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# Macroprudential Policy: What Does It Really Mean

By Claude Lopez, Donald Markwardt and Keith Savard

Before the global financial crisis unfolded, imbalances and risks within the financial structure had accumulated to such a level that they jeopardized the entire system and—absent unprecedented and extraordinary interventions by central banks and governments— threatened to devastate the real economy. Prior to 2007, a financial event such as a speculative bubble in the housing market or the downfall of a systemically important “too big to fail” institution might have been viewed as an isolated event, with blame laid solely on participants or regulators in the particular industry. With hindsight it has become evident that these seemingly unrelated risks of price bubbles or susceptibility to financial contagion are in fact closely intertwined. These intimate linkages and risk exposures among financial system participants pose serious threats to economic growth.

Ironically, the quiet buildup of financial “fault lines” leading up to the crisis was due in part to financial institutions’ and regulators’ growing overconfidence in their ability to micromanage risks on an individual, or firm, level, without regard for broader systemic impact. Financial institutions were confident they had eliminated most of their risks by hedging their known idiosyncratic (individual) risks with products like credit default swaps, and diversifying exposures based on historical return relationships (e.g. real estate performance is a mostly local phenomenon so a sustained nationwide downturn is mathematically near impossible).

Regulators monitored individual financial institutions to attempt to ensure that no single body was taking outside risks. Regulators and financial institutions alike failed to anticipate that the burgeoning use of securitized products like credit default swaps could create harder-to-assess risk exposures among institutions such as banks, and that small destabilizing forces could ripple into catastrophic market disturbances in a fragile system.

POLICY	OBJECTIVE	LEVEL OF IMPACT
MONETARY	Price stability	Macro: stable economic growth
MACROPRUDENTIAL	Stability of financial sector	Both macro and micro
MICROPRUDENTIAL	Stability of financial institutions	Micro: protection of consumers

It is clear then why the crisis has highlighted the need for macroprudential supervision that takes a wider view of the financial system, beyond (but in complement to) traditional microprudential regulation. Macroprudential supervision is concerned with the stability of entire industries and the health of the relationships within the financial sector that can significantly impact the economy. While macroprudentialism has no precise definition, its principal goal is to monitor systemic risk.<sup>1</sup> Such risk is a negative externality created by financial institutions that do not fully bear the cost of their actions but affect other participants in the financial system. It can manifest in two dimensions: across institutions (contagion risk) or across the financial cycle (procyclical risk). These risk dimensions are closely linked and their problems often accumulate at the same

time—to participate in and enhance gains during an upswing in the financial cycle, firms can increase leverage and concentrate that leverage in opaque but intimately connected areas of the financial system.

## **A new framework to fill the gap**

Just as microprudential policy is too narrow in scope to take on these broader challenges, monetary policy is too blunt an instrument to address systemic risk in the financial system. Macroprudential supervision is emerging as a critical tool to fill this gap, where it can help coordinate policies and supervision among existing microprudential and monetary tools. With such supervision still in its nascent stages, consensus must still be developed on the best way to monitor or measure systemic risk. In the event that such risks to the financial system are reliably detected, questions remain as to what sort of actions—if any—are most desirable under a macroprudential framework.

Empirical evidence may serve as a guide to assessing the efficacy of various macroprudential policies. Naturally, one might look to Asian economies that have been leaders in implementing macroprudential supervision and countercyclical measures. Studies have found many of these wide-ranging policies successful in achieving their objectives, whether cooling housing markets (loan-to-value limits on mortgages) or dampening the extension of credit (levies on procyclical types of funding for banks).

However, understanding how these policies can be effectively implemented in developed Western economies such as Europe or the United States is a major challenge. Many Asian countries that employed macroprudential measures were more closed economies, with the ability to simultaneously coordinate monetary and fiscal measures. In more open Western economies, autonomous action by monetary and fiscal decision-makers cloud the ability to assess whether similar policies could be orchestrated.

Overall, the system-wide focus is clearly welcome in light of recent crises, yet many unknowns still exist as policymakers seek to move forward in adopting macroprudential tools. This report aims to clarify the current state of the discussion around macroprudential policies. More specifically, it highlights the strengths and limitations of these “trendy” tools, in order to identify those (if any) that can effectively enable policymakers to achieve their main objective (reduce the risk of crisis and lower any excessive procyclicality) while providing a better understanding of their cost.

In this article, we provide an overview of macroprudential policy discussion from the fundamental rationales behind such policies to the set of measures currently used. Then we discuss in more details the notion of systemic risk, we finally discuss some of the challenges the implantation of these regulations may encounter.

