Macroprudential Policy:
What We've Learned, Don't Know and Need to Do

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During a discussion of the emerging financial crisis in 2008, the Queen of England asked, "Why did no one see it coming?" There have been many attempts to answer that question, and one recurring theme is the insufficient understanding of macroprudential risks—of the vulnerabilities related to aggregate financial exposures, interrelationships between different financial institutions, and mechanisms by which shocks can be amplified throughout the system. The "best practice" macroeconomic framework in 2008, which relied on central banks for price stability and microprudential regulators for the stability of individual institutions, was missing this crucial focus on risks to the broader financial system.

Countries around the world have learned this lesson, however, and most have established some type of macroprudential authority and adopted an array of macroprudential tools. The new "best practice" macroeconomic framework involves 3Ms: macroprudential policy, monetary policy and microprudential supervision. But are the steps taken to date on macroprudential policy enough? Have they sufficiently addressed the vulnerabilities behind the 2008 crisis? And, most important, can they live up to their promise of meaningfully reducing systemic financial vulnerabilities so that the next shock—from wherever it emerges—will not evolve into another costly crisis? If not, what more should be done?

The term "macroprudential" seems straightforward (stability of the entire financial system), but quickly becomes technical and complicated when constructing specific policies, applying them, and assessing their effectiveness. It includes a diverse set of tools and targets an assortment of vulnerabilities. Even translating the broader goal of financial stability to specific targets and policies is not straightforward. Moreover, even though the term "macroprudential" has existed for decades, and tools were used selectively before 2008 (especially for emerging markets and housing), there was limited evidence on their effectiveness.

As macroprudential tools have been adopted more widely over the last decade, however, we

are beginning to accumulate a body of evidence on their effectiveness, making this an opportune time to assess their successes and shortcomings. This paper explores what we have learned (Section I), what we don't know (Section II), and what we need to do to make macroprudential policy more effective in the future (Section III).

The discussion suggests that we have made substantive progress in terms of understanding the goals of macroprudential policy and developing a toolkit of policy options that can be adopted for each country's circumstances. We are also beginning to accumulate evidence that many of these tools can successfully accomplish their specific goals, albeit often with unintended leakages and spillovers. There has been less progress, however, in terms of understanding: the ramifications of these leakages and spillovers, how to calibrate various tools, and how to identify the next set of risks as the global financial system evolves. In particular, there is more that needs to be done in terms of monitoring the new vulnerabilities that develop as individuals, banks, and other firms adapt to existing regulations and shift risky exposures outside the perimeter currently targeted by existing macroprudential regulations.

I. What We've Learned

The increased attention to and use of macroprudential policy over the last decade has substantially improved our understanding of its goals and tools, its effectiveness, and its unintended consequences.

A. Goals and Tools[1]

Unlike monetary policy—which can be succinctly summarized as focusing on one goal (such as inflation at 2%) and accomplished through a small number of tools (such as adjusting an interest rate or asset purchases)—macroprudential policy involves a more amorphous goal and larger set of tools. It is even hard to assess if macroprudential policy has been successful if "success" is a crisis that never happened.

With these caveats, progress has been made in defining three broad (and related) objectives for macroprudential policy: (1) addressing excessive credit expansion and strengthening resilience in the overall financial system; (2) reducing key amplification mechanisms of systemic risk; and (3) mitigating structural vulnerabilities related to the role of important institutions and key markets. If successful, macroprudential policy should improve the

[1] For progress on these goals and tools, see CGFS (2010), IMF-FSB-BIS (2016), Cecchetti and Schoenholtz (2017) and Forbes (2018).

economy's ability to withstand aggregate shocks and allow the financial system to function effectively under adverse conditions.

Progress has also been made in establishing a set of policies that should be part of the standard macroprudential toolkit—albeit with the details determined by country-specific circumstances. These tools can be broadly divided into four categories: (1) *capital and reserve instruments*, including measures which take into account the stage of the economic cycle, such as countercyclical capital buffers and dynamic provisioning requirements; (2) *liquidity instruments*, including regulations to contain maturity and currency mismatch, such as through net stable funding ratios and the liquidity coverage ratio; (3) *credit instruments*, including policies targeting vulnerabilities to mortgage risk, such as caps to loan-to-value ratios and debt-to-income ratios; and (4) *instruments targeting structural institutions*, including resolution plans, additional cushions and surcharges for systemically-important institutions, and rules for key intermediaries. Individual countries have adopted different combinations of these policies, often reflecting their history, institutions, political priorities, and perceived vulnerabilities.

