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# Incentive Audits

## A New Approach to Financial Regulation

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## Abstract

A large body of evidence points to misaligned incentives as having a key role in the run-up to the global financial crisis. These include bank managers' incentives to boost short-term profits and create banks that are "too big to fail," regulators' incentives to forebear and withhold information from other regulators in stressful times, and credit rating agencies' incentives to keep issuing high ratings for subprime assets. As part of the response to the crisis, policymakers and regulators also attempted to address some incentive issues, but various outside observers have criticized the response for being insufficient. This paper proposes a pragmatic approach to re-orienting financial regulation to have at its core the objective of addressing incentives on an ongoing basis. Specifically, the paper proposes "incentive audits" as a tool that could help in identifying incentive misalignments in the financial sector. The paper illustrates how such audits could be implemented in practice, and what the implications would be for the design of policies and frameworks to mitigate systemic risks.


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# Incentive Audits: A New Approach to Financial Regulation

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## 1. Introduction

The global financial crisis has highlighted the crucial role that incentives play in finance. Misalignments between public interest and private incentives can become a problem in any economic sector. But they are particularly important in the financial sector, not only because of that sector's critical role in development, but also because any incentive misalignments are compounded by other issues specific to finance, in particular asymmetric information. If economic agents in the financial system face a bad structure of incentives, this tends to lead to a build-up of systemic risk. These incentives include bank managers' incentives to boost short-term profits and create banks that are "too big to fail", credit rating agencies' incentives to keep issuing high ratings for subprime assets, regulators' incentives to forebear and withhold information from other regulators in stressful times, and policymakers' incentives to keep bailing out weak financial institutions rather than allowing timely exit from the financial sector. These points are well documented in the existing literature. For example, Caprio, Demirgüç-Kunt, and Kane (2008) examine incentive conflicts as an explanation of how securitization went wrong and why credit ratings proved so inaccurate, and Levine (2009) discusses the role of incentive failures in regulatory authorities.

The crisis has also re-opened important policy debates on financial regulation. Among other things, at the global level, the Basel Committee has started working on new capital and liquidity requirements (e.g., Basel Committee 2010), and the Financial Stability Board (FSB) has developed an impressive agenda of reform (e.g., FSB 2010). At the country level, various national authorities have started reviewing their bank resolution regimes, macroprudential policy, consumer protection, and other aspects of their regulatory framework. (For a comprehensive review, see the World Bank's Bank Regulation and Supervision Survey, presented in Čihák, Demirgüç-Kunt, Martínez Pería, and Mohseni-Cheraghlou 2012.)

How far have these reforms gone in addressing the underlying incentive failures in the financial sector? Outside reviews (e.g., Geneva Report 2009; the LSE Report on the Future of Finance 2010; the Squam Lake Working Group 2010; and the CEPR Future of Banking report 2010) suggest that much more is needed at the global level to address the underlying incentive breakdowns that led to the global financial crisis. Empirical analysis of the regulatory steps taken at the national level in a large sample of countries since the onset of the crisis also makes it clear that there is still a major scope for improvement to address the incentive problems in the financial sector (Čihák, Demirgüç-Kunt, Martínez Pería, and Mohseni-Cheraghlou 2012).

The motivation for this paper is the need for incentive issues to be more fully reflected in the design of regulatory systems. Reflecting the importance of incentives in the financial sector, several authors have argued for the need to make incentives more central to regulatory frameworks, or to embark on regulatory reforms that are incentive-robust

(Calomiris 2011). This means that they improve not only market incentives and discipline, but they also improve incentives of regulators and supervisors by making rules and their enforcement (or lack of it) more transparent, therefore increasing credibility and accountability.

In this paper we outline an approach to the regulation of financial systems that would place issues of asymmetric information and incentives at its center rather than as an afterthought. The paper argues that the regulatory approach should be re-oriented to have at its core ongoing identification and correction of incentive problems that interfere with effective market discipline. Implementation of the approach would require a redesign of the instruments and institutional arrangements for safeguarding financial stability. In particular, the regulator should have the capacity to look beyond or through the factors that give rise to systemic risk and to identify and correct the fundamental sources of failures, e.g. in asymmetric information or perverse incentives. The policy responses that would follow from this approach are potentially much broader than prudential tools.

Specifically, we propose and illustrate the idea of "incentive audits" as a new tool to better identify perverse incentives faced by financial institutions, market participants and regulators, before they give rise to systemic risk. While this is a new tool, there are examples of existing incentive-based analysis that can constitute components of such audits.

The remainder of this paper is organized as follows. Section 2 reviews some of the lessons from the financial crisis, highlighting the importance of incentive distortions in the financial sector. Section 3 discusses the policy response to the crisis, pointing out that further steps are needed to address the underlying incentive distortions. Section 4 introduces the incentive audits, discussing the modalities and implementation of such audits. Section 5 concludes.

## 2. Lessons from the Global Financial Crisis for Financial System Oversight

Breakdowns in incentives played a major role in the run-up to the crisis. Since 2008, a rapidly growing body of literature has been devoted to examining the run-up to the crisis.[2] A key group of factors identified by scholars and policymakers relates to the governance of the financial system. Some of the literature also points to the broader macroeconomic factors, which certainly played a role, but there is a rather broad agreement that at the center of was an important breakdown in the governance of the financial system, which includes regulatory and supervisory failures, as well as problems with incentives of rating agencies, accounting

[2] See for example, Caprio, Demirguc-Kunt and Kane (2009), Demirguc-Kunt and Serven (2009), Levine (2010), Rajan (2010), Calomiris (2011) and Masciandaro, Pansini, and Quintyn (2011).

practices, and transparency. This section concentrates on the key incentive issues highlighted by the crisis.[3]

***Case study: Distorted incentives in the run-up to the U.S. subprime mortgage crisis***

A wide body of evidence suggests that distorted incentives at several levels were a key cause of the U.S. subprime mortgage crisis. For example, Levine (2010) finds that the design, implementation, and maintenance of financial policies in 1996-2006 were primary causes of the financial system's demise. He rejects the view that the collapse was only due to the popping of the housing bubble and the herding behavior of financiers selling increasingly complex and questionable financial products. Rather, the evidence indicates that regulatory agencies were aware of the growing fragility of the financial system associated with their policies during the decade before the crisis and yet chose, under great pressure from the industry and politicians, not to modify those policies. Along similar lines, Wallison and Calomiris (2009), Rajan (2010) and Calomiris (2011) document that the policies to promote home ownership in the United States created perverse incentives within official and quasi official agencies, contributing to the buildup of exposures in subprime mortgages, and to forbearance in the regulatory/supervisory oversight of the risks.

Regulation and supervision was not the only culprit, but regulation had a key role in widespread distortions of incentives, including incentives of rating organizations to conduct appropriate due diligence. This was compounded by incentive distortions (moral hazard) associated with too-big-to-fail policies (e.g., Kane 2007, Caprio et al. 2009, Ötker-Robe and others 2011), adverse selection associated with the rules for assessing the credit worthiness of borrowers, and the principle/agent problems within financial institutions, related to the nature of ownership and the structure of executive compensation that favored risk taking and higher short term returns to the longer term detriment of shareholders.

***Lack of incentives for supervisory intervention***

One broader point illustrated by the U.S. example is that prudential supervisors often failed to intervene and implement the regulations and powers that they already had. For example, before the subprime crisis, the U.S. regulators did raise alarms over risks in subprime lending, but, as documented by Levine (2010), a tightening of prudential practices did not occur, due to pressures from the industry and lawmakers.

[3] The paper's focus on shortcomings and areas for improvement does not mean that *all* pre-crisis regulation failed, or that all supervisors performed uniformly badly. Within advanced economies, Australia, Canada, and Singapore have been mentioned among examples of countries that withstood the global crisis rather well, due in part to prudent supervision (e.g., Palmer and Cerrutti 2009). Also, many emerging markets and developing economies had limited exposure to the risky behaviors that precipitated the crisis, and most of these countries averted outright distress in the financial system, due in part to conservative prudential and supervisory practices. Malaysia and Peru are just two examples that have been praised for their prudential policies (IMF 2010 2012). Čihák, Demirgüç-Kunt, Martínez Pería, and Mohseni-Cheraghlou (2012) provide an in-depth comparison of regulation and supervision in countries that were directly hit by the crisis and those that were not.

This does not mean that the failure was purely a supervisory one. Indeed, some of the micro prudential regulations were poorly designed, contributing to systemic risk. The Basel capital adequacy measures considerably misrepresented the solvency of the banks. During the crisis, the major bank failures occurred in banks that were compliant with regulatory capital requirements (Haldane 2011). One of the reasons for this was the use of risk weights that underestimated the riskiness of assets such as mortgages and sovereign debts,[4] the different treatment under the Basel rules of assets held in the banking book and those held in the trading book,[5] and the definition of capital.[6] Moreover, the rules encouraged risks transfers to entities that were less able to bear it.[7] These actions transferred risk in non-transparent ways and to entities that were unregulated for risk capital purposes. As a result, while individual banks' regulatory capital positions appeared more sound, the capital adequacy of the financial system was weakened and systemic risk increased. More generally, as regulatory rules became more complex, they became much harder to enforce. Information on exposures and risks became increasingly difficult to compile as financial groups grew in complexity and became more interconnected, with operations both locally and overseas, spanning many business lines.