## **Macroprudential Policy: Fundamental Rationales**

Most policymakers (governments, central banks, and international institutions) agree on the need for macroprudential policy to reduce systemic risk, whether it is to correct for market failure

or smooth financial cycles. Unfortunately, macroprudential principles are not the main motivation for this consensus in an environment where monetary and fiscal policies have very little room left to maneuver. The guidelines proposed by the Basel Committee on Banking Supervision (BCBS) in Basel III provide a rather telling story: They are mostly based on existing microprudential and regulatory tools to which “Pigouvian” taxes and levies have been added to meet their new macroprudential objectives. <sup>ii,iii</sup>

Understanding the fundamental rationales behind macroprudential policy is essential to appreciate how it complements monetary, fiscal and structural policies. Indeed, financial regulatory policies are not enough to address systemic risk, and other policies—especially monetary and fiscal policy—also have roles to play. Coordination among monetary, fiscal and macro- and microprudential policies is essential, nationally as well as internationally.

The underlying causes of contagion or procyclicality risks dictate the type of policy required. Aggregate shocks such as commodity price shocks and policy deficiencies such as poorly conducted microprudential and monetary policies can generate both types of risk. Yet macroprudential policy would not be the appropriate answer in either case.

Externalities and market failures arising from various financial frictions and market imperfections should motivate macroprudential policies, especially when microprudential supervision and monetary policy are conducted effectively. The 2007-08 crisis illustrates that spillovers across financial institutions and between the financial sector and the real economy are the key market failures that create systemic risk. Since then, these externalities have been commonly classified following two dimensions:

- Contagion risk: excessive concentration of risk among a few highly interconnected groups, as with too-big-to-fail institutions, which can take down the wider financial system when destabilized.
- Procyclical risk: the underlying buildup of risks over time that are hidden and underpriced. In this case, the financial sector generates systemic risk endogenously.

Hence, the macroprudential toolbox should focus on these two dimensions. However, financial regulatory policies are not enough to address systemic risk.

Theoretically, the set of macroprudential tools available is quite large as it includes existing microprudential and other regulatory tools, taxes and levies, as well as new instruments. In practice, however, the IMF has identified 18 main instruments, and in 2013 it launched a survey on Global Macroprudential Policy Instruments (GMPI) in which central banks or national authorities disclosed which they were using. The following table classifies the measures around three main axes (housing, contagion, and reserve requirements) and summarizes their usage in 2013. <sup>iv</sup>

## Macroprudential measures: type and usage

Measures in 2013	Advanced economies		Emerging economies	
	Total	Pct.	Total	Pct.
<b>Housing-related</b>				
Loan-to-value related measures	24	40%	30	26%
Debt-to-income ratio	6	10%	11	10%
Dynamic loan-loss provisioning	1	2%	5	4%
General countercyclical capital buffer	2	3%	0	0%
<b>Contagion</b>				
Leverage ratio	4	7%	3	3%
Capital surcharges on SIFIs	2	3%	3	3%
Limits on interbank exposures	4	7%	11	10%
Concentration limits	7	12%	19	17%
Limits on domestic currency loan	0	0%	4	4%
Levy/tax on financial institutions	6	10%	5	4%
<b>Reserve requirements</b>				
Limits on foreign currency loans	2	3%	7	6%
Reserve requirements-related measures	2	3%	16	14%

Sources: Cerutti et al. (2015)<sup>9</sup>.

Several of the macroprudential instruments reported in the table can address both the contagion and the procyclical risks. As a result, since each tool has unique advantages and limitations, a combination is likely to provide a better solution to the problem of correcting the same externality. Overall, the use of macroprudential tools has become more frequent and varied over the years, across all the countries considered. In 2013, closed or emerging economies have used instruments related to contagion and housing in roughly equal amounts, while using many of the reserve requirement instruments as well, which they consider monetary tools. In contrast, open or advanced economies favor measures related to housing but also use some of the contagion-risk instruments. Among the instruments available, both emerging and advanced countries prefer loan-to-value-related measures and debt-to-income-ratio. In addition, emerging countries use concentration limits and reserve requirement measures quite frequently, which is consistent with their concerns about large, volatile capital flows and related systemic risks.

Interestingly, the tools considered to date are mostly based on existing microprudential tools that are adaptable to macroprudential objectives. These tools are part of the road map proposed in Basel III to mitigate systemic risk.

### Systemic Risk and Basel III framework

The regulations suggested in Basel III address the systemic risk issue by (i) significantly increasing capital buffers for risks related to the interconnectedness of the major dealers and (ii)

incentivizing institutions to reduce counterparty risk through clearing and active management (hedging).<sup>vi</sup>

While the first point aims at reducing the contagion risk generated by global systemically important financial institutions (G-SIFIs), current initiatives focus mostly on banks. Every year, the Financial Stability Board and similar institutions in other countries publish a list of global and domestic/national systemically important banks (G-SIBs and D/N-SIBs) based on a methodology that refers to size, interconnectedness, cross-border activity, the lack of available substitutes, and complexity. Then, each country applies its regulatory measures (Dodd-Frank for the United States) such as higher loss absorbency, more intensive scrutiny, and resolution planning requirements.