B. Effectiveness

As these macroprudential tools have become more widely used, a number of research papers have begun to analyze what works—and what does not.[2] Although this literature is still in its infancy, and the number of observations and period for which to assess their impact is limited, a compelling body of evidence suggests that many macroprudential tools can influence their immediate objective. For example, a series of papers convincingly shows that raising bank reserve requirements can reduce aggregate credit growth. Another series of studies focuses on the impact of housing-related policies and shows that measures regulating household credit through borrower-based policies (such as caps on loan-to-value and debt-to-income ratios) and financial-institution based policies (such as limits on leverage and dynamic provisioning) are effective at restraining household credit growth. A smaller set of studies has evaluated the impact of policies limiting foreign currency (FX) exposures and find that these measures can limit bank borrowing and lending in FX.

Several studies have a more ambitious goal, of not just assessing whether macroprudential policies affect their direct target (such as credit

[2] For details on studies evaluating macroprudential policies, including cites for the evidence cited below, see Cerutti *et al*. (2015), Buch and Goldberg (2016), IMF-FSB-BIS (2016) and Forbes (2018).

growth or FX exposure), but also if they attain the ultimate goals of building resilience in the broader financial system and supporting economies during downturns. Assessing these broader goals is particularly challenging given the limited time these tools have been used and the lack of a recession in many countries over that period. With this caveat, the initial evidence is mixed, but suggests that there are benefits.[3] Several papers of specific regulations find that they can support the supply of credit during downturns, crises, and/or recoveries. Martin and Philippon (2017) show how macroprudential regulations could have reduced unemployment during the 2008-12 recession in the Eurozone. Ahnert *et al.* (2018) finds that FX regulations reduce banks' sensitivity to currency movements, but only provide a modest (and often insignificant) reduction in the broader economy's sensitivity to currency movements.

C. Unintended Consequences

A final set of results emerging from this literature evaluating the effects of macroprudential policies can explain why these policies appear to be effective at influencing their direct targets, but may generate more limited macroeconomic benefits; macroprudential policies often have unintended leakages and spillovers.[4] Leakages are generally defined as shifting lending or credit to other institutions in the same country that are outside the regulatory perimeter, while spillovers are shifts to other countries. The evidence suggests these leakages and spillovers regularly occur and can be significant.

Two studies provide concrete examples of these leakages and their potential magnitudes. Aiyar *et al*. (2014) shows that increased capital requirements on UK domestic banks causes foreign banks to increase their UK lending, with this "leakage" equivalent to about one-third of the initial contraction in lending by UK banks. Ahnert *et al*. (2018) shows that tighter regulations on FX borrowing by banks causes companies to increase their FX debt issuance, with this "leakage" equivalent to about 10% of the initial reduction on bank FX borrowing.

Studies focusing on the international spillovers from macroprudential regulation also often find significant effects, but usually smaller in magnitude than for domestic leakages. For example, Buch and Goldberg (2016) carefully evaluates spillovers in over 15 countries and finds that macroprudential tools

[3] Also see Cerutti *et al*. (2015), IMF-FSB-BIS (2016) and Forbes, Fratzscher and Straub (2015).

[4] For summaries and evidence of leakages and spillovers, see Avdjiev *et al*. (2016), Buch and Goldberg (2016), Agénor and da Silva (2017) and Forbes (2018).

targeting liquidity or certain sectors generate significant cross-border bank credit spillovers, but the magnitudes are moderate in most countries and sometimes insignificant. Forbes *et al.* (2017) is one study that finds larger spillovers from macroprudential policies—albeit this may partially reflect its focus on the UK, a major banking center. This study shows that increased UK capital requirements combined with a targeted lending program explain roughly 30% of the contraction in aggregate UK cross-border bank lending, corresponding to around 10% of the contraction in global cross-border lending, between mid-2012 and end-2013.

The ramifications of these types of unintended consequences is one of the aspects of macroprudential policy about which we do not know enough….