An important issue here is the lack of effective independent oversight. Many regulators lacked operational independence, and even those that were legally independent on paper found it difficult in practice to withstand pressures from the financial services industry and politicians. In assessments of compliance with the Basel Core Principles, the weakest areas in many countries include operational independence of regulators (e.g., Čihák and Tieman 2011). The “revolving door” of staff between the supervisory authority and the industry – perhaps justified to some extent, because industry background and familiarity with the instruments and activities help in understanding risks – resulted in the perception of conflicts of interest for some individual supervisors (e.g., Kane 2007).

Examining a broader sample of countries, Barth, Caprio, and Levine (2012) document a similar lack of supervisory intervention as observed in the U.S. in the run-up to the sub-prime mortgage crisis. They argue that among other factors, psychological bias in favor of the industry, similar to that prevailing in sports, where referees regularly call games in favor

[4] For a more in-depth discussion of the risk weights, see Admati and Hellwig (2012), Hellwig, (2010) and Demirgüç-Kunt, Detragiache, and Merrouche (2010).

[5] The difference between banking and trading book, a part of Basel rules since mid-1990s, is becoming less relevant with the move towards mark-to-market accounting.

[6] Many banks, especially in advanced economies, held a relatively small part of capital as equity, with the remainder being in capital with weak loss absorbing characteristics that had little value during the crisis. Given the large differences and lack of transparency in the definition of capital, it was hard to assess and compare the adequacy of capital across institutions.

[7] Under the rules, banks could reduce their capital requirements by shifting assets to legally remote entities that were excluded from the asset definitions, through the use of credit default swaps, or by credit enhancements that improved the ratings of assets and thus the need to hold regulatory capital.

of home teams, operates in finance. In the authors' view, therefore, the key issue to address is not necessarily more regulations (although some additional regulations may be appropriate), but it is how to get regulators to enforce the rules.

Underlying the limited capacity of regulators to monitor systemic stability were important information gaps and asymmetries. It was difficult to know the extent to which the failure of one institution would impact others and the functioning of the financial system generally. Systemically important segments of the financial system were not covered by surveillance and crisis management arrangements. The political and economic climate dampened the incentives of financial stability analysts to dig more deeply and question the adequacy of the information and the underlying benign assumptions on which their analysis was based. There were no well-established procedures for resolving large banking institutions and those with significant activities in multiple jurisdictions.

To compound these problems, the prudential approach suffered from regulatory "silos" along functional and national lines, so there were often many different supervisors with very different incentives. The approach focused on the risks in individual institutions and in their legal form, with separate approaches often developed for the regulation and supervision of banks, insurance, and securities. This approach allowed transactions to be channeled through the entities that were subject to weaker regulation, and for transactions to be conducted in the gaps between the regulatory silos to avoid regulation altogether. The rapid growth of the shadow banking system was a case in point. In addition, while the regulated entities have become increasingly global, financial regulation has remained largely national, and cross-border regulatory cooperation (despite some progress) still faces serious incentive problems. The use of supervisory memoranda of understanding and "colleges" has been promoted to strengthen cross-border supervision, but it broke down in stressful situations (such as the Fortis failure in 2008). This illustrates that the supervisory task-sharing anchored in the Basel Concordat is not crisis-proof, reflecting misalignments in the underlying incentives. In the absence of an ex ante agreed upon resolution and burden-sharing mechanism and deteriorating health of the bank, incentive conflicts escalate and supervisory cooperation breaks down. Some authors (e.g., D'Hulster 2011) have therefore called for a rigorous review of the supervisory task-sharing framework, so that the right incentives are secured during all stages of the supervisory process.

***Lack of incentives for market discipline***

In the run-up to the crisis, some jurisdictions, especially advanced economies, placed heavy emphasis on market discipline in safeguarding financial soundness and stability. The idea of market discipline rests on the notion that, *given the right information and right incentives,* market participants would penalize institutions that are overly exposed to risk given the capital available to absorb the potential losses. The Basel II capital accord sought to expand the role of market discipline in the regulatory framework. Rating agencies were given a role in the evaluation of the risks in the portfolio under so-called Pillar I, and an explicit role for market discipline was introduced under so-called Pillar III. Beyond the Basel rules, the reliance on market discipline was reflected for example in the limited attention by officials to the risks posed by unregulated entities in the shadow banking system or to the lack of information on risk transfers. The assumption was that the regulated financial institutions have incentives to be prudent in managing exposures to their counterparties. [8]

The issue with market discipline in the pre-crisis period was that the underlying assumptions were not met. In particular, *the market participants' incentives were distorted and they did not have access to the necessary information*. Many institutions and instruments were allowed to grow highly complex and non transparent. Information on interconnections and exposures of financial institutions was lacking. The increasing use of over the counter financial derivatives, enabled financial institutions to transfer or to take on risk in non transparent ways, and to do so rapidly. The assessment of the risks of the entities and instruments fell to specialized bodies, such as the rating agencies and auditing firms, but the incentives of these agencies to conduct independent due diligence was distorted by conflicts of interest. In such a situation, effective market discipline could not function.

The lack of effective market discipline also resulted from herding behavior and moral hazard. There is ample evidence that large financial institutions enjoyed an implicit market subsidy prior to the crisis, consistent with the moral hazard associated with "too big to fail" policies (Rajan 2010, Ötker-Robe and others 2011; Goldstein and Véron 2011). Without external discipline, large financial institutions could take on more risk and grow their balance sheet rapidly to boost short-term profits.[9] Indeed, this was one of the greatest challenges highlighted by the crisis as institutions that are too large or too inter-connected to fail were given more favorable treatment during crises, which also distorts their risk-taking incentives during normal times by undermining market discipline. Inadequate corporate governance structures in the financial institutions have enabled managers to pursue high-growth strategies at the expense of shareholders, providing support for greater government regulation.[10]

One aspect of these inadequate governance structures that attracted particularly close attention during the crisis is the area of executive compensation. The spectacular collapse of banks whose executives were allegedly paid for ensuring performance raises questions about

[8] Some unregulated entities, particularly hedge funds, were subject to much discussion in the Financial Stability Forum before the crisis, but the more general (and more troubling) question of where risk had been transferred (and whether it was held in entities that could bear the losses) received scant attention.
[9] In the case of the United States, this in turn created the conditions for another market failure -- adverse selection in the subprime mortgage market. As institutions expanded their mortgage lending they did so by introducing instruments and approval procedures that opened the market to households with weak credit and were more likely to default.
[10] Demirgüç-Kunt and Huizinga (2011), using a wide international sample of banks, present evidence that casts doubts on the need for systemically large banks. Bank growth has not been in the interest of bank shareholders in small countries, and it is not clear whether those in larger countries have benefited.

the link between executive pay and risk-taking. Philippon and Reshef (2009) show that while in 1980 bankers made no more than their counterparts in other parts of the economy, by 2000 wages in the financial sector were 40 percent higher for employees with the same formal qualifications. The last time such a discrepancy was observed was just prior to the Great Depression—an irony which has not been lost on critics of bank compensation, ranging from regulators to the Occupy Wall Street protesters. But the level of compensation alone may not be the real problem. Many economists have emphasized that a much more important (and difficult) question to answer is how the structure of performance pay may encourage excessive risk-taking at all levels of the institution, from traders and underwriters right up to the firm's chief executive officer.[11]

Nevertheless, how exactly the structure of executive pay affects risk-taking is still a topic of heated debate. Some have argued that—even before the crisis—executive compensation at banks had several features that should have discouraged short-termism and excessive risk-taking: paying bankers with equity or stock options, for instance, should ensure that if the firm's market value gets wiped out the same fate awaits the paycheck of its senior management. But matters may be more complex. Incentive schemes may emphasize immediate revenue generation over a prudent long-term assessment of credit risk (as was likely the case in mortgage lending); and bonuses awarded today may entail risks that do not become apparent until much later. Both aspects of bank compensation have become the focus of increased regulation intended to discourage bank executives from excessive risk-taking. But our understanding of how incentives at banks translated into actual risk-taking behavior is still limited and regulators struggle to come up with rules that can rein in reckless risk-taking without extinguishing banks' ability to reward actual performance.[12] Ellul and Yerramilli (2010) find that commercial banks with a strong commitment to risk management (approximated by the ratio of the compensation of the chief risk officer relative to that of the chief executive officer) fared much better during the subprime crisis than those with weaker commitments to risk management. Proper risk management is essential to stability since risk managers, acting in the interest of their stockholders are the first line of defense against imprudent investing; prudential regulation and supervision is only the second line of defense, in case risk management fails.

