, to de jure banks should be extended, in suitable form, to shadow banks. Stirrings of this kind are apparent in the rules proposed by the US Securities and Exchange Commission (SEC) during 2015-2016 for liquidity policy at open-end funds.

As discussed in the previous section, however, runs are not the sole threat to stability. In consequence, a functional approach would entail that the type of leverage constraints applying to banks should be applied to those levered shadow banks whose failure, individually or collectively, could materially impede the supply of essential services or, through fire sales and interlinkages, push the economy onto a lower growth path.

Those are sweeping statements. Far more careful analysis would be needed of the *degree* to which social welfare was threatened by distress among different "types" of intermediary. For example, on the approach we are taking, it should matter what services an intermediary provides as well as what risks those services entail. Thus, commercial banks might need to have stronger balance sheets than leveraged credit funds, which are not direct members of the payments system and do not provide payments and settlements to customers.

A New Trusted Policy

Commercial banks are especially important because they provide liquidity insurance to the rest of the economy, including to securities dealers, which themselves provide liquidity services, via market making, in the capital markets. That is, commercial banks are liquidity *reinsurers* to the capital markets. If, as most people believe, we should place a high premium on sustaining the supply of private liquidity insurance, an argument could be made that commercial banks should not also be *directly* exposed to market liquidity crunches. In 2007 as asset-backed securities (ABS) markets dried up, commercial banks' equity was severely impaired as their own holdings of ABS and other instruments were marked down. Had they not been able to hold mark-to-market instruments, they would have remained better capitalized and so better able to provide funding liquidity to the dealers and funds with unsatisfied demand.

What this amounts to saying is that while leveraged liquidity-mismatched intermediaries of all "kinds" matter to stability, through the fire-sale and interlinkage channels, they matter more if they provide highly valuable services that only they, as a type, can provide.

So, a form of structural reform might re-enter through a cap on the proportion of commercial bank balance sheets accounted for by positions that are marked-to-market. This would give some substance to the metaphor Alan Greenspan conjured around two decades ago of financial intermediation having twin engines: banking and capital markets.

Once the population of intermediaries that should run limited mark-to-market risk was identified, the policy would be easy to apply as, unlike a dividing line between banking and securities products, the test is binary and under the control of regulated auditors. But to whom should the restriction apply? The principled answer is any intermediary whose liabilities are treated as being money. The practical answer is not so easy. It may not be possible to pin down in terms of categories rather than case-by-case assessment, so even a functional approach would not resolve the challenges faced by the authorities.

Barriers to Entry and the Returns to Core Banking

There is one further set of considerations around industry structure and terms of trade: competition policy. Unfortunately,

44 See Tucker (2014a).

this too fails to deliver a conclusive answer. In fact, there are considerations pulling in opposite directions.

Briefly, the experience of Australia and Canada might point in the direction of higher barriers to entry into core domestic banking markets. By virtue of a somewhat oligopolistic structure, the two countries' commercial banks are sometimes thought to be able to make a decent return from the core services of intermediating between depositors and borrowers. That leaves them, so the argument goes, less tempted to gamble in capital-market exotica. But in terms of resilience, it is a structure that might create a super-tail risk of all the important banks failing together, due to correlated portfolios.

The opposite approach argues that it would be a good idea to lower barriers to entry so as to reduce the social costs of any particular firm or group of firms, however large, failing and ceasing to provide important services. The advantages of low entry barriers can be observed in the catastrophe- and specialist-insurance markets. When unexpectedly bad insured events occur, carrying out some of the key insurers, demand for that kind of insurance rises and premiums rocket, which draws in fresh supply via new vehicles or accounts in the Lloyd's or Bermudian markets. Crucially, these new entrants are not weighed down by legacy problems. Contrast that with banking, where we look to surviving but wounded banks to help sustain the economy and see it through to recovery. For stability policy, the case for lower barriers to entry into banking is to make it a bit more like parts of the insurance market. If that could be achieved, the metaphor of the stability commons would be less apt.

The consensus policy has not directly embraced either approach. But, arguably, there is an implicit choice in the international official strategy of developing resolution regimes that allow distressed firms to be recapitalized by bondholders and, thus, either wound down in an orderly way or revived so that essential services can be sustained. If that strategy works, barriers to entry can be lower. For those reasons, effective resolution regimes would allow policy makers to be more liberal about financial technology, or "fintech" innovations.

The Gap: Resource Misallocation and Over-indebtedness

This section has sketched the high-level substance of a regime for system resilience:

- a standard for the resilience of intermediaries determined in light of, among other things, the structure of the industry, the infrastructure that supports it and the presence of any barriers to entry; and
- a standard that is cashed out in terms of policies for the severity of shocks intermediaries should be able to absorb while continuing to provide services, and arrangements for their orderly resolution and, suitably transformed, service resumption.

The next section will outline the types of activity that this apparently simple set-up entails for the authorities. Before doing so, I want to reprieve what it seems to leave behind.

The prescriptions I have been outlining for the purpose and objective of a financial stability regime is focused especially on the second rather than on the first of the two broad kinds of social cost identified at the beginning of the first section: reducing the probability and social costs of *financial system crises* that wreak havoc in the economy rather than on wholly avoiding the misallocation of resources or real-economy over-indebtedness that credit and asset-price booms can bring about.

Very broadly, this amounts to prioritizing steady growth in the economy, and therefore its aggregate size, over the allocation of resources within the economy. As such, it assumes that: allocative inefficiencies can be remedied over time; that the tax and welfare system can be deployed to remedy material distributional injustices; and that the safety net, including deposit insurance, can alleviate hardship for people of ordinary means who are directly hit by crises.

It also takes for granted that the economic headwinds stemming from a debt overhang are greater following implosion of the financial system than if a distortionary bubble deflated more or less smoothly rather than in a grand bust. It would hardly be

surprising if boom-with-collapse was more costly than boom-without-collapse.[45] That does not mean, however, that we should be indifferent to the macroeconomic and other social costs of the accumulation of excessive indebtedness in the household or business sectors where a material threat is *not* posed to the stability of the financial system itself. This gap in a regime for the resilience commons could leave an economy limping along as a debt overhang in the real economy was gradually worked off, especially if wounded but not felled intermediaries tighten the supply of financial services.

Put another way, prioritizing the social cost of economic wreckage cannot of itself make a case for ignoring the social costs that exuberance and mispriced finance can impose on society. Since my reasons for this posited separation lie partly in the political economy of democratic governance, a fuller discussion has to wait until the next section (under NBS management) and, especially, the discussion of institutional responsibilities in the final section. But I want to reiterate that the resilience commons analysis leads to regimes that address one of our problems only incidentally and uncertainly.

And if there are missing regimes — for internal and external macroeconomic balance — the standard of resilience for the financial system might require tougher concrete requirements since the underlying processes that generate losses will have fatter tails.

Resilience Standard Inputs Redux

Our discussion should make us re-examine our earlier description of the three inputs to the standard of resilience that is the centerpiece of a regime for financial system stability: (a) a tolerance for crisis; (b) a model/picture of the mechanisms through which losses are transmitted around the system; and (c) a "stochastic process" that generates first-round losses.

We described (b) and (c) as objects for scientific enquiry. But we can now see that it is a bit more complicated than that. Policy on industry structure, competition and infrastructure affects (b). Policy on regimes for domestic macroeconomic stability, NBS management and for the international monetary system — broadly, whether there are credible regimes for maintaining or restoring internal and external macroeconomic balance — affects (c). There are choices here as well as scientific enquiry.

In any case, the framers of the standard of resilience must be clear when those structures or regimes are inadequate. Given the global nature of the resilience commons and the consequent need for an internationally agreed standard of resilience, that presents challenges that have tended to remain implicit in public explanation and justification. Do international policy makers assume — and *should* they assume — that each of their jurisdictions has a basically sound monetary and fiscal framework, but that fault lines persist in the international monetary system? If so, that would entail that when the standard is applied in a jurisdiction lacking, say, an effective fiscal framework, tougher regulatory requirements would be needed to achieve the commonly agreed degree of resilience.[46] This would surely make international standards harder to agree. But ignoring the issue leaves the international system less resilient than a common standard implies or, alternatively, leaves strong jurisdictions with incentives to protect themselves from their frailer peers.

45 Mendoza and Terrones (2012) shows that credit booms are often accompanied by macroeconomic booms, and often but not always lead to financial system collapse. Likewise, Schularick and Taylor uncover costs of booms without collapse. That the costs of debt overhang are greater when combined with collapse are graphically demonstrated in Reinhart and Rogoff (2009) and Jorda, Schularick and Taylor (2013). My thanks to Carmen Reinhart, Ken Rogof and Alan Taylor for exchanges on this.

46 This consideration might be elided in work on the amount of equity needed in banking that approaches the question by examining the scale of banking crises over the past few hundred years. War-triggered crises are sometimes excluded, but that would leave in the dataset those crises sourced in inadequate fiscal and/or monetary regimes.

The Activity Structure of a Financial System Resilience Regime

With that background, we can now, finally, sketch the elements of a financial stability regime designed to maintain a resilient system. To be clear, this is still not about institutional architecture, but about the functions the state needs somehow to deliver.

A decent regime for the resilience of the financial system has five high-level components:

- a statement of requirements for the various parts of the system designed to deliver the high-level standard of resilience;
- microprudential *supervision* of individual firms, funds, structures and so on;
- macroprudential *surveillance* of the system as a whole;
- dynamic macroprudential *regulatory policy*; and, when all has failed,
- crisis-management tools and policies.

In the following subsections I say something about each of those components, but in a different order. Crisis management is discussed second since it constitutes part of the policy for effecting the standard for resilience, and is the object of the hidden actions of avoidance and evasion.

As this composite regime leaves unanswered what, if anything, should be done about unsustainable imbalances in the real economy that do not threaten the viability of the financial system itself, the section concludes with some thoughts fleshing out what a framework for NBS management might entail.

The Baseline Regime for Financial System Resilience

In the previous section, I said merely that: there should be a high-level standard for resilience of the system as a whole; that it should be agreed with or blessed by elected politicians; and that how resilient each intermediary needs to be turns on its importance to the economy and the risks it poses to the system. That last item poses the question of how the standard should be applied more generally.

Operationalizing the Standard of Resilience for Different Sectors and Activities

No sector or activity should pose a bigger threat to stability than any other *after* the resilience standard has been applied to it. That might be operationalized only after the high-level standard had been articulated explicitly. Alternatively, the implicit resilience standard might be inferred from some particular sectoral requirement for safety and soundness, perhaps Basel III (including the "systemic surcharges"), but the example is not material. This would be an approach where one set of requirements was treated as *revealing* the underlying resilience standard, without being its definition in a more fundamental sense. The backed-out standard would then be translated into equivalent measures for other types of firm, fund, structure, activity, function, service provider or market.

That is not straightforward in practice. It entails taking into account the risks that each type of sector or activity or balance sheet poses to the system, given the choices the authorities have made about structure (see the previous section) and, more broadly, their model/picture of how shocks are propagated. To make things even harder, where application of the resilience

standard was liable to induce changes in the system's structure, reasonably clear assumptions would need to be made about that. Even though rarely expressed in this way, I insist that this is what is going on in the "system resilience branch" of stability policy.

This exercise would need to address questions such as:

- Does a credit institution need to be more resilient if it is a direct member of the payments system?
- Where a lot of intermediation is via capital markets, do intermediaries that provide clearing or prime-brokerage services need to be more resilient than otherwise identical firms?
- Could an insurance or reinsurance company always be wound down in an orderly way, and would substitute suppliers enter frictionlessly?