II. What We Don't Know

Despite these advances in our understanding and use of macroprudential policy, there is still much that we do not know—including on issues critical for macroprudential regulation to live up to its promise of meaningfully bolstering financial resilience. I will focus on three areas where a better understanding is crucial: the new risks that emerge from the leakages and spillovers of macroprudential regulations, the appropriate way to calibrate the regulations, and the need to target the source of the next shock rather than focusing on the past.

A. Incorporating the Risks from Leakages and Spillovers

As discussed above, recent research has documented that macroprudential tools often generate unexpected leakages and spillovers. This usually implies that a portion of the risk that the regulation is intended to mitigate shifts elsewhere—to other countries or to other sectors or institutions within the domestic economy. An assessment of any macroprudential policy should therefore include not only the effects on the direct target (such as credit growth or foreign currency exposure), but also any indirect effects and new vulnerabilities that are generated.

As also discussed above, a few papers have provided evidence that these types of leakages are often significant and the magnitudes can be meaningful, but that they are generally much smaller than the direct effects on the intended target, suggesting an aggregate reduction in country risk and financial vulnerability. International spillovers also tend to be even smaller than domestic leakages—albeit with a range of magnitudes based on the specific policy and country analyzed.

Although these results might suggest that leakages or spillovers are not of primary

importance when evaluating macroprudential regulations, it is important to put these results in context. The spillovers, and especially the leakages, can still be meaningful when assessed relative to the size of the sector where the risks shift and in terms of the new vulnerabilities generated. For example, consider the results in Ahnert *et al.* (2018) which suggests tighter FX regulations on banks generate a leakage of "only" 10% (measured as the increase in corporate FX debt issuance resulting from the reduction in bank FX borrowing). This 10%, however, is still large and meaningful; it is equivalent to about 10% of median annual FX debt issuance in the sample, and about a 15%-20% increase in FX corporate debt issuance for emerging markets such as Brazil and Indonesia. This is a meaningful impact on an important market that is generally not under the purview of macroprudential regulators.

Even more difficult to assess than the magnitudes of these types of leakages and spillovers is what the new allocation of risks implies for broader financial stability. Continuing with the example above, who holds this new FX debt? Are these entities aware of the risks related to currency exposure that they have taken on? Are they hedged? Will they remain solvent if there is a large currency movement, and if not, will their failure generate broader systemic risks? Although this shifting of FX risk away from banks, which are at the heart of the financial system, undoubtedly builds financial resilience in a critical sector, this shifting of risks outside the regulated sector may not only introduce new risks—but risks that are less understood, not monitored, and harder to prepare for. If these new FX-related exposures are dispersed and diversified, there may be less systemic implications, but if they are concentrated and feed into financial interrelationships that are poorly understood, they could amplify risks in ways that are unexpected and harder to address.

B. Calibrating the Regulations

A second issue about which we need to learn more in order for macroprudential regulations to achieve their goals is the appropriate levels at which to calibrate different regulations—especially given the political challenge of taking difficult steps today to prepare for risks that may not arise for a number of years.

While substantial progress has been made in developing a toolkit to address different vulnerabilities, there has been far less progress in determining the optimal levels at which to set them. Macroprudential regulations have costs and benefits, and calibrating their levels to find the optimal balance is not straightforward, especially as they will all vary

across countries and over time. Very high reserve or capital requirements on certain types of exposures (such as on mortgages or foreign exchange) would significantly reduce the risks related to those exposures (such as from declining house prices or sharp currency movements), but could also significantly harm economic growth. If the economic slowdown was large enough, it could even increase the risks of financial instability in the future. Setting tighter regulations will also increase incentives for borrowers to shift outside the regulated sector, thereby increasing the risks related to leakages and spillovers that are less well monitored and understood.

Aggravating this challenge of finding the optimal level at which to set macroprudential regulations is the limited experience of how tight these regulations would need to be in order to provide sufficient protection during a downturn. Many of these tools have only been more widely used over the last decade—a period of recovery, falling unemployment, low borrowing costs, and financial stability in most economies. There have been few recessions and periods of financial stress—the periods when macroprudential regulations are expected to increase resilience, reduce amplification effects, and ensure stability in systemically-important institutions. Will the current levels of macroprudential regulations prove stringent enough to provide the expected financial stability when the next downturn hits? Stress tests in many countries have attempted answer this question, but it is extremely difficult to model the various interactions in an economy. The only true test will come with the next downturn.