## 3. Policy Responses So Far

After the onset of the global financial crisis, there was much talk about responding to the crisis by pushing through the necessary reforms. The Basel Committee has prepared new

[11] See, for instance, op-eds from Alan Blinder and Raghuram Rajan.

[12] Another related, although less explored, facet of market discipline is the forced departure of managers from underperforming financial institutions. Schaeck and others (2011) find that when banks take on too much risk and get into trouble, their managers do get forced out, but it is often too late for the banks, which tend to remain in trouble for years after the turnover. In this sense, there is lack of convincing evidence that executive dismissals constitute an effective disciplinary mechanism.

capital and liquidity requirements, under Basel III, and the FSB has developed an impressive agenda of reform. New legislation has been passed or is being prepared also at the national level.[13] This section discusses some of the challenges and outstanding issues in the reform agenda, focusing on the incentive distortions highlighted during the crisis.

Many of the elements of the Basel and FSB reforms are sensible and might help in reducing the build-up of vulnerabilities. This includes measures to improve transparency and risk management, curb excessive risk-taking by requiring more and higher quality capital and requiring liquidity buffers, aiming to reduce "too big to fail" subsidies by authorizing regulators to seize and wind down insolvent financial firms; and trying to reduce pro-cyclicality by introducing countercyclical buffers. These reform initiatives, if properly implemented, may go some way towards addressing the incentive breakdowns highlighted in the run-up to the crisis.

There are, however, important challenges that still remain. These relate to issues such as increasing complexity of the regulatory framework, the need for flexibility, and supervisory resources and capacity, which we will discuss in more detail in the remainder of this section. Ultimately, these challenges lead to a risk of not adequately addressing the underlying incentive distortions.

***Challenges related to regulatory complexity***

For regulations to be incentive-compatible and enforceable, they need to be relatively simple. This does not mean that all simple regulations are good, of course. But if regulations become too complex, their enforcement becomes more costly and less transparent, decreasing credibility and accountability. Complex regulations are also hard to understand for market participants and other stakeholders, weakening market incentives and discipline. Also, complex regulations create more opportunities for special interests to create loopholes, further weakening the effect of the regulation. In regulation, less complexity can often mean more in terms of results.[14]

One problem with the recent regulatory reforms is that they have been leading to ever more complicated regulations. In the case of the United States, for example, numerous observers have pointed out the great complexity of the regulation introduced during the crisis.[15] Also in a broader sample of countries covered by the World Bank's Banking Regulation and Supervision survey, it is correct to say that regulatory complexity has been on the rise, with even many small, low-income jurisdictions opting for relatively complex

[13] Čihák, Demirgüç-Kunt, Martínez Pería, and Mohseni-Cheraghlou (2012) provide an update on regulatory developments in individual countries based on the World Bank's Banking Regulation and Supervision survey. World Bank (2012) overviews the global regulatory response, focusing on Basel III and FSB reforms.

[14] For a broader discussion on simplicity versus complexity, see for example Maeda (2009).

[15] For example, The Economist (2012a) pointed out that at 848 pages, the Dodd-Frank law of 2010 is "longer, less intelligible, more incomplete than any other financial reform that was ever passed into law in the US".

approaches to capital regulation (Čihák, Demirgüç-Kunt, Martínez Pería, and Mohseni-Cheraghlou 2012).

Underlying this increased complexity is the belief that crises could be avoided if the regulations were more comprehensive and extensive. So, the deficiencies that caused the crisis are supposedly eliminated by ever-more complex sets of rules and regulations. However, in the United States, where the global financial crisis started, the pre-crisis regulations were already quite complicated and supervisory resources were extensive. Internationally, the complexity of the banking rules had already increased significantly before the crisis with the introduction of Basel II. Nevertheless, private risk-taking at public expense reached unprecedented levels.

Complexity in search of comprehensiveness is an elusive goal and the resulting regulations almost always remain partial despite their increased complexity. Initial efforts to implement the new regulatory regimes have been progressing slowly as industry has pushed back against elements of the reforms. This is again the case, for example, in the United States, with certain provisions in the Dodd-Frank legislation.[16] The risk with partial reform is that the gaps will provide scope for gaming the system and circumvention of regulations. For example adjusting the regulations for the banking sector without comparable regulation for the shadow banking sector could simply shift risk outside the regulatory perimeter. Tweaking different levers of the regulatory framework independent of each other may even create more risk instead of mitigating it and can be counterproductive (Laeven 2011). Partial implementation would perpetuate moral hazard in the financial system, if there is an assumption that the shortcomings that led to crisis had been corrected, but underlying weaknesses remain unaddressed.

The increasing complexity of regulation is also increasing the pressure on supervisory capacity. Considerably more resources will need to be devoted to supervisory oversight for the FSB/Basel reforms to be effective. The FSB reviews of progress finds weaknesses with implementation in several areas, including information for supervisory oversight, compensation practices, and reducing reliance on rating agencies. In low income developing countries, there are already important capacity issues where supervisory skills are in short supply, so this further exacerbates implementation and enforcement issues. Constraints arise not only because of scarce resources, but also because of weaknesses in the mandates and independence of supervisors and regulators (Čihák and Tieman 2008).

Ever more complicated rules, or even more supervisory discretion or resources, will not address the fundamental problems, unless there is an appropriate alignment of incentives. To the contrary, introducing simpler rules that take into account the *incentives* of market participants and regulators are less likely to be circumvented by market participants and

[16] See for example the Economist (2012).

easier for supervisors to monitor and enforce.[17] Simpler rules, accompanied by increased transparency and appropriate alignment of incentives, could not only help in supervisory enforcement, but also greatly enhance the role of market discipline.

***Challenges to stress testing and international standards***

Much of the work on financial stability relies on two sets of tools: macroprudential stress tests and assessments of compliance with international standards and codes. These tools have been given a larger role in response to the crisis, and they do provide useful insights, but they also have important limitations.

As for macroprudential stress tests, they are helpful in facilitating the quantification of vulnerabilities in the financial system. However, they have been criticized for failing to provide an early identification of vulnerabilities in tranquil times and for triggering remedial action (Borio, Drehman, and Tsatsaronis 2012). More importantly, they focus on the observed risks and exposures but not on the underlying incentive factors that drive those risks and exposures.

As for assessments of compliance with international standards and codes, they are helpful in facilitating the discussion on regulatory and supervisory framework, but they do not examine the incentive issues in the financial sector directly. They define minimum common standards that can be adopted by a wide range of countries.[18] A part of the motivation was to reduce the scope for international regulatory arbitrage and for one jurisdiction gaining a competitive advantage over another. The assessments of compliance can help promote adoption of good practices as countries can refer to the international agreed standards in designing national approaches. The creation of a common standard can provide a good basis for benchmarking countries, which is also why standards play an important part in international assessments of financial systems, such as the IMF/World Bank FSAPs.

Nevertheless, these standards also have some well-known limitations. First, achieving an international agreement on a common set of detailed regulations or standards involves negotiation and compromises, and some compromises result in a weakening of the standards in unintended ways.[19] Second, an internationally agreed standard is not necessarily optimal in a national context, and national regulations have to be tailored to reflect national circumstances.[20] Third, there is as yet limited evidence that compliance with the international

[17] An example would be replacing risk-weighted capital adequacy rules with a simple leverage ratio complemented by loan interest rate spreads (World Bank 2012).
[18] Basel II allows for some differences in the methods of application depending on the sophistication of the risk management systems.
[19] This was true, for example, of the components that some national authorities insisted be included under the definition of regulatory capital in Basel I and Basel II.
[20] Relatedly, Kane (2007) provides an interesting "contracting perspective" on Basel II, pointing out that financial safety nets are incomplete social contracts that assign responsibility to various economic sectors for

banking standards – such as Basel Core Principles, BCPs - helps in limiting financial crises at the national level (see for example Demirgüç-Kunt, Detragiache and Tressel 2008; Demirgüç-Kunt and Detragiache 2011).

***Symptomatic treatment vs. underlying incentive distortions***

Most regulations of course affect incentives in one way or the other. Indeed, the recent regulatory reforms at the global level as well as those at the country level have included measures aimed at reducing the role of systemically important financial institutions, improving compensation policies, reducing the role of credit ratings, fill in various data and information gaps, all of which go some way towards addressing the weaknesses highlighted by the crisis (World Bank, 2012). But, as pointed out by Čihák, Demirgüç-Kunt, Martínez Pería, and Mohseni-Cheraghlou (2012) based on a detailed analysis of the World Bank's bank regulation and supervision survey, the regulatory responses to the crisis at the individual country level have been slow and in most areas gradual at best. The crisis did not trigger a major change in national regulatory and supervisory frameworks. While some measures adopted in the crisis (such as improvements in resolution regimes in some countries) are encouraging, others (such as extension of blanket guarantees, and increase coverage of deposit insurance schemes) are likely to be less so. The survey results suggest that there is substantial room for further improving the regulatory and supervisory frameworks as well as private incentives to monitor risk-taking.