That will read uncannily like the official sector approach to the designation of "systemically important institutions," albeit with a clearer emphasis on service provision and, therefore, resolvability and barriers to substitutability. But, if our objective is the provision of services, the lesson of the second section, "The Nature of the Problem: Which Economic Model for Policy?," was to focus on activities and markets.

To be clear, therefore, transpositions of the resilience standard into real-world regulatory requirements do *not* simply entail applying the traditional tools of "banking regulation" to other parts of the financial services industry. While the same standard of *system* resilience needs to be applied to any parts of the industry that have access to the stability commons, this is not a mechanical exercise, and it is not just about firms. It would require considering whether any markets or activities might be vital in and of themselves even if no specific intermediary has a dominant share: what might be termed *systemically relevant markets.*[47]

To underline the point, transparency requirements might suffice in some cases, in order to help check some of the private inefficiencies mentioned in the second section. But for others, including large money markets, which rely on an assumption of safety, the issue would be whether the underlying claims — the collateral in secured transactions — really were, as economists put it, informationally insensitive, which is to say not worth the bother of analysis because they are unambiguously safe.[48] As we have seen, such blind reliance proved fatefully silly when the ABS repo markets dried up in the summer of 2007. A regime revolving around a standard for system resilience accordingly requires more work on how to frame policy for the money markets, capital markets and other financial services.

But to underline a point, what *is* true is that where the systemic risks posed by two de jure distinct sectors are much the same, not only in severity but also in the manner of their realization and transmission, then a broadly similar regulatory application of the resilience standard would be warranted. That follows from the discussion, in the previous section, of whether to regulate according to economic function and risks (substance) or institutional form. It is a major implication of framing policy in terms of preserving the resilience commons.

Institutional Implications: A Financial Stability Regulator

For the institutional architecture, what this entails, above all, is the importance of each jurisdiction having a *unitary financial stability regulator* that can make the assessments of absolute and relative systemic risk. In principle, that might be a committee of the legislature, but more likely it will be an agency acting, under a legislated mandate, as either a decision taker or an adviser to an elected minister.

Any such system-stability regulator need not *control* all instruments. Indeed, if it is an independent agency, it should not do so; for example, it should not control the tax code. But the stability regulator must be free — indeed, be under a duty —

47 See the discussion in Tucker (2014a).

48 Ibid.; see also Holmstrom (2015).

to make public *recommendations* to other bodies charged with regulating parts of the financial system or, in parliamentary democracies, to executive-branch politicians responsible for high policy. Further, it might need to be empowered to *direct* rule changes by sectoral micro-regulators where the resilience standard had not been applied properly and there was a material threat to stability.

That alone would obviously be a major change. It implies that the current regulatory architecture is incomplete in many jurisdictions, and so provides an important starting point for debates about the design of stability regimes.

Crisis Management: Resolvability as a Feature of System Resilience

The other core part of resilience policy is the framework for crisis management. Although operational only when everything else has failed, it is integral to any regime for two reasons. First, its design and the degree of credibility it enjoys shape the incentives of market participants and regulators. A well-designed system would both enhance market discipline and reduce the probability of runs on sound institutions.

Second — and vitally — the crisis-management regime bears on the calibration of any balance sheet constraints applying to different parts of the industry. If, for example, the social costs of bankruptcy could be materially reduced, a higher probability of bankruptcy might be tolerated. (Some weight was given to that in the high-policy discussions about the new Basel capital standard for banks.)

Resolution and Liquidity Reinsurance: Substance

Sustaining the provision of core services while consigning to the past taxpayer solvency bailouts (that is, taxpayers providing equity support to firms, funds or other structures) is precisely the goal of the new resolution regimes.

In practice, this is about moving from worse to better circles of hell in the event of abject distress among significant intermediaries. That is hugely worthwhile in terms of mitigating social costs, but should not leave policy makers indifferent to the possibility of bankruptcy. In consequence, a well-designed resilience regime incorporates higher institution-specific or activity-specific regulatory "surcharges" for those intermediaries that are most interlinked with the rest of the system, whose fire sales would be liable to be largest and whose resolution, although not shaking the system's foundations, would be likely to entail the most serious spillovers. That is how "systemic" designations and regulatory responses fit into the framework.

By making possible a robust approach to assessing fundamental solvency or soundness, effective resolution policies relieve the LOLR of dilemmas around whether to put failed intermediaries into bankruptcy.[49] Liquidity assistance can lose the taint of "bailout." But that does not dispense with the utility of official liquidity reinsurance to contain liquidity shocks and runs.

As discussed in the previous section, "The Purpose and Objective of a Financial Stability Regime," the broadly functional approach I have espoused entails that any intermediary exposed to run-like risks whose failure would likely have material social costs should have access to the LOLR (subject to a fundamental solvency constraint). Where jurisdictions do not permit that, the system stability regulator (as well as the LOLR, if different) should apply or call for countervailing regulatory measures since, lacking a liquidity reinsurer, such intermediaries pose an elevated risk to stability.

Problems of Hidden Action Here Too

Any such crisis management regime leaves firms with incentives to disguise how bank-like they are in the normal run of things, but their incentives flip around in stressed circumstances. Then, all of a sudden, such firms and funds want instead to batter down the barriers in the way of their accessing liquidity assistance.

Similarly, the regulatory requirements that back a decent resolution regime, mandating certain liability structures, are tempting targets for regulatory salami-slicing and arbitrage.

49 See Tucker (2014c).

If firms think they have a chance, they will try to persuade regulators to treat bonds with exotic features, issued out of non-core entities or ranking with liabilities tied to operational services as counting toward the minimum requirements for debt requirements that can be bailed in, even though that would weaken the system and reduce their own prospect of effective resolution.[50]

And most obviously, where there is a capital surcharge for intermediaries whose distress and resolution would entail spillovers, firms have strong incentives to mask their size, complexity, interconnectedness and value to the economy as a whole.

The authorities therefore face a vital task in detecting and deterring hidden actions that leave the system more vulnerable than society wishes and/or create misunderstandings about how the crisis management regime would be applied. This, above all else, is the purpose of micro-supervision, and I want to argue that it requires a revolution that is, at best, only in its earliest stages.

Microprudential Supervision: Hidden Actions at the Level of Regulated Intermediaries

The role of microsupervision flows from the discussion of Pigouvian taxes and the resilience commons.

Just as the resilience commons metaphor pushes toward functional regulation, it has equally stark implications for supervision. Attempts at solving the common resilience-resource problem are afflicted by the impossibility of writing and of enforcing a completely specified, unambiguous (mechanical) rule book that can cater for everything.

Where quantity constraints are placed on intermediary balance sheets to induce them to internalize social costs or self-insure beyond their perceived private interests, the requirements likely need tailoring to the specific cost and risk structures of each intermediary, and to their significance for the system's maintaining the provision of core services. In the language of prudential supervisors, this would cover both "Pillar 2" and "systemic surcharge" requirements.

This essentially regulatory function requires deep knowledge of, and judgments about, each relevant intermediary. But the hidden-action problem leaves the authorities facing problems of opaque idiosyncracy and regulatory arbitrage. In other words, the authorities cannot easily tell who is surreptitiously eating the stability grass, and each time they design a new constraint for animal X, it seems to morph into X'.

Microprudential supervision is called into existence to address the first problem (and also to help spot the second problem, of metamorphosis).

The ubiquity of opaque idiosyncracy means that thinking about microsupervision as only about banking or, separately, as primarily about checking compliance with rules is fundamentally misconceived. Properly thought of, microsupervision starts where financial stability rule writing or, more generally, general policy making leaves off.[51]

For banks and near-banks, and probably more widely, this entails making judgments about the prudence with which a firm is being managed. The micro-supervisor has to be ready and able to make judgments of the kind: "firm X is managed so imprudently that there is no reasonable prospect of its meeting the ex ante required standard of resilience in the states

50 An account of the thinking behind mandating a minimum level of outstanding longer-term bonds is given in Tucker (2014b).

51 That is to say, the regulatory rules for resilience would be drafted at a higher level in the institutional architecture (see the next section, "The Institutional Architecture of a Stability Regime"). A possible exception to this stricture on microprudential rule writing arises if rules are warranted on internal organizational structures in the face of problems of hidden action *within* firms. I do not get into that here, but it entails exploring why top management would not themselves face incentives to remedy such problems, and which of the firm or the market is the best locus for managing such transaction costs, which is a route back to structural policy.

of the world it is likely to confront." Where that judgment is reached, the microsupervisor needs to be ready (and so legally empowered) to revoke the firm's license, or to place constraints (that can be monitored and enforced) on its risk taking.

The basic criteria underpinning the supervisor's findings — for example, prudence, competent management, a separation of powers within the intermediary — have to be established in statute. In other words, the legislature needs to lay down the criteria for action by the supervisor against firms, funds and other intermediaries.

Models of Microsupervision: Adverse Selection and Moral Hazard

Thinking about the purpose of microsupervision in this way — as being to uncover and deter hidden actions or information — sheds light on an incoherence in the long-standing debate about different supervisory models. Is it better, US-style, to place large numbers of examiners on site or to hold old-style BoE "prudential meetings" with management off site?

Our framework highlights that the former, on-site examination, is about *ex post* moral hazard.[52] The latter, forensic meetings with top management, is partly about remedying problems of adverse selection; that is, the risk of approving individuals as top management who, in fact, will not know what they are doing. Unfortunately, that model was not put to the test since, it is said, UK supervisors had jettisoned the "prudentials" held by the BoE up to 1997. As it happens, I think, but obviously cannot prove, that old-style BoE supervision could have revealed that some top bankers were not sufficiently expert in banking properly to pass a continuing statutory test of being a "fit and proper person" to hold positions of power in banks.

But the more important point I want to underline is that a debate that persisted from the 1970s into the 1990s about the best model of supervision was mixing apples and pears: there are both adverse selection problems and moral hazard problems. Any supervisory model needs to address both.

The Role of Judgment: Adjudicatory Decisions under Constrained Discretion

When problems are detected at individual firms, the microsupervisor is called upon to make what, in the language of US administrative law, are called adjudicatory judgments, subject to canons of procedural fairness and reason. We also want a microsupervisor's judgments and actions to be fair in the sense of being consistent across different cases and over time. This makes it important that the supervisor should articulate how it plans to apply the statutory criteria for authorization, consistent with the overriding standard for resilience.[53] I stress this because, as I hope will be clear, it is not the same as writing legally binding rules for each and every dimension or facet of an activity bearing on safety and soundness.

It is nothing short of tragic that this basic conception of prudential supervision was lost for a generation. It is precisely why, in the United Kingdom, when planning for the return on banking supervision to the BoE, Mervyn King and I, to name only those of us who have left central banking, talked so much about a return to "judgment-based supervision" centred on statutory criteria for authorization.

But it is also tragic that microsupervision — and please note that I am leaving out prudential — is often regarded as being relevant only to banking and insurance. Given that other parts of the financial system can deplete the common resource of system resilience and have equally powerful incentives to hide or camouflage their actions, it is vital that they too be supervised in the sense I have described: making judgments about whether the resilience standard is in jeopardy.

52 At least as practised, it did not remotely work prior to the 2007–2009 crisis, but that does not of itself mean that it cannot be useful.

53 Elsewhere, I call these an agency's "operating principles." They are, I believe, a vital part of any independent agency regime. See forthcoming book to be published by Princeton University Press.

Institutional Implications

Above all, this calls for forensic skills matched to an understanding of the dynamics of each firm's linkages to other parts of the system. Any institutional design needs, therefore, both to equip line supervisors and policy makers with a rich information set, and to generate and sustain a culture that supports a searching and skeptical cast of mind, which has the discipline to separate the relevant from the largely irrelevant details, and to take action not in response to imprudence but to *stability-threatening* imprudence. That is formidably difficult.

