Macroprudential Policies in Open Emerging Economies

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This paper examines macroprudential policies in open emerging economies. It discusses how the recent financial crisis has provided a rationale for macroprudential policies to help manage the economy and the need for policymakers to monitor the financial cycle and systemic risks. It also discusses one particularly promising measure of the state of the financial cycle, the growth of noncore liabilities of the financial sector, and evaluates macroprudential policy frameworks. The paper uses Korea as an example and conducts an empirical evaluation of noncore liabilities of Korean banks as a measure of the financial cycle.

1. Introduction

Prior to 2007, there was a general consensus in central banks about most elements of monetary policy strategy and prudential supervision of the financial system. Then, starting in August 2007, the world was hit by what Alan Greenspan, former Chairman of the Federal Reserve, described as a "once-in-a-century credit tsunami." The credit tsunami not only flattened the world economy, resulting in the most severe worldwide economic contraction since the Great Depression, but has also called into question the basic policy strategies used to manage the economy. This has led to a new focus on macroprudential regulation and supervision, that is, regulation and supervision of the financial system that focuses on system-wide risk, rather than just the riskiness of individual financial institutions, as an important policy tool to promote a healthy economy.

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This study examines macroprudential policies in open emerging economies, with a particular emphasis on South Korea. We start in Section 2 by first examining why thinking has changed about basic policy strategies to manage the economy. Section 3 examines in more detail the rationale for macroprudential policies and the need for policymakers to monitor the financial cycle and systemic risks. We then discuss in Section 4 one particularly promising measure of the state of the financial cycle, the growth of noncore liabilities of the financial sector. This section also applies the analysis to Korea and conducts an empirical evaluation of noncore liabilities of Korean banks as a measure of the financial cycle. Section 5 broadens the discussion to evaluate macroprudential policy frameworks. Section 6 provides some concluding remarks.

2. How Has Thinking Changed about Policies to Manage the Economy?

To put things into perspective, we will first examine how central bankers and academic economists viewed the basic policy strategy before the crisis and then go on to discuss how their thinking has changed as a result of the crisis.[1]

2.1. Basic Policy Strategy before the Crisis

Before the crisis there was broad consensus in central banks and academia for a policy framework that pursued a form of flexible inflation targeting, while assuming a dichotomy between monetary policy and financial stability policy. There was somewhat less agreement on what the central bank's response should be to asset price bubbles.[2]

2.1.1. Flexible inflation targeting

The basic monetary policy framework followed by almost all central banks (who had the ability to conduct an independent monetary policy because they did not pursue an exchange rate peg) involved a strong, credible commitment by the central bank to stabilize inflation in the long run, often at an explicit numerical level. However, it also allowed for the central bank to pursue policies to stabilize output around its natural rate in the short run.[3] This framework is referred to in the academic literature as "flexible inflation targeting" (Svensson 1997), although the phrase "inflation targeting" to describe this monetary policy strategy is somewhat unfortunate. This is because central banks have followed different approaches to the communication strategy of flexible inflation targeting, with some objecting to characterizing their inflation objective as a target.

Many central banks, such as the Bank of Korea, have announced an explicit numerical inflation objective and treat it as a target, and these are classified as

full-fledged inflation targeters. Others are reluctant to be so explicit. For example, the Federal Reserve has espoused a strong commitment to stabilize inflation, but has not been willing to announce an explicit inflation objective.[4] The Federal Reserve reports on the individual Federal Open Market Committee participants' projections of inflation in the long run under "appropriate monetary policy." In effect, the Fed provides the long-run inflation objective for each FOMC participant, but has not required that the participants agree on a common objective for inflation. The Federal Reserve has therefore not yet adopted an agreed-upon inflation objective and so it is not classified as being in the inflation-targeting camp. On the other hand, the FOMC participants' long-run inflation projections all have been in a pretty tight range between 1½ and 2 percent, and so they are not far from committing to a specific inflation objective, and not very large modifications in their communication strategy would move them to the inflation-targeting camp (Mishkin 2008). In other cases, such as the European Central Bank (ECB) or the Swiss National Bank, central banks have been willing to announce an explicit numerical inflation objective, but are reluctant to treat it as a target because they believe that this would not give them sufficient flexibility. They are unwilling to be classified as inflation targeters because they believe that the use of the word "target" might lead the public to expect them to hit the inflation targets too precisely or over too specific a horizon.

Despite these apparent differences in communication strategy, the basic approach of central banks with an independent monetary policy before the crisis was very similar. They were willing to conduct monetary policy under a strong commitment to stabilize inflation in the long run. Indeed, Svensson (2002) argues that any central bank that indicates it will pursue the standard objective function which involves minimizing both inflation and the output gap in an intertemporal setting is effectively a flexible inflation targeter. Before the crisis, almost all central banks with an independent monetary policy fell into this classification.

2.1.2. Dichotomy between monetary and financial policy

Although most central bankers were aware that financial disruptions could have a serious negative impact on the economy, nonetheless, the general equilibrium modeling frameworks at most central banks did not incorporate financial frictions as a major source of business cycle fluctuations. This naturally led to a dichotomy between monetary policy and financial stability policy in which these two types of policies were conducted separately. Monetary policy instruments focused on minimizing inflation and output gaps. It would then

be up to prudential regulation and supervision to prevent excessive risk-taking that could promote financial instability. Although most central banks supported the dichotomy between monetary policy and financial stability policy, some expressed the view that monetary policy should address financial stability issues, particularly with regard to responding to potential asset price bubbles, as discussed below.

2.1.3. The "lean" versus "clean" debate on the response to possible asset price bubbles

An active debate in central banks before the crisis focused on how central banks should respond to potential asset price bubbles. Because asset prices are a central element in the transmission mechanisms of monetary policy, the theory of optimal monetary policy requires that monetary policy respond to asset prices to obtain good outcomes in terms of inflation and output. Hence, the issue of how monetary policy might respond to asset price movements is not whether it should respond at all, but whether it should respond over and above the response called for in terms of objectives to stabilize inflation and employment. Another way of stating the question is, should monetary policy try to pop or slow the growth of developing asset price bubbles to minimize damage to the economy when these bubbles burst? Alternatively, should the monetary authorities not respond directly to possible asset price bubbles, but instead respond to asset price declines only after a bubble bursts to stabilize both output and inflation? These two positions have been characterized as leaning against asset price bubbles versus cleaning up after the bubble bursts. And so, the debate over what to do about asset price bubbles has been characterized as the "lean" versus "clean" debate.

Even before the crisis, there was no question that asset price bubbles have negative effects on the economy. As Dupor (2005) has emphasized, the departure of asset prices from fundamentals can lead to inappropriate investments that decrease the efficiency of the economy. Furthermore, the bursting of bubbles throughout history has been followed by sharp declines in economic activity, as Kindleberger's (1978) famous book demonstrated.

The clear-cut dangers of asset price bubbles before the crisis led some economists both inside and outside central banks—such as Cecchetti et al. (2000), Borio and Lowe (2002), Borio, English, and Filardo (2003), and White (2004)—to argue that central banks should at times "lean against the wind" by raising interest rates to stop bubbles from getting out of hand. They argued that raising interest rates to slow a bubble's growth would produce better outcomes because it would either prevent the bubble or would result in a less-severe bursting of the bubble, with far less damage to the economy.

The opposing "clean" view states that asset prices should have a special role in the conduct of monetary policy over and above that implied by their foreseeable effect on inflation and employment. This is often referred to as the Greenspan doctrine because he strenuously argued that monetary policy should not try to lean against asset price bubbles, but rather should just clean up after they burst (Greenspan 2002). There are several elements of this argument.

First, bubbles are hard to detect. To justify leaning against a bubble, a central bank is assuming that it can identify a bubble in progress. That assumption was viewed as highly dubious because it is hard to believe that the central bank has such an informational advantage over private markets. If the central bank has no informational advantage, and if it knows that a bubble has developed, the market will almost surely know this too, and the bubble will burst. Thus, any bubble that could be identified with certainty by the central bank would be unlikely ever to develop much further.

A second objection against leaning is that raising interest rates may be very ineffective in restraining the bubble because market participants expect such high rates of return from buying bubble-driven assets. By definition, bubbles are departures from the behavior that is normally incorporated within models, and so the tools of monetary policy are unlikely to work normally in abnormal conditions.

A third objection is that there are many asset prices, and at any one time a bubble may be present in only a fraction of assets. Monetary policy actions are a very blunt instrument in such a case, as such actions would likely affect asset prices in general, rather than solely those in a bubble.

Fourth, although some theoretical models suggest that raising interest rates could diminish the acceleration of asset prices, others suggest that raising interest rates would cause a bubble to burst more severely, thus doing even more damage to the economy (Bernanke, Gertler, and Gilchrist 1999; Greenspan 2002; Gruen, Plumb, and Stone 2005; and Kohn 2006). This view was supported by historical examples, such as the monetary tightening that occurred in 1928 and 1929 in the United States and 1989 in Japan, suggesting that raising interest rates may cause a bubble to burst more severely, thereby increasing the damage to the economy. Another way of saying this is that bubbles are departures from normal behavior, and it is unrealistic to expect that the usual tools of monetary policy will be effective in abnormal conditions. Attempts to prick bubbles were thus viewed as possibly violating the Hippocratic oath of "do no harm."

Finally, there was a view that the monetary authorities had the tools to keep the harmful effects of a bursting bubble at a manageable level, as long as

they respond in a timely fashion. This was true even if interest rates fell and approached the zero lower bound, and so the conventional tool of lowering the policy interest rate was no longer an option. The economy could be stimulated by (1) managing expectations so that the policy rate would be viewed as staying low for an extended period, thereby lowering long-term interest rates, (2) lowering risk and term premiums by purchasing securities, thereby changing their relative supply, and (3) intervening in foreign exchange rate markets to lower the value of the domestic currency, thereby increasing foreign demand for domestic production.

One counter argument to this view was the experience of Japan after the bursting of its stock market and real estate bubble. However, as Posen (2003) pointed out, the problem in Japan was not so much the bursting of the bubble as it was the subsequent policies. The imbalances in Japan's banking sector were not resolved, so they continued to get worse well after the bubble had burst. In addition, as pointed out in Ahearne et al. (2002), the Bank of Japan did not ease monetary policy sufficiently or rapidly enough in the aftermath of the crisis.

The bottom line from this reasoning was that the cost of leaning against asset price bubbles was likely to be high, while the costs of bursting bubbles could be kept low. Instead of trying to lean against bubbles, central banks should just clean up after the bubble burst. This approach was fully consistent with monetary policy focusing on stabilizing inflation and employment without a special focus on asset price bubbles.

Another argument against focusing on asset prices is that it could lead to public confusion about policy objectives. As reported in Giavazzi and Mishkin (2006), interviews with participants from different sectors of Swedish society suggested that statements on house prices by the Riksbank confused the public and led to a general weakening of confidence in the Swedish central bank.

The Greenspan doctrine, which was strongly supported by Federal Reserve officials, generally held sway in the central banking community before the crisis. However, even among central bankers there were dissenting voices. The Reserve Bank of Australia during the period from 2002 to 2004 argued that rising housing prices in Australia posed a risk to the economy, and there is evidence that developments in the housing market encouraged the Bank to tighten monetary policy earlier rather than later (see Bloxham, Kent, and Robson 2010). In several meetings in 2004, a minority of members of the Monetary Policy Committee (MPC) of the Bank of England argued for raising interest rates to reduce the risks that high house price appreciation and the rapid accumulation of household debt would lead to an abrupt adjustment process. Statements from officials at the ECB and other central banks also suggested that

the possibility of an asset boom or bust might require a longer period than the usual one to two years to assess whether the price stability goal was being met (Issing 2003a, b; King 2004a, b; Stevens 2004; Selody and Wilkins 2004; Bank of Canada 2006; and Rosenberg 2006).

2.2. Lessons from the Financial Crisis

There are three lessons from what occurred during the financial crisis that have a bearing on basic policy strategy.[5]

2.2.1. Developments in the financial sector have a far greater impact on economic activity than was recognized earlier

Although central bankers generally recognized that financial frictions could play an important role in business cycle fluctuations, the 2007–09 financial crisis made it clear that the adverse effects of financial disruptions on economic activity could be far worse than was anticipated for advanced economies. When the financial crisis started in August 2007, central bank actions to contain it seemed to work. Many officials at the central banks, although still concerned about the disruption to the financial markets, hoped that the worst was over and that the financial system would begin to recover (see Mishkin 2011b). The subprime mortgage sector was after all only a small part of the overall capital market, and the losses in the subprime mortgage market, although substantial, still seemed manageable. By the summer of 2008, central banks were even turning their attention to the very high inflation rates at the time; for example, there were discussions inside the Federal Reserve whether the easing phase of monetary policy might have to be reversed to contain inflation (e.g., see Wessel 2009).