The second point aims at reducing procyclical risk. Basel III introduces a framework for a time-varying capital buffer on top of the minimum capital requirement. The countercyclical capital buffers are intended to make banks more resilient against imbalances in credit markets and thereby enhance medium-term prospects for the economy. In good times when system-wide risks are growing, the regulators could impose counter-capital buffers, which would help the banks withstand losses in bad times. Basel III suggests credit per GDP as the proxy for the financial cycle.

Basel III represents a significant cooperation and coordination effort across G-20 countries. Yet its guidelines or, more precisely, their implementation at the country level raises many questions. At this stage of the Basel III process, two main drawbacks should be highlighted. First, will stabilizing the banking sector be enough to stabilize the whole financial system? Indeed, the current thrust of regulation could create powerful incentives to move financing from the banking system to unregulated financial institutions and securitization. Second, will policymakers be able to reliably identify the buildup of financial risks in order to effectively lean against the cycle? Even when excesses are evident, assessing their impact on the real economy and weighing them against the effects of tighter macroprudential policy are quite challenging. The difficulties range from the risk of diagnostic error (both Type I and II) to how to account for country circumstances and characteristics (financial structure, industrial organization and ownership structure, openness, exchange rate regime, international financial integration, political economy, etc.).

## **Systemic Risk and Contagion**

In the absence of consensus regarding the most effective methodology for assessing the resilience of financial systems, the Basel III framework advocates country-specific stress tests. As a result, central banks such as the Bank of England, the European Central Bank and the Federal Reserve evaluate their system's capital adequacy, on a yearly basis, relying on supervisory/confidential data. The outcome of these tests may lead to policy responses if the level of capitalization is deemed unsatisfactory based on Basel III guidelines (or more accurately, with the country's regulations derived from Basel III, such as Dodd-Frank for the U.S.). Yet, these tests are country- or currency-area-specific and thus difficult to compare.

As an alternative, Acharya et al. (2010a, b, 2012) and Brownlees and Engle (2011) propose a measure of systemic risk (SRISK) that relies solely on publicly available market data.<sup>vii</sup> Similar to

the stress tests, the SRISK measure represents the capital a financial institution would need to raise during severe marketwide downturns to function normally. It has several interesting features (i) it is available for several countries, (ii) it accounts for the endogenous nature of the systemic risk, which makes it macroprudential based, (iii) its assessment does not depend on Basel risk regulation (capital ratio measurement), and (iv) it has a higher frequency—bimonthly instead of yearly.

## Systemic risk and Financial Cycle

Basel III guidelines are more specific when it comes to the financial cycle.<sup>1</sup> They recommend a formula that translates the credit gap measure into activation of the countercyclical capital buffer (CCB). The CCB should be imposed if the credit-to-GDP ratio exceeds its trend value. More specifically, threshold values of the gap are used to define when the buffer should be deployed. If the gap is below 2 percent, the CCB is zero. If the gap is above 10 percent, the CCB should be set at its maximum of 2.5 percent of risk-weighted assets.<sup>viii</sup> Between the lower and upper threshold, the CCB should vary with the extent of the buildup of systemic risk.

While an aggregate indicator for credit is useful, knowing the source and quality of the credit is essential when assessing whether a policy response is needed and how it should be calibrated. Monitoring systemic risk within the financial cycle requires correct evaluation of both the stage of the credit cycle relative to its long-term behavior and the propagation of financial risks or systemic risk spillovers. The credit-to-GDP ratio captures only the first.

Following Shin and Shin (2011), Lopez et al (2015) build an alternative indicator using the composition of bank funding.<sup>ix</sup> The idea is that funding markets are the balance-sheet counterpart to intermediate lending, and they can be sorted around two categories:

- Core liabilities, namely retail deposits of domestic household and business, which are stable and grow in line with the economy.<sup>x</sup>
- Non-core liabilities, encompassing the other major forms of funding such as lending between banks or foreign lending, are more volatile. Non-core liabilities include funding sources for banks—and, in more mature financial markets, other financial intermediaries.