To sum up this important set of conclusions from the resilience commons metaphor:

- Regulated firms will seek to avoid the full substance of the resilience standard, and unregulated entities will seek to stay outside the de jure regulated population by obscuring the extent to which they are mimicking its economic substance.
- Microprudential supervision is, accordingly, to do with the problem of hidden action. To protect and preserve the stability commons, anybody who could materially deplete the system's resilience needs to be covered in some way. In this sense, prudential supervision as traditionally conceived, and parts of securities regulation, address the same problem.
- Bank supervisors should lay more stress on requiring regulated firms to reveal information, and securities regulators should attend to whether their disclosure requirements are effective in delivering a standard for systemic resilience.
- Microsupervision of this kind is, I would suggest, almost non-existent outside banking, where it has needed to be revived and redirected.

If that is microsupervision's place within a regime for stability, where does the now ubiquitous macroprudential fit in? I will divide this into three parts[54]:

- macroprudential *surveillance* of the financial system as a whole;
- macroprudential *policy* that dynamically adjusts core regulatory parameters; and
- *NBS management*, defined as any policies aimed at directly controlling household, business, government and external indebtedness.

The following three subsections address each of these in turn.

Macroprudential Surveillance

Perhaps the most important thing to say about macroprudential surveillance is that it can contribute to everything that we are concerned with in this essay. By treating the financial system as a *system*, by engaging with feedback mechanisms between asset markets and the behaviour of financial intermediaries, and similarly those between macroeconomic variables and the resilience and risk appetite of intermediaries, investors and end-users, it engages with the world as it is. But it also traverses the boundaries of institutional power characteristic of most regulatory regimes.

In terms of inputs to policy, analysis — static and dynamic — of the macrofinancial system can inform judgments about both types of social cost. It can help to identify:

- possible hidden actions or trends among intermediaries, whether or not covered by micro-regulation, that might plausibly undermine parts of the system (relative to the standard of resilience) and so warrant deeper investigation by microsupervisors and/or the stability policy makers; and

54 The meaning of the term macroprudential I use here should not be relevant to this three-fold set up.

- weaknesses in the national balance sheet (whether households, businesses, the state sector) or imbalances in the real economy that threaten welfare while not undermining system resilience.

In that sense, macroprudential surveillance is pure input, albeit one that is ambitious and formidably demanding. Separately, it is engaged, via stress testing, as a policy actor in judging and constructing the scenarios that some or all components of the system should be able to withstand in order for core services to be maintained and fire sales avoided.

In this last endeavour, the "macroprudential turn" is something of a revolution. It blurs the borderline between micro- and macrosupervision. Indeed, the burden of this essay is that the enterprises of microprudential supervision and system-wide surveillance simply do not make sense — are incoherent — as stand-alone activities. An earlier generation understood this, as was made apparent by the first chair of the Basel Supervisors Committee, George Blunden, more than a quarter of a century ago:

> Supervisory standards are set with an eye to protecting [banks] from problems which could be created by wider, systemic developments. A bank may consider a course of action it wishes to take to be acceptable — as it may well be in a limited context. But the same course might, if widely copied by other banks, have unfortunate effects on the banking system as a whole. It is part of the supervisors' job to take that wider, systemic view and sometimes to curb practices which even prudent banks might, if left to themselves, regard as safe.[55]

Stress testing recaptures the substance and broad spirit of that observation, but modernizes it in terms of both technique and scope. To deliver its promise it will need to extend to all intermediaries whose distress or failure might bring material social costs, including clearing houses and other infrastructure providers, and it will need to incorporate the interlinkages among intermediaries and the rich macrofinance feedback mechanisms.

But this is not just about intermediaries in and of themselves. In earlier sections, we described the goal of resilience policy as maintaining the provision of core services. Stress testing accordingly needs to have a focus on activities, consistent with the broadly functional approach to regulation and supervision that follows from framing policy in terms of the problem of the resilience commons. In practice, that might mean that a stress test designed to reveal the resilience of, say, custody services needs to cover different types of intermediary if the regulatory regime remains non-functional. That is to say, some supervision should be functional (based around service type) even if the formal institutional architecture is not.

That is a formidable agenda, which may take a quarter century to progress.

But even today, stress testing takes a step that would have been unimaginable during Blunden's period as a policy maker in the 1970s and 1980s. It provides, for the first time, a basis for generating and making transparent some of the work that underpins regulatory judgments and policy actions. This has the potential to overcome half a century of political-economy problems inherent in regulation intended to ensure the safety and soundness of finance.

The Visibility and Monitorability of Outputs: The Political Economy of Stress Testing

*Micro*prudential supervision has existed, in one way or another, since the nineteenth century. It has always been highly opaque. Sensitivity to the social costs of firm failure gave rise to a mindset or doctrine among prudential supervisors that their work must be confidential: that the world would not be safe if they revealed what they knew or what they were doing. Although I understand why people (including myself for a while) believed that, I have come to think it is dangerous nonsense in that it is completely

55 Blunden (1987). By the time this speech was delivered, Blunden had stepped down from the Basel Committee, retired from the BoE (for the first time) and returned as deputy governor.

at odds with a parallel belief that prudential supervisors should be independent, by which I mean insulated from day-to-day politics.

Quite apart from the blunting of incentives and therefore the associated risk of capture by the regulated community, opacity is at odds with the necessity, in a democracy, of being able to monitor the exercise of delegated authority. If prudential supervision must be opaque, then either it should be under political control or, alternatively, subject to oversight by a committee of the legislature whose members, like committees overseeing security and intelligence, hold hearings in camera and are subject to very strict duties of secrecy.

Fortunately, the beginnings of a solution to the opacity problem are emerging. The social purpose is clear — stability (or, more narrowly, avoiding systemic collapse); an objective can be articulated — the standard for resilience; and, crucially, one big *output* of supervision can now be observed — stress testing.

The last is nothing short of transformational. Both the scenario applied in stress tests and the firm-by-firm results are published. While the "models" used by the authorities are not published, because they might be gamed, the big point is that the single most important output of microsupervision can now be observed, debated and criticized, creating the possibility for public debate on whether the chosen standard for resilience is appropriate and how well the supervisors are doing. That has come about by rethinking microsupervision as an input into a broader *macroprudential assessment* of the resilience of the system as a whole.

Some Institutional Implications

In institutional terms, this calls for an ability to blend inputs on firms, infrastructure, markets and the macroeconomy, and to draw upon analytical, statistical and anecdotal work. That catalogue is demanding in terms of technical capacity and cultural capability.

It is also demanding in a quite different sense. If the purpose of supervision, as I have described it, is to uncover and deter hidden actions that consume the resilience commons, we have to address the second-order moral hazard problem (identified in the section "The Nature of the Problem: Which Economic Model for Policy?") arising from the need for collective action among supervisors in different jurisdictions. Since my part of the global financial system cannot be safe and sound (to the desired resilience standard) unless yours is, then my incentives are altered if I believe that (a) you will cheat, but also (b) that there would be short-to-medium-run costs to my local economy if I were to run a super-resilient policy in order to compensate for the risk of your laxity. But the risks are, of course, symmetric because you cannot tell whether my declarations of stress-testing virtue should be taken at face value; for example, you do not know whether I shaded my choice of scenario to favour "my" banks or, even harder for you to detect, have shaded my application of the scenario to particular banks.

In our joint paper on this, Cecchetti and I propose that, for the most significant internationally active or relevant institutions, jurisdictions should be able to observe in detail, and even work together on, each other's stress testing.[56] And, to help deter collusion, an international institution — say the IMF or the Bank for International Settlements (BIS), perhaps in tandem — should have on-site monitors able to scrutinize the integrity of the process. Those monitors adopt a role akin to the club stewards employed as a partial solution to some commons problems analyzed under Ostrom's framework (see Box 1).

Macroprudential Policy: Dynamic Adjustment of Core Regulatory Parameters

The discussion thus far has been silent on the question of whether the resilience standard-implementing rule book can be

56 See Cecchetti and Tucker (2015). It has been suggested that the proposed approach is naïve. My response is that that depends on how far forward one looks. Over the longer run it might well be reckless to ignore the problem that Cecchetti and I identify. It could be avoided via balkanization, but it is not clear to me that that should be a choice for unelected officials.

static. I think that a static set of requirements cannot be relied upon.

I accordingly define macroprudential *policy* to be a subregime under which policy makers can *dynamically* adjust regulatory parameters to maintain the desired degree of resilience in the financial system. The adjustments are state-contingent, not time-contingent.[57]

That does not mean that there must be a lot of variation. The better the design and calibration of the base regulatory regime and the better the contribution of microsupervisors in preventing regulatory arbitrage from undermining that base regime, the less cause there would be temporarily to vary the core regulatory parameters. But where necessary, they could be varied to sustain the system's resilience.

Why Dynamic Variation Might Be Needed and So Should Be Permitted

It matters why this should be so. It is essentially for reasons going back to our uncertainty about longer-term trade-offs and to the hazards of regulatory arbitrage, technical evolution and evolving end-user demands. While a society's considered tolerance for crises should be reasonably stable over time, the other two key inputs to the resilience standard — the underlying loss-generating process and the structures through which those losses are propagated — will almost certainly not be.[58]

I suggest that, big picture, the underlying risk process in the financial system as a whole can usefully be thought of as being at any time in one of three broad modes — normal, exuberant or depressed. In exuberant phases, risk will be underpriced and debt will build to levels that stretch budget constraints, leaving the financial system exposed to more risk than otherwise.

If that is helpful as a picture, then a very important policy question is how to calibrate the base regulatory requirements designed to keep the system safe and sound. Should the minimum capital requirements, minimum collateral requirements on derivatives transactions and other measures that apply the standard for resilience be calibrated to exuberant states of the world? An argument against doing so is essentially ignorance and uncertainty about whether there might be a long-run trade-off that matters to social welfare. As a matter of fact, policy makers concluded, in effect, that not enough is known about the properties of the financial system to be confident about how the supply of credit and other core financial services would be affected by calibrating the base regulatory requirements against the most vicious exuberant states of the world.

If, however, a regime is calibrated to a more "normal" underlying risk-generation process — as, broadly speaking, the regime for banking was — then we know that those regulatory requirements will be insufficient when the world moves into a highly exuberant mode. In those circumstances, capital requirements, margin requirements, haircut requirements or whatever else will need to be changed in order to sustain the desired degree of resilience. Although unfortunately named given my earlier analysis, that is the basis for the "counter-cyclical capital buffer" for banks, which policy makers can switch on (and, later, off) as conditions warrant.

Separately, a temporary recalibration of regulatory parameters might be warranted if the system becomes materially more interconnected. Facing a choice between enforcing resimplification of the network and strengthening its atomistic parts, the latter might be the only feasible short-term palliative.

To be clear, in neither case is dynamic policy about changing the goal posts. They stay fixed: the goal posts are driven by the tolerance for crisis as specified in the resilience standard.

57 Some people use the term macroprudential for wider financial stability policy as well as for dynamic policy, but we can easily avoid this unnecessary and confusing usage. See Tucker (2016).

58 By "considered tolerance" I mean to abstract from both the complacency characteristic of long-duration booms and the heightened aversion typical after catastrophes have occurred.