But then came a set of shocks that sent the financial system and the economy over the cliff: the Lehman Brothers bankruptcy on September 15, 2008, the AIG collapse on September 16, the run on the Reserve Primary Fund on the same day, and the U.S. Treasury's struggle to get the Troubled Asset Relief Program approved by the U.S. Congress over the next couple of weeks (Mishkin 2011b). The financial crisis morphed into a global crisis that caused a sharp drop in economic activity in the United States—real GDP declined at an annual rate of –1.3 percent in 2008:Q4, –5.4 percent in 2009:Q1, and –6.4 percent in 2009:Q2—but in the rest of the world as well—with real GDP falling at a –6.4 percent rate in the fourth quarter of 2008 and a –7.3 percent rate in the first quarter of 2009. The unemployment rate shot up to over 10 percent in the United States and in many other advanced economies, with the unemployment rate remaining stubbornly high even after the world economy started to recover. The worldwide recession that resulted from the financial crisis turned

out to be the most severe economic contraction since the worldwide depression of the 1930s.

The global financial crisis of 2007–09 therefore demonstrated that financial frictions have become front and center in macroeconomic analysis. They no longer could be ignored in the macroeconometric models that central banks use for forecasting and policy analysis, as was generally the case before the crisis.

2.2.2. The cost of cleaning up after financial crises is very high

Besides the obvious cost of a huge loss of aggregate output as a result of the worldwide recession, the global financial crisis suggests that there are likely to be three additional costs that will raise the costs far higher: (1) financial crises are typically followed by very slow growth, (2) the budgetary position of governments sharply deteriorates, and (3) the exit strategy for central banks from nonconventional monetary policy may be complicated and may hinder the ability of the central bank to successfully manage the economy in the future.

When economies experience deep recessions, the typical experience is that they subsequently have very strong recoveries, often referred to as V-shaped recoveries. However, as Reinhart and Reinhart (2010) document, this V-shaped pattern is not characteristic of recessions that follow financial crises because the deleveraging process takes a long time, resulting in strong headwinds for the economy. When analyzing 15 severe post-World War II financial crises, the Great Depression, the 1973 oil shock period, and the recent crisis, they find that real GDP growth rates are significantly lower during the decade following this episode, with the median decline in GDP growth being about 1 percent. Furthermore, unemployment rates stay persistently higher for the decade after crisis episodes, with the median unemployment rate five percentage points higher in advanced economies. Although we have many years to go before a decade goes by after the most recent crisis, it actually looks like it might have worse outcomes than the average crisis episode studied by Reinhart and Reinhart. They find that 82 percent of the observations of per capita GDP from 2008 to 2010 remained below or equal to the 2007 level, while the comparable number for the 15 earlier crisis episodes was 60 percent. We now recognize that the cumulative output losses from financial crises are massive, and this current crisis looks like it will be no exception.

As pointed out by Reinhart and Rogoff (2009), the aftermath of financial crises is almost always a sharp increase in government indebtedness. We have seen exactly this situation in the aftermath of the current crisis. The massive bailouts of financial institutions, fiscal stimulus packages, and sharp economic contractions that reduced tax revenue that occurred throughout the world have

adversely affected the fiscal situation for many countries. Budget deficits over 10 percent of GDP in advanced countries like the United States have become common. Furthermore, this rise in indebtedness has the potential to lead to sovereign debt defaults, which have come to the fore with the Greek sovereign debt crisis and concerns about the long-term fiscal health of other European countries, including Ireland, Portugal, Spain, and Italy. The fiscal retrenchments required to put fiscal balances on a sustainable path are likely to not only be contractionary but also to increase societal stress. Indeed, there is even a possibility that the fiscal problems brought on by the crisis could lead countries to exit the euro area.

Actions by central banks to contain the global financial crisis resulted in huge expansions of their balance sheets. The expansion of balance sheets arising from liquidity provision is typically easy to reverse because most of the liquidity facilities have provided loans at interest rates that are higher than market rates during normal times. Hence these liquidity facilities are self-liquidating because, as financial markets return to normal, market participants are no longer willing to borrow at above-market rates, so the use of these facilities shrinks. Hence this source of balance sheet expansion naturally reverses itself as the financial system recovers, and this is exactly what has happened.

A far more serious concern is the expansion of the balance sheet that stems from asset market purchases. This expansion of the balance sheet is not self-liquidating, and there are concerns that the resulting expansion of the monetary base will lead to high inflation in the future. This concern would be more worrisome if an expansion in the monetary base were closely linked to an expansion in the money supply, but this is not the case in the current environment. Because banks are perfectly happy to hold onto huge amounts of excess reserves as long as they are paid interest on them, as is the case currently, high growth rates in the monetary base do not translate into high growth rates of the money supply. Hence, quantitative easing and the resulting increase in the monetary base are unlikely to be inflationary.

More problematic is that asset market purchases were often for long-term securities, which expose the central bank to interest risk (and credit risk if it buys private securities like mortgage-backed securities) because these securities can have substantial price fluctuations. Possible losses on these securities thus mean that there could be an erosion of capital in the central bank's balance sheet, and this could subject it to congressional or parliamentary criticism and actions that could weaken its ability to conduct an independent monetary policy. In addition, if the central bank has bought private securities, their presence on the balance sheet means that the central bank has encroached on the politicians' turf be-

cause the central bank has engaged in a form of fiscal policy, which makes its political position more precarious, again possibly leading to a loss of independence.

Even the purchase of long-term government securities poses a danger for central banks because it may create the perception that the central bank is willing to accommodate irresponsible fiscal policy by monetizing the debt. This is a particular concern right now in the euro area, where the ECB has purchased securities issued by governments that not only have large fiscal imbalances but, in the case of Greece, have even lied about their fiscal position. This problem is also a serious concern in the United States, where both political parties have been unwilling to address long-run trends in entitlements that could cause U.S. government debt to explode. Not only can the purchase of long-term government assets encourage fiscal profligacy, but it can also lead to an unhinging of inflation expectations, which could make it difficult for the central bank to control inflation in the future.

2.2.3. Price and output stability do not ensure financial stability

The inability of price and output stability to ensure financial stability is perhaps the most important lesson for central banks from the recent financial crisis. Before the crisis, the common view, both in academia and in central banks, was that achieving price and output stability would promote financial stability. This was supported by research (Bernanke, Gertler, and Gilchrist 1999, and Bernanke and Gertler 2001), which indicated that monetary policy that optimally stabilizes inflation and output is likely to stabilize asset prices, making asset price bubbles less likely. Indeed, the success of central banks in stabilizing inflation and decreasing volatility of business cycle fluctuations, which became known as the Great Moderation, made policymakers complacent about the risks from financial disruptions.

The benign economic environment leading up to 2007, however, surely did not protect the economy from financial instability. Indeed, it may have promoted it. The low volatility of both inflation and output fluctuations may have lulled market participants into thinking there was less risk in the economic system than was really the case. Credit risk premiums fell to very low levels, and underwriting standards for loans dropped considerably. Some recent theoretical research even suggests that benign economic environments may promote excessive risk-taking and may actually make the financial system more fragile (Gambacorta 2009). Although price and output stability are surely beneficial, the recent crisis indicates that a policy focused solely on these objectives may not be enough to produce good economic outcomes.

2.3. Implications for Monetary and Macroprudential Policy Strategy

Now we can see what the implications of these lessons are for basic policy strategy and in particular for macroprudential policies.

2.3.1. Flexible inflation targeting

The first key point is that the lessons from the crisis do not invalidate the benefits of having a strong, credible commitment to stabilize inflation in the long run, which is the key rationale for adopting a flexible inflation targeting framework. (For a more detailed discussion of this point, see Mishkin 2011a.) Indeed, as argued elsewhere (Mishkin 2008), a strong, credible commitment to stabilize inflation can be even more valuable in periods of financial market stress, when prompt and decisive expansionary monetary policy may be required to prevent a market meltdown, but which will only be effective if inflation expectations remain grounded.

However, although the case for a flexible inflation targeting framework is not weakened by the lessons from the financial crisis, they do suggest that details of how such a framework is executed would benefit from some rethinking. Particularly important in this regard is thinking about the lean versus clean debate regarding whether monetary policy should react to potential asset price bubbles.

2.3.2. The lean versus clean debate

In thinking about this debate, it is worth distinguishing between two different types of asset price bubbles. As pointed out in Mishkin (2010a), not all asset price bubbles are alike. Financial history and the financial crisis of 2007–09 indicate that one type of bubble, which is best referred to as a *credit-driven bubble*, can be highly dangerous. With this type of bubble, there is the following typical chain of events: Because of either exuberant expectations about economic prospects or structural changes in financial markets, a credit boom begins, increasing the demand for some assets and thereby raising their prices. The rise in asset values, in turn, encourages further lending against these assets, increasing demand, and hence their prices, even more. This feedback loop can generate a bubble, and the bubble can cause credit standards to ease as lenders become less concerned about the ability of the borrowers to repay loans and instead rely on further appreciation of the asset to shield themselves from losses.

At some point, however, the bubble bursts. The collapse in asset prices then leads to a reversal of the feedback loop in which loans go sour, lenders cut back

on credit supply, the demand for the assets declines further, and prices drop even more. The resulting loan losses and declines in asset prices erode the balance sheets at financial institutions, further diminishing credit and investment across a broad range of assets. The decline in lending depresses business and household spending, which weakens economic activity and increases macroeconomic risk in credit markets. In the extreme, the interaction between asset prices and the health of financial institutions following the collapse of an asset price bubble can endanger the operation of the financial system as a whole.

However, there is a second type of bubble that is far less dangerous, which can be referred to as an *irrational exuberance bubble*. This type of bubble is driven solely by overly optimistic expectations and poses much less risk to the financial system than credit-driven bubbles. For example, the bubble in technology stocks in the late 1990s was not fueled by a feedback loop between bank lending and rising equity values, and so the bursting of the tech-stock bubble was not accompanied by a marked deterioration in bank balance sheets. The bursting of the tech-stock bubble thus did not have a very severe impact on the economy and the recession that followed was quite mild.

However, we have learned from the recent crisis that the bursting of credit-driven bubbles not only can be extremely costly, but are very hard to clean up afterward. Furthermore, bubbles of this type can occur even if there is price and output stability in the period leading up to them. Indeed, price and output stability might actually encourage credit-driven bubbles because it leads market participants to underestimate the amount of risk in the economy. The case for leaning against potential bubbles rather than cleaning up afterwards has therefore become much stronger.

However, the distinction between the two types of bubbles, one of which (credit-driven bubbles) is much more costly than the other, suggests that the lean versus clean debate may have been miscast, as White (2009) indicates. Rather than leaning against potential asset price bubbles, which would include both credit-driven and irrational exuberance type bubbles, there is a much stronger case for leaning against credit bubbles which would involve leaning against credit-driven bubbles, but not irrational exuberance bubbles. As White (2009) and Mishkin (2010a) have pointed out, it is much easier to identify credit bubbles than it is to identify asset price bubbles. Financial regulators and central banks often have information that lenders have weakened their underwriting standards, that risk premiums appear to be inordinately low, or that credit extension is rising at abnormally high rates. The argument that it is hard to identify asset price bubbles is therefore not a valid argument opposing leaning against credit bubbles.

2.3.3. Macroprudential policies

This realization leads directly to the main theme of this report, which is the use of macroprudential policies to address the potential buildup of financial vulnerability. Although there is a strong case to lean against credit bubbles, what policies will be most effective? First, it is important to recognize that the key principle for designing effective policies to lean against credit bubbles is whether they fix market failures. Credit extension necessarily involves risk-taking. It is only when this risk-taking is excessive because of market failures that credit bubbles are likely to develop. Recognizing that market failures are the problem, it is natural to look to prudential regulatory measures to constrain credit bubbles.

Some regulatory measures to fix market failures are simply the usual elements of a well-functioning prudential regulatory and supervisory system. These elements include adequate disclosure and capital requirements, liquidity requirements, prompt corrective action, careful monitoring of an institution's risk-management procedures, close supervision of financial institutions to enforce compliance with regulations, and sufficient resources and accountability for supervisors. However, the standard measures mentioned focus on promoting the safety and soundness of *individual* firms and fall into the category of what is referred to as microprudential supervision. However, even if individual firms are operating prudently, there still is a danger of excessive risk-taking because of the interactions between financial firms that promote externalities. An alternative regulatory approach, which deals with these interactions, focuses on what is happening in credit markets in the aggregate and involves macroprudential policies.

This recognition provides a strong rationale for macroprudential policies, which we discuss in Section 3 of this study. However, in designing macroprudential policies, we require measures of when excessive risk-taking is taking place systemically. We discuss such potential measures in Section 4. Macroprudential tools can be used to dampen the interaction between asset price bubbles and credit provision, and these are discussed in more detail in Section 5 of this study.

2.3.4. Monetary policy

The fact that the low interest rate policies of the Federal Reserve from 2002 to 2005 were followed by excessive risk-taking suggests to many that overly easy monetary policy might promote financial instability. Using aggregate data, Taylor (2007) has argued that excessively low policy rates led to the housing bubble,

while Bernanke (2010), Bean et al. (2010), Turner (2010) and Posen (2009) have argued otherwise. Although it is far from clear that the Federal Reserve is to blame for the housing bubble, the explosion of microeconomic research, both theoretical and empirical, suggests that there is a case for monetary policy to play a role in creating credit bubbles. Borio and Zhu (2008) have called this mechanism the "risk-taking channel of monetary policy."