Moreover, even if we knew how to optimally calibrate macroprudential regulations, there are political hurdles to tightening them in a timely fashion. Tighter macroprudential regulations usually entail immediate costs (such as reduced access to credit), while the benefits may not appear for years—or even be impossible to measure at all (i.e., a crisis avoided). Any macroprudential authority influenced by elections and the political cycle would be tempted to adopt less stringent regulations—especially if they are unlikely to be in office when the next crisis hits. The uncertainty about the optimal thresholds for regulations only adds to this bias. Why would any politically sensitive macroprudential authorities adopt costly regulations if there were uncertainty about whether they are even necessary?

A clear example of how these political challenges combined with uncertainty about how to calibrate macroprudential regulations can imply they are not used optimally is recent experience with the counter-cyclical capital buffer (CCyB). The CCyB is a macroprudential

tools that has widespread academic and policy support and one of the better-defined frameworks. It could be powerful in cushioning economies against all phases of the financial cycle, as it can not only moderate credit growth and increase resilience to a range of shocks during "booms", but also provide benefits during "busts" (as the buffer can be quickly eased to mitigate any credit contraction). Hanson *et al.* (2011) shows, however, that "to achieve meaningful time variation in capital ratios, *the regulatory minimum in good times must substantially exceed the market-imposed standard in bad times."*(pg. 8). Although many countries have the framework in place to use the CCyB, very few have actively triggered it. As of 2017, only about six countries have tightened the CCyB at all, and none appears to have tightened it or varied it as aggressively as suggested by basic calculations (*i.e.*, Hanson *et al*., 2011).

C. The Source of the Next Shock

A final concern about the current state of macroprudential policy is if it is sufficiently prepared for the next "shock"— where the next vulnerabilities emerge. Macroprudential regulations in place today prioritize addressing the vulnerabilities behind the 2008 crisis. This makes sense, and there has been meaningful progress, especially in terms of ensuring that the banks at the heart of the last crisis are better capitalized and less leveraged. But where will the next shock come from? Could changes in the global financial system—including those aimed at building bank resilience—be sowing the seeds of the next crisis?

One potential vulnerability in many countries is the "shadow" financial system—the range of non-bank institutions involved in financial transactions (such as hedge funds, pension funds, insurance companies, securitization vehicles, money market funds, and mortgage funds). Most macroprudential regulations focus on banks, leaving these "shadow" institutions outside the regulatory perimeter or subject to oversight by other bodies, which are usually less powerful, adopt less stringent regulations, and are less focused on macroprudential risks. In fact, many of the leakages from macroprudential regulations could be diverting financial flows to this shadow system, thereby contributing to this source of vulnerability.

Moreover, these "shadow" institutions could be a source of broader financial vulnerabilities, including through banks. For example, if tighter macroprudential regulations on banks' mortgage exposures cause consumers to shift to other sources of mortgages (such as pension funds)—then another key sector of the economy could become exposed to the housing

market.[5] Or, continuing the above example of FX regulations on banks, as non-bank institutions take on the "leakage" of FX exposure that was previously held by banks, if these non-bank financers had loans from banks and also go bankrupt after a large currency movement, the banks would still be negatively affected by FX movements despite the seeming success of the regulations in removing their direct FX exposure.

As another example of evolving risks, consider recent shifts in cross-border capital flows, shifts that partly reflect tighter bank regulations since 2008. Gross cross-border capital flows have collapsed since 2007, largely driven by gross banking flows falling by over two-thirds between 2007 and 2017. Since cross-border banking flows tend to be the most volatile type of capital flow and played a key role in the severity of the 2008 crisis, this has undoubtedly increased the resilience of financial systems around the world to the types of shocks behind the 2008 crisis.

But what about the next set of shocks? As international banking flows have declined, other types of flows, such as portfolio debt flows, now constitute a larger share of gross global capital flows. Portfolio debt flows can also be volatile, and along with cross-border debt flows, are key drivers of the sudden "surges" and "stops" that correspond to periods of financial instability (Forbes and Warnock, 2014). Portfolio debt flows could also be particularly vulnerable to the current and expected changes in global interest rates.