Institutional Implications: The Need for Credible Commitment and, Possibly, for International Coordination

In terms of prescriptions for institutional design, effective dynamic macroprudential policy obviously relies heavily on credible commitment. Otherwise, intermediaries and end-users would not be influenced by the prospect of exuberance meeting with a "tightening" of regulatory requirements. This policy function must, therefore, be housed in an institutional framework that is capable of delivering credibility.[59]

Even so housed, there is a potential bias to inaction. If faced with uncertain long-term benefits but an immediate risk of unpopularity, a policy maker might incline toward delaying action until the resilience-eroding threats of exuberance or imbalances were widely perceived.[60] In terms of institution design, the underlying problem is how to make clear that doing nothing is doing something. A solution is to require the macroprudential policy maker formally to reset various core regulatory instruments at fixed intervals, with published minutes of reasons for its decisions, including "no change."

In other words, decision-making structures and processes should be broadly akin to those employed for monetary policy. This marks a contrast with micropolicy. If the watchword for microprudential supervision is adjudicatory and judgmental *fairness*, the watchword for dynamic macroprudential policy is that it should be *systematic*.

But there are important differences from monetary policy, including, I suggest, in international relations. While it is now contested whether spillovers from the operation of monetary policy are wholly avoided in a world of floating exchange rates, the nature of any spillovers are different in the macroprudential sphere. Here they could arise from countries publishing what would amount to adverse criticisms of foreign countries' stability policies. That risk and the consequent challenges of cooperation arise because of the global nature of the resilience commons.[61]

Imagine circumstances where country A becomes concerned that action is not being taken in country B to mitigate stability-threatening imbalances that could damage the rest of the world as well as B itself. In consequence, A contemplates taking action in order to maintain the desired standard for resilience in its own financial system. For example, it might require its banks and other intermediaries to cut (or hold more capital against) exposures to B. Should A alert B before acting? The grounds for doing so would be: (a) that it might nudge B into acting itself; and (b) that it would, in any case, be the decent thing to do since the planned action would publicly signal how worried A was about B, possibly bringing on B's incipient crisis. Quite apart from the economic costs, that would likely be an international relations disaster.

The possible need for such communication is not fanciful given the new macroprudential regimes and mindsets. Equipped as they are now, Europeans might have acted pre-emptively to protect themselves against the US sub-prime boom; or likewise, the United States to protect itself against the fault lines in the construction of Europe's monetary union.

The huge significance of those episodes should make us ask whether there could usefully be attempts at *coordination*. Going beyond bare communication (A tells B what it is going to do), should A try to persuade B to act, on the grounds that that would, on the whole, be more efficient and because that would avoid the risk of wider political fallout from A acting to cater for B's failings? There are a wide range of possible outcomes.

59 There might also be a strict time-inconsistency problem in the narrow sense that, in theory, even a non-political social planner with unchanging preferences would depart from a long-run optimal plan because they could improve upon it in a single period. This question is under researched.

60 This point was made eloquently by my old friend Aerdt Houben, senior official at De Nederlandsche Bank, at a conference held by CIGI with the Bank of Canada, the IMF and the Peterson Institute, in Ottawa in May 2016.

61 This is not to say that such challenges are absent in the monetary sphere, but rather that they could be explosive in the stability sphere. Episodes during the worst of the recent crises provided useful warning signals.

They include mitigating actions being taken by both countries and an announcement that each welcomed the other's, turning the potential diplomatic disaster into an opportunity for public solidarity. But there would also need to be a convention under which it was legitimate for A to act alone if, despite its urgings, B declined to address its problems. To date, as far as I know, no formal machinery or norms exist for coordinating in this manner, but the basis for them probably exists within the community of central banks in their Basel headquarters.[62]

Since those who gather in Basel have jurisdiction over (at most) only the financial sector a whole, this should remind us of the gaps deliberately structured into the resilience regime I have been describing. The section accordingly concludes with our gaps problem.

Gaps Redux: NBS Management and Real-economy Imbalances

The central limitation of the regime I have been setting out is that it cannot be guaranteed to engage with the resource misallocation and over-indebtedness that can result from the financial system's tendency to generate and, even more frequently, amplify credit and asset-price booms (the first type of social cost described in the first section). Those costs can manifest themselves in a number of ways:

- over-investment in low productivity sectors that can put the economy onto a lower growth trajectory than was otherwise feasible;[63]
- over-indebtedness internally that arrests economic growth conjuncturally and, in some circumstances, weakens the traction of macroeconomic stabilization policy; and
- over-indebtedness externally that endangers a country's credit standing in international markets and, in some circumstances, the sustainability of its exchange-rate regime.

As well as mattering in and of themselves, each of those costs, together and individually, might also reduce the capacity of the state to respond to macroeconomic weakness via fiscal policy.

To be clear, the dynamic macroprudential policy measures described in the previous subsection might, again depending upon the circumstances, substantially mitigate each of those and other similarly sourced problems. For example, if a macroprudential policy maker raises the amount of equity capital that banks and other financial firms have to hold against property-related exposures, conditions in the relevant markets *might* be dampened, arresting the accumulation of debt. But, in the regime I have outlined, that course of action would not be available if the financial system remained sufficiently resilient, notwithstanding boom conditions in the particular sector and the associated prospect of an overhang of debt arresting the economy's post-bust growth.

The problems of resource misallocation and of debt overhang are strictly separable from the resilience of the financial system. This can, perhaps, be seen by remembering that no one would expect a financial regulator to act in order to address an unsustainable fiscal position except to the extent that it required parts or all of the financial system to be more resilient than otherwise. The same condition would apply to a financial system regulator's response to an economy's external position being unsustainable, or to persistent imbalances in the composition of aggregate demand. They would not act to try to shift the economy's terms of trade or to shift resources into higher-productivity activities, only to buttress the resilience of the stability commons in the face of heightened adverse risks.

I want to argue that excessive household and non-financial business debt should be viewed in the same light as unsustainable public or external finances: as, first of all, problems in the economy's national balance sheet rather than as always and exclusively problems to be cured via the regulation of the financial system itself.

62 Cecchetti and Tucker (2015). The sentiments in footnote 56 apply even more powerfully here.

63 See Borio, Kharroubi, Upper and Zampolli (2015).

That being so, the question is whether the state needs institutions and instruments to mitigate and cure pure NBS problems. Perhaps remarkably, this question has remained largely unaddressed — at least explicitly — among the advanced economies, notwithstanding lessons from the Asian crises in the late 1990s, when countries such as Indonesia were brought to their knees by non-financial businesses' dollar-denominated external indebtedness under exchange regimes that could not hold. We have been reminded of these problems by worries about emerging-market economy dollar-debt burdens and, in the advanced economies, by the overhang of household or government debt that arguably impedes growth in some countries. A macroprudential policy regime might, incidentally, be part of the solution for this, but it would be serendipitous if it were a complete or a reliable solution.

As put, I have made NBS management sound like a close relative of fiscal policy, and it is. But leaving things there obscures the question of how, if at all, this relates to broad conceptions of macroeconomic stabilization policy, as notably set up in BIS research on the "credit cycle" (or, perhaps different, the "financial cycle") as an important macro phenomenon alongside but somewhat distinct from, and typically slower moving than, the more familiar business cycle. Since I have argued that financial system regulation should not directly concern itself with real-economy indebtedness for its own sake, what this amounts to is whether macroeconomic policy, broadly conceived, should do so.

The prima facie answer to that is yes, because to ignore such imbalances would seem to run potentially costly but avoidable risks. If so, the question for regime design is whether this should be incorporated into the framework for monetary policy or for fiscal policy or, alternatively, whether some new branch of macroeconomic policy needs to be created. The details of an answer lie beyond the scope of this essay, but I would want to argue that we would do better to think of this possible government mission in terms of sustainability and budget constraints (that is, stocks) rather than of cycles (that is, flows). In other words, it ought to be more like ensuring long-run fiscal sustainability than like the efforts of monetary policy to keep the real interest rate consistently in line with the (unobservable) equilibrium real interest rate in the interests of efficient intertemporal resource allocation. That, of course, is reflected in my preference for the label "national balance sheet management" over the term "credit-cycle management."[64]

Any such regime would entail focusing on, among other things, the structure of external obligations and claims — for example, the consequent currency and maturity mismatches — and, thus, on the composition of *gross* capital flows. In some ways, NBS management would amount to a *whole-economy macroprudential policy* in that it would mitigate some sources of external vulnerability. But that should not be confused with policies to "manage" the terms of trade, the real exchange rate or the global pattern of *net* capital flows: whole-economy macroprudential policy is not the same as capital-flow management tools designed to influence a country's competitiveness. A system of national regimes for NBS management would not make adjustments to persistent current account balances more symmetric between debtors (deficit countries) and creditors (surplus countries). NBS management regimes would not, as such, address all the fault lines in the international monetary and financial system, but might reduce the risks of extreme crises.

In terms of the implications for the institutional design of a stability regime, this excursion into inefficient resource allocation, over-indebtedness, NBS management and the terms of trade reminds us, again, of the important distinction between unelected technocrats and elected governments. That is centre stage in the next, and final, section of this essay.

64 The importance of NBS monitoring and management was set out in Li and Tucker (2014).

The Institutional Architecture of a Stability Regime

In outlining the institutional design of a stability regime, we need one more building block. Since any regime is going to incorporate delegation of some responsibilities to more or less independent agencies, we need some principles for legitimate delegation in democracies. I am going to state these without defending them here, because that is a major exercise in its own right. My purpose in this essay is, simply, to avoid hidden assumptions and make clear the principles to which I believe we should hold.

Having cashed out what those precepts entail for the design of stability regimes, I discuss the implications for the international machinery and for four types of national institution: central banks; bank supervisors; securities regulators and finance ministries.

Principles for Legitimate Delegation to Independent Agencies

My broad answer to the general question of conditions for the legitimacy of independent agencies in a democratic, liberal republic comes in three parts.[65]

First, a policy function should not be delegated to an independent agency unless: society has broadly settled preferences; the objective is capable of being framed in a reasonably clear way; delegation would materially mitigate a problem of credible commitment; and the policy maker would not have to make first-order distributional *choices*. Whether those conditions are satisfied in any particular field is properly a matter for determination by elected legislators, after as rich a public debate as can be mustered.

Second, the way the delegation is framed should meet five design precepts: the agency's purposes, objectives and powers should be clear and be set by legislators; its decision-making procedures should be set largely by legislators; the agency itself should publish the operating principles that will guide its exercise of discretion within the delegated domain; there should be transparency sufficient to permit accountability for the agency's stewardship of the regime and, separately, for politicians' framing of the regime; and it should be clear ex ante what (if anything) happens, procedurally and/or substantively, when the edges of the regime are reached but the agency could do more to avert or contain a crisis.

Third, in order to incentivize an agency to take all of its responsibilities seriously, multiple missions should be delegated to a single agency only if: they are inextricably linked, and, in particular, rely on seamless flows of information; and decisions are taken by separate policy committees, with overlapping membership, but each with a majority of dedicated members.

Without further elaboration, we will apply those principles for delegation to the high-level regime for financial system resilience set out in the previous section.

The Division of Labour and Power under Financial Stability Regimes

Under the regime for preserving the resilience of the stability commons, I distinguished between financial stability policy; microprudential supervision; system-wide surveillance; and

65 This was first stated in summary form in my Harvard Kennedy School 2014 Gordon Lecture, and more fully in a forthcoming work, to appear in a book to be published by Princeton University Press.

dynamic macroprudential policy.[66] This is reflected in some jurisdictions' regimes.