The literature provides two basic reasons why low interest rates might promote excessive risk-taking. First, as Rajan (2005, 2006) points out, low interest rates can increase the incentives for asset managers in financial institutions to search for yield and hence increase risk-taking. These incentives could come from contractual arrangements that compensate asset managers for returns above a minimum level, often zero, and with low nominal interest rates only high-risk investments will lead to high compensation. They also could come from fixed-rate commitments, such as those provided by insurance companies, forcing the firm to seek out higher yielding, riskier investments. Or they could arise from behavioral considerations such as money illusion in which asset managers believe that low nominal rates indicate that real returns are low, encouraging them to purchase riskier assets to obtain a higher target return.

A second mechanism for how low interest rates could promote risk-taking operates through income and valuation effects. Low interest rates increase net interest margins and increase the value of financial firms, boosting their capacity to increase their leverage and take on risk (Adrian and Shin 2009, 2010, and Adrian, Moench, and Shin 2010). In addition, low interest rates can boost collateral values, again enabling increased lending. This mechanism is closely related to the financial accelerator of Bernanke and Gertler (1999) and Bernanke, Gertler, and Gilchrist (1999), except that it derives from financial frictions for lenders rather than borrowers.

Monetary policy can also encourage risk-taking in two other ways. Although desirable from a viewpoint of establishing credibility and a strong nominal anchor, more predictable monetary policy can reduce uncertainty and encourage asset managers to underestimate risk (Gambacorta 2009). Monetary policy that cleans up after financial disruptions by lowering interest rates, which has been named the "Greenspan put" because this was the actual and stated policy of the Federal Reserve when Alan Greenspan headed the Fed, can lead to a form of moral hazard in which financial institutions expect monetary policy to help them recover from bad investments (e.g., see Tirole and Farhi 2009, Keister 2010, and Wilson and Wu 2010). The Greenspan put can also increase systemic risk because it is only exercised when many financial firms are in trouble

simultaneously, and so they may be encouraged to pursue similar investment strategies, thereby increasing the correlation of returns.

Micro empirical analysis provides a fair amount of support for the risk-taking channel of monetary policy. Jimenez et al. (2008), using Spanish credit registry data, find that low nominal interest rates, although they decrease the probability of defaults in the short term, lead to riskier lending and more defaults in the medium term. Ioannidou, Ongena, and Peydro (2009) examine a quasi-controlled experiment in Bolivia and find that lower U.S. federal funds rates increase lending to low-quality borrowers that end up with higher rates of default and yet at lower interest rate spreads. Delis and Kouretas (2010), using data from euro-area banks, find a negative relationship between the level of interest rates and the riskiness of bank lending.

Adrian and Shin (2010) discuss and provide evidence for the risk-taking channel of monetary policy using more aggregate data. They find that reductions in the federal funds rate increase term spreads and, hence, the net interest margin for financial intermediaries. The higher net interest margin, which makes financial intermediaries more profitable, is then associated with higher asset growth, which they interpret as a shift in credit supply, and which in turn predicts higher real GDP growth.

Given the support for the risk-taking channel, does this mean that monetary policy should be used to lean against credit bubbles? There are several objections to doing so. First, if monetary policy is used to lean against credit bubbles, it violates the Tinbergen (1939) principle because one instrument is being asked to do two jobs: stabilize the financial sector and stabilize the economy. Because there is another instrument to stabilize the financial sector, that is macroprudential supervision, would it not be better to use macroprudential supervision to deal with financial stability, leaving monetary policy to focus on price and output stability?

This argument suggests that macroprudential policies would be the first line of defense against credit bubbles. This is why we focus so much attention on these policies in this study. However, there are reasons why macroprudential policies may not always be sufficiently effective, providing a possible rationale for using monetary policy to restrain credit bubbles. Prudential supervision is subject to more political pressure than is monetary policy because it affects the bottom line of financial institutions more directly. Thus they will have greater incentives to lobby politicians to discourage macroprudential policies that would rein in credit bubbles. After all, it is during a credit bubble that financial institutions make the most money and so have greater incentives and more resources

to lobby politicians to prevent restrictive macroprudential policies. A case in point has been the recent Basel III accord. Press reports suggest that the capital standards in the accord were substantially weakened because of complaints by the German Landesbanken. Furthermore, implementation of the accord was put off for almost 10 years, and the accord did not contain measures to deal with systemic risk considerations, such as adjusting capital requirements over the credit cycle. The Basel III episode suggests that political considerations may make it extremely difficult to have effective macroprudential supervision.

The possibility that macroprudential policies may not be implemented sufficiently well to constrain credit bubbles, suggests that monetary policy may have to be used instead. But this raises another objection to using monetary policy to lean against credit bubbles: it may not work. We are sympathetic to the view discussed earlier that tightening monetary policy may be ineffective in restraining a particular asset bubble because market participants expect such high rates of return from purchasing bubble-driven assets. On the other hand, the evidence on the risk-taking channel of monetary policy suggests that there is a stronger case that raising interest rates would help restrain lending growth and excessive risk-taking. Furthermore, the theoretical analysis we discussed earlier suggests that if a central bank credibly commits to raise interest rates when a credit bubble looks like it is forming, then expectations in credit markets will work to make this policy more effective. The expectation that rates will go up with increased risk-taking will make this kind of activity less profitable and thus make it less likely that it will occur. Furthermore, expectations that rates will rise with increased risk-taking means that interest rates will not have to be raised as much to have their intended effect.

Nonetheless, using monetary policy to lean against credit bubbles is not a monetary policy strategy that can be taken lightly. Doing so could at times result in a weaker economy than the monetary authorities would desire or inflation that is too low. This suggests that there is a monetary policy trade-off between the pursuit of financial stability and the pursuit of price and output stability. Also as mentioned earlier, giving monetary policy another objective might lead to confusion about the central bank's commitment to price stability, thereby weakening the nominal anchor, with potentially adverse effects on economic outcomes.

Another danger from using monetary policy as a tool to promote financial stability is that it might lead to decisions to tighten monetary policy when it is not needed to constrain credit bubbles. A situation of low interest rates does not necessarily indicate that monetary policy is promoting excessive risk-taking. One lesson from the discussion here is that policymakers, and especially

monetary policymakers, will need tools to assess whether credit bubbles are developing. This provides an additional motivation for our analysis of measures to assess when excessive systemic risk-taking is occurring that we discuss in Section 4 of this study. Such measures can help central banks decide if there is imminent danger of credit bubbles, and whether monetary policy may have to be adjusted, in addition to using macroprudential policies, to restrain them. Monitoring of credit market conditions will become an essential activity of central banks in the future.

This danger of thinking of using monetary policy to promote financial stability is highly relevant today. Some economists, for example Hoenig (2010) and Rajan (2010), have called for the Federal Reserve to raise interest rates because they argue that the current low rates encourage excessive risk-taking. The $600 billion large-scale asset purchase (LSAP) program the Federal Reserve adopted in November 2010 has led to further criticism of Federal Reserve monetary policy, with many commentators in the media suggesting that this would also encourage excessive risk-taking. However, the U.S. economy is currently not in a situation of rapid credit growth, low-risk premiums, and increasing leverage. Indeed, it still seems to be mired in a deleveraging cycle that is producing serious headwinds for the economy. This does not mean that the situation could not change. However, the Federal Reserve's expansionary monetary policy does not appear to be creating the next credit bubble in the United States and justification for raising interest rates and abandoning LSAPs on these grounds is very weak.[6]

But are there dangers from the current expansionary U.S. monetary policy for other countries, especially open emerging economies? The answer could be yes, because many emerging market economies are currently in a very different environment, with rapid credit growth and rapidly rising real estate prices. The empirical research by Ioannidou, Ongena, and Peydro (2009) is particularly relevant on this point, because it shows that low U.S. interest rates helped promote a lending boom in an open emerging economy, in this case Bolivia. As we discuss in Section 4, we find corroborating evidence for such an effect in Korea because U.S. interest rates are found to be an important driver of the Korean credit cycle.

The current expansionary monetary policy suggests that policies in open emerging market countries could be directed at prevention of a credit bubble. But does this mean that monetary policy tools should be used to do so? In some cases, monetary policy is not an option because the exchange rate is in effect pegged to an anchor currency like the U.S. dollar. However, even in other cases where there is no exchange rate peg, monetary policy may not be effective at

constraining credit booms. Again, our empirical results for Korea in Section 5 shed light on this issue. There we find that Korean interest rates do not appear to be an important driver of the Korean credit cycle, although U.S. interest rates are. In addition, as discussed in Section 3, open emerging market economies face the dilemma that when foreign interest rates are very low, raising domestic interest rates may just encourage capital inflows that may exacerbate the credit boom, rather than restraining it.

The situation thus argues for an even greater focus on macroprudential policies in open emerging market economies. However, not all open emerging market economies are in the same boat right now. For instance, liability measures in Korea do not suggest that Korea has yet exited from a deleveraging cycle. Other emerging market economies look quite different, suggesting that they may have to tighten macroprudential standards to slow credit growth.

2.3.5. Interaction between monetary and macroprudential policies

Another lesson from the financial crisis and this discussion is that monetary policy and financial stability policy are intrinsically linked to each other, and so the dichotomy between monetary and financial stability policy is a false one. As we have seen, monetary policy can affect financial stability, while macroprudential policies to promote financial stability will have an impact on monetary policy. If macroprudential policies are implemented to restrain a credit bubble, they will slow credit growth and the growth of aggregate demand. To counter this slow growth in aggregate demand, monetary policy would be more stimulatory to stabilize inflation and output. Alternatively, if policy rates are kept low to stimulate the economy, there is a greater risk that a credit bubble might occur. This may result in tighter macroprudential policies to ensure that a credit bubble does not get started. Coordination of monetary and macroprudential policies would make it easier to pursue all three objectives of price stability, output stability, and financial stability.

3. Balance Sheet Aggregates and Financial Stability

The traditional approach to financial regulation is focused on the task of ensuring the soundness of individual financial institutions. In the case of banking regulation, this focus has been given specific form with requirements on minimum capital for banks as a proportion of the risk-weighted assets of the bank. However, the traditional approach based on the "loss absorbency" of capital suffers from two shortcomings.

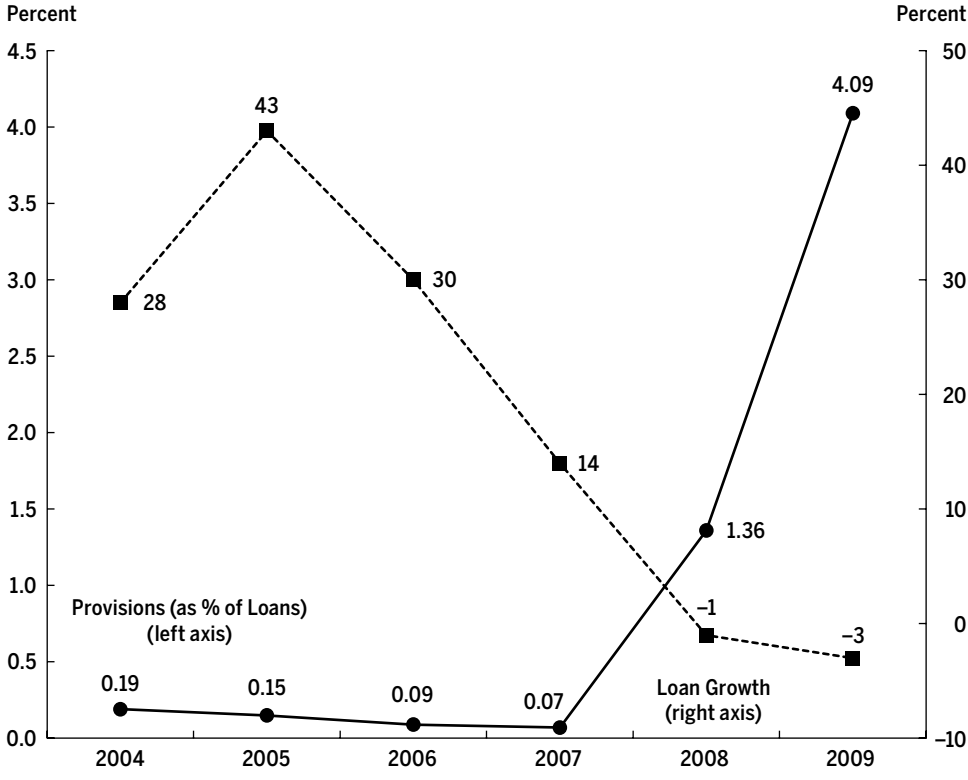
- Loss absorbency does not address directly *excessive asset growth* during booms.

- Preoccupation with loss absorbency diverts attention from the *liabilities side* of banks' balance sheets and vulnerabilities from the reliance on unstable short-term funding and short-term foreign currency debt.

To be effective, a macroprudential policy framework should address excessive asset growth and fragility of bank liabilities. Start first with the problem of excessive asset growth in a lending boom. During a lending boom, high bank profitability and low measured risk tend to bolster bank capital ratios. However, experience has shown repeatedly that rapid loan growth is achieved only at the cost of lowering lending standards. Take the example of Allied Irish Banks (AIB), which is currently very topical given the difficulties in Europe, but there is no shortage of examples from the recent global financial crisis.