Addressing incentive problems with regulations has been far from trivial. For one, many regulations provide only a symptomatic treatment. For example, ceilings on credit growth have been used to slow down credit growth in some countries. This measure is aimed at the symptom—rapid credit growth—without addressing the underlying incentive issue, which is the incentive of commercial bank managers and shareholders to boost profits by rapidly expanding credit portfolio, without sufficient regard to risk. If regulations address the symptoms but not these underlying issues, the result may be just another, sometimes even more problematic issue. In many countries experimenting with credit ceilings, the result was a growth in unregulated activities. Hence, addressing one incentive issue by a new regulation often leads to creating incentive breakdowns elsewhere.

Another important argument for putting incentive issues front and center is that the regulation-based approach is reactive and tends to get overtaken by events. For example, at the global level, Basel II was created when the shortcomings in Basel I became apparent, and Basel III is being put in place after shortcomings in Basel II became apparent. Risk weights, which play a central role in these frameworks, should ideally change with the evolution of risks. For example, capital requirements should in principle take into account the co-dependence of financial institutions (see e.g. Acharya 2011). But these can change quite

preventing, detecting, and paying for losses at financial institutions. Basel II forces signatory countries to reopen safety-net bargaining across affected sectors.

substantially over time, and in practice, making these risk weights properly reflect the underlying risks has been extremely challenging. A well-known example is the risk weights for sovereign debt in many euro area countries, which have been too low, as evinced during the euro area turmoil. The static, reactive nature of standard regulation leads to regulatory arbitrage and frequent re-regulation becomes an inevitable part of regulatory reform that is not incentive-robust, i.e. that does not take into account incentive issues in a dynamic, forward looking fashion.

Indeed, recommendations for regulatory reform developed by independent fora (e.g., Geneva Report 2009; the LSE Report on the Future of Finance 2010; the Squam Lake Working Group 2010; and the CEPR Future of Banking report 2010) consistently point out that incentive issues need to be more fully reflected in the design of regulatory systems. The importance of designing regulations that are “incentive-robust” is being increasingly recognized (e.g., Calomiris 2011).

It is therefore important to put identification of incentive problems at the center of the regulatory approach rather than leaving it as an afterthought. Some of the incentive issues highlighted during the crisis (e.g., lack of incentives of supervisors from different jurisdictions to share relevant information in situations of stress) have not really been fully addressed. Regulators have often failed to implement the regulations and powers that they already had. As pointed out by Barth, Caprio, and Levine (2012a) finance is subject to factors such as psychological bias in favor of the industry (similar to that prevailing in sports, where referees regularly call games in favor of home teams). This suggest that the key issue to be addressed is not necessarily more regulations (although some additional regulations may be appropriate), but it is how to make sure regulations are designed so that the market participants’ incentives to circumvent them are minimized and the regulators incentives to enforce these rules are maximized.

## 4. Introducing the Incentive Audit

The discussion so far has highlighted two points. First, incentives play an absolutely crucial role in the financial sector. Second, incentives misalignments need to be addressed head-on if we are to do a better job at preventing future financial crises. That is the motivation for the “incentive audits”, introduced in this section.

The core point of our paper is that the identification of incentive problems in a financial sector would benefit from a specific analysis of incentives -- an incentive audit.[21] Introducing such audits could help to strengthen the policy framework for financial sector as we discuss next.

[21] The term “incentive audit” was first used by Johnston, Chai and Schumacher (2000) and Chai and Johnston (2000), who discussed incentive analysis in the context of international surveillance.[22] See IMF/FSB/BIS (2011).

***How would an incentive audit work in practice?***

The basic idea of incentive audits is to more regularly and systemically evaluate structural factors that affect incentives for risk-taking in the financial sector. Standard approaches to assessing financial stability, including macroprudential stress tests and assessments of compliance with international standards and codes, provide useful insights, but they also have important limitations as discussed above.

A truly forward-looking analysis of financial vulnerabilities needs to go beyond these approaches and complement them with the assessment of structural weaknesses in financial systems. The contribution of the incentive audit would be that it focuses more directly on the factors that influence economic behavior of the main agents in the financial sector. The focus on economic incentives of the main agents can accommodate great diversity in the organization of financial systems. If well executed, it can provide early identification of potential financial sector problems.

So, how can the incentive audits ensure that addressing the incentive breakdowns is central to the regulatory framework? To illustrate the basic difference between a regulation-based and incentive-based approach to dealing with systemic risk, it is useful to examine the two dimensions of systemic risk and policy responses identified in the literature:[22] times-series dimension (associated with pro-cyclicality in financial systems that exacerbate the tendency towards boom-bust cycles) and cross-section dimension (associated with the systemic risks created by an institution or group of institutions at a point in time due to interconnectedness or highly concentrated nature of financial services).

The regulation-based policy response to systemic risk is to build buffers of capital and liquidity to enhance the resiliency of the financial system to handle the risks. The pro-cyclical risks would be addressed through a pro-cyclical capital charge, a contingent capital buffer and a leverage ratio as a back stop. Under the pro-cyclical capital charge, capital buffers would be built up in the upturn based on indicators of excessive credit expansion, which could also put a check an excessive growth of credit. The releasing of the buffers to cover the losses during the down turns could help to maintain the flow of credit in the down turns. The cross section risks would be addressed by introducing an additional capital/liquidity provisions for systemically important financial institutions.

In contrast, an approach based on incentive audits would seek to identify and correct the distortions and information frictions that contribute to the buildup of excessive risk. The difference in the approach is to look beyond the symptoms to their source. For example, the buildup of excessive risk concentrations due to interconnectedness can be attributed to serious information gaps that prevented the assessment of exposures and network risks, and to incentive failures in the monitoring of the risks due to conflicts of interest and moral

[22] See IMF/FSB/BIS (2011).

hazard, as well as incentives in the micro prudential regulations that encouraged risk transfers. Addressing these underlying incentive problems should be the first line of response to the systemic risks posed by interconnections. This approach might still recommend that higher capital requirements be imposed on systemically important financial institutions due to the risk externalities of their failures, but it is arguable that the risk externalities would be less and the markets would already demand higher standards once information is disclosed and the conflict of interest and moral hazard problems addressed. [23]

Central to the different approaches is the question of the effectiveness of the response: is it possible to effectively mitigate systemic risk without addressing the underlying incentives that give rise to it? The approach proposed in the literature of applying higher capital/liquidity charges or to build buffers has the acknowledged shortcoming of creating incentives for circumvention and of increasing risks associated with the perimeter of regulation. The proposed regulatory response is to expand the monitoring of the shadow banking system and if necessary regulation as well, but such an approach will be limited by the capacity for implementation.

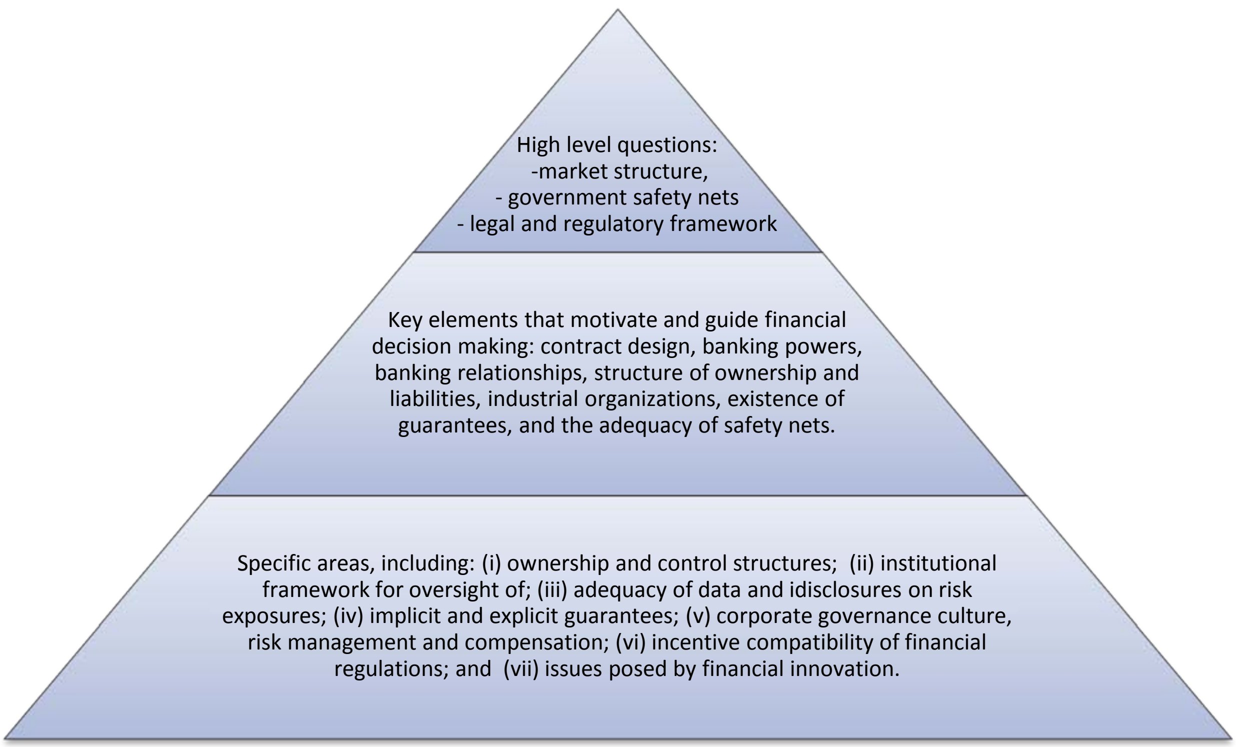
The incentive audit approach described here would focus on seeking to eliminate the risk at source. This approach should not give rise to the same incentives for circumvention, and would not impose the same burden on the regulatory framework. It would, of course, require a reorientation of the approach to risk assessment and mitigation. Less reliance would be placed on the enhancements of statistical indicators and network models to measure systemic risk, and more emphasis would be given to methods and techniques to identify incentive failures in the financial system that result in the buildup of systemic risk. A recalibration of prudential measures to take account of systemic risk would support or be replaced by a correction of the incentive failures. The range of polices that would be addressed under the latter approach would potentially be much broader than prudential measures. For example, it might also include recommendations to eliminate tax incentives that encourage excessive borrowing.