This reduced role of banking flows in global capital flows has also corresponded to changes in the drivers of global capital flows; before the 2008 crisis, changes in "risk" (often measured by the VIX) was a key correlate of cross-border capital flows and the global financial cycle. Since 2008, however the relationship between global capital flows and risk measures has weakened, even becoming insignificant in some studies.[6] Are there new forces driving global capital flows—possibly reflecting the impact of regulations, reduced role of banking flows and shifts to "shadow" financing?

There is no shortage of explanations for these shifts in the global financial system—from the actions of central banks in major economies, to the increased heft of China and other emerging markets in the global economy, to the greater role of automatized trading and quantitative investment strategies. Can macroprudential regulations be nimble enough to address vulnerabilities arising from these shifts?

[5] See Forbes (2018) for evidence of this in Iceland. In 2016 pension funds in Iceland originated over half of new mortgages by value.

[6] See Avdjiev *et al.* (2017), and Goldberg and Krogstrup (2018).

III. What We Need to Do

This paper has highlighted a number of successes of macroprudential policy. There is a more coherent framing of its goals, a more developed toolkit of policies to target these goals, and an emerging body of evidence documenting that these tools can significantly affect their primary targets, albeit with unintended consequences. The elevated importance of macroprudential policy, combined with its more widespread use, has undoubtedly helped improve the resilience of financial systems and reduced the chance that moderate shocks are amplified to generate sharp economic contractions, contagion and financial instability.

These successes, however, are only a start, and likely not nearly enough to avoid another financial crisis in the future. There are key issues around macroprudential policy about which we do not have sufficient understanding, such as on the new risks generated from the leakages and spillovers, on how to calibrate the different regulations (especially given political incentives), and on the potential risks to financial stability outside the mandates for most macroprudential authorities.

On a more positive note, there are a number of steps that economists and policymakers can take to address these shortcomings.

First and foremost, is more academic research on macroprudential regulations. This is not an easy field to delve into. It requires learning a substantial number of acronyms and technical language—none of which is taught in graduate school. Nonetheless, it would be well worth the effort. Few academics have yet ventured into this area, and the rapid adoption of different regulations across countries over the last decade has provided a wealth of data and potential evidence. Careful research could have substantial impact on policy at the highest level and should be a priority for economists—especially for a profession that was slow to see the vulnerabilities that led to the 2008 crisis.

A second area for progress is on designing institutions to support the optimal use of macroprudential policy. Although most countries have some type of committee or institution in charge of macroprudential regulations, there is little consistency and "best practice" yet.[7] Tightening macroprudential regulations can be politically challenging, as the costs are immediate and apparent, while the benefits are more amorphous and may not appear for years. The example above of the

[7] See IMF-FSB-BIS (2016), Edge and Liang (2017), and Forbes (2018) for key issues.

CCyB suggests that regulations are not being sufficiently tightened to provide the resilience that is hoped for. The optimal macroprudential authority should be independent and somewhat insulated from the political cycle, while at the same time maintaining a high degree of transparency and accountability, as macroprudential regulations can affect consumers, firms, and the broader economy. Several frameworks show promise—such as the Financial Policy Committee at the Bank of England—but careful analysis is needed of which frameworks are most effective and politically viable across the business cycle.

A final area where more progress is needed is creative thinking about future risks—and especially those arising outside the purview of most regulations. Macroprudential regulations currently focus on where the last set of vulnerabilities arose, especially in banks and mortgage markets. These are critically important, but the next crisis could start in other sectors. In fact, the success of existing regulations in reducing the risks in banks could be contributing to the build-up of vulnerabilities elsewhere, such as by shifting exposures to currency and liquidity risk to the corporate sector and shadow financial system—sectors about which regulators have less information and where entities may be less prepared to handle surprises.

Macroprudential policy has made impressive progress and significantly reduced the probability of another crisis unfolding in the banking system as it did in 2008. Macroprudential policy still has some way to go, however, to ensure that there is not another crisis and economists are not asked again by a future monarch: "Why did no one see it coming?"

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