Figure 1 plots AIB's loan growth and loan loss provisions from 2004 to 2009. AIB's loan book increased 43 percent in 2005 and 30 percent in 2006, but loan growth came to a sudden halt with the global financial crisis. Provisions

FIGURE 1
Loan Growth and Provisions for Allied Irish Banks



were low and falling throughout the lending boom. However, the underlying vulnerability of the loan book was exposed by the recession, and provisions have jumped above 4 percent.

AIB's capital ratios were highest at the peak of the boom in 2006 and did not issue timely warnings, as seen in Table 1. The severity of the subsequent bust calls into question the philosophy of relying on capital ratios while neglecting asset growth itself.

Would additional measures, such as forward-looking provisioning, have prevented the collapse? Larger capital cushions would undoubtedly have mitigated the shock to the real economy, but the experience of Spain (which had such forward-looking provisioning) suggests that forward-looking provisioning may not be sufficient.

Both Ireland and Spain as members of the euro area were prevented from using autonomous monetary policy to rein in domestic liquidity. However, as discussed in the previous section, the loss of autonomy over monetary policy is a more general theme that affects many more countries than just the euro area. Emerging economies with open capital markets face constraints on monetary policy from carry trade inflows. Faced with low interest rates in advanced economies, raising domestic interest rates may backfire by inducing greater carry trade inflows and looser domestic financial conditions.

The constraints on monetary policy of an economy with open capital markets can be seen from the findings of a recent empirical study by Kim and Shin (2010). This study illustrates the way in which Korea's monetary policy was affected by the U.S. monetary policy stance even after Korea officially adopted a floating exchange rate policy.

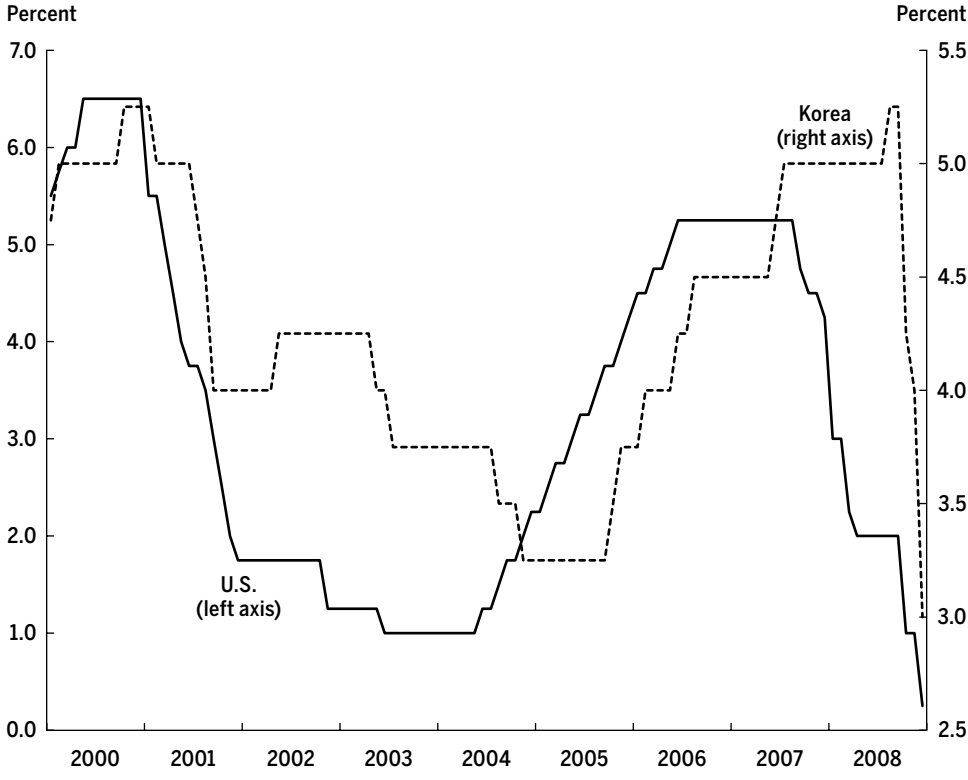
In Figure 2, the U.S. policy rate, scaled by the left axis, is measured by the federal funds target rate, and the Korean policy rate, scaled by the right axis, is measured by the target rate set by the Bank of Korea. The figure clearly shows that the Korean policy rate follows the U.S. policy rate very closely with a few months' lag. The chart is consistent with the following narrative, often encountered in market financial commentary. When U.S. interest rates fall, carry trade capital flows into Korea, loosening domestic liquidity conditions and boosting the economy. This capital inflow puts the Korean monetary authority

TABLE 1
Capital Ratios for Allied Irish Banks

	2004	2005	2006	2007	2008	2009
Tier 1 capital ratio (%)	7.9	7.2	8.2	7.5	7.4	7.2
Total capital ratio (%)	10.7	10.7	11.1	10.1	10.5	10.2

FIGURE 2

Policy Interest Rates in the United States and Korea



Sources: Federal Reserve Economic Data at Federal Reserve Bank of St. Louis and Bank of Korea.

Note: The U.S. policy rate, measured on the left axis, is the federal funds target rate (from Jan. 2000 to Dec. 2008) and the federal funds target range/upper limit (from Jan. 2009–present). The Korean policy rate, measured on the right axis, is the overnight rate set by the Bank of Korea.

in a dilemma, since raising the policy interest rate may further attract capital inflows. According to Figure 2, the Korean monetary authorities resolved the dilemma by following the stance of U.S. monetary policy and lowering Korean rates.

When faced with excessive asset growth fueled by loose domestic financial conditions other tools may be necessary to lean against the buildup of vulnerabilities. Administrative measures on bank lending such as caps on loan-to-value (LTV) ratios and debt service-to-income (DTI) ratios may be important additional ingredients in the macroprudential policy framework. DTI rules serve as an anchor that ties loan growth to the wage level. The experience of Korea and other Asian economies suggests that DTI rules may be a useful complement to more traditional tools of banking supervision.

4. Noncore Liabilities

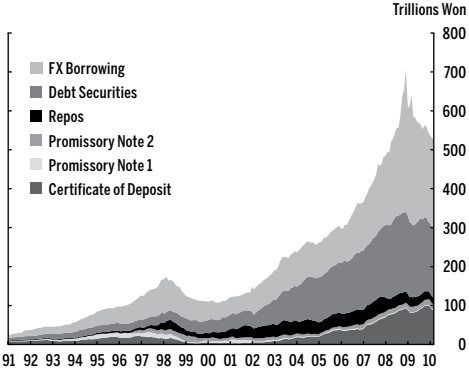
Excessive asset growth is mirrored on the liabilities side of the balance sheet by shifts in the composition of bank funding. The core funding available to the banking sector is retail deposits of household savers, which grow in line with the aggregate wealth of the household sector. In a lending boom when credit is growing very rapidly, the pool of retail deposits is not sufficient to fund the increase in bank credit. Other sources of funding are tapped to fund rapidly increasing bank lending. The state of the financial cycle is thus reflected in the composition of bank liabilities.

In an open emerging economy, rapid increases in the noncore liabilities of the banking system show up as capital inflows through increased foreign exchange-denominated liabilities of the banking system. Figure 3 charts the noncore liabilities of the Korean banking sector, taken from Shin and Shin (2011) with the foreign exchange liabilities shown as the light gray band at the top of the chart. Note that the first peak in noncore liabilities coincides with the 1997 crisis. After a lull in the early 2000s, noncore liabilities increase rapidly in the run-up to the 2008 crisis prompted by the fall of Lehman Brothers.

Figure 4 (also from Shin and Shin 2011) plots the noncore liabilities as a fraction of M2. We see that there has been substantial variation in noncore liabilities, ranging from around 15 percent of M2 to a peak of 50 percent in the Lehman crisis.

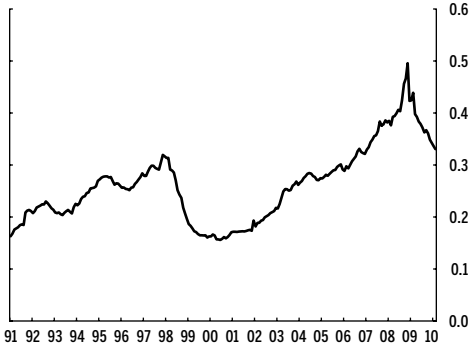
Shin and Shin (2011) have argued that the stage of the financial cycle can be gauged by using the information on the liabilities side of the banking sector

FIGURE 3
Noncore Liabilities of Korean Banking Sector



Source: Shin and Shin (2011).

FIGURE 4
Noncore Liabilities of Korean Banking Sector as a Proportion of M2



Source: Shin and Shin (2011).

balance sheet. Although monetary aggregates are also liabilities-side aggregates of the banking sector, they argue that traditional monetary aggregates can be refined and improved upon to serve as an effective set of indicators that underpin effective macroprudential policy. In this regard, they propose an approach to bank liability aggregates based on the distinction between *core* and *noncore* liabilities.

As banks, particularly in emerging market economies, are the most important financial intermediary and often play active roles in propagating the financial cycle, central banks have given special attention to the growth and changing composition of bank liabilities. For instance, traditional monetary aggregates give a window on the size and composition of bank liabilities, and hence can give an insight into the stage of the financial cycle. Key monetary aggregates such as M2 track the size of the short-term deposit base of the domestic banking system, and hence can serve as a proxy for the claims of the household sector on the banking sector, or on the intermediary sector more generally, encompassing money market funds and other short-term claims held by the household sector. In this way, monetary aggregates open a window on the possibility of macroprudential policy that takes cues from the money stock.[7]

As emphasized by Shin and Shin (2011), traditional classifications of monetary aggregates focus on the transactions role of money as a medium of exchange. As such, the criterion is based on how close to cash—how money-like—a particular financial claim is. Demand deposits are the archetypal money measure, since such liabilities of the banking sector can be quickly transferred from one person to another. Saving deposits are less money-like, and hence figure in broader notions of money, such as M2, but even here they fall outside the M2 measure if the depositor faces restrictions on easy access to the funds. In this way, the traditional hierarchy of monetary aggregates goes from cash to very liquid claims, such as demand deposits, going out to more illiquid claims on the banking sector such as term saving deposits, with the criterion being how easily such claims can be used to settle transactions. In the context of the quantity theory equation of money, this traditional monetary aggregate is more appropriate in identifying the extent to which inflation is likely.

For financial stability purposes, however, we need an alternative classification system for liability aggregates which is more directly related to the propagation of financial risks. The movement of this alternative aggregate must have implications for the procyclicality of financial cycles and systemic risk, and this property is not always captured by the ease of settlement of transactions. For instance, overnight repurchase agreements (repos) between financial institutions are claims that are short-term and highly liquid. However, the financial

crisis of 2008 demonstrated through the near-failure of Bear Stearns and the bankruptcy of Lehman Brothers that repos can be highly destabilizing when the collateral requirements on the repos rise through imposition of higher margins charged by creditors, setting off a spiral of distress in the financial system as a whole (Adrian and Shin 2010, Morris and Shin 2009, and Gorton 2008).

Shin and Shin (2011) emphasize that an important dimension that is not addressed in the traditional hierarchy of monetary aggregates is *who holds the claims*. The same claim can have very different financial stability implications if they are held by different entities. For instance, the cash deposits of a leveraged hedge fund at its prime broker are similar to demand deposits of household savers in the banking system in terms of how liquid the claim is. However, they have very different systemic implications. At the other end of the spectrum in terms of liquidity, a covered bond issued by a bank is an extremely illiquid long-term claim that is not money-like. However, a covered bond held by long-term investors such as a pension fund is similar to retail deposits in that the funding provided to the banking sector is more sticky—that is, stable—than a mortgage-backed security or a collateralized debt obligation (CDO) held by a securities firm.

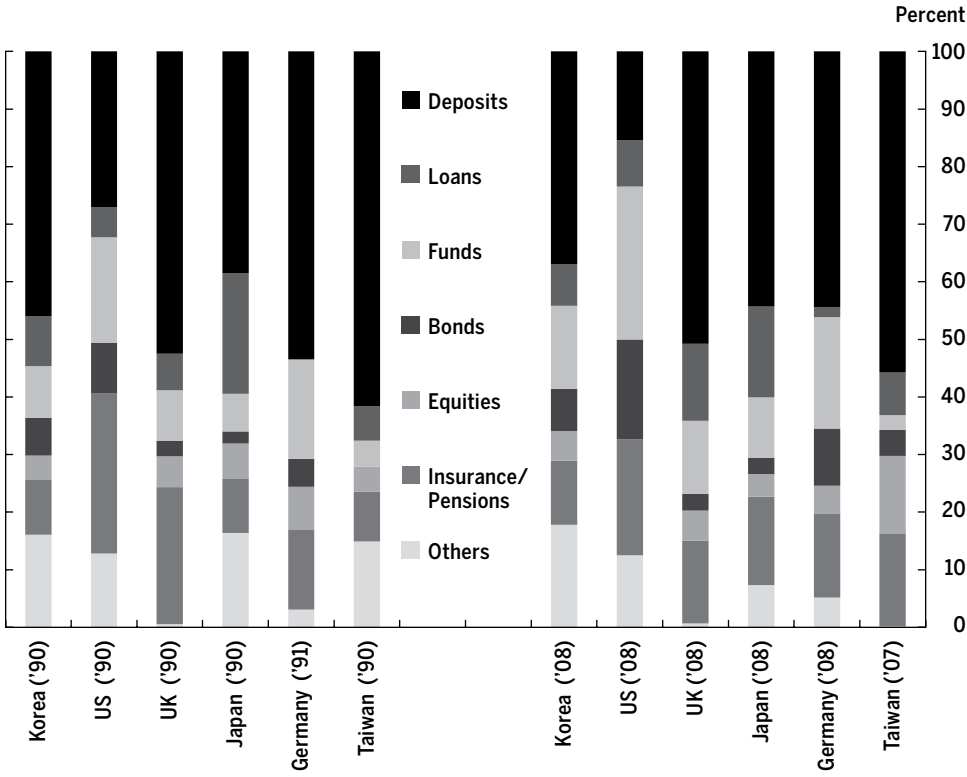
Hence, from the perspective of financial stability, traditional monetary aggregates such as M2 fail to capture the stage of financial cycles. The relevant distinction is not how cash-like a claim is as embedded in traditional monetary aggregates, but rather the core versus noncore distinction that has to do with whether the claim is held by the ultimate domestic creditors such as the domestic household sector as it is more stable. For instance, repos and other claims held by banks on other banks can be regarded as noncore liabilities, which are more volatile.