The incentive audit would consist of a sequenced set of analysis proceeding from higher level questions on market structure, government safety nets and the legal and regulatory framework, to progressively more detailed questions that would identify the relevant elements (incentives) in the particular environment that motivate and guide financial decision making (Figure 1). This sequenced approach would enable the analyst conducting the audit to drill down and identify factors that could lead to market failures and excessive risk taking.

[23] Concerning the systemic risks associated with pro-cyclicality, the types of incentive issues that the approach would examine would include potential incentive distortions created by (i) the risk weightings on different types of loans; (ii) the methods for the calibration of risk models, provisions, collateral valuations and debt service capacity; (iii) compensation policies; and (iv) the tax system and bankruptcy procedures.

While "incentive audit" is a novel concept, analysis of incentives in the financial sector is not without precedents. Indeed, there are some examples of how it could be performed. One example is the report issued in 2010 by a special parliamentary commission examining the roots of the financial crisis that erupted in Iceland in 2007. This meticulous and publicly available report (Special Investigation Commission 2010) notes the overly rapid growth of the three major Icelandic banks as a major contributor of the crisis, and goes into great depth in documenting the underlying "strong incentives for growth", which included the banks' incentive schemes as well as the high leverage of the major owners. The report then proceeds to map out in detail the network of conflicting interests of the key bank owners who were also the largest debtors of these banks.

**Figure 1. The Design of Incentive Audits**




Source: authors

Incentive audits were first discussed by Chai and Johnston (2000), who propose an incentive approach to identifying financial system vulnerabilities in the context of international surveillance. It begins with higher level questions to identify the key structural features of the financial system and then proceeds to lower level questions to identify potential incentive failures that would be most relevant given the structural features of the system. They illustrate their method by analyzing the incentive failures that resulted in the Japanese banking crisis of the early 1990s.

A recent example of work that is close in substance to an incentive audit is Calomiris's (2011) analysis of the incentive failures that led to the U.S. financial crisis and his evaluation of reform proposals in terms of their impact on market and supervisory incentives. The reform measures examined address mortgage risk subsidization, regulators inability to measure risks ex ante and losses ex post, the too-big-to-fail problem, liquidity risk, macro-prudential regulations that vary over the cycle, prudential regulations to encourage the greater use of clearing houses in clearing over-the-counter transactions, and designing appropriate guidelines to constrain government assistance to banks during crises. These reforms are shown to be “incentive-robust,” in the sense they improve not only market incentives and discipline, but they also improve incentives of regulators and supervisors by making rules and their enforcement (or lack of it) more transparent, therefore increasing credibility and accountability.

What would an incentive audit cover? It would involve a detailed analysis of the key structural and organizational features of the financial system that affect the incentives to conduct and monitor financial transactions. The detailed design of an incentive audit would need to evolve with experience and practice. But the key issues to be covered in the audit would include contract design, banking powers, banking relationships, structure of ownership and liabilities, industrial organizations, existence of guarantees, and the adequacy of safety nets. More specifically, the main elements of an audit would include:

- Ownership and control structure of financial and non financial firms, including financial system infrastructure. This analysis should include unregulated activities where financial activity is significant. It should examine group structures and important interconnections and channels of control;
- Institutional framework for oversight of financial systems, including the responsibilities, independence, resources and accountability of the supervisory and regulatory bodies; and the role, liability and funding sources of self regulatory bodies and agencies responsible for due diligence in financial systems (credit rating agencies, accounting firms) -- to help identify conflicts of interest and potential moral hazard;
- Adequacy of financial statistical data and information disclosures on the risk exposures of financial institutions, and the adequacy of the analysis and early warnings based on financial information -- to identify significant information gaps that would weaken market discipline or effective surveillance of financial systems;
- Role of implicit and explicit guarantees in the financial system and the role and effectiveness of crisis management, resolution and bankruptcy provisions, including potential systemically important and too-big-to-fail financial institutions -- to identify potential moral hazard;

- Corporate governance culture, risk management and compensation practices especially in systemically important financial firms -- to identify the role of internal procedures in promoting and mitigating risk taking;
- Incentive compatibility of financial regulations and their potential role in contributing to or reducing systemic risk; and
- Incentive and monitoring issues posed by financial innovation.

Depending on the stage of development and structure of the financial system in a particular country, a more detailed and prioritized assessment of incentives in certain areas would be warranted. For example, in countries where market discipline is underdeveloped, greater weight would be placed on the incentives and instruments of the supervisory authorities and on the institutions' internal governance and control mechanisms in mitigating systemic risk. Similarly, in countries where too-big-to-fail problems cannot be resolved in the short-term, greater weight would be placed on the supervisory processes and internal controls. In countries where market discipline is relatively more effective, greater attention would be placed, for example, on the adequacy of information disclosures, the conflicts of interest in the agencies responsible for due diligence, and sources of moral hazard.

***Implementation issues***

To be effective, incentive audits would have to be performed regularly, and their outcome would have to be used to address incentive issues by adapting regulation, supervision, and other measures. In the Iceland example, as well as in the other examples mentioned above, the analysis of incentives was done as part of a "post mortem" on the banking crisis. As such, the analysis benefitted from hindsight. Nonetheless, it would have been feasible to do such analysis ex-ante. Indeed, much of the information used in the Iceland Parliament Commission's report was available (readily, or with moderate data-gathering effort) even before the crisis. Also, the Commission had relatively modest resources (three members and small support staff), illustrating that incentive audits need not be very costly or overly complicated to perform. As the Commission's report points out, "it should have been clear to the supervisory authorities that such incentives existed and that there was reason for concern," but supervisors "did not keep up with the rapid changes in the banks' practices", and instead of examining the underlying reasons for the changes they took comfort in the banks' capital ratios exceeding a statutory minimum and appearing robust in narrowly-defined stress tests (see also Čihák and Ong 2010).

Incentive audits need not be a replacement of other parts of the overall assessment of vulnerabilities, but can complement them. For example, many reports on financial stability focus narrowly on a quantitative description and analysis of trends (e.g., Čihák, Muñoz, Teh Sharifuddin, and Tintchev 2012). Also, much of the recent debate on macroprudential policy focuses on a relatively narrow set of time-varying ratios that can be used to influence quantitative measures of financial stability (see, e.g., Bank of England 2012). This does not mean that existing approaches completely overlook incentives- related issues.

One possibility is for the incentive audits to be done as part of the financial sector assessments carried by third-party assessors, such as those done under the Financial Sector Assessment Program by the IMF and World Bank. This would be in line with an earlier proposal by Chai and Johnston (2000). Indeed much of the information required to conduct an incentive audit is already collected or can be collected as part of assessments of financial systems. The FSAPs already examine the structure of financial systems, and the adequacy of safety nets and crisis management arrangements; and the codes and standards assessments as part of FSAPs review the independence, resources and accountability of supervisory bodies. In addition, international regulatory reforms developed by the FSB are encouraging increased attention to unregulated entities, the adequacy of information disclosures and corporate governance and compensation practices.