In the United Kingdom, for example, the first, third and fourth were allocated in 2012 to the BoE's Financial Policy Committee (FPC); the second partly to the Prudential Regulation Authority, created as a subsidiary of the central bank, and also to the Financial Conduct Authority, both of which are subject to recommendations or, on some specific matters, directions from FPC. While the regime's high-level architecture is formally decided by the Westminster Parliament (and partly in the European Union), the FPC has a statutory responsibility to keep the whole system under review and make recommendations to the executive branch of government if, for example, the regulatory perimeter needs to be changed.

It is a little harder to say how the US regulatory architecture maps into this structure. Microsupervision is allocated to a number of agencies, but everything else is slightly fuzzy. That is because, for understandable reasons, given the number of "veto points" in the US legislative process, the Dodd-Frank Act was passed soon after the worst of the 2008-2009 phase of the crisis and therefore before thinking on stability regimes had got beyond the vital points of more capital, more liquidity, less interconnectedness and "too big to fail."

Particular regimes aside, we can draw the following propositions on institutional architecture from our discussion thus far:

- There should be a single independent agency responsible for determining or for making public recommendations to elected governments on the "rules of the game" for stability that effect the standard of resilience for the financial system. Its mandate should cover the entire sector.
- Outputs of that and any other independent agencies involved in pursuing stability should be visible and so monitorable against reasonably clear objectives.
- Dynamic macroprudential policy should be delegated to a body that is highly insulated from day-to-day politics as this field faces big challenges of credible commitment and inaction.
- It is not absolutely necessary that all functions be located within the same agency, but where they are in separate agencies freely flowing exchanges of information *must* be incentive compatible and actively monitored.
- Where they are located within the same agency, microsupervision and macroprudential policy (and, where relevant, monetary policy) must be under the control of separate committees.

The first three of those propositions were articulated in the previous section, and so do not need to be discussed as such, other than to underline that a resilience standard constitutes a quantitative objective, and stress testing a line of sight into outputs and outturns. Instead, what remains is the question of which functions could or should be combined. In particular, should the high-level financial stability authority be responsible for dynamic macroprudential adjustments, and should system-level responsibilities be combined with microsupervision? That turns, in part, on the construction of the financial stability authority itself.

The Constitution of the Financial Stability Authority

In the previous section, we contemplated a high-level authority that was responsible for advising on the high-level resilience standard formally signed off by elected politicians, and applying that standard to specific sectors and activities or for blessing/overriding its application by specialist sectoral/functional regulators.

That stability authority might in principle take one of two forms:

- a committee headed by an elected minister; or
- an independent authority, whose policy body might include the leaders of other regulatory agencies.

66 I am not engaging with crisis management regimes here, since that is a massive subject in its own right. For views on the design of LOLR regimes, see Tucker (2014c).

In either case, any agencies from which committee members were drawn would need to have a statutory responsibility for financial system stability, and it would need to be clear that decisions taken by the stability authority were binding on those other agencies. Otherwise, there could be conflicts of objectives within the policy committees of the lower-level agencies that had the effect of undermining high-level stability policy. Thus, even where lower-level sector/activity-specialist agencies implemented policy, they would not determine it. Thus, a separate bank supervisor would not decide what minimum equity-ratio requirement was introduced to implement the resilience standard.

The choice between the two models turns on the role of elected ministers. Under the first model, they would be intimately involved in setting the detailed rules of the game that applied the resilience standard across the different parts of the industry. Unless the high-level standard and each and every application of that standard were determined simultaneously, there would be scope for slippage as politicians' preferences shifted between the time the high-level standard was framed and the time(s) of its application.

That makes a strong case for the second model. A similar conclusion follows from the need (discussed in the section "The Purpose and Objective of a Financial Stability") for the standard of resilience to take account of the structure of the system and any inadequacies or gaps in the policy regimes for (internal and external) macroeconomic balance, both of which belong with elected politicians.

But if we can make a strong case for an independent stability authority, that leaves open whether it should, or at least could, reasonably have authority to make decisions itself or, instead, must only reach published conclusions that are subject to political veto (or approval).

The Financial Stability Authority's Responsibility for Dynamic Policy Adjustments

Things are more clear cut when it comes to dynamic macroprudential policy. The political bureaus cannot sensibly take this on due to the commitment problem. An independent agency is needed. That underlines the case for the second model above, since an independent stability authority would in any case need to be created to conduct dynamic policy. But whereas any such authority must have control over dynamic policy, under the principles espoused here, it would be open for debate whether it determines the structure and calibration of the base regime(s).

Any specialist sectoral (lower-level) regulators might also have powers dynamically to adjust their regulatory calibrations, but this would desirably be subject to override by the high-level independent authority in order to ensure consistency of resilience policy across the system as a whole. In what follows, therefore, I shall assume for simplicity that the stability authority and the macroprudential agency are the same.

Already we can see how different jurisdictions match up to this prescription to very different degrees. In the United States, some regulatory agencies have powers dynamically to vary regulatory parameters, but there is no authority responsible for ensuring that they do so consistently or, indeed, that the base requirements reflect the same standard of resilience across the system as a whole.

But No First-order Distributional Choices for an Independent Stability Authority

But just how far can the stability authority's powers reach? Earlier in this section we stipulated that where a policy regime is delegated to an independent institution, insulated from day-to-day politics, that should *not* entail society delegating first-order distributional choices. The stress is on *choices*. The suggestion is not that these regimes cannot have distributional effects. Such effects might be foreseen by the politicians who are doing the delegating, whether or not they are expected to average out to zero over time.

If that design constraint is accepted, it would entail that policy decisions on the structure of the financial system, which, as discussed earlier, affect the distribution and propagation of shocks, should lie with elected politicians. This accords with

measures such as Glass-Steagall being legislative and, more recently, with the BoE pressing for as much as possible of the regime for ring-fenced UK retail banks being set out in legislation (secondary as well as primary) drawn up by the executive branch of government for parliamentary scrutiny and sanction.

At a lower level, the same design precept means that each potential macroprudential instrument would need to be assessed for whether it entailed a non-political authority making big distributional choices. For example, is it acceptable for independent agencies to set maximum loan-to-value or loan-to-income ratios for products available to households, which would amount to banning certain high-risk financial products? I am doubtful that this is appropriate.

That is partly because such constraints deprive some households or firms of products or services that they desire and understand. As such, it reduces their liberty. It is also because such policies can shade into regional or sectoral policy. An interesting example is provided by New Zealand, where prudential measures designed to control a property price boom have developed to include measures that are specifically tailored for the city of Auckland. Imagine similar policies for London or New York: might they need to be for only specific parts of the metropolis and, if so, which streets would comprise the boundaries? I find it hard to imagine such measures without political sanction. It is therefore noteworthy that, under the terms of a memorandum of understanding, the New Zealand Reserve Bank did consult the minister and the Treasury before taking final decisions.

An alternative measure in such circumstances, adopted by the BoE in 2014, would be to place a cap on the percentage of any lender's portfolio that could be accounted for by, say, high loan-to-value mortgages. That approach helpfully underlines the focus on the resilience of the financial system rather than appearing to shade into prescribing the terms on which services or products can be provided to households and businesses. As such, it could be provided without formally consulting ministers, although there is a non-voting Treasury member of the BoE's Financial Policy Committee.

If Supervisory Functions Are Fragmented, There Must Be Strong Incentives to Exchange Information

A separate set of questions revolves around whether a unitary financial stability authority should have any microsupervisory responsibilities and powers. This requires elaboration of (d) and (e) above, which go to how much would, desirably, be under one roof, and on what terms.

Many nations, notably the United States, have historically favoured a fragmented regulatory architecture. Where different agencies are overseen by separate legislative committees, as in the US Congress, this spreads the political rents available to legislators. In parliamentary systems, a fragmented regulatory architecture enhances the power of executive branch politicians and advisers through their de facto rights of coordination and their constitutional obligation to account for the regime as a whole to Parliament. At the other end of the spectrum, integrated regulatory structures enable politicians to shed blame onto the unitary authority.

Which of "hidden power" or "insulation from blame" is the dominant consideration in architectural design will vary according to the circumstances. However, while particular regulatory structures might be explained by political balance-of-interests analysis, they can hardly be justified by it.

The normative case for fragmentation has typically been specialism and focus, and that for integration economies of scope and scale. I will argue that an emphasis on the resilience commons changes this.

I have already suggested that, after the high-level standard for resilience has been agreed or blessed democratically, a single financial stability authority should determine or approve how it should be effected across different parts of the financial system. Otherwise, the integrity and consistency of the regime would be sacrificed at the very first stage of its implementation. It follows that in a set-up with different sectoral regulators, the stability authority needs to have an override on those policies that affect

the common standard that has been agreed. Very obviously, that presents a challenge to the arrangements prevailing today in many jurisdictions.

By contrast, microsupervision of individual firms, funds and structures designed to detect and deter hidden actions that undermine or violate the resilience standard might reasonably be fragmented across specialist agencies. But a system-wide view is impossible without free flows of information. There are no bounds to the artful ingenuity of agencies who can claim to be sharing information while doing nothing of the sort. The incentives not to share are obvious: knowledge is power; do not give legislative sponsors reason to be interested in the competition; and so on. But the incentives not to receive information can be equally powerful: avoid blame for things you do not have the power to control, keep the focus on the core mission, and so on. Separate agencies are, in short, beset with incentives to compete or withdraw rather than cooperate.

But the structure I am outlining gives a twist to this relatively familiar (if intractable) problem. In a structure with multiple microsupervisory agencies, they are *agents* for the stability authority (within that part of their responsibilities). The problem of information exchange is, therefore, only one among a number of principal-agent problems. In the language of political scientists, the microsupervisors could shirk by softening the resilience standard in their adjudicatory judgments, forebearing to act in a timely way, and so on. This risk, which is a third layer of hidden-action problems, would run through their activities. For example, earlier we described how a regime based largely on quantity controls rather than on a tax can entail institution-specific requirements (in bank supervision, the so-called Pillar 2 requirements). The basis for such requirements would need, somehow, to be visible to the stability authority if it was to be assured that the resilience standard was being applied reasonably.

The problem for society is that the very human incentives that could impair those principal-agent relationships cut across the need to monitor the resilience and vulnerabilities of the system as a whole in the cause of guarding against the social costs of crises. The case for reducing fragmentation or giving an override power to a single stability authority rests, essentially, on mitigating the problem of cooperation and coordination in the face of a resilience commons that can be depleted by almost any type of financial intermediary or activity.

If a Single Agency Has Responsibility for Different Stability Functions, Separate Committees and Subregimes Are Vital

But housing different functions under a single roof opens up another set of problems, and, therefore, I shall elaborate on the structure of agencies with multiple functions serving stability, including, perhaps, monetary policy.

Concretely, if high-level stability policy, microsupervision and dynamic macroprudential policy are not separable in a deep sense, should there be one unitary policy board or, as in the United Kingdom, distinct functional committees or boards?

The skill sets and dispositions in those various fields are, of course, distinct. Good microprudential supervision focused on hidden actions requires a forensic, associative, even skeptical cast of mind. Good financial stability policy — that is, articulating how the standard for system resilience should be applied in different sectors and activities — requires an analytical cast of mind spanning macroeconomics as well as finance and the microeconomics of information, incentives and more.

That just says the skill sets are different, which could be addressed by specialist divisions within the organization. The purpose of prescribing separate committees is, instead, about mitigating a risk of "government failure" from incentive problems within multiple-mission agencies.

As formal papers by Bengt Holmstrom and Paul Milgrom (1991) and more observational work by J. Q. Wilson (1991) showed a quarter of a century ago, agencies struggle to do a good job at delivering more than one function, as they tend to orient their effort to the more visible, salient activity. For a while this became enshrined in New Public Management orthodoxy, which is often seen as making a case for allocating only one function (one mission) to any agency. But as I have argued, the pursuit

of system resilience entails different functions working toward a common objective: none can deliver without the others, so information flows must be seamless and policy must be joined up.