If the financial system is organized around the capital market, conventional measures of money represent only a small proportion of the aggregate size of the leveraged sector. Nor is the quantity of deposits the most volatile component of the total aggregate liabilities of the financial system. In such a world, monitoring money aggregates is less useful for macroprudential policy.

The rapid move toward a market-based financial system in recent years has accelerated the trend toward greater reliance on nontraditional, non-deposit-based funding and toward greater use of the interbank loan market, the market for commercial paper, and asset-backed securities. As an illustration, Figure 5 compares the composition of liabilities of financial institutions in major countries. As we can see, the composition of liabilities varies substantially across countries and across time. Note also that the share of deposits

FIGURE 5

Composition of Financial Liabilities of Financial Intermediaries in Selected Countries



Source: Hahm (2010).

differs dramatically across countries, which shows that the usefulness of monetary aggregates is likely to be limited.

For countries with open capital markets, international capital flows play a particularly important role in financial stability, and hence have implications for the design and implementation of macroprudential policies. As argued by Shin and Shin (2011), during a boom when bank assets are growing rapidly, the funding required outstrips the growth of the domestic deposit base. It is often met by capital flows from international banks and is reflected in the growth of short-term foreign currency-denominated liabilities of the domestic banking system. As such, short-term foreign currency-denominated bank liabilities can also be seen as volatile noncore liabilities of the banking sector.

Overall, the core versus noncore properties of bank liabilities provide a better window on the actual exposure of the banking sector to financial risk and its willingness to increase exposure. As such, the relative size of noncore liabilities can be used as a monitoring tool to reflect the stage of the financial cycle and the degree of vulnerability to potential setbacks.

4.1. An Accounting Framework for Core versus Noncore Bank Liability Aggregates

Shin and Shin (2011) considered a basic accounting framework to clarify the discussion of core and noncore liabilities. Suppose that the domestic financial system consists of ultimate borrowers (domestic firms and households) and ultimate creditors (domestic households). The domestic banking sector channels funds from ultimate creditors to ultimate borrowers. There is also a foreign creditor sector that stands ready to supply funds to the domestic banking sector. Shin and Shin (2011) show that the aggregate balance sheet identity can be rewritten in the following way.

$$\begin{aligned}\text{Total Credit} = {} & \text{Total Equity of Banking Sector} \\ & + \text{Liabilities to Nonbank Domestic Creditors} \\ & + \text{Liabilities to Foreign Creditors}\end{aligned}$$

The accounting identity above helps us understand the connections between (1) the procyclicality of the banking system, (2) systemic risk spillovers, and (3) the stock of noncore liabilities of the banking system. The core liabilities of a bank are its liabilities to the nonbank domestic creditors (such as through retail deposits). Then, the noncore liabilities of a bank are either a liability to another bank or a liability to a foreign creditor. This accounting identity nets out the claims and obligations *between* banks and describes only the total claims of ultimate creditors on the ultimate debtors. The accounting identity is helpful in keeping track of the total credit to the private sector, and the total funding that is needed to support that credit. The systemic risks that result from the claims between banks will be addressed below separately.

The accounting identity above nets out the interbank claims, and so is not well-suited to identifying the risks from runs. Instead, the focus is on total credit that flows to the ultimate borrowers in the economy. If the concern is with "excessive" lending by banks (the quotes indicate we're not giving a formal definition), then the accounting identity serves to draw attention to the role of noncore liabilities in funding the excessive lending.

As seen in Section 3, in a boom when credit is growing very rapidly, the growth of bank balance sheets outstrips the growth in the pool of retail deposits. As a result, the growth of bank lending results in greater lending and borrowing

between the intermediaries themselves, or results in the sucking in of foreign debt. To understand this point better, first, consider the simple case where there is no foreign creditor sector. In a boom when the assets of banks grow rapidly but the pool of retail deposits stays fixed, the proportion of banking sector liabilities in the form of retail deposits will fall. More generally, in the presence of a foreign creditor sector, the increase in bank lending will result in increased cross-lending between banks, but also will result in greater borrowing from abroad. In this way, Shin and Shin (2011) argue that there are close conceptual links between procyclicality, systemic risk spillovers, and the stock of noncore liabilities of the banking system. The stage of the financial cycle is reflected in the composition of the liabilities of the banking sector.

The discussion so far suggests that the definition of core and noncore liabilities should focus on whether the liability is to an ultimate domestic creditor or not. In particular, Shin and Shin (2011) argue that we should distinguish between

1 liabilities due to an ultimate domestic creditor,
2 liabilities due to an intermediary, and
3 liabilities due to a foreign creditor.

The principle would be that (1) is classified as a core liability and (2) and (3) as noncore liabilities. In practice, however, the classification is not so clear-cut. For instance, the claims held by domestic nonfinancial firms share features of both core and noncore liabilities and are not easy to classify. For a small and medium-sized enterprise with an owner-manager, the bank deposits of that firm could be seen as household deposits. However, the firm could be a major firm with access to market finance, that can issue bonds and then deposit the proceeds of the bond sale in the banking system. This is what happened in Japan in the 1980s, for instance. This latter case should not be counted as a core liability, since the creditor firm is acting like an intermediary who borrows in the financial markets to lend to the banks.

For instance, as shown in Table 2, Shin and Shin (2011) suggest a two-way classification that takes account of the traditional concern with the liquidity of monetary aggregates together with the question of whether the liabilities are core or noncore. While acknowledging that some differences of views could lead to alternative classifications, they used the distinction to examine the case of Korea. For Korea, they define noncore liabilities as the sum of (1) bank liabilities to foreign creditors (2) bank debt securities (3) promissory notes (4) repos and (5) certificates of deposit (CDs).[8] This is the measure that was plotted earlier in Figures 3 and 4.

TABLE 2
Classification of Core versus Noncore Liabilities

	Core liability	Intermediate	Noncore liability
Highly liquid	Cash Demand deposits (households)	Demand deposits (nonfinancial corporate)	Repos Call loans Short-term foreign exchange bank debt
Intermediate	Time deposits & CDs (households)	Time deposits & CDs (nonfinancial corporate)	Time deposits & CDs (banks & securities firms)
Illiquid	Trust accounts (households) Covered bonds (households)	Trust accounts (nonfinancial corporate)	Long-term bank debt securities (banks & securities firms) Asset-backed & mortgage-backed securities

Source: Shin and Shin (2011).

Note that this measure of noncore liabilities is an approximation of true noncore liabilities as the classification is still based upon financial instruments rather than actual claimholders. For instance, bank debt securities such as debentures and CDs can be held by households, and those must be excluded from the noncore liabilities. In Section 4.3 we conduct a more accurate analysis using information on claimholders of bank liabilities.

4.2. Empirical Properties of Bank Liability Aggregates: The Case of Korea

Based on our accounting framework, we examine the empirical properties of core and noncore bank liability aggregates using Korean data. We construct more detailed measures of core and noncore liabilities by using information in the flow of funds data. While the measures used in Section 3 were suggestive, they were not rigorously formulated since we did not use the information about who holds the claim. In Korea, the flow of funds data report the financial flows across various sectors of the economy. Since this contains information about both assets and liabilities of each sector classified by detailed instruments, we can infer the information about who holds the claim. We obtained Korea's flow of funds data from the Bank of Korea (http://ecos.bok.or.kr/).

4.2.1. Preliminary data analysis

For our study, we focus on the liabilities outstanding (i.e., stock measures) of depository financial corporations. The depository financial corporations include domestically licensed banks, specialized banks, foreign bank branches, bank

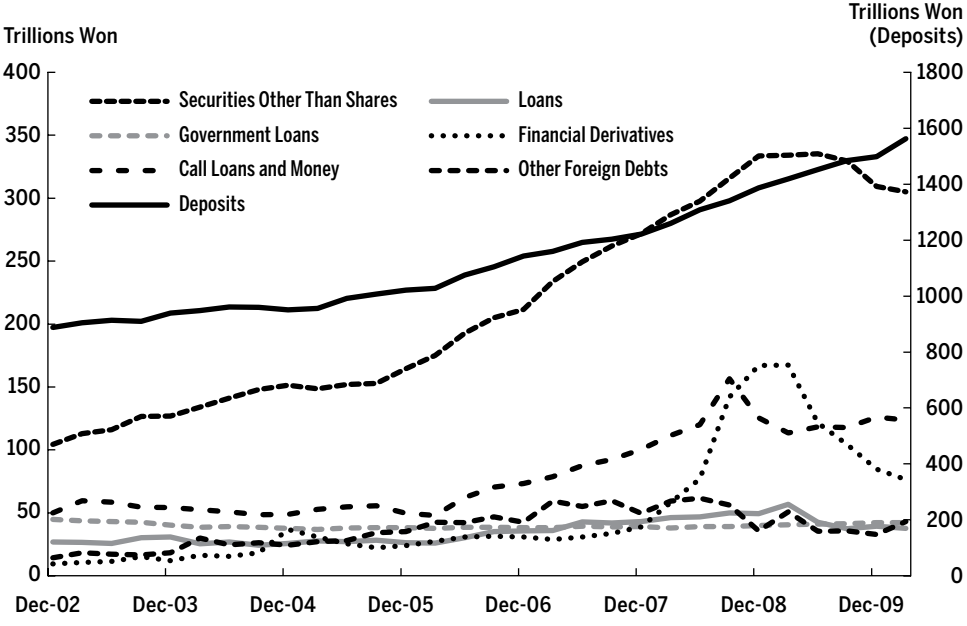
holding companies, and nonbank depository institutions such as bank trust accounts and credit unions. Hereafter, we simply refer to the depository financial corporations as banks. The data are quarterly (end of quarter) from 2002:Q4 to 2010:Q1.[9] Given our purpose of constructing core and noncore bank liabilities, we exclude equities, foreign direct investment, Bank of Korea (BOK) loans, beneficiary certificates, and miscellaneous items from the total liabilities of banks.

Our bank liabilities data are classified by two dimensions: by instruments and by claimholders. First, in terms of instruments, bank liabilities are classified into seven broad categories: deposits; securities other than shares; loans; government loans; call loans and call money; financial derivatives; and other foreign debts. Other foreign debts are mainly foreign borrowings of domestic banks and foreign bank branches located in Korea. Deposits are further classified into six subcategories: transferable and short-term deposits; long-term savings deposits; cover bills; negotiable CDs; repurchase agreements RPs; and money in trust. Securities other than shares (hereafter securities) are further classified into three categories: financial debentures; commercial paper (CP); and external securities. Loans are further classified into four categories (excluding the BOK loans): depository corporation loans; insurance company loans; loans by credit-specialized financial institutions; and loans by public financial institutions. Second, the bank liabilities are classified into five categories depending upon who holds the claim: other financial corporations; nonfinancial corporations; households; general government; and the foreign sector.

Figure 6 shows how bank liabilities classified by instrument evolved over time. In terms of size, deposits are the largest item, constituting over 70 percent of total bank liabilities. The growth of most instruments other than deposits stagnated after the outbreak of global financial crisis in 2008. Note that three instruments in particular—securities, financial derivatives, and foreign debts—exhibit a much more pronounced rise and fall around the crisis.