The idea of incentive audits therefore is not to build a new assessment from scratch, but to raise the profile of incentive-related issues and bring more structure to the assessments. The incentive audits could be considered as an organizing framework that puts at its center the identification of perverse incentives. Incentive audits need to be combined with quantitative risk assessment, which helps to identify near-term vulnerabilities (as exemplified in the so-called "risk assessment matrix" used in recent FSAP assessments) and with assessments of the regulatory, supervisory, and crisis preparedness frameworks (which, in the context of the FSAP, include assessments of compliance with international standards).

Incentive audits could of course be a very helpful tool also at the national level and could be performed by a body or agency within a country. The obvious choice is the macroprudential authority, which could use incentive audits to complement the other instruments available to country authorities.

As regards the tools that the macroprudential authority would use, these would include micro prudential instruments tailored to address systemic risks, but would also encompass a broader set of instruments to deal with the sources of incentive failures. Table 1 lists a number of the possible instruments and their role in addressing incentive problems that give rise to systemic risk.

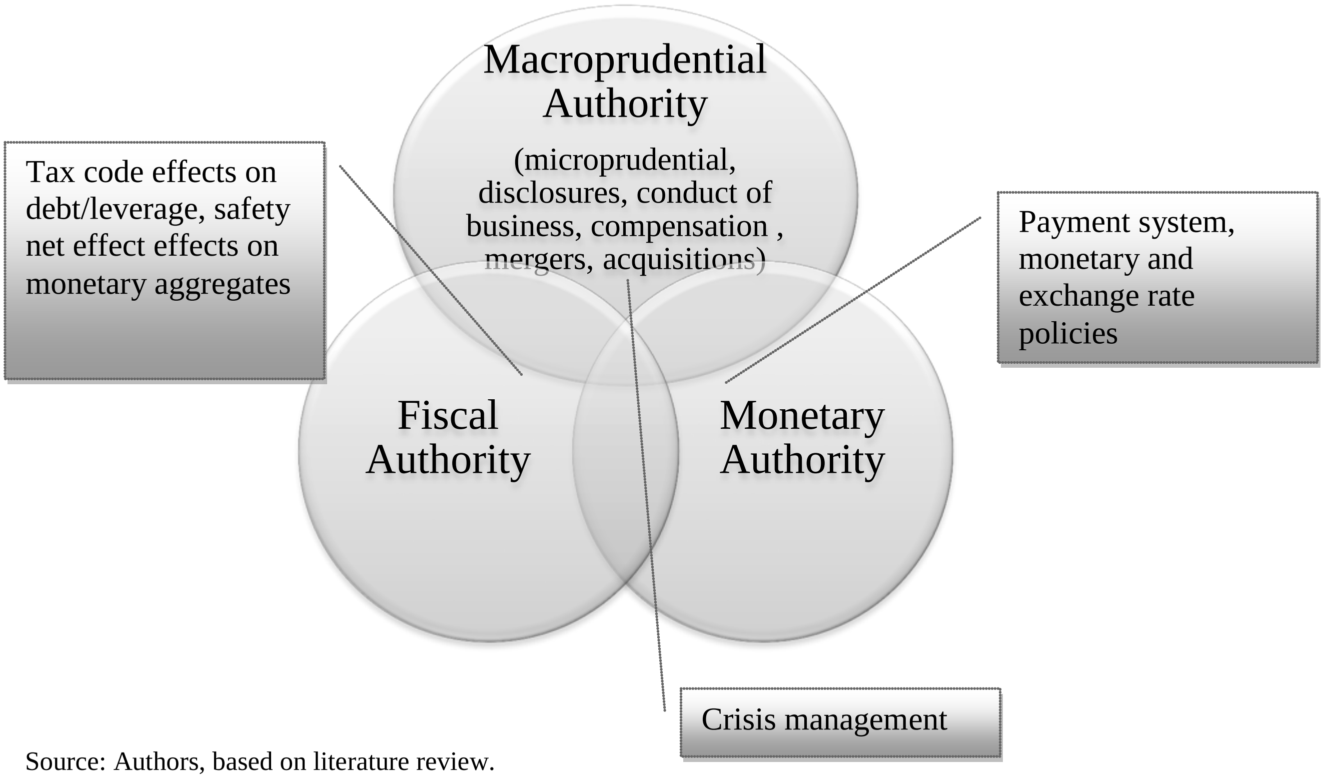
**Table 1. Instruments to Address Incentive Problems**

| **Tools for addressing systemic risk** | **Purpose** |
| --- | --- |
| Micro prudential tools (capital and liquidity requirements, provisioning and collateral policies) | 1. To address externalities that are not internalized in the risk assessments of financial firms and markets and create systemic risk, including risks from size, interconnections, and lack of substitutability; |

| | |
|---|---|
| | 2. As second best response to deal with residual moral hazard associated with too-big-to-fail or other implicit or explicit guarantees. Instruments should be designed to be incentive compatible and to minimize complexity and incentives for circumvention. |
| Disclosure requirements that would be graduated depending on the threat to systemic risk and which would cover both regulated and unregulated entities | To identify information asymmetries that prevent market and agency monitoring of risks in individual institutions and risk transfers that could have systemic consequences. |
| Conduct of business rules, to be applied to all financial firms, agents, auditors and rating agencies | To identify conflicts of interest that would interfere with effective market and agency monitoring. |
| Compensation practices in financial firms | To identify incentives for risk taking within financial firms that could pose a threat to systemic stability |
| Competition policy, and mergers and acquisitions involving financial firms | To limit the risks associated with having systemically important financial institutions |
| Cease and desist orders covering both regulated and unregulated entities | To prevent the materialization of threats to systemic stability |
| Resolution regimes for financial firms | To limit risks of contagion from failures of financial firms and moral hazard associated with too big to fail |
| Analysis and dissemination of assessments and warning of risks to financial stability | To enhance the quality of private risk assessment and reduce the risks of herding |
| Authority to gather information from unregulated firms engaged in financial transactions | To identify risks to systemic stability posed by firms that are outside the regulatory perimeter |
| Authority to designate systemically important financial institutions | To identify firms that would require more intensive supervision or disclosure practices. |

There would need to be a mechanism for coordination of macroprudential policy with other policies. For example, crisis management would be a shared responsibility with the central bank (as lender of last resort and with oversight of payments systems) and the fiscal authority (responsibility for safety nets and use of public funds). Consumer and investor protection would also be a shared responsibility. There would be need for coordination in other areas where policy design could create systemic risk. Examples are: (1) distortions and incentives created by the tax code to take on excessive risk, debt or leverage; (2) monetary and exchange rate policies that encourage excessive borrowing and risk taking e.g. unsustainable exchange rate regimes that encourage short-term foreign currency borrowing or excessively lax interest rate policies; (3) safety net arrangements and deposit/investment guarantees that create moral hazard in the financial system; and (4) competition polices that are ineffective in addressing the buildup of risk concentrations in the financial systems. The framework that could be envisaged would be to have a triumvirate of authorities with clear delineations of responsibilities and mechanisms for coordination (Figure 2).

**Figure 2. Triumvirate of Macroeconomic Policy Authorities**




Source: Authors, based on literature review.

A key issue is the governance of the macroprudential authority. Clearly its own incentives to act would have to be appropriately aligned. Various approaches can be followed to achieve the objectives of an effective macroprudential framework (IMF 2011b).[24] Its mandate, independence and accountability would have to be clearly established. The organization of the macroprudential authority could be a single body or a committee. In this regard, one suggestion worth further consideration is the idea proposed in Levine (2009) and in Barth, Caprio, and Levine (2012 of establishing an auxiliary institution to act as a "sentinel" for the public. This agency would watch the regulators on behalf of taxpayers, with the aim to improve the design, interpretation and implementation of financial regulation. The proposed sentinel agency would have no direct regulatory or supervisory powers (to limit the risk of conflicts of interest) but it would have the ability to obtain all the information available to regulatory agencies and with the duty to report on the key systemic risks and what the regulators are doing to address those risks. This idea could be considered, though

[24] An effective macroprudential framework would require:

- Effective identification, analysis and monitoring of systemic risk, including through (a) assuring access to relevant information; and (b) using existing resources and expertise.
- Timely and effective use of macroprudential policy tools, by (a) creating strong mandate and powers; (b) enhancing ability and willingness to act; and (c) assuring appropriate accountability.
- Effective coordination across policies aiming to address systemic risk, so as to reduce gaps and overlaps in risk identification and mitigation, while preserving the autonomy of separate policy functions.

the scope of its oversight would be broader than envisaged there to encompass the policy tools outlined above. Going in a somewhat similar direction, Masciandaro, Pansini, and Quintyn (2011), make the case for keeping macro- and micro-prudential supervision institutionally separate to allow for more checks and balances and thus reduce the probability of supervisory failure. Formal accountability arrangements should require the identification of polices that while not under the macroprudential authority's control, pose a serious threat to financial stability, and which would prevent the macroprudential authority from achieving its objective. The accountability arrangements could thus make transparent the need for coordination with the monetary and fiscal authorities. The authority should have the power to access information and to conduct assessments/audits system wide, and not be limited to regulated entities.