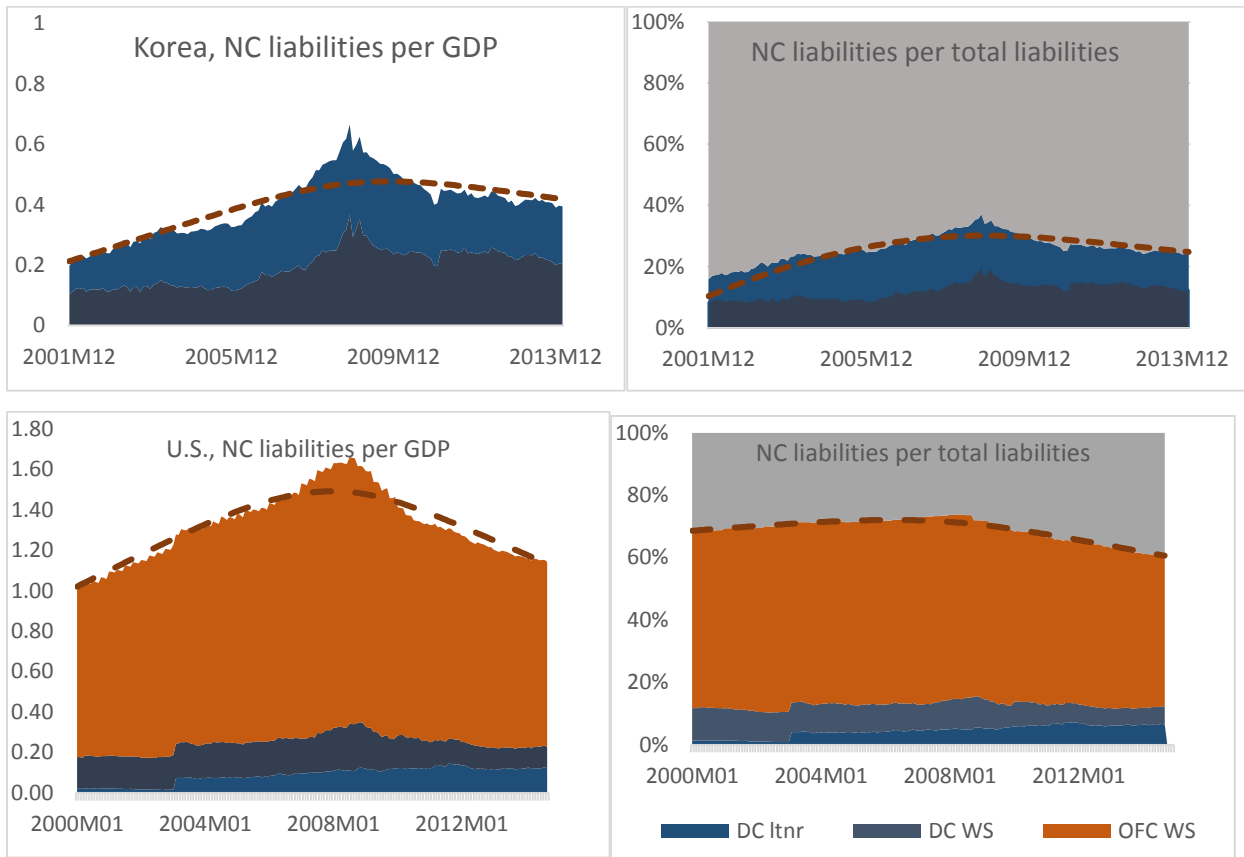
In times of “excessive” credit growth, non-core liabilities increase in order to fund the fast-growing lending that cannot be accommodated by core liabilities. Both liabilities should provide useful signals on financial conditions. Hence we calculate two indicators:<sup>xi</sup>

- Non-core liabilities to GDP ratio: Normalizing by the level of economic activity allows a better understanding of the size of the financial market and its non-core fraction relative to the size of the real economy. While directly comparable to the credit-to-GDP ratio, it also shares its main drawback: GDP is a poor “real-time” measure because it is often revised.
- Non-core to total liabilities ratio: increasing proportions of non-core funding relative to core deposits could indicate a credit market that is “overheating.” Focusing on the composition of

the financial system enables the buildup of one funding method or intermediary to be monitored (see appendix for more detail).

These indicators are complementary in the effort to understand the vulnerability of a country's financial market based on its reliance on short-term funding or short-term foreign currency debt as well as type of lender. Both sets of information are essential when designing well-targeted policy. Finally, the composition of the economy's non-core liabilities may also indicate a buildup of systemic risk as non-core liabilities are often in foreign currencies, cross-held by other intermediaries, and/or of shorter duration than retail deposits.<sup>xii</sup>