Now we turn to the classification of bank liabilities by claimholder—namely by who holds the claim. The evolution over time of bank liabilities by claimholders in Korea is shown in Figure 7. Recall that in the previous section, we defined liabilities held by households or nonfinancial corporations as core liabilities and those held by financial corporations or by the foreign sector as noncore liabilities. We see that both the liabilities held by financial corporations and liabilities held by the foreign sector increased rapidly before the crisis and then collapsed afterward. This is typical of the dynamics of noncore liabilities around financial crises. While foreigners had reduced their holdings at the end of 2008 and maintained their positions subsequently, financial institutions reduced their holdings most dramatically after the first quarter of 2009. In contrast, the liabilities

FIGURE 6
Bank Liabilities by Instrument



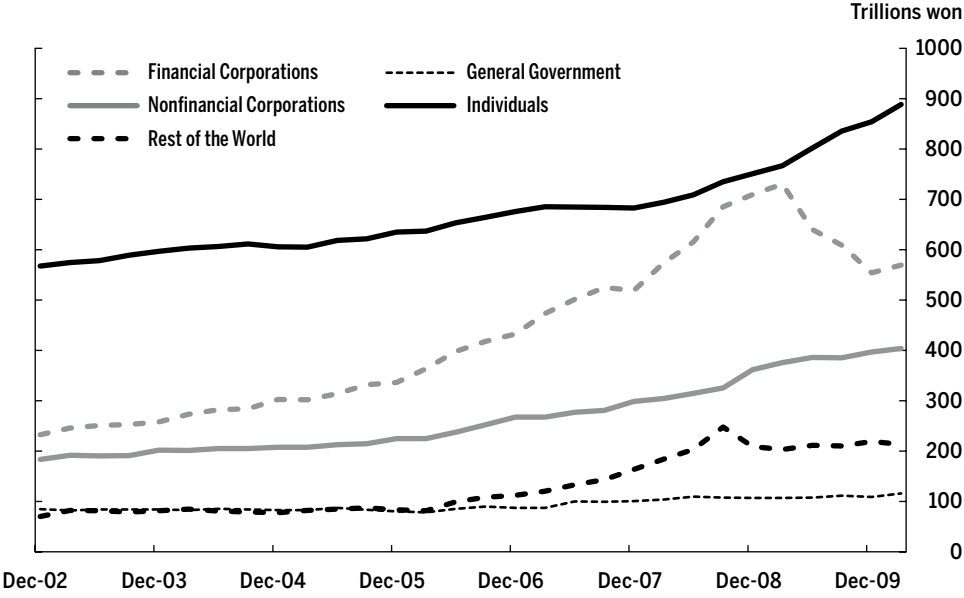
Note: Currency and deposits are measured by the right axis. Others are measured by the left axis.
Source: Flow of funds data, Bank of Korea.

held by households and by nonfinancial corporations increased steadily without much fluctuation around the crisis, which is a typical feature of core liabilities.[10]

During the boom, as bank lending increases, the liabilities also increase. Since core liabilities are quite stable, if total liabilities increase rapidly, then the increase must be mainly through the buildup of noncore liabilities, as shown above. Hence the financial cycle shows up in the composition of liabilities; the share of noncore liabilities increases rapidly before the crisis, only to collapse with the crisis.

Figure 8 exhibits the ratio of noncore to core bank liabilities. It is defined as the ratio of noncore liabilities held by financial corporations and the foreign sector to core liabilities held by households and nonfinancial corporations. The figure also illustrates the quarterly average exchange rate of the Korean won against the U.S. dollar. As foreign borrowings are a major source of noncore liabilities, changes in the noncore-to-core ratio are expected to be closely associated with the movement of the exchange rate as discussed in the previous section. Indeed, the figure shows that the peak of the noncore-to-core ratio was followed by a sudden plummet of the exchange rate.

FIGURE 7
Bank Liabilities by Claimholders



Source: Flow of funds data, Bank of Korea.

4.2.2. Procyclicality of bank liability aggregates

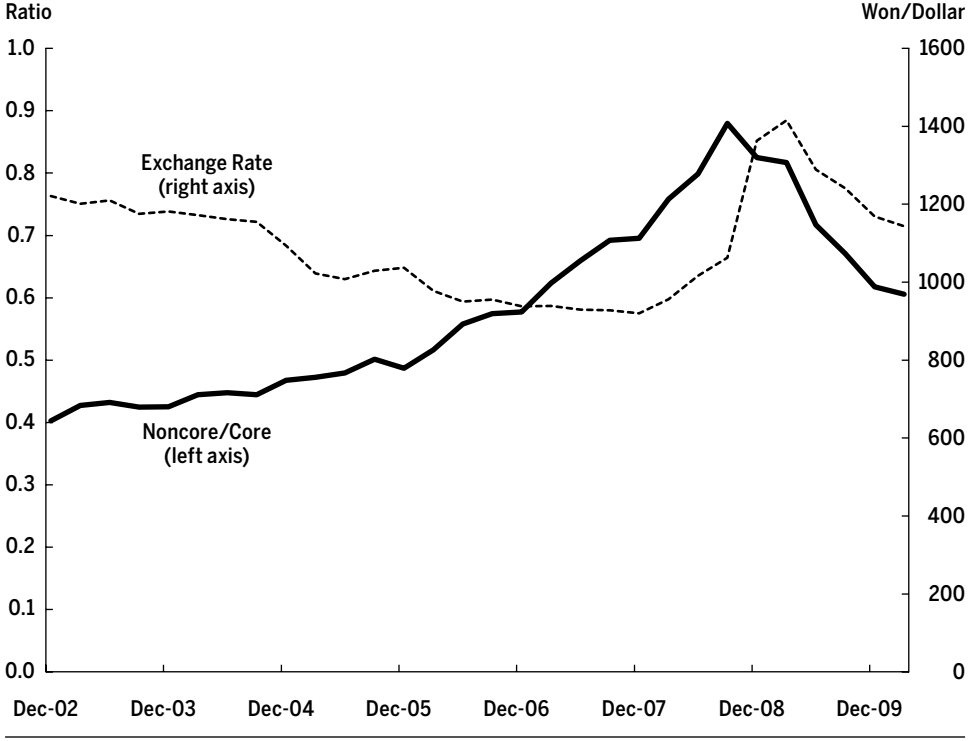
As discussed in Section 3, mitigating procyclicality is a key challenge for macroprudential policies. However, for policymakers to apply any macroprudential tools, it is necessary to monitor and identify the relevant stage of financial cycles. We hypothesize that the degree of financial procyclicality is amplified by the expansion and shrinkage of noncore liabilities. During the boom, when bank lending increases, liabilities also increase but all liabilities do not increase evenly. Namely noncore liabilities will be more procyclical than core liabilities.

To confirm this claim and estimate the responsiveness of bank liabilities over the business cycle, we rely on the simplest possible measure: the elasticity of the liability with respect to real GDP. The elasticity of each liability i with respect to real GDP is calculated through regressions of the following form:

$$\ln(L_{it}) = \beta_0 + \beta_1 \ln(y_{t+\tau}), \tau = -1, 0, 1. \quad (1)$$

Here, L_{it} is bank liability i at date t, and i denotes core and noncore liabilities, respectively; $y_{t+\tau}$ is real GDP at date $t+\tau$, where τ takes values $\tau = -1, 0, 1$. In the regression, the estimated value of β_1 represents the elasticity of liability i

FIGURE 8
The Noncore to Core Ratio and the Won/Dollar Exchange Rate



Source: Bank of Korea.

Note: The noncore to core ratio is defined as the ratio of noncore liabilities held by financial corporations and the foreign sector to core liabilities held by households and nonfinancial corporations. The exchange rate is the quarterly average of the Korean won/U.S. dollar exchange rate.

with respect to current real GDP ($\tau = 0$), lagged real GDP ($\tau = -1$), and lead real GDP ($\tau = 1$).[11]

In Table 3 we present the estimated elasticity with respect to real GDP of core and noncore bank liabilities as classified by claimholders. As can be seen in the table, noncore liabilities provided by financial institutions and the foreign sector are much more procyclical than core liabilities held by households and nonfinancial firms. The real GDP elasticity of contemporaneous noncore liabilities is estimated to be 4.26 while the real GDP elasticity of core liabilities is relatively low at 1.74.[12] The estimation results suggest that bank liabilities can be classified as core versus and noncore depending upon who holds the claim, and this classification well captures the differential degree of respective liabilities' contribution to financial procyclicality.

TABLE 3
Real GDP Elasticity of Bank Liabilities

	Real GDP Elasticity (02Q4–10Q1)		
	–1	0	1
Core liability	1.75***	1.74***	1.68***
	(11.25)	(11.88)	(11.51)
Noncore liability	4.36***	4.26***	4.28***
	(17.75)	(14.99)	(12.62)

Note: T-values are reported in parentheses and the statistical significance at 10%, 5%, and 1% levels is denoted by *, **, and ***, respectively.

4.2.3. Responsiveness of bank liabilities to the policy interest rate

Given the positive results, we proceed to estimate the responsiveness of bank liabilities with respect to the stance of monetary policy as measured by Korea's short-term policy interest rate, and investigate whether core and noncore liabilities show a differential responsiveness. For instance, a permissive monetary policy environment and low interest rates may lead to amplification of financial cycles through expansion of short-term market-based borrowings. Furthermore, from the perspective of financial stability policy, for central banks to use monetary policy to lean against the excessive buildup of bank liabilities, a necessary condition is that bank liabilities respond to the change in the policy interest rate.

In this section, to examine this possibility, we estimate a semi-elasticity of bank liabilities with respect to the policy interest rate by modifying the equation as follows:

$$\ln(L_{it}) = \beta_0 + \beta_1 \ln(y_t) + \beta_2 i_{t+\tau}, \tau = -1, 0, 1. \quad (2)$$

Here, $i_{t+\tau}$ is the domestic policy interest rate at time $t+\tau$. In the regression the estimated value of β_2 represents a semi-elasticity of liability i with respect to the policy rate after controlling for the impact of real GDP.

Table 4 reports estimates of the semi-elasticity for the domestic policy interest rate of core and noncore bank liabilities. Interestingly, the semi-elasticity of

TABLE 4
Domestic Policy Interest Rate Semi-elasticity of Bank Liabilities

	Interest Rate Elasticity (02Q4–10Q1)		
	–1	0	1
Core liability	–3.88***	–5.13***	–5.55***
	(–3.29)	(–6.08)	(-8.83)
Noncore liability	4.25	–0.92	–5.99***
	(1.64)	(–0.36)	(–2.72)

Note: T-values are reported in parentheses and the statistical significance at 10%, 5%, and 1% levels is denoted by *, **, and ***, respectively.

core liabilities with respect to the contemporaneous policy rate is –5.13, which is quite high and very significant, while the semi-elasticity of contemporaneous noncore liabilities is not statistically different from zero.[13] While our regression results do not demonstrate any causal relationship, if we take the policy rate to be exogenous, the results suggest that domestic monetary policy may not be an effective macroprudential tool to lean against the excessive growth of noncore liabilities, while it may be able to contain core liabilities. This finding is consistent with the discussion in Section 2 about the constraints on monetary policy placed on the central bank of a country with open capital accounts.

To explore the possibility of domestic bank liabilities being responsive to global liquidity shocks, we now replace the domestic policy rate with the foreign policy rate. For the foreign policy rate, we use the U.S. federal funds rate set by the Federal Reserve. Table 5 reports estimates of the semi-elasticity with respect to the U.S. policy rate of core and noncore bank liabilities. Since U.S. policy rates are exogenous to the Korean economy, these estimates are more likely to provide information about causality, and they are quite different from those when we use the domestic policy rate. The semi-elasticity of noncore bank liabilities with respect to the U.S. policy rate is negative and statistically significant. The semi-elasticity of noncore liabilities with respect to the current U.S. policy rate is –3.49 while the semi-elasticity of the core liabilities is –2.97.

Overall, we find that Korean banks' noncore liabilities are much more negatively related to the U.S. policy rate than to the domestic policy rate. One plausible interpretation is that, for emerging economies such as Korea, banks' noncore liabilities tend to build up more vigorously when global liquidity conditions are lax. For instance, when foreign interest rates are low, financial intermediaries are more engaged in the carry trade of borrowing through the low foreign interest rate instruments and investing in higher domestic interest rate instruments. This carry trade leads to more foreign borrowing and thus larger bank liabilities held by the foreign sector.

TABLE 5

U.S. Policy Interest Rate Semi-elasticity of Bank Liabilities

	US Fed Fund Rate Elasticity (02Q4–10Q1)		
	–1	0	1
Core liability	–3.14***	–2.97***	–2.55***
	(–8.30)	(–8.09)	(–5.99)
Noncore liability	–2.74**	–3.49***	–4.43***
	(–2.12)	(–3.08)	(–4.55)

Note: T-values are reported in parentheses and the statistical significance at 10%, 5%, and 1% levels is denoted by *, **, and ***, respectively.

The intermediaries with more funding from foreign sources are capable of lending to other intermediaries as well as to ultimate borrowers. Hence, bank liabilities held by other financial corporations also increase. Since these two noncore liabilities, held by the foreign sector and by financial corporations, are the major source of rapid accumulation of bank liabilities, it is not surprising to see that the foreign interest rate plays such an important role in emerging market countries such as Korea. If the negative relationship between bank liabilities and the U.S. policy rate can be interpreted to reflect a causal relationship, our results suggest that accumulation of Korean noncore bank liabilities is much more affected by the U.S. policy rate than the domestic policy rate. This implies that there is not much scope for domestic monetary policy to play in controlling bank liabilities for prudential purposes.

In Section 3 we referred to a recent empirical study by Kim and Shin (2010) that shows how Korean monetary policy is dependent on U.S. monetary policy even after Korea officially adopted a floating exchange rate policy. This fact is clearly reflected in Figure 2, where we observed that the Korean policy rate follows the U.S. policy rate very closely with a few months lag.