Many countries have been putting in place committees or agencies to carry out macroprudential regulation and supervision, and in some cases, these new or proposed bodies have some of the features of the macroprudential agency discussed here. Also, some of them have the checks and balances emphasized by Masciandaro, Pansini, and Quintyn (2011). However, this is far from universal. Moreover, the tools available to the agencies are intended primarily to address the materalization of systemic risk rather than the incentives that give rise to it in the first place. The tools include additional microprudential measures, such as additional capital charges for globally systemic banks, and various administrative measures, such as maximum loan to value ratios. Few if any of the agencies have been given a specific mandate to review the incentive structures under which financial system operate or the tools to address perverse incentives that would threaten financial system stability.

## 5. Conclusion

One of the key lessons from the crisis is that the structure of incentives under which agents operate in the financial system can be a fundamental source of weakness in financial systems. Incentive issues need to be more fully reflected in the design of regulatory systems. Although some of the post-crisis regulatory reforms are going in this direction, more work is required.

The incentive audits, proposed in this paper, could help in placing issues of asymmetric information and incentives at the center of financial system regulation rather than as an afterthought. The incentive audit is a tool aimed at better identifying perverse incentives faced by financial institutions, market participants and regulators, before these incentives give rise to systemic risk. In the paper, we have illustrated how such audits could be implemented in practice. We have also pointed out that there are already existing examples of incentive-based analysis that are similar to incentive audits. The incentive audit can be conceived as an organizing principle that would build on existing and prospective analysis and reports and would not need to be developed from scratch.

We also outline the implications of the incentive audit approach for policy design and the organization of oversight of financial systems. In particular, we argue the that policy response to deal with systemic risk must look beyond the materialization of systemic risk and address the fundamental sources that give rise in perverse incentive and asymmetric information. The policy instruments that would be needed to do this are much broader than micro prudential instruments. Finally, we outline how the monitoring and policy response could be organized under the macroprudential authority.

**References**

Admati, Anat, and Martin Hellwig. 2012. "Good Banking Regulation Needs Clear Focus, Sensible Tools, and Political Will." International Centre for Financial Regulation, London.

Babczuk, Ricardo. 2003. *Asymmetric Information in Financial Markets: Introduction and Applications*, Cambridge, MA: Cambridge University Press.

Bank of England. 2012. Instruments of Macroprudential Policy, Discussion Paper.

Barth, James R., Gerard Caprio Jr., and Ross Levine. 2006. *Rethinking Bank Regulation: Till Angels Govern*. Cambridge, MA: Cambridge University Press.

Barth, James R., Gerard Caprio, and Ross Levine. 2012. *Guardians of Finance: Making Regulators Work for Us*. Cambridge, MA: MIT Press.

Basel Committee on Banking Supervision (BCBS). 1988. International convergence of capital measurement and capital standards, July.

BCBS. 2005. "Basel II: International Convergence of Capital Measurement and Capital Standards: A Revised Framework - Comprehensive Version" http://www.bis.org/publ/bcbs128.pdf

BCBS. 2010. "Basel III: International framework for liquidity risk measurement, standards and monitoring," December, http://www.bis.org/publ/bcbs188.htm.

BCBS. 2011a. Progress report on Basel III implementation, October.

BCBS. 2011b. "Global Systemically Important Banks: Assessment Methodology and the Additional Loss Absorbency Requirement," October.

Bordo, Michael, Angela Redish and Hugh Rockoff. 2011, "Why Didn't Canada Have a Banking Crisis in 2008 (Or in 1930, Or in 1907, Or…)? NBER Working Paper 17312, National Bureau of Economic Research, Cambridge, MA.

Borio, Claudio. 2009. "Implementing the Macroprudential Approach to Financial Regulation Supervision," Banque de France, Financial Stability Review 13, The Future of Financial Regulation, September, Banque de France, Paris.

Borio, Claudio, and Matthias Drehmann. 2008. "Towards an Operational Framework for Financial Stability: 'Fuzzy' Measurement and Its Consequences." BIS Working Paper 284, November, Bank for International Settlements, Basel, Switzerland.

Borio, Claudio, Matthias Drehmann, and Kostas Tsatsaronis. 2012 "Stress Testing Macro Stress Testing: Does It Live Up to Expectations?" BIS Working Paper 369, November, Bank for International Settlements, Basel, Switzerland.

Borio, Claudio and Ilhyok Shim. 2007. "What can (Macro-) Prudential Policy Do to Support Monetary Policy?" BIS Working Paper 242, Basel: Bank for International Settlements.

Brunnermeier, Markus K. 2009. Deciphering the Liquidity and Credit Crunch 2007–08. *Journal Economic Perspectives* 23, 77–100.

Calomiris, Charles. 2011. An Incentive-Robust Programme for Financial Reform, *The Manchester School*, Vol. 79, 39–72.

Caprio, Jr., Gerard, Aslı Demirgüç-Kunt, and Edward J. Kane. 2009. "The 2007 Meltdown in Structured Securitization Searching for Lessons, Not Scapegoats", *World Bank Research Observer*, 25(1): 125–155.

Chai, Jingqing and R. Barry Johnston. 2000. "An Incentive Approach to Identifying Financial System Vulnerabilities", IMF Working Paper 00/211.

Čihák, Martin, Sonia Muñoz, Shakira Teh Sharifuddin, and Kalin Tintchev. 2012. "Financial Stability Reports: What Are They Good For?", IMF Working Paper 12/1, IMF, Washington, DC.

Čihák, Martin, Aslı Demirgüç-Kunt, María Soledad Martínez Pería, and Amin Mohseni-Cheraghlou. 2012. "Banking Regulation and Supervision around the World: A Crisis Update". Policy Research Working Paper 6286, World Bank, Washington, DC.

Čihák, Martin, and Alexander Tieman. 2008. "Quality of Financial Sector Regulation and Supervision Around the World," Working Paper 08/190, IMF, Washington, DC.

Čihák, Martin, and Richard Podpiera. 2008. "Integrated Financial Supervision: Which Model?," *North American Journal of Economics and Finance*, doi:10.1016/j.najef.2008.03.003.

Čihák, Martin, and Li Lian Ong. 2010. "Of Runes and Sagas: Perspectives on Liquidity Stress Testing Using an Iceland Example." Working Paper 10/156, IMF, Washington, DC.

Claessens, Stijn, Giovanni Dell'Ariccia, Deniz Igan, and Luc Laeven. 2010, "Lessons and Policy Implications from the Global Financial Crisis," Working Paper 10/44, IMF, Washington, DC.

Committee on the Global Financial System. 2010, Macroprudential Instruments and Frameworks: a stocktaking of issues and experiences, CGFS Papers 38, Basel, Bank for International Settlements.

Crowe, Christopher, Giovanni Dell'Ariccia, Deniz Igan and Pau Rabanal. 2011. "Policies for Macrofinancial Stability: Options to Deal with Real Estate Booms," Staff Discussion Note 11/02, International Monetary Fund, Washington, DC.

Galati, Gabriele and Richhild Moessner. 2010. "Macroprudential policy—a literature review," DNB Working Paper 267, De Nederlandsche Bank, Amsterdam.

Goodhart, Charles and Dirk Schoenmaker. 1995. "Should the Functions of Monetary Policy and Banking Supervision Be Separated?", *Oxford Economic Papers*, New Series, 47: 539–560.

Das, Udaibir S., Marc Quintyn, and Kina Chenard. 2004. "Does Regulatory Governance Matter for Financial System Stability? An Empirical Analysis." IMF Working Paper 04/89.

Demirgüç-Kunt, Asli and Enrica Detragiache. 2011. "Basel Core Principles and Bank Risk: Does Compliance Matter?"*Journal of Financial Stability* 7(4): 179–90.

Demirgüç-Kunt, Asli, Enrica Detragiache, and Ouarda Merrouche. 2010. Bank Capital: Lessons from the Financial Crisis (World Bank: Policy Research Working Paper No. 5473).

Demirgüç-Kunt, Asli, Enrica Detragiache, and Thierry Tressel. 2008."Banking on the Principles: Compliance with Basel Core Principles and Bank Soundness," *Journal of Financial Intermediation*, 17(4): 511–42.

Demirgüç-Kunt, Aslı, and Luis Servén. 2009. "Are All the Sacred Cows Dead? Implications of the Financial Crisis for Macro and Financial Policies," *World Bank Research Observer*, 25(1).

Dewatripont, M. and Jean Tirole. 1994. *The Prudential Regulation of Banks* (Cambridge: MIT Press).

Economist, the. 2012a "Over-regulated America," *Economist*, February 18–24, p. 9.