### Non-Core Liabilities ratios



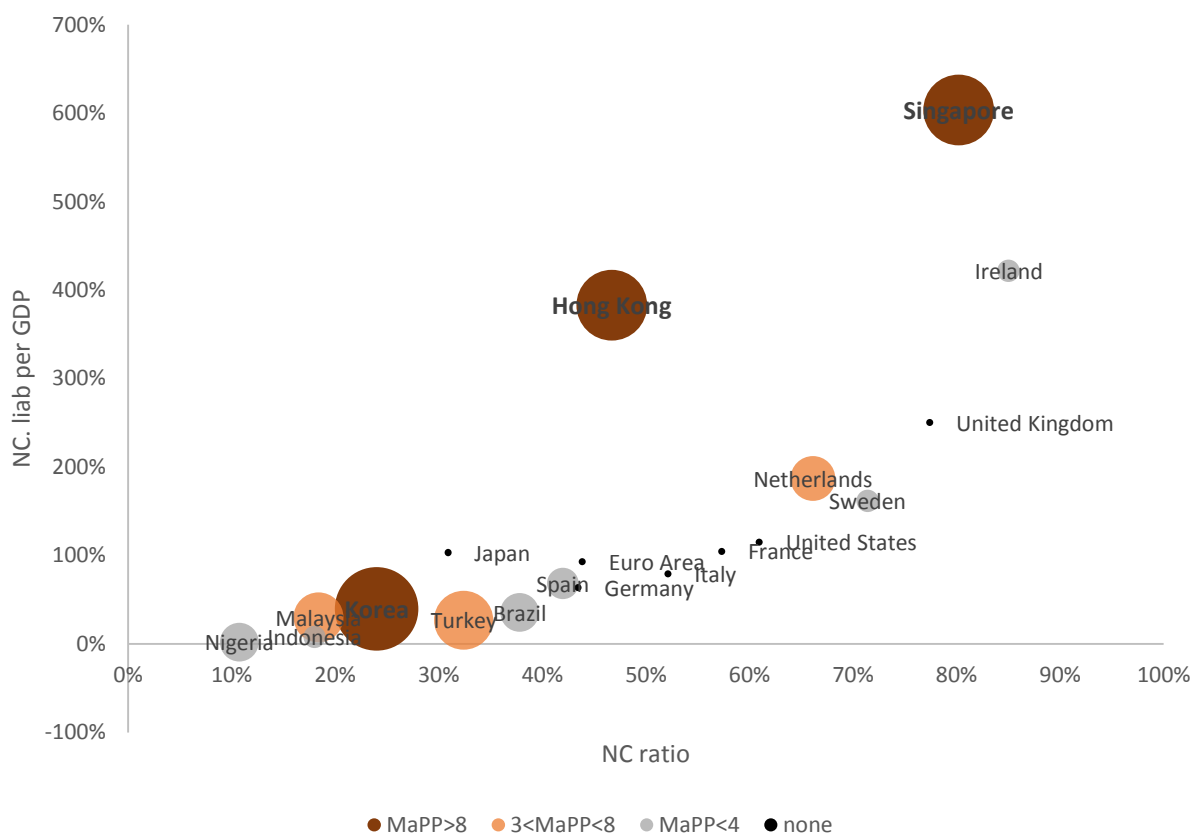
Source: Lopez et al. (2015).

The figures show the components of financial companies' liabilities, disaggregated by type of financial institution and liability category. Segments in blue/purple hues indicate liabilities of depository corporations (or monetary financial institutions for euro area economies), which include institutions traditionally thought of as banks—those that accept deposits. Liabilities of other financial corporations (OFCs) are displayed in orange/red. OFCs include but are not limited to insurance companies, funding corporations, and holding companies. Liabilities issued by OFCs can be considered borrowing to fund “shadow banking” activity. The figures below confirm that shadow banking has a prominent role in the U.S.. In contrast, South Korea is far less dependent on non-core liabilities to fund banking operations.



## Common factors and challenges

### Macroprudential index versus Non-Core (NC) liability-based ratios<sup>xiii</sup>



Source: Lopez et al. (2015).

Looking coincidentally at the macroprudential index and the non-core liabilities-based ratios (per GDP and per total liabilities) for some countries, the previous figure highlights common factors across countries with the strongest macroprudential stances.

With the exception of Singapore and Hong Kong, which are special cases as leading international financial centers, the financial markets of the countries recording at least four macroprudential measures depend overwhelmingly on banks' core funding, as both liabilities-based ratios are below 50 percent. In other words, these countries have limited depth in their financial systems relative to their real economies and have relatively "simple" financial structures, with banks more important than capital markets. Whether they are closed emerging economies (Malaysia, and Turkey), closed advanced economies (Korea, Singapore) or open advanced economies (Hong Kong, and the Netherlands), their access to autonomous monetary policy is restricted. Whether this is due to proactive exchange rate management, greater carry-trade inflows or being part of a monetary union, the outcome is the same: Macroprudential policy seems to be an alternative

to monetary policy for reining in domestic liquidity. Finally, most of these countries have more concentrated institutional systems (industrial organization, ownership structure, central bank and government), which makes the implementation of these tools easier.