Our finding in Table 4 that the lead of the domestic policy rate in Korea is more negatively related to bank noncore liabilities than either contemporaneous or lagged rates can also be understood by the fact that Korea's domestic monetary policy follows the U.S. policy rate with a lag. Since future domestic monetary policy is more or less similar to current U.S. monetary policy, if bank liabilities respond to current U.S. monetary policy, the semi-elasticity of bank liabilities will be more correlated to the lead of the domestic policy interest rate.

Overall, our results confirm that the accumulation of noncore bank liabilities in Korea is more affected by the U.S. policy rate than by the domestic Korean policy rate. This finding strongly suggests that monetary policy has cross-border spillover effects and that the stages of the domestic financial cycle and thus the buildup of financial risks cannot effectively be addressed solely by monitoring domestic monetary policies in emerging economies.

5. Macroprudential Policy Frameworks

Our finding in the previous section suggests that central banks in open emerging economies, even when they have a flexible exchange rate regime, may want tools beyond the traditional policy interest rate to respond preemptively to the buildup of financial risks. A macroprudential policy framework is necessary to complement monetary policy in this respect. This framework should encompass a system of early warning indicators that signal increased vulnerabilities to financial stability and a set of associated policy tools that can address the

increased vulnerabilities at an early stage. The surveys by the Bank of England (2009) and Bank for International Settlements (BIS 2010) give useful taxonomies. Hanson, Kashyap, and Stein (2011) provide further empirical context and support.

5.1. Macroprudential Indicators

Excessive asset growth of the banking sector is at the core of increased financial sector vulnerabilities. The challenge for policymakers is knowing when asset growth is "excessive" and finding policy tools that can address and counter the excessive asset growth in a timely and effective manner.

Simple rules of thumb such as the ratio of total credit to GDP may be useful, as demonstrated by Borio and Lowe (2004). This ratio has figured prominently in the discussion of the countercyclical capital buffer under the Basel III framework, which proposes a buffer focused on the credit to GDP ratio as the measure of procyclicality that would trigger increased capital requirements on banks (Basel Committee on Banking Supervision 2009). The idea that the required capital buffer would vary with the financial cycle had been in existence for some time and had been argued in the Geneva Report on bank regulation (Brunnermeier et al. 2009), but the Basel Committee's approach went one step further in selecting the credit to GDP ratio as the appropriate cyclical indicator.

It is natural that credit growth should be scaled by normalizing it relative to some underlying fundamental measure. Normalizing credit growth by GDP has many advantages, since GDP is an aggregate flow measure of economic activity that reflects current economic conditions. However, more controversial is the choice of the measure of credit growth itself, especially if such a choice entails decisions that are made on a discretionary basis by the relevant authority that is in charge of banking sector oversight.

Further research will be necessary to determine to what extent the simple credit to GDP ratio can serve as a finely calibrated signal that can support the use of automatic tightening of bank capital standards, as envisaged in the Basel III framework.

Edge and Meisenzahl (2011) argue that using the credit to GDP ratio in real time as a guide to policy may be fraught with difficulties due to measurement problems. They identify two types of measurement issues—the first dealing with the underlying components of GDP that may subsequently be revised, and the second dealing with the difficulties of estimating the gap between the current realization and the trend. Since the trend itself must be measured in real time, the gap measure turns out to be highly sensitive to measurement problems.

It would be uncontroversial to say that the less unanimity there is in the interpretation of the signal, the greater will be the political economy challenges faced by policymakers in acting decisively and in a timely fashion to head off financial booms that build up vulnerabilities. Therefore, the use of the credit to GDP ratio in real-time policy can be expected to present formidable challenges.

Given the potential difficulties of using the simple credit to GDP ratio as the appropriate signal of the stage of the financial cycle, alternatives may be preferable. Following from our discussion in previous sections, a more promising set of measures of the financial cycle are those derived from the liabilities side of banking-sector balance sheets. In particular, the growth of various components of noncore to core liabilities of the banking sector may be especially useful in gauging the stage of the financial cycle.

Although balance sheet aggregates are forms of monetary aggregates and liability measures of the banking sector, there are important distinctions with the traditional approach to monetary analysis. Traditional monetary aggregates have been examined by monetary economists for their effect on future inflation through the quantity theory of money. The recent lengthy study by the ECB (Papademos and Stark 2010) is a comprehensive survey of the traditional approach to the study of monetary aggregates.

However, the macroprudential role of monetary aggregates depends on the behavioral and stability properties of such aggregates. As we have seen, the legal form of the claim may not coincide with the behavioral properties of the claim. For instance, we have seen that household deposits have empirical traits that differ from deposits held by other types of owners, even though the legal form of the claims is identical.

In particular, we have shown that a two-dimensional classification of bank liabilities in terms of (1) the holder of the claim and (2) the type of claim provides a much richer texture to the overall picture of banking-sector fluctuations. Further refinements of this two-way classification and further explorations of the predictive properties of the noncore liability aggregates for financial spreads and exchange rate changes may shed light on the optimal set of indicators.

Measures of cross-exposures across intermediaries (such as the conditional value at risk (CoVaR) measure due to Adrian and Brunnermeier 2009) may be useful complementary indicators, bearing in mind that cross-exposures themselves are procyclical, and track noncore liabilities. The study of cross-exposures across financial institutions is still in its infancy, but there has been a growth in interest on this issue, especially from researchers in central banks from those advanced economies that were on the front line of the financial distress during the recent financial crisis.

Among advanced economy central banks, the Bank of England has been one of the most active in research into the systemic risk generated by cross-exposures between financial intermediaries. In November 2009, the Bank of England published a discussion paper on the role of macroprudential policy (Bank of England 2009). The report reflects the issues and policy concerns that reflect the country's experience with the failure of Northern Rock bank and the subsequent intervention and resolution in the U.K. banking system. Although there is some gap between the concerns of an advanced economy and those of an emerging economy, many of the lessons on excessive asset growth and the growth of volatile market-based liabilities are common themes.

The Bank for International Settlements, especially its Committee for the Global Financial System (CGFS) has also conducted extensive study of the role of macroprudential policy. The CGFS published a discussion paper in May 2010 that gives an overview of the instruments and frameworks of macroprudential policies.

5.2. Macroprudential Tools

Macroprudential policy tools to mitigate vulnerabilities ideally would be designed to fit closely with the early warning indicators and the conceptual underpinnings for the relevant economic externalities. We proceed to outline the variety of tools that have been used or proposed, but we do not attempt to construct an encompassing framework that can gauge the trade-offs in a systematic way. A promising approach in providing a more systematic framework is given by Goodhart et al. (2012) who examine a micro-founded general equilibrium model with default.

Examples of macroprudential policy tools include the following:

5.2.1. Loan-to-value and debt service-to-income caps

When monetary policy is constrained, administrative rules that limit bank lending such as caps on LTV and DTI ratios may be a useful complement to traditional tools in banking supervision. Although LTV ratios are more familiar to financial regulators, the use of DTI caps is less widespread. However, for Korea and some Asian economies such as Hong Kong, the use of DTI ratios has been an important supplementary tool for macroprudential purposes. In the case of Hong Kong, the use of DTI rules takes on added significance because Hong Kong has a currency board based on the U.S. dollar, and hence does not have an autonomous monetary policy. As such, monetary policy shocks are transmitted directly to Hong Kong. The flexible use of LTV and DTI rules are key elements of the macroprudential toolkit.

5.2.2. Capital requirements that adjust over the cycle

Research has shown that the rise in asset values that accompanies a boom results in higher capital buffers at financial institutions, supporting further lending in the context of an unchanging benchmark for capital adequacy; in the bust, the value of this capital can drop precipitously, possibly even necessitating a cut in lending.[14] Capital requirements as currently constituted therefore can amplify the credit cycle, making a boom and bust more likely. Capital requirements that, instead, lean against the credit or business cycle, that rise with credit growth and fall with credit contraction, can thus play an important role in promoting financial stability and reducing systemic risk. Research on how to design such cyclical capital requirements needs to be a high priority for both academia and central banks.

We have already commented on some of the measurement issues associated with implementing countercyclical capital buffers. The framework for countercyclical capital buffers as envisaged in the Basel III framework has focused on the ratio of credit growth to GDP. There are two preconditions for successful implementation of such countercyclical measures. First, the quantitative signals that trigger actions should accurately reflect the features (such as excessive asset growth) that are being targeted by policymakers. Second, the implementation procedure should work better if it allows policymakers to move decisively and in a timely manner to head off the buildup of vulnerabilities. We have already commented on the first point, so here we focus on the second point.

If triggering countercyclical capital requirements is predicated on the exercise of discretion and judgment by the authorities, the political economy problems associated with the exercise of such discretion put the authorities under pressure from market participants and other interested parties. The political economy problem is similar to that of central banks that tighten monetary policy to head off property booms. Since there are private-sector participants who are the beneficiaries of the short-term boom, they can be expected to exert pressure against policymakers. The political economy problems will be more acute if there are controversies on the correctness or accuracy of the quantitative indicators used by the authorities.

Thus, the two issues mentioned above—the accuracy of the quantitative indicators and the political economy problems—are in fact very closely related. One of the disadvantages of the countercyclical capital buffer is that it relies on triggering additional capital requirements in response to quantitative signals. Although such quantitative measures are relatively straightforward in simple theoretical models, there may be considerable challenges to smooth and decisive implementation in practice.

5.2.3. Forward-looking provisioning

Forward-looking provisioning operates in a similar manner to the countercyclical capital requirements discussed earlier, although there are also important differences. The Bank of Spain has pioneered the use of forward-looking (or dynamic) provisioning. A good early reference to the specific rules and procedures as well as the empirical studies that underpin the specific quantitative features of the scheme is given in Fernandez, Pages and Saurina (2000). A more recent update is provided by Saurina (2009) in a World Bank note.

Forward-looking provisioning requires building up a loss-absorbing buffer in the form of provisions at the time of making the loan. In this sense, there is a similarity with the countercyclical capital buffer. However, the main difference between forward-looking provisioning and the countercyclical capital requirement is the accounting treatment. In the case of forward-looking provisioning, the provision passes through the income statement as reduced profit, and hence affects the capital of the bank. By influencing the capital of the bank it is likely to influence bank management that targets a specific return on equity figure.

Although forward-looking provisioning has been important in cushioning the Spanish banking system from the initial stages of the global financial crisis, there is a question mark on whether building up loss-absorbing buffers, by itself, can be sufficient to cushion the economy from the bursting of a major property bubble, as Spain is discovering its cost during the ongoing European financial crisis.

5.2.4. Leverage caps and loan-to-deposit caps

Caps on bank leverage may be used as a way to limit asset growth by tying total assets to bank equity.[15] The rationale for a leverage cap rests on the role of bank capital as a constraint on new lending rather than the Basel approach of bank capital as a buffer against loss.

In June 2010, Korean regulatory authorities introduced a new set of macroprudential regulations to mitigate the excessive volatility of foreign capital flows. Specific policy measures included explicit ceilings on foreign exchange derivative positions of banks, regulations on foreign currency bank loans, and prudential regulations for improving foreign exchange risk management of financial institutions. These policy measures are to limit short-term foreign currency denominated borrowings of banks. Along with these regulations, short-term external debts of Korean banks have remained at approximately US$200 billion level since early 2009, which is much less than the US$250 billion at the peak in

2008. Note that foreign borrowing is a key noncore funding source for Korean banks, and reining in foreign borrowing has also contributed to the deleveraging of bank noncore liabilities.

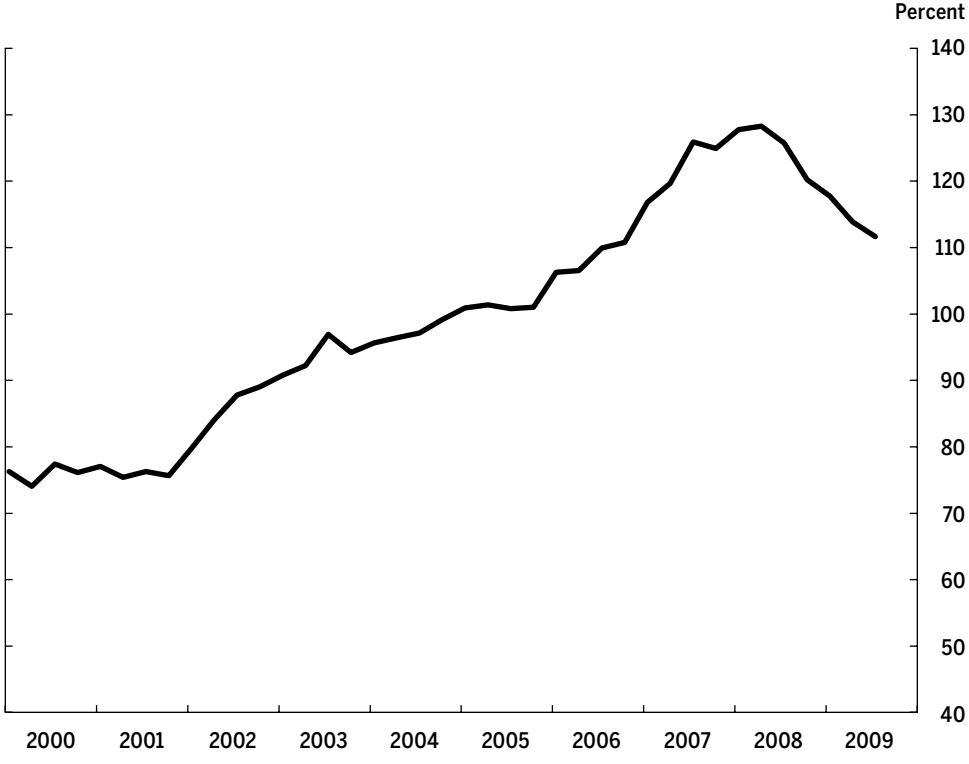
Korea's leverage cap on bank foreign exchange derivative positions introduced in June 2010 is aimed at limiting the practice of banks hedging forward dollar positions with carry trade positions in Korean won funded with short-term U.S. dollar debt. The leverage cap has moderated carry trade capital inflows into Korea, but the primary rationale of the leverage cap is as a macroprudential measure aimed at financial stability rather than as a capital control tool.