The UK structure designed over 2010–2013 — of separate policy bodies within one agency, combined with a constrained override power for FPC over other agencies — is designed to thread its way through these cross-currents, the key ingredient being that each committee has a majority of members who are on only that committee. Provided there is effective public monitoring by Parliament and provided each member of every committee is truly free to vote in a minority, those one-committee-only members are incentivized to deliver their committee's particular contribution to stability. The regime depends on them.

In the euro area, the ECB has a structure with something of the spirit of that model, as the board for supervising the euro area's big banks has a degree of separation from the governing council.

Even without broader reforms to the US architecture of the kind advocated powerfully by Paul Volcker, elements of the model could be adopted at the Federal Reserve without legislative change.[67] While the Open Markets Committee is responsible for monetary policy, the Federal Reserve Board holds the regulatory powers. On the approach I have been describing, this would mean that the board of governors would make decisions on the deployment of those macroprudential instruments it controls, including the use of any statutory powers to improve the resilience of individual institutions relevant to stability, and any warnings or recommendations to other authorities. It would, on that model, publish formal minutes of its deliberations and vote, and it would ask Congress to allow it to testify, as a board, on this part of its mandate. In other words, the board would become the Fed's financial stability committee. The point here is not advocacy, but to reveal that a range of de facto institutional modalities exist under the legislated structure and constraints that could go some way toward instantiating a regime for system resilience.

Those general thoughts and particular examples provide the basis for a few, incomplete observations on what this essay's analysis means for international cooperation, central banks, prudential supervisors, securities regulators and finance ministries.

International Machinery: The Problem of a Global Resilience Commons

That analysis of institutional architecture proceeded as if each country can preserve financial system stability entirely through its own efforts. But it was argued in the first part of this essay, that the resilience commons is a global resource and that, therefore, we need some kind of shared or cooperative approach to the formulation of the high-level resilience standard, its incorporation into policy for sectors and activities, and the implementation and enforcement of those policies.[68]

What that earlier discussion omitted is that cross-border policy making and cooperation might be seriously difficult if there are material divergences in national institutional architectures and capabilities.

At one level, the problem can be mitigated by having "everyone" around a large table, and accepting the inefficiencies. In a way, the Financial Stability Board delivers that. But the challenge goes somewhat deeper.

Imagine country A has an institution(s) empowered to conduct dynamic macroprudential policy, but country B does not. Quite apart from the coordination problems discussed earlier — that country A might act in ways that damage B — they might find it hard to agree on a common base regime for particular sectors. That is because, assuming identical tastes and understandings of how the world works, country B's authorities might need to seek a "tougher" base calibration of regulatory requirements given their inability to make adjustments in the face of unusual risks. For them, the "base" regime is static and, thus, all they have.

67 For Paul Volcker's proposals, see Volcker (2015).

68 See also Cecchetti and Tucker (2015).

Cognizance of this would explain why the "countercyclical capital buffer" for banks was included as part of the Basel III international standard; that is, everyone has committed to have at least one dynamic instrument. But wider international convergence on institutional capabilities remains a work in progress, as does convergence in architectures.[69]

In some ways, the current divergence in regulatory architectures provides useful diversity and experimentation. But it means that the historically settled concepts of "central bank," "prudential supervisor" and "securities regulator" are in a degree of flux, with different jurisdictions seemingly committed to different doctrines on what various types of agency might decently do. It is hard to believe that this is a sustainable state of affairs.

Implications for Central Banks

The questions about central banks revolve around just how much power they can decently have. There is no denying that they are reasonable candidates for each and every one of the roles I have identified. They combine expertise in the economy and the financial system; from the beginning, when the BoE was established at the end of the seventeenth century, they have been machines or devices for solving problems of credible commitment.[70] Their core purpose of maintaining stability in the monetary system overlaps with financial stability given that private institutions issue monetary liabilities and, as the economy's liquidity reinsurer, they are invariably summoned to the scene of financial disasters, whether or not they are prudential supervisors. I shall not debate here whether they *should* be the financial stability authority or the microsupervisor, but rather what constraints and responsibilities should be placed upon them in either case.

A Non-supervisory Central Bank

For a central bank that is not the high-level stability authority and has no supervisory responsibilities, the important point is that, even so, it cannot be detached from efforts to preserve the resilience and stability of the system.

First, as the LOLR, it must have access to relevant information about any intermediaries that have or might reasonably be expected to have access to its resources. Given the risks that supervisors might not provide the information it wants, that should be enshrined in law as a right, with the reciprocal obligations applying directly to regulated banks (or a broader community if a broadly functional approach to supervision is adopted).

Second, the central bank should be under an obligation to provide economic and other advice to the stability authority and any separate microsupervisors. Some jurisdictions, perhaps including Australia and Canada, might see no need for such an obligation to be cast in statute given their constitutional conventions and culture. That is to say that in some jurisdictions the authorities can generate what amounts to soft law through custom and practice. Whether in hard or soft law, the arrangements should be sufficiently clear for the bounds of the central bank's accountability to be properly understood.

The Central Bank as Stability Authority

The polar opposite obtains where the central bank is the high-level stability authority, with responsibility for how the resilience standard is articulated across the system and for dynamic macroprudential policy. Some of the necessary constraints are already clear: separate committees, lexicographic objectives, transparent outputs and monitorable outturns. But there is a deeper issue of whether getting so far into stability takes them too far afield from their more routine monetary functions.

It is more than half a century since Richard Musgrave separated out three purposes of the state: allocative efficiency, distributive

69 Within the European Union, there is provision under EU law for each member state to have a longer list of macroprudential instruments, subject to constraints on not undermining the single market.

70 See North and Weingast (1989).

justice and macroeconomic stability.[71] We typically think of central banking as being devoted to the third. Even where they have responsibilities for prudential supervision (micro and macro) of banking, we can think of them as engaged in intertemporal stabilization of the monetary system as a whole.

But where they are given responsibility for financial stability policy more generally or a duty to make recommendations on policy to other bodies in order to maintain system resilience, they enter the "allocative branch" as well. That is because one of the central ingredients of any decent stability policy will be diagnosing and prescribing remedies for the externalities that drive the stability problem. If societies are to guard against central banks becoming too powerful for comfort, they should be involved in *taking policy decisions* in this area only in so far as specific inefficiencies are very materially relevant to system resilience. On this view, they should not be involved in the pursuit of efficiency in financial intermediation more generally, which involves competition and tax policy among many other things. This constraint would supplement our precept barring unelected officials from making big distributional choices.

Making Recommendations and Providing Analysis on the Efficiency Costs of Booms

The words "taking policy decisions" are italicized in the previous paragraph because I need to choose my words carefully here. My discussion has left hanging in the air the gap we have already identified in a regime for the resilience of the stability commons: what if a credit boom does not threaten the financial system but is creating a debt overhang that, when the bust comes, would impede economic growth? It might be useful for central banks or for any separate stability authority (or both) to have an unduckable responsibility to alert elected policy makers to such risks, but it is hard to see that they should themselves have de facto powers of Pigouvian taxation or regulatory constraint that go beyond ensuring financial system resilience.

Where any such advisory responsibility exists, it should be clear, and should be clearly demarked from powers to *decide* upon a course of action.

Implications for Traditional Prudential Supervisors

The discussion of traditional prudential supervisors can be somewhat briefer. Big picture, either they become the nucleus of the resilience regime or they become subordinate to a higher-level stability authority. The important point is that it should be clear which model a jurisdiction adopts, with statutory mandates and powers cast accordingly.

What lies behind this is that within a regime for resilience:

- as a matter of legal mandate, the pursuit of the safety and soundness of individual intermediaries should construe "safety" and "soundness" in terms of the social costs of the system ceasing to function;[72]
- the key activities are applying sector/activity-specific requirements to individual intermediaries, and detecting and deterring hidden actions within and beyond the regulatory perimeter; and
- it must be possible to recalibrate regulatory parameters in response to threats that are greater than contemplated in the base regime.

As put, under either model, the "prudential supervisor" becomes part of a wider effort. That is unavoidable if we are correct to cast the problem as preserving a common resource — resilience — that all intermediaries can erode.

71 Musgrave omitted security, possibly on the grounds that he was concerned with the "fiscal state." Although security is a public good, it is a different kind of public good from, say, lighthouses, as it is a precondition for the existence of a political community at all.

72 The statutory objectives of the United Kingdom's Prudential Regulation Authority are framed precisely in that way, each of safety and soundness being defined in ways consistent with the BoE's broader mandate for stability. This marks a departure from previous UK legislation delegating responsibility for prudential supervision.

One question that might affect the choice of model is whether, given local practices and conventions, a prudential supervisor could be empowered to override the policies of other regulators where warranted in the interests of stability. That might be a stretch in those jurisdictions where the prudential supervisor is not expert in markets or where the prudential and market regulators have strained relationships, sourced in divergent histories and cultures. Where either expertise or history is an obstacle, then either a higher-level authority is needed, or some kind of cooperative framework would have to be relied upon. A challenge for the latter is ambiguity about responsibilities and accountability.

Implications for Securities Regulators and for Financial Regulators More Generally

The implications for securities regulators are perhaps especially momentous, but can be more briefly stated.

Typically, securities regulators have microregulatory jurisdiction over capital markets, asset managers and many manifestations of shadow banking. But their statutory objectives and their historical mission and cultures are centred on the vital importance of honesty and efficiency, in the interests of investor protection, rather than on avoiding runs or disorderly failures or, more broadly, preserving systemic stability.

Given the changes in markets over recent decades, on the story I have told, securities regulators have to grow beyond their roots. That is because they have jurisdiction over vast parts of the stability commons.

In the United States, protracted debate about money market mutual fund reform, notwithstanding a domestic and international stability-policy consensus, left the rest of the world anxious about the capacity of the US authorities to grapple with shadow banking; a concern that is, perhaps, only now starting to be mitigated through the SEC's initiative to introduce a rule on liquidity risk in funds. In the United Kingdom, people have worried whether the Financial Conduct Authority will give sufficient weight to its prudential oversight of funds and asset managers, and to using its listing-authority powers in the interests of stability.

If anything like the current regulatory architecture is to continue around the world, some reorientation of securities regulators' objectives and priorities towards stability is needed.[73]

Indeed, it follows from this essay's analysis that *any* regulator whose policies, rules or decisions materially affect system resilience must have a statutory responsibility for stability, and either that objective must be prior to others or, alternatively, a higher-level stability authority must be able to override or direct the regulator. This would entail such sectoral or activity regulators embracing the need to detect and deter hidden actions that erode the resilience commons. It is the responsibility of legislatures to help that happen, through legislation and questions asked during testimony.

But existing agencies more commonly thought of as stability authorities need to meet securities regulators at least halfway, widening their engagement on markets and finance. "Macropru," an overused term, is a lot more than banking supervision for macroeconomists. Among other things, central banks should accept that, standing at the apex of the monetary system, they have a special responsibility for the health of the money markets, and should work out with capital-market regulators and legislators how that can work peaceably.

Overlap is preferable to underlap: turf disputes will not work as a defence for failing the public following another crisis.

Implications for Finance/Economic Ministries

Finance ministries, the part of the executive branch most concerned with stability, have an obvious role in the design and oversight of regimes for the stability of the financial system. That is recognized more or less everywhere. What risks falling

73 Suggestions of the possibility of what would amount to an epochal shift are found in a speech by the chair of the SEC, Mary Jo White (2014).

through the cracks is their responsibility for what I have called the national balance sheet and for wider macroeconomic imbalances.