Unlike the countries previously discussed, the euro zone, the UK, and the U.S. are relatively large, open economies with well-developed and complex institutions. For instance, in the U.S., less than half of total liabilities outstanding can be linked to bank balance sheets, while more than half can be attributed to the so-called shadow banking system. In Europe, banks are still responsible for the majority of financial intermediation. In France, they count for close to 60 percent of total liabilities, although the share of non-bank financial intermediation has increased. Furthermore, the recent crisis showed these countries tend to influence the global financial cycle. Monitoring systemic risk is essential for them as they actively contribute to it, yet the complexity of these advanced Western economies makes the task extremely challenging.

Beyond their macroeconomic conditions, their network of international banks need to be taken into account because they may exacerbate policy's unintended consequences. A very open capital account and large foreign bank presence make circumvention of the rules more likely. Aiyar, Calomiris, and Wieladek (2014) show that foreign bank branches increased their lending in the UK in response to tighter measures applied to local banks, a sign of cross-border competition and regulatory arbitrage.<sup>xiv</sup> Similarly, as supervisors required UK-based banks and their subsidiaries to meet higher capital requirements during the 2000s, local banks lent less abroad.

In the presence of independent monetary policy, its interaction with macroprudential policy cannot be ignored and should be managed. So far, only the Bank of England hosts both the Monetary Policy Committee and the Financial Policy Committee, which is responsible for macroprudential measures. The U.S. Federal Reserve has some macroprudential tools, but others are dispersed among several agencies. The ECB's main difficulty is the key difference between macroprudential and monetary policies: Macroprudential policy must be country-specific and is sensitive to a country's political pressure while it must be coherent for the euro zone as a unit.

## **Macroprudential Policy and Institutional Framework**

Because macroprudential policy is at an early stage of implementation, it faces a number of crucial issues. One of the most important is building—or refining—its institutional underpinnings. A strong institutional framework is essential to ensure that the policy can work effectively. As noted by the IMF and others, the framework must foster the ability to act in the face of evolving systemic threats, assuring access to information and defining an appropriate range and reach of macroprudential instruments. It needs to establish strong accountability and compel assertive and timely action, despite lobbying by the financial industry or political pressure.

For many countries, the central bank has been the focal point for macroprudential policy. In instances where powers have been delegated to central banks, they also can be revoked by politicians, especially where macroprudential mandates remain vague and allow considerable

discretion. Paradoxically, high levels of central bank discretion and empowerment are likely to increase the political questioning and scrutiny they can expect.

If central banks are to build support for macroprudential regulation, they will have to cogently explain the public and social purpose this policy serves. Simply speaking about the importance of financial stability is unlikely to be successful, reflecting the public's inclination toward financial stability myopia and time inconsistent preferences. In the end, the failure to build broader rationales and constituencies will damage their capacity to fulfill their new regulatory role. However, cultivating constituencies and a broader sense of purpose for this project potentially erodes central banks' claims to technically impartial and nonpolitical authority.

Although central banks are playing a key role in the exercise of macroprudential policy, they are not the only institutions involved. Participation by government departments and regulatory agencies can help bring about the effective use of macroprudential tools. In addition, governments can be useful in ensuring the support of tax policy and facilitating legislative changes to mitigate systemic risk by creating regulatory authority over nonbank lenders and other institutions.

Because the relationship between central banks and government institutions is at an early stage when it comes to managing macroprudential policy, challenges are still being identified. For now, it is safe to say that if institutional silos and rivalries develop, it could hinder risk identification and mitigation, undermining the effectiveness of the policy. The overlap among policy areas is another major challenge. There is also a political challenge in the relationship between finance ministries and central banks on macroprudential questions, given that many decisions will have fiscal as well as financial and monetary implications with institutional politics at play.

## **Macroprudential Policy and the Political Landscape**

Macroprudential policy by most standards is a new field and it is hard to say how it will play out politically. Among the unknowns is the degree of involvement from politicians and industry players as well as the attitudes of the wider public toward the tactics and tools used to conduct policy. Assessing how the institutional design of macroprudential frameworks will interact with the wider political process requires some degree of speculation.

At this point, the intervention of politicians generally has been limited. Legislation identifying broad aspects of the policy and its operation has been agreed. However, much of the detail has been left to government and central bank officials to figure out. In the United States, the system for implementing macroprudential tools and measures is composed of many independent regulators, each of whom has mandates focused on particular institutions or markets. The legislation governing each agency limits its objectives and the reach of its regulations. No agency has the explicit objective of maintaining financial stability—for taking into account the macroprudential add-ons to microprudential oversight.