Another related measure that is in place in Korea is the cap on the ratio of loans to deposits. The Korean supervisory authority announced in December 2009 that it will reintroduce the loan-to-deposit ratio regulation which had been scrapped in November 1998 as a part of the government deregulation efforts. According to the new regulation, Korean won-denominated loans must be less than 100 percent of Korean won-denominated deposits, with negotiable CDs not being counted as deposits in computing the ratio. The 100 percent ceiling must be met by Korean banks by the end of 2013. As can be seen in Figure 9, the loan-to-value ratio of Korean banks continued to fall after this announcement as banks shifted their funding structure away from wholesale funding through CDs and bank debentures towards taking deposits such as time deposits.

However, the rule does not apply to the Korean branches of foreign banks. By capping the growth of lending to the same pace as the growth of deposit funding, the Korean loan to deposit cap has two effects. First, it restrains excessive asset growth by tying loan growth to the growth in deposit funding. Second, it has a direct effect on the growth of noncore liabilities, and hence on the buildup of vulnerabilities that come from the liabilities side of the balance sheet. In this respect, there are similarities between the loan-to-deposit cap and the levy on noncore liabilities, to be discussed later.

Indeed, at the theoretical level the loan-to-deposit cap can be seen as a special case of a noncore liabilities levy where the tax rate is kinked, changing from zero to infinity at the threshold point. However, the comparison with the noncore liabilities levy is less easy because the loan-to-deposit cap applies only to loans, not total assets or total exposures (including off-balance-sheet exposures). Also, the fact that the loan-to-deposit cap does not apply to the Korean branches of foreign banks means that there are limits on what might be achieved in reining in excesses during booms.

FIGURE 9
Loan-to-Deposit Ratio of Korean Banks



Source: Korea Financial Supervisory Service.

5.2.5. Levy on noncore liabilities

The stock of noncore liabilities reflects the stage of the financial cycle and the extent of the underpricing of risk in the financial system. A levy or tax on noncore liabilities can serve to mitigate pricing distortions that lead to excessive asset growth. The Financial Stability Contribution (FSC) recommended by the IMF in its report on bank levies[16] to the G-20 leaders is an example of such a corrective tax. Korea announced its Macroprudential Levy in December 2010, and began operation in August 2011. This levy is applied to the foreign exchange-denominated liabilities of the banking sector, with the rate initially set at 20 basis points for short-term foreign exchange-denominated liabilities.

A levy on noncore liabilities has many desirable features. First, the base of the levy itself varies over the financial cycle. The levy bites hardest during the boom when noncore liabilities are large, so that the levy has the properties of an automatic stabilizer even if the tax rate itself remains constant over

time. Given the well-known political economy challenges to the exercise of discretion by regulators, the automatic stabilizer feature of the levy has important advantages.

Second, a levy on noncore liabilities addresses financial vulnerability while leaving unaffected the essential functioning of the financial system in channeling core funding from savers to borrowers. By targeting noncore liabilities only, the levy addresses externalities associated with excessive asset growth and systemic risk arising from interconnectedness of banks.

Third, the targeting of noncore liabilities addresses the vulnerability of open emerging economies to sudden reversals in capital flows due to deleveraging by banks. Indeed, for emerging economies, a levy on noncore liabilities could be aimed more narrowly at the foreign currency-denominated liabilities only. A levy on the foreign exchange liabilities of the banking sector will have an impact on foreign currency flows, but such a policy is best characterized as a macroprudential tool aimed at financial stability, rather than a tool for capital controls or a tool to manage the exchange rate.

The revenue raised by the levy is a secondary issue. The main purpose of the levy is to align incentives. A good analogy is with the congestion charge used to control car traffic into central London. Under this charge, car drivers pay a daily fee of £8 to drive into central London. The main purpose of the charge is to discourage drivers from bringing their cars into central London, thereby alleviating the externalities associated with traffic congestion. In the same way, the noncore liabilities bank levy can be seen primarily as a tool for aligning the incentives of banks closer to the social optimum. The revenue raised by the levy would also be of benefit (perhaps for a market stabilization fund) but the revenue is a secondary issue.

5.2.6. Unremunerated reserve requirements

A traditional form of capital controls has been unremunerated reserve requirements, where the central bank requires importers of capital to deposit a certain fraction of these inflows at the central bank. The deposit does not pay interest, and so the requirement constitutes a tax on the capital inflow. In Korea, a reserve requirement for deposits is already in place, but there is no similar reserve requirement for nondeposit liabilities. The introduction of a reserve requirement for the nondeposit liabilities of banks would raise the cost of nondeposit funding for banks and thereby restrain the rapid growth of such liabilities during booms. In this respect, a reserve requirement on nondeposit liabilities would have a similar effect to a tax or levy on such liabilities.

However, there are also important differences. The reserves would have to be held on the central bank's balance sheet, with implications for fluctuations in the money supply in line with the private sector's use of nondeposit liabilities, and the selection of counterpart assets on the central bank's balance sheet.

There are also differences in the revenue implications between a reserve requirement and a levy on bank liabilities. The reserve requirement would raise revenue to the extent that the net income on the assets held by the central bank that is funded by the reserves would be positive. The bigger the interest spread, the larger the income.

There is one advantage of the reserve requirement that is not shared by the levy, which is that the banks would have access to a liquid asset in case there is a liquidity shortage or run in the financial market. In this respect, the reserve requirement would have some of the features of the Basel III liquidity requirement on banks.

However, a disadvantage of the reserve requirement is that it applies only to banks, rather than to the wider group of financial institutions that use noncore liabilities. When faced with the possibility of arbitrage, or with structural changes that shift intermediation activity from banks to market-based financial intermediaries, the reserve requirement would be less effective. For Korea, this problem is less acute under the current market structure, but the endogenous evolution of market structure cannot be ruled out.

6. Concluding Remarks

The global financial crisis has spurred a fundamental review of the principles of prudential regulation. While microprudential regulations with the objective of strengthening individual financial institutions will have some beneficial effects on strengthening the resilience of the financial system as a whole, such a firm-specific approach has been demonstrated as being insufficient to ensure financial stability. Broader measures to strengthen systems as a whole and reduce the buildup of risks over time are also needed.

The centerpiece of Basel III is a strengthened common equity buffer of 7 percent together with newly introduced liquidity requirements and a leverage cap, to be phased in over an extended timetable running to 2019. However, the elements that were most promising in living up to the macroprudential aims of regulatory reform—the countercyclical capital buffer and the capital surcharge for the systemically important financial institutions (SIFIs)—proved most controversial.

In the case of the countercyclical capital buffer, disagreements between countries meant that the countercyclical buffer will be introduced at the discretion

of national regulators in the range of 0 to 2.5 percent. In other words, there has been a failure to agree on a uniform international standard for countercyclical capital. In the case of the additional restrictions against SIFIs, the G-20 summit in Seoul in November 2010 pointed to a varied approach where individual country regulators will select policies from a large menu that includes contingent capital, leverage caps, or levies.

Thus, under its common denominator that excludes countercyclical capital or SIFI surcharges, Basel III is almost exclusively *micro*-prudential in its focus, concerned with the solvency of individual banks, rather than being *macro*-prudential, concerned with the resilience of the financial system as a whole.

The language of Basel III is revealing in this regard, with repeated references to greater "loss absorbency" of bank capital. However, we have argued in this paper that achieving greater loss absorbency by itself is almost certainly inadequate in achieving a stable financial system, for the following reasons:

- Loss absorbency does not address directly *excessive asset growth* during booms.
- Preoccupation with loss absorbency diverts attention from the *liabilities side* of bank balance sheets and vulnerabilities from the reliance on unstable short-term funding and short-term foreign currency debt.

In this paper, we have given an overview of the policy options that can complement traditional tools of bank regulation and the tools of monetary policy in reining in the excesses in the financial system. Macroprudential policies aim to constrain excessive growth in lending during booms, and thereby attain both a more viable long-term growth in lending and also mitigate the emergence of vulnerabilities on the liabilities side. The current global conjuncture with global liquidity driven by expansive monetary policies pursued by advanced economy central banks makes the topic of macroprudential policies in emerging market economies even more important and pressing than usual. Although the study of macroprudential policy frameworks is in its infancy, there is a quickly accumulating body of work on the subject. We hope that this study makes a contribution in this direction.

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NOTES

1 This section draws heavily on Mishkin (2011a).

2 One element of monetary policy strategy before the crisis not discussed here is gradualism, in which policy interest rates display a substantial amount of inertia (see Mishkin 2010a). Gradualism is not discussed here because it is not as central to the discussion of macroprudential policies.

3 The rationale for a flexible inflation targeting framework was provided by nine basic principles derived from the science of monetary policy and which have become known as the new neoclassical synthesis (Goodfriend and King 1997). These nine principles, which are discussed in detail in Mishkin (2011a) are: (1) inflation is always and everywhere a monetary phenomenon; (2) price stability has important benefits; (3) there is no long-run trade-off between unemployment and inflation; (4) expectations play a crucial role in the determination of inflation and in the transmission of monetary policy to the macroeconomy; (5) real interest rates need to rise with higher inflation, i.e., the Taylor principle; (6) monetary policy is subject to the time-inconsistency problem; (7) central bank independence helps improve the efficiency of monetary policy; (8) commitment to a strong nominal anchor is central to producing good monetary policy outcomes; and (9) financial frictions play an important role in business cycles.

4 Since the writing of this study, the Federal Reserve announced a 2 percent target in a January 25, 2012, statement.

5 There are two other lessons, not discussed here that are relevant to whether monetary policy changes should exhibit gradualism (see Mishkin 2011a): The macroeconomy is highly nonlinear, and the zero lower bound for policy rates is more problematic then previously recognized. They are not discussed here because our study focuses less on monetary policy issues.

6 Even though objections to the LSAP program on the basis that it would produce a credit bubble are currently not justified, there are features of this program that do raise legitimate concerns (see Mishkin 2010b).

7 Indeed, central banks that continue to give some attention to monetary aggregates have emphasized the financial stability properties of monetary aggregates for this reason. For instance, the ECB has shifted in recent years to interpreting their monetary pillar increasingly as a financial stability pillar. Indeed, the ECB has published a comprehensive and in-depth study of the role of monetary aggregates in the economy (Papademos and Stark 2010). The ECB study, which runs almost 600 pages, covers both the traditional roles of money in the quantity theory of money (and hence on inflation), as well as the more recent attention to the role of monetary aggregates in financial stability issues.

8 The inclusion of CDs in noncore liabilities is motivated by the fact that CDs are often held by financial institutions engaged in the carry trade, who use CDs as an alternative to holding Korean government securities in their transactions.

9 The data begin from 2002:Q4 due to the substantial revision of the data collection method following the 1993 System of National Accounts (93 SNA). Before 2002:Q4, no data are reported according to the new 93 SNA and no separate accounts exist for different types of financial corporations. Another advantage of using 93 SNA data is that it reports gross liability data within each sector without netting cross-transactions within the sector, which is more appropriate to capture the expansion and shrinkage of the balance sheet of financial institutions.

10 In the fuller version of our paper, we also conducted detailed analyses of liabilities held by different claimholders for respective instrument categories. We find that even at the deposit level, those deposits held by financial corporations show the typical dynamics of noncore liabilities, and that the securities held by households show the typical pattern of core liabilities. These findings suggest that the classification of bank liabilities by claimholders should be more informative for the purpose of macroprudential policy analysis.

11 In this regression, both regressor and regressand may be subject to a nonstationarity problem. In particular, it is well-known that if both variables are nonstationary, this type of regression is vulnerable to a spurious estimation. However, since our objective is to measure the percentage change of the liability in response to a 1 percent change in real GDP, estimating β_1 in this double log form is the right way to proceed. For a robustness check, however, we detrended both the regressor and regressand by the Hodrick-Prescott filter and obtained qualitatively similar results.

12 We also conducted more detailed analyses to estimate real GDP elasticities of respective bank liabilities classified by instruments and claimholders. We find that, when classified by instruments, the elasticity estimates for securities, financial derivatives, and foreign claims are relatively high. When classified by claimholders, elasticity measures for financial corporate and foreign sector are much higher. These results are available upon request.

13 Quite interestingly, only the lead policy rate is statistically significant with a negative sign. We will revisit and discuss this issue.

14 For example, see Kashyap and Stein (1994) and Adrian and Shin (2009).

15 Morris and Shin (2008).

16 IMF (2010).