We have discussed how independent stability authorities might be under a responsibility to advise the executive branch or legislature when financial system pathologies are creating or exacerbating material problems of resource allocation or over-indebtedness that do not threaten the system's own resilience. They might similarly be under a responsibility to advise publicly on vulnerabilities in the national balance sheet.[74] But the big issue is whether Treasuries should have specific powers to act to deter excessive indebtedness in the household sector or business sector where actions by independent agencies to preserve system resilience will not suffice. Debate on this has hardly begun. Indeed, if anything, there is a tendency toward subsidizing debt finance in the real economy, notably by the government-backed Fannie Mae and Freddie Mac in the US mortgage market.

Finance ministries have a responsibility, I suggest, to generate the careful debate we need about this. The gaps in the regime for stability might be warranted and desirable, but they ought to be deliberate.

Such a debate would, I suggest, need to address the following questions:

- Is a regime for resilience, including dynamic macroprudential policy (as I have defined it), sufficient to head off the social costs of booms and mispricing of resources or risk?
- If not, is that because (a) the scope of the resilience regime is too narrow and needs to be extended to, for example, varieties of shadow banking or parts of the capital markets; or because (b) even if perfectly designed, a resilience regime could never be enough?
- If (b), what would be the objective of a regime for managing risks in the national balance sheet and/or domestic macroeconomic imbalances?
- What powers would such a regime need to include?

I do not know the answers to any of those questions. The first is fundamental, and does not necessarily have a binary answer. One possibility is that a decent regime for resilience would significantly reduce but not eliminate the probability of booms that damage welfare without undermining the system itself. If that were so, a government could hold reserve powers to act itself in such circumstances.

That would still leave open the nature of such powers. Should they be:

- to tax excess growth in (or the cumulative stock of) certain types of financial transactions;
- to constrain indebtedness among households and firms; or
- to adjust its own balance sheet, so as to influence aggregate national saving, with the government saving more (borrowing less) when private sector indebtedness was becoming excessive?

My point is that if independent authorities can decently be empowered only with maintaining the resilience of the financial system as a whole, somebody needs to ensure that those questions are properly debated and resolved. That is the responsibility of elected legislators and executive branch politicians.

74 That might, incidentally, make it somewhat easier for central banks to issue analytical commentary on the public finances since it would be placed within a much broader context, covering households, firms and the economy's external position.

Summing Up

By way of conclusion, I want to highlight three points: about the multiplicity of regimes that might be needed to maintain the promise of stability; the imperative of designing the core regime for system resilience around constrained discretion rather than a static rule book; and, introducing a final theme, the lack of a lobby for stability outside the authorities themselves. Then, finally, we must return to Keynes and Hegel.

A Regime of Regimes

I have attempted to combine an exploration of the frictions that give rise to stability problems with the political economy of credible commitment and the constraints on legitimate delegation to independent agencies. The upshot was that there are interventions that might (I put it no more strongly) be socially useful that could not decently be delegated to independent regulators, since they entail *discretionary* intervention in the rights of individual households and non-financial businesses. It is not obvious that that has been faced up to during the years in which the new regimes for stability have been constructed. It is not easy to tell, in fact, whether independent agencies are being asked or mandated to do too much or too little. The answer is likely to vary across jurisdictions, which exacerbates the already formidable problem of cooperating to preserve the global resilience commons.

I have described a framework for stability that calls upon each national jurisdiction to have distinct but, overall, coherent regimes in four key fields:

a. the resilience of the financial system as a whole, which has been my central concern;
b. NBS management, which either steers private actors away from stability-threatening positions or adjusts the public sector balance sheet to compensate for private excesses;
c. intertemporal macroeconomic stabilization policy, prioritizing domestic price stability; and
d. global macroeconomic balance.

I am concerned that too many people want to make (a) part of (c). That is to change the subject, perhaps in the interests of the skill set and predilections of a dominant tribe of macroeconomists. I am concerned that the need for (b) is barely debated, if it is recognized at all. And I am not alone in being concerned that (d) is repeatedly put in the "too hard" box, as my former colleague Mervyn King has eloquently argued for over a decade.

One of the most significant messages of this essay, therefore, is that we need to escape from an ill-articulated framework that assumes that the same institution(s) can address the social costs of resource misallocation, over-indebtedness and distress in the financial system. The latter can, with suitable care, be delegated to independent agencies, but I do not see how the social costs of NBS vulnerabilities can be delegated consistently with our democratic values. By lumping together the externalities of herding during booms, fire sales during busts and the systemic interlinkages among intermediaries, we have blinded ourselves to some important political economy constraints on institutional design. Perhaps worse, when macroprudential powers have been granted to an independent agency, we have imagined that both types of social cost are being addressed. Not so, or, more accurately, not sustainably so.

By using the problem of the stability commons as a motivating framework, I have tried to underline the distinction between a regime for systemic resilience and a regime for efficient resource

allocation. In principle, we know how to design and build the former, but it is affected by the missing-regimes problem.

The Core Regime for the Resilience of the Financial System as a Whole

I am hardly alone in concluding that the resilience of the financial system matters. But, beyond that, I have argued that systemic resilience can usefully be thought of as a common-resource problem, where individual firms have strong incentives to take hidden actions that undermine the resilience they themselves produce, rely upon and, indeed, typically take for granted. This does not mean we jettison Coasian property rights or Pigouvian taxes as solutions, but rather that a decent regime must cater for the aggregate effects of individual intermediaries taking obscure and sometimes complex actions that erode the system's resilience. That being so, a static regulatory rule book is doomed to fail, and instead carefully constrained discretion is needed.

The regime I have outlined for establishing and preserving the resilience of the financial system has five components:

- The articulation of a standard of resilience applied, *mutatis mutandis* and in the light of infrastructure policy, to all relevant parts of the system. That provides an objective.
- An *ex ante* crisis management regime, which, most vitally, makes every intermediary resolvable.
- Microsupervision of individual firms, funds, structures and infrastructure providers against the resilience standard, given idiosyncratic opacity and the imperative of detecting and deterring hidden actions. As part of this, stress testing makes it possible to monitor delivery of the objective.
- Macrosurveillance of sectoral or system-wide developments that threaten to bypass or otherwise undermine the regime for effecting the resilience standard.
- Macroprudential policy that, where necessary, can dynamically adjust core regulatory parameters in order to sustain the desired standard of resilience as the world changes.

Broadly speaking, the first and second are about general policy manifested in rule writing, designed to cure or mitigate externalities and must be cast widely given the "common-resource" problem; the third is about seeking out hidden actions and making adjudicatory case-by-case judgments; the fourth is about hidden actions and technological developments within, across and beyond the regulatory net that call for temporary mitigants or permanent reforms to the regime; the fifth is about maintaining a systematic policy so as to deliver a standard for resilience time consistently.

For any given tolerance for crisis, the quantitative standard of resilience and its application to particular sectors or activities will be affected by the problem of missing regimes. In particular, if a proclivity toward global and national macroeconomic imbalance remains unchecked, the financial system as a whole will need to be more resilient than otherwise, because the world will be a riskier place. This is merely a generalization of the proposition that banks need more capital, the weaker an economy's macroeconomic regimes. That was a clear implication of the "missing regimes" problem. It poses sizeable challenges. For example, do euro-area intermediaries need more equity capital, other things being equal, given that the resilience of the system as whole is weakened by the paucity of private sector risk transfer between regions (via equity markets) and the lack of a (transparent) fiscal risk-transfer system[75]?

Another set of conclusions flowed from casting financial system stability as a problem of a common resource plagued by hidden actions. There is not one set of "macro" regulatory standards and another set of "micro" regulatory standards. And the approach, from regulation through to stress testing, needs to be as functional as possible, focusing on the importance of services delivered and the potency of system dynamics rather than on legal form.

75 I add "transparent" because fiscal risk transfers among national central banks, and hence their governments and taxpayers, occur via the TARGET payments system.

How far real-world regimes approximate that structure varies enormously across jurisdictions. I am not sure that the lessons for how microsupervision should be framed have been fully debated or acted upon, although one can see evidence of exactly that in some of the Federal Reserve's internal reforms and its trail-blazing stress-testing innovations. Widely emulated, they are opening up prudential supervision to public scrutiny for the first time outside of crises.

The Want of a Lobby for Stability

This essay began by exploring possible parallels with the problem of environmental pollution. The discussion there was about whether the structure of Coasian or Pigouvian solutions applied neatly to financial stability problems. The parallels proved rich in some respects, but thin in others. Most obviously, unlike most chemical polluters, financial intermediaries undermine their own welfare when they succumb to consuming the resilience commons. In concluding, I want to highlight, bemoan even, another contrast that makes it hard to design robust institutions for stability.

In his famous 1960s' monograph on collective action, Mancur Olson distinguished between those areas of economic activity and public policy where the effects were concentrated and those where they were dispersed.[76] Where benefits are highly dispersed but the costs concentrated, the losers can be expected to mobilize much more effectively. Thus, industry might be expected to lobby effectively against initiatives that bring small benefits to hundreds of millions of people.

Over the following half century, we have learnt that Olson's rich insights were not rich enough. Public interest groups have altered the terms of trade.[77] Environmental campaigners engage not just at a general level but in microscopic detail on pollution issues. They have become a social force, even a form of identity politics. This does not mean that they are always right, and perhaps they are often wrong. But it means that policy initiatives are analyzed and debated from all points of view. If an environmental agency proposes a policy that is unwarrantedly tough, that will be called out by industry. If an agency puts out a policy that claims to be tougher than it is, the softness buried in the detail will be called out by the other side. Nothing is going to remain uncontested, but just as important, nothing is going to get slipped through.

In the financial stability arena, Olson holds still. The financial services industry, with its vast penumbra of consultants and analysts, is too often a lobby against stability policy. On the other side, there are commentators lobbying for tough stability policies, but almost universally they operate at 30,000 (if not 100,000) feet. If the authorities were ever to adopt a soft policy but proclaim it as a tough one, the softness buried in the detail, no one outside the industry is likely to notice.

This is a set-up that relies on the stability authorities to be constrained by well-specified mandates and subjected to incentives that keep them on the straight and narrow. But the straight and narrow is never preordained. Whereas monetary policy actions meet criticism from all angles, stability policies do not.

There is, in short, no substitute for a constituency for stability. The authorities should do what they can to foster and encourage social forces for stability. It would, without doubt, be a burdensome distraction at times. But the costs of crises are great, as tragically we are still seeing.

Final Thoughts: One Project and Three Gaps

So to wrap up, we have identified one project and three gaps.

The project is to ensure that all important jurisdictions have regimes for preserving financial system resilience based on recognition of a global commons beset with pervasive hidden actions. The work is incomplete. I have tried to articulate a framework for thinking about it.

76 See Olson (1965 and 1971).

77 For one account, linking the emergence of public interest lobbying groups to the 1960s' New Left, see Harris and Milkis (1996).

The first type of gap is in the constellation of interests competing to be heard over the stability commons: a voice for resilience outside and independent of government that is capable of keeping independent stability authorities tied to the mast that is the justification for their existence. The absence of that voice makes the project of building a regime for resilience a more fragile endeavour than might be thought.

The second type of gap is in regimes to mitigate the social costs of booms that do not threaten financial collapse. These would be regimes, under day-to-day political control but incorporating published independent advice, for leaning against or remedying economic and financial imbalances and debt overhangs. Research is needed to assess the costs of this gap. In the advanced economies, silence prevails. Among the emerging economies, by contrast, there are experiments to address these issues, somehow or other, because they feel they have no choice given spillovers from the policies of the major currency areas. That points to the biggest gap of all in this area: a regime that mitigates or cures the global macroeconomic imbalances and flows of hot money that remain a fault line in the international monetary and financial system. So long as that gap persists, financial systems need to be more resilient than otherwise. Put more starkly, fault lines in macro regimes must not be ignored by micro regimes.