The Financial Stability Oversight Council (FSOC), created as part of the Dodd-Frank legislation, has made progress in promoting cooperation among many agencies in the context of shared goals but isn't as effective as it needs to be in the balkanized U.S. regulatory system. The fact that the FSOC has to make recommendations on a comply-or-explain basis indicates difficulties and

shortcomings in the political process. At minimum, the FSOC structure needs to be changed to enhance its independence and its ability to take unpopular stands, especially on countercyclical macroprudential policy.

At its core, the emerging political economy of macroprudential regulation suffers from a political constituency problem. As Claudio Borio of the Bank for International Settlements recounts, there is no readymade constituency against the inebriating feeling of growing rich that is characteristic of a financial boom (Borio, 2013).<sup>xv</sup> Unlike monetary policy, whose prowess in fighting inflation can be linked to an individual's own welfare, a macroprudential perspective alludes to systemically beneficial outcomes only tenuously associated with individual gains. In this type of circumstance, it is understandable that politicians might not want to be associated with a policy that could be viewed as "taking away the punch bowl."

## Concluding remarks

The macroprudential framework and the regulations implemented in various countries are still a work in progress. So far, most regulations focus on banks, whether the banking system represents 20 percent or 100 percent of a nation's financial sector.

The success of these regulations in promoting financial stability remains unclear and their potential unexpected consequences quite unsettling, as financial activities tend to migrate to less regulated markets with the resulting risks often underestimated. As Goodhart's law (1975) states: "Any observed statistical regularity will tend to collapse once pressure is placed upon it for control purposes."<sup>xvi</sup>

At the recent "Rethinking Macro Policy III" conference in Washington, D.C., IMF Chief Economist Olivier Blanchard said: "Policymakers cannot be simple observers, as what the financial system will be depends very much on regulation. And we do not have a good sense of what regulation should be." Such a warning should encourage policymakers to acquire a better understanding of the issues before trying to regulate them. Already, we have learned from Basel I, II and III that failing to heed the financial sector's reaction to proposed changes in policy and regulation leads to more complex and less efficient measures. What about changing strategy and trying a "transparent and constructive" dialogue as a starting point?

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<sup>i</sup> “Macroprudentialism”, A VoxEU.org eBook edited by Dirk Schoenmaker, December 2014.

<sup>ii</sup> Microprudential tools are caps on loan-to-value ratios, limits on credit growth, additional capital adequacy requirements, reserve requirements and other balance sheet restrictions.

<sup>iii</sup> A Pigouvian tax is applied to a market activity that is generating negative externalities (costs for somebody else). The tax is intended to correct an inefficient market outcome by imposing costs equal to the negative externalities.

<sup>iv</sup> Housing-related measures, such as loan-to-value ratio and ratio caps, \*\* debt-to-income ratio, dynamic loan-loss provisioning, and general countercyclical capital buffer/requirement, loan-to-deposit ratio\*

Contagion measures, such as leverage ratio, capital surcharge on SIFIs, limits on interbank exposures, concentration limits, limits on domestic currency loans, and levy/tax on financial institutions, sector specific buffer/requirement,\* margins/hairecuts on collateralized financial market transactions\*

Reserve requirements:<sup>iv</sup> reserve requirement ratios, limits on foreign currency loans, FX and/or countercyclical reserve requirements, \*\* limits on open FX positions or currency mismatches\*

Where \* identifies new tools with not enough data to be included in the analysis and \*\* the instruments derived by Cerutti et al. (2015) from the Global Macroprudential Policy Instruments (GMPI) survey from the IMF.

<sup>v</sup> Cerutti, Eugenio, Stijn Claessens, and Luc Laeven. “The Use and Effectiveness of Macroprudential Policies: New Evidence,” IMF working paper 69, 2014.

<sup>vi</sup> Basel Committee document. “Global systemically important banks: updated assessment methodology and the higher loss absorbency requirement,” July 2013. Basel Committee on Banking Supervision. “Countercyclical Capital Buffer Proposal, Consultative Document,” Bank for International Settlements, Basel, 2010.

<sup>vii</sup> Acharya, Viral V., Lasse H. Pedersen, Thomas Philippon and Matthew P. Richardson. “Measuring Systemic Risk,” technical report, Department of Finance, New York University, 2010. Acharya, Viral V., Lasse H. Pedersen, Thomas Philippon and Matthew P. Richardson. “Measuring Systemic Risk,” *CEPR Discussion Papers* 8824, 2012. Brownlees, Christian T., and Robert F. Engle. “SRISK: A Conditional Capital Shortfall Index for Systemic Risk Measurement,” Department of Finance, New York University, 2015.