Economist, the. 2012b. "The Dodd-Frank act -- Too big not to fail (Flaws in the confused, bloated law passed in the aftermath of America's financial crisis become ever more apparent)", *The Economist*, February 18.

Ellul, A. and Yerramilli, V. 2010. "Stronger Risk Controls, Lower Risk: Evidence from U.S. Bank Holding Companies," NBER Working Paper 16178, July.

FSB. 2009a. "Improving Financial Regulation" http://www.financialstabilityboard.org/publications/r_090925b.pdf

FSB. 2009b. "FSB Principles for Sound Compensation Practices".

FSB. 2009c. "FSB Principles for Sound Compensation Practices: Implementation Standards", http://www.financialstabilityboard.org/publications/r_090925c.pdf.

FSB. 2010a. "Ongoing and Recent Work Relevant to Sound Financial Systems" http://www.financialstabilityboard.org/publications/on_1006.pdf.

FSB. 2010b. Principles for Reducing Reliance on CRA Ratings http://www.financialstabilityboard.org/publications/r_101027.pdf

FSB. 2011. "Key Attributes of Effective Resolution Regimes for Financial Institutions", October.

FSB. 2011. "Intensity and Effectiveness of SIFI Supervision", October.

FSB Secretariat and IMF staff. 2009. "The Financial Crisis and Information Gaps".

FSB Secretariat and IMF staff. 2010. The Financial Crisis and Information Gaps: Progress Report (http://www.financialstabilityboard.org/publications/r_100510.pdf).

Haldane, Andrew G. 2011. "Capital Discipline." Speech at the American Economic Association, Denver, CO, January 9.

Hellwig, Martin. 2010. Capital Regulation after the Crisis: Business as Usual? Max Planck Institute for Research on Collective Goods, Working Paper 2010_31.

Herring, Richard, and Anthony Santomero. 2000. "What is Optimal Regulation?" (Pennsylvania: Financial Institution Center, University of Pennsylvania).

Honohan, Patrick. 2010. "The Irish Banking Crisis: Regulatory and Financial Stability Policy 2003-2008." Report to the Irish Minister for Finance by the Governor of the Central Bank (Dublin).

Ingves, Stefan. 2011. "Central bank governance and financial stability, A report by a Study Group" (Basel: Bank for International Settlements).

International Monetary Fund (IMF). 2010. "Malaysia: 2010 Article IV Consultation." Staff Report, IMF Country Report No. 10/265, IMF, Washington, DC.

International Monetary Fund. 2010. "Central Banking Lessons from the Crisis", IMF, Washington, DC.

International Monetary Fund. 2011a. Macroprudential Policy: An Organizing Framework, IMF, Washington, DC.

International Monetary Fund. 2011b. "Towards Operationalizing Macroprudential Policies: When to Act? Global Financial Stability Report Chapter 3, International Monetary Fund, Washington, DC.

International Monetary Fund. 2012. "Peru: 2011 Article IV Consultation." Staff Report, IMF Country Report 12/26, International Monetary Fund, Washington, DC.

Johnston, R. Barry, Jingqing Chai, and Liliana Schumacher 2000. Assessing Financial System Vulnerabilities. IMF Working Paper 00/76, IMF, Washington, DC.

Kane, Edward. 2007. "Basel II: A Contracting Perspective," *Journal of Financial Services Research*, vol. 32(1), pages 39–53, October.

Laeven, Luc and Fabian Valencia. 2010. "Resolution of Banking Crises: The Good, the Bad, and the Ugly", IMF Working Paper 10/146 (Washington: International Monetary Fund).

Levine, Ross. 2009. "The Sentinel: Improving the Governance of Financial Regulation" Available at SSRN: http://ssrn.com/abstract=1498757.

Levine, Ross. 2010. "An Autopsy of the U.S. Financial System", NBER Working Paper No. 15956, April.

Levine, Ross. 2011. "Regulating Finance and Regulators to Promote Growth", paper prepared for the Federal Reserve Bank of Kansas City's Jackson Hole Symposium on August 25-27.

Lim, C., F. Columba, A. Costa, P. Kongsamut, A. Otani, M. Saiyid, T. Wezel, and X. Wu. 2011. "Macroprudential Policy: What Instruments and How to Use Them, Lessons from

Country Experiences", IMF Working Paper 11/238, International Monetary Fund, Washington, DC.

London School of Economics. 2010. *The Future of Finance: The LSE Report* (London School of Economics).

Maeda, John. 2006. *The Laws of Simplicity*. MIT Press, Cambridge, MA.

Majnoni, Giovanni. 2012. "Basel III and Macro Prudential Policies in Developing Countries: A New Framework or a Familiar Agenda?", mimeo, Banca d'Italia.

Masciandaro, Donato, Rosaria Vega Pansini, and Marc Quintyn. 2011. The Economic Crisis: Did Financial Supervision Matter? IMF Working Paper No. 11/261.

Melecky, Martin, and Anca Podpiera. 2012. "Institutional Structures of Financial Sector Supervision, Their Drivers, and Emerging Benchmark Models", World Bank mimeo.

Merrouche, Ouarda and Erlend W. Nier. 2010. "What Caused the Global Financial Crisis? Evidence on the Build-up of Financial Imbalances 1999–2007," IMF Working Paper 10/265 (Washington: International Monetary Fund).

Nier, Erlend W., Jacek Osiński, Luis I. Jácome, and Pamela Madrid. 2011. "Towards Effective Macroprudential Policy Frameworks: An Assessment of Stylized Institutional Models", IMF Working Paper 11/250 (Washington, D.C.: International Monetary Fund)

Rajan, Raghuram. 2010. *Fault Lines: How Hidden Fractures Still Threaten the World Economy* (Princeton: Princeton University Press).

Rajan, Uday, Amit Seru, and Vikrant Vig. 2011. "The Failure of Models That Predict Failure: Distance, Incentives, and Defaults," London Business School Working Paper.

Schaeck, Klaus, Martin Čihák, Andrea Maechler, and Stephanie Stolz. 2011. "Who disciplines bank managers?", *Review of Finance*. doi: 10.1093/rof/rfr010.

Shadow Regulatory Financial Committee. 2007. "Lessons for Basel II from the Recent Financial Turmoil", September 17.

Shadow Regulatory Financial Committee. 2011. "The Basel Proposed Rules on Liquidity Regulation and a Suggestion for a Better Approach" September 12.

Special Investigation Commission. 2010. Report on the collapse of the three main banks in Iceland. Icelandic Parliament, April 12. 2010.

Ötker-Robe, İnci, Ceyla Pazarbasioglu, A. Buffa di Perrero, S. Iorgova, T. Kışınbay, V. Le Leslé, F. Melo, J. Podpiera, N. Sacasa, and A. Santos. 2010. "Impact of Regulatory Reforms on Large Complex Financial Institutions," IMF Staff Position Note 10/16.

Ötker-Robe, İnci, Aditya Narain, Anna Ilyina, and Jay Surti. 2011. The Too-Important-to-Fail Conundrum: Impossible to Ignore and Difficult to Resolve, IMF Staff Discussion Note SDN/11/12.

Palmer, John and Caroline Cerruti. 2009. "Is there a need to rethink the supervisory process?" International Conference "Reforming Financial Regulation and Supervision: Going Back to Basics" Madrid, June 2009.

Rothschild, Michael and Joseph Stiglitz. 1976. "Equilibrium in competitive insurance markets," *Quarterly Journal of Economics* 90: 629–649.

Stigler, George 1971. "The Economic Theory of Regulation," *Bell Journal of Economics* 2: 3–21.

Shadow Regulatory Financial Committee. 2011. "The Basel Proposed Rules on Liquidity Regulation and a Suggestion for a Better Approach" September 12.

Special Investigation Commission. 2010. Report on the collapse of the three main banks in Iceland. Icelandic Parliament, April 12.

Tucker, Paul. 2011. "Macroprudential Policy: Building Financial Stability Institutions," speech given at the 20th Annual Hyman Minsky Conference, New York, April 14.

Véron, Nicolas and Guntram B. Wolff. 2012. "Rating agencies and sovereign credit risk assessment." Bruegel

Viñals, J. and others. 2010. "The Making of Good Supervision: Learning to Say "No"," IMF Staff Position Note SPN/10/08.

Wallison, Peter J. and Charles W. Calomiris. 2009. "The Last Trillion-Dollar Commitment: The Destruction of Fannie Mae and Freddie Mac." *Journal of Structured Finance,* Spring, 71–80.

Wellink, Nout. 2011. "Remarks" at the High Level Meeting on Better Supervision and Better Banking in a Post-crisis era, Kuala Lumpur, Malaysia, January 17.

Weder di Mauro, Beatrice. 2009. "The Dog that Didn't Bark" *The Economist*, October 1.

World Bank. 2012. *Global Financial Development Report 2013: Rethinking the Role of the State in Finance*.