The third type of gap, therefore, is in international architecture that can enable the extra degrees of cooperation, coordination, joint work and peer group monitoring needed in the new world of macroprudential policy regimes. Here the foundations exist. It is simply unclear to outsiders whether it is being deepened and used in new ways. Concretely, when will we see the first jointly conducted stress testing of international active financial intermediaries and infrastructure?

There is, then, a lot of learning, researching and reforming left for the authorities and economists in the years ahead.

Enlightenment before Dusk

Keynes was of course right that practical policy makers are often the slaves of defunct academicians. Indeed, normatively, we should want Keynes to be right, since that would mean that policies and policy regimes had been thought through, with what count, by the standards and state of knowledge of the day, as solid foundations. But Keynes did not see as far or as deeply as Hegel. Often public policy regimes are shackled together in the midst of need, in a curious cocktail of received wisdom, robust enquiry, careful reflection, speculative innovation, momentary insight and sheer expedience. That is where we are. It could not have been any other way.

As prefigured in the title of this essay, we have a global common-resource problem that challenges our technical know-how, our capacity to design institutions that combine effectiveness with legitimacy, and the scope and norms of international cooperation and coordination.

Prosaically, that means deciding what, for us, "financial stability" means, the social costs we truly care about and how far behind us we are prepared to put an earlier generation's institutional architecture. Looking higher, to make sense of the world and our needs, finally, only when a still-more abject crisis shakes the fabric of our democratic societies would be a mortal sin.

Even nearly a decade after the crisis first broke in the summer of 2007, plenty of questions remain unanswered in how to frame effective regimes for stability. We must nurture the determination that they will not persist until the dusk of the next crisis sees Minerva's owl spread its wings — just a little bit too late.

Acknowledgement

I would like to thank two anonymous referees for their comments on an earlier draft of this essay.

Acronyms

ABS	asset-backed securities
BCBS	Basel Committee on Banking Supervision
BIS	Bank for International Settlements
BoE	Bank of England
CCPs	central counterparties
ECB	European Central Bank
FPC	Financial Policy Committee
FSB	Financial Stability Board
G10	Group of Ten
G20	Group of Twenty
IMF	International Monetary Fund
IMFS	international monetary and financial system
LOLR	lender of last resort
NBS	national balance sheet
SEC	Securities and Exchange Commission

Works Cited

Blunden, George. 1987. "Supervision and Central Banking." *Bank of England Quarterly Bulletin*, August.

Borio, Claudio, Enisse Kharroubi, Christian Upper and Fabrizio Zampolli. 2015. "Labour reallocation and productivity dynamics: financial causes, real consequences." BIS Working Papers No 534, December. www.bis.org/publ/work534.pdf.

Cecchetti, Stephen G. and Paul M. W. Tucker. 2015. "Is there Macro-prudential Policy without International Cooperation?" CEPR Paper No.11042. http://people.brandeis.edu/~cecchett/WPpdf/2015_Cecchetti_Tucker.pdf.

Coase, Ronald. 1960. "The Problem of Social Cost." *Journal of Law and Economics* 3: 1–44.

Cochrane, John. 2014. "Toward a Run-free Financial System." April 16. http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2425883.

De Nicolò, Gianni, Giovanni Favara and Lev Ratnovski. 2012. "Externalities and Macroprudential Policy." IMF Staff Discussion Note, June 7. SDN/12/05.

Feroli, Michael, Anil Kashyap, Kermit L. Schoenholtz and Hyun Shin. 2014. "Market Tantrums and Monetary Policy." Chicago Booth Research Paper No. 14-09. http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2409092.

Gennaioli, Nicola, Andrei Shleifer and Robert Vishny. 2010. "Neglected Risks, Financial Innovation, and Financial Fragility." National Bureau of Economic Research Working Paper No. 16068, June.

Glaezer, E. L. and A. Shleifer. 2001. "A Case for Quantity Regulation." NBER Working Paper 8184, March.

Greenwald, Bruce and Joseph E. Stiglitz. 1986. "Externalities in Economies with Imperfect Information and Incomplete Markets." *Quarterly Journal of Economics* 101 (2): 229–64.

Harris, Richard A. and Sidney M. Milkis. 1996. *The Politics of Regulatory Change: A Tale of Two Agencies*. 2nd ed. New York, NY: Oxford University Press, Second Edition.

Holmstrom, Bengt. 1982. "Moral Hazard in Teams." *The Bell Journal of Economics* 13 (2): 324–340.

————. 2015. "Understanding the role of debt in the financial system." Bank for International Settlements Working Papers No 479, January.

Holmstrom, Bengt and Paul Milgrom. 1991. "Multitask Principal-Agent Analysis: Incentive Contracts, Asset Ownership, and Job Design." *Journal of Law, Economics & Organisation* 7 (special issue): 24–52.

Jorda, Oscar, Moritz Schularick and Alan Taylor. 2013. "When Credit Bites Back." *Journal of Money, Credit and Banking* 45 (s2): 3–28.

Kaplow, Louis and Steven Shavell. 1996. "Property Rules versus Liability Rules: An Economic Analysis." *Harvard Law Review* 109 (4): 713–790.

King, Mervyn. 2016. *The End of Alchemy: Money, Banking and the Future of the Global Economy*. London: Little, Brown.

Li, David Daokui and Paul Tucker. 2014. "2014 Triennial Surveillance Review — External Study — Risks and Spillovers." July 30. IMF. www.imf.org/external/pp/longres.aspx?id=4902.

Mendoza, Enrique G. and Marco E. Terrones. 2013. "An Anatomy of Credit Booms and their Demise." NBER Working Paper No. 18379, September.

Milne, Alistair. 2013. "Register, Cap and Trade: A Proposal for Containing Systemic Liquidity Risk." *Economics* 7, March 5. www.economics-ejournal.org/economics/journalarticles/2013-7.

North, Douglas C. and Barry R. Weingast. 1989. "Constitutions and Commitment: The Evolution of Institutions Governing Public Choice in Seventeenth-Century England." *Journal of Economic History* 49 (4): 803–32.

Olson, Mancur. 1965 and 1971. *The Logic of Collective Action: Public Goods and the Theory of Groups*. Cambridge, MA: Harvard University Press.

Ostrom, Elinor. 1990. *Governing the Commons: The Evolution of Institutions for Collective Action*. Cambrige, UK: Cambridge University Press.

Pigou, Arthur C. 1920. *The Economics of Welfare*. London: Macmillan and Co.

Ranciere, Romain, Aaron Tornell and Frank Westerman. 2008. "Systemic Crises and Growth." *The Quarterly Journal of Economics* 123 (1): 359–406.

Reinhart, Carmen M. and Kenneth S. Rogoff. 2009. *This Time Is Different: Eight Centuries of Financial Folly*. Princeton, NJ: Princeton University Press.

Ricks, Morgan. 2016. *The Money Problem: Rethinking Financial Regulation*. Chicago, IL: University of Chicago.

Schularick Moritz, and Alan Taylor. 2012. "Credit Booms Gone Bust: Monetary Policy, Leverage Cycles, and Financial Crises, 1870–2008." *American Economic Review* 102 (2): 1029–61.

Shek, Jimmy, Ilhyock Shim and Hyun Song Shin. 2015. "Investor redemptions and fund manager sales of emerging market bonds: How are they related?" BIS Working Paper No. 509, August. www.bis.org/publ/work509.htm.

Tucker, Paul. 2013. "Banking Reform and Macroprudential Regulation: Implications for Banks' Capital Structure and Credit Conditions." Bank of England speech given at the SUERF/Bank of Finland Conference, Helsinki, June 13.

———. 2014a. "Regulatory Reform, Stability, and Central Banking." Hutchins Center Working Paper No. 1. Hutchins Center on Fiscal & Monetary Policy, Brookings.

———. 2014b. "The Resolution of Financial Institutions without Taxpayer Solvency Support: Seven Retrospective Clarifications and Elaborations." European Summer Symposium in Economic Theory, Gerzensee, Switzerland, July 3.

———. 2014c. "The lender of last resort and modern central banking: principles and reconstruction." BIS Papers No. 79.

———. 2014d. "Capital Regulation in the New World: The Political Economy of Regime Change." Yale Program on Financial Stability, Yale School of Management, August 1. http://paultucker.me/wp-content/uploads/2014/08/Yale-School-of-Managment-Program-on-Financial-Stability.pdf.

———. 2014e. "Are Clearing Houses the New Central Banks?" Paper presented at the Federal Reserve Bank of Chicago Annual Symposium on the Central Clearing of Derivatives, Chicago, IL, April 11. www.chicagofed.org/events/2014/annual-over-the-counter-derivatives-symposium.

———. 2016. "Macro Prudential Policy Regimes: Definition and Institutional Implications." In *Progress and Confusion: The State of Macroeconomic Policy*, edited by Oliver Blanchard, Raghuram Rajan, Kenneth Rogoff and Lawrence H. Summers. Cambridge, MA: IMF and MIT Press.

Volcker, Paul A. 2015. *Reshaping the Financial Regulatory System: Long Delayed, Now Crucial*. The Volcker Alliance. April.

Weitzman, Martin. 1974. "Prices versus Quantities." *Review of Economic Studies* 41 (4): 477–91.

White, Mary Jo. 2014. "Enhancing Risk Monitoring and Regulatory Safeguards for the Asset Management Industry." December 11.

Wilson, J. Q. 1991. *Bureaucracy: What Government Agencies Do and Why They Do It*. 2nd edition. New York, NY: Basic Books.

About the Author

Sir Paul Tucker is chair of the Systemic Risk Council, and a fellow at the Harvard Kennedy School. Previously, he was deputy governor at the Bank of England, sitting on its monetary policy, financial stability and prudential policy committees. Internationally, he was a member of the G20 Financial Stability Board, leading its work on "too big to fail"; a director of the International Settlements, and chair of its Committee for Payment and Settlement Systems. His other activities include being a director at Swiss Re, a senior fellow at the Harvard Center for European Studies, a visiting fellow of Nuffield College, University of Oxford, and a governor of the Ditchley Foundation.

About CIGI

The Centre for International Governance Innovation is an independent, non-partisan think tank on international governance. Led by experienced practitioners and distinguished academics, CIGI supports research, forms networks, advances policy debate and generates ideas for multilateral governance improvements. Conducting an active agenda of research, events and publications, CIGI's interdisciplinary work includes collaboration with policy, business and academic communities around the world.

CIGI's current research programs focus on three themes: the global economy; global security & politics; and international law.

CIGI was founded in 2001 by Jim Balsillie, then co-CEO of Research In Motion (BlackBerry), and collaborates with and gratefully acknowledges support from a number of strategic partners, in particular the Government of Canada and the Government of Ontario.

Le CIGI a été fondé en 2001 par Jim Balsillie, qui était alors co-chef de la direction de Research In Motion (BlackBerry). Il collabore avec de nombreux partenaires stratégiques et exprime sa reconnaissance du soutien reçu de ceux-ci, notamment de l'appui reçu du gouvernement du Canada et de celui du gouvernement de l'Ontario.

For more information, please visit www.cigionline.org.

67 Erb Street West
Waterloo, Ontario N2L 6C2, Canada
tel +1 519 885 2444 fax +1 519 885 5450
www.cigionline.org