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<sup>viii</sup> Drehmann et al. (2013) suggest calculating the long-term trend using the Hodrick–Prescott filter with a lambda of 400,000. Drehmann, Mathias, and Mikael Juselius. “Evaluating early warning indicators of banking crises: satisfying policy requirements,” BIS working paper 421, 2013

<sup>ix</sup> Shin and Shin (2010) consider one country: South Korea. Shin, Hyun Song, and Kwanho Shin. “Procyclicality and Monetary Aggregates,” NBER working paper 16836, 2010.

Lopez, Claude, Markwardt, Donald and Keith Savard, “Macroprudential Policy, Silver Bullet or Refighting the Last War”, Milken Institute Report, 2015.

<sup>x</sup> Our definitions are in line with IMF’s core and non-core liquidity definition (2015). The data are collected from national and international institutions’ websites such as IMF, central banks, and regulatory agencies. Harutyunyan, Artak, Alexander Massara, Giovanni Ugazio, Goran Amidzic, and Richard Walton. “Shedding Light on Shadow Banking,” IMF working paper 1, 2015.

<sup>xi</sup> More information on the non-core liabilities ratio. The composition of the economy’s non-core liabilities may also indicate a buildup of systemic risk as non-core liabilities are often in foreign currencies, cross-held by other intermediaries, and/or of shorter duration than retail deposits.

In Fig Box a, components of financial companies’ liabilities are disaggregated by type of financial institution and liability category. Segments in blue/purple hues indicate liabilities of depository corporations (or monetary financial institutions for euro area economies), which include institutions traditionally thought of as banks—those that accept deposits. Liabilities of other financial corporations (OFCs) are displayed in orange/red. OFCs include but are not limited to insurance companies, funding corporations, and holding companies.

Liabilities issued by OFCs can be considered borrowing to fund “shadow banking” activity. The figures below confirm that shadow banking has a more prominent role in developed economies such as Japan and the U.S. than in developing economies. This disparity is slightly more pronounced in the charts given that some emerging Asian central banks (South Korea, Malaysia) do not report balance sheet data for OFCs. Little data is available because their OFC sectors are not sufficiently developed to be measured. Indeed, Indonesia and Thailand have begun reporting OFC liabilities, but they represent less than 8 percent of total core and non-core liabilities.

When viewed through the lens of non-core liabilities as a ratio of either core liabilities or the country’s gross domestic product, it is evident that emerging Asian economies are far less dependent on non-core liabilities to fund banking operations. The United States, by contrast, experienced remarkable growth in OFC liabilities in recent decades while depository institution liabilities remained somewhat level (below 25 percent).

<sup>xii</sup> Types of non-core liabilities

Liabilities to non-residents : While domestic retail deposits are considered part of banks’ core funding because of their stability, deposits from non-residents fall under non-core liabilities because they lack the same type of stability and can be subject to sudden withdrawals or reversals in the event of crisis. Foreign currency deposits cause a currency mismatch between

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the foreign currencies the bank borrows in and the domestic currency it lends to residents. Such currency mismatches—which were at the heart of the Asian financial crisis of the late 1990s— increase systemic risk in the banking sector, especially in emerging markets.

Loans : This category is made up primarily of repurchase agreements, or “repos,” which are effectively collateralized loans. Repos are a popular form of short-term borrowing for financial institutions. Often, repurchase agreements last just one day and are subsequently “rolled over” in a cycle of very-short-term borrowing. Due to their short-term nature and being subject to haircuts or rollover risk during times of financial distress, repos can be considered a less stable source of funding than core deposits.

Securities other than shares: Securities other than shares are any kind of negotiable debt instrument, including bonds, commercial paper, and certificates of deposit. In developed economies, commercial paper has played a significant role in financial intermediaries’ ability to raise short-term debt. In early 2007 the U.S. financial sector had \$1.8 trillion in commercial paper outstanding, before falling by nearly 20 percent as financial markets froze in the aftermath of the Lehman Brothers collapse. Vulnerability to such sudden, sharp funding reductions illustrate why these types of securities are considered “non-core” and their rapid buildup may indicate an accumulation of systemic risk.

<sup>xiii</sup> Source: Lopez et al(2015).

<sup>xiv</sup> Aiyar, Shekhar, Charles W. Calomiris, and Tomasz Wieladek. “Does Macro-Prudential Regulation Leak? Evidence from a UK Policy Experiment,” *Journal of Money, Credit and Banking*, 46(1), 181-214, 2014.

<sup>xv</sup> Borio, Claudio. “Macroprudential Policy and the Financial Cycle: Some stylized facts and some suggestions,” Re-Thinking Macro II conference, IMF, Washington, April 16-17, 2013.

<sup>xvi</sup> Goodhart, Charles. “Problems of Monetary Management: The U.K. Experience, *Papers in Monetary Economics* (Reserve Bank of Australia), 1975.