

# Dealing with real estate booms and busts

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## Introduction

The global financial crisis changed the way we view macroeconomic policy, especially in the context of housing and mortgage markets. The main policy tenet in dealing with a real estate boom used to be “benign neglect” (Bernanke (2002)): better to wait for the bust and pick up the pieces than to attempt to prevent the boom. Two assumptions underlie this advice: the belief that it is extremely difficult to identify unsustainable booms, or “bubbles”, in real time and the notion that the distortions associated with preventing a boom outweigh the costs of cleaning up after a bust. But the crisis has shown that post-bust policy intervention can be of limited effectiveness, and thus the costs associated with a bust can be daunting. While early intervention may engender its own distortions, it may be best to undertake policy action on the basis of a judgment call if there is a real risk that inaction could result in catastrophe.

Yet a call for a more preventive policy action raises more questions than it provides answers to. What kind of indicators should trigger policy intervention to stop a real estate boom? If policymakers were fairly certain that intervention was warranted, what would be the policy tools at their disposal? What is their impact? What are their negative side effects and limitations? What practical issues would limit their use? This short paper explores these questions.

It should be recognised at the outset that there is no silver bullet. A more proactive policy stance can help reduce the risks associated with real estate booms, but will inevitably entail costs and distortions, and its effectiveness will be limited by loopholes and implementation problems. With this in mind, we reach the following conclusions. Policy efforts should focus on booms that are financed through credit, and when leveraged institutions are directly involved, as the following busts tend to be more costly. In that context, monetary policy is too blunt and costly a tool to deal with the vulnerabilities associated with increased leverage, unless the boom occurs as a result of or at the same time as broader economic overheating. Fiscal tools may be, in principle, effective. But in practice they would likely create distortions and are difficult to use in a cyclical fashion. Macroprudential tools (such as limits on loan-to-value ratios) are the best candidates to deal with the dangers associated with real estate booms as they can be aimed directly at curbing leverage and strengthening the financial sector. But their careful design is crucial to minimise circumvention and regulatory arbitrage. Further, they will entail a cost to the extent that some agents find themselves rationed out of credit markets.

In what follows, we first give a summary of how real estate boom-bust cycles may threaten financial and macroeconomic stability. Then we discuss different policy options to reduce the risks associated with real estate booms, drawing upon several country experiences (a more

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detailed analysis of country cases is in Crowe et al (2011)). We conclude with a brief discussion of guiding principles in dealing with real estate booms.

## **The case for policy action**

### ***Leverage and the link to crises***

From a macroeconomic stability perspective, what matters may be not the boom in itself, but how it is funded. Busts tend to be more costly when booms are financed through credit and leveraged institutions are directly involved. This is because the balance sheets of borrowers (and lenders) deteriorate sharply when asset prices fall. When banks are involved, this can lead to a credit crunch with negative consequences for real economic activity. In contrast, booms with limited leverage and bank involvement tend to deflate without major economic disruptions. For example, the burst of the dot-com bubble was followed by a relatively mild recession, reflecting the minor role played by leverage and bank credit in funding the boom.

Real estate markets are special along both these dimensions. The vast majority of home purchases and commercial real estate transactions in advanced economies involve borrowing. And banks and other levered players are actively involved in the financing. Moreover, homebuyers are allowed leverage ratios orders of magnitude higher than for any other investment activity. A typical mortgage loan carries a loan-to-value ratio of 71 per cent on average across a global sample of countries. In contrast, stock market participation by individuals hardly ever relies on borrowed funds. And when it does, loans are subject to margin calls that prevent the build-up of highly leveraged positions.

During the current crisis, highly leveraged housing markets had a prominent role, but this pattern is not limited to the United States, nor is it new to this crisis. The amplitude of house price upturns prior to 2007 is statistically associated with the severity of the crisis across countries (Claessens et al (2010)). Put differently, the US market may have been the initial trigger, but the countries that experienced the most severe downturns were those with real estate booms of their own. And, historically, many major banking distress episodes have been associated with boom-bust cycles in property prices (Reinhart and Rogoff (2008)). A distinguishing feature of “bad” real estate boom-bust episodes seems to be coincidence between the boom and the rapid increase in leverage and exposure of households and financial intermediaries. In the most recent episode, almost all the countries with “twin booms” in real estate and credit markets (21 out of 23) ended up suffering from either a financial crisis or a severe drop in GDP growth rate. Eleven of these countries actually suffered from both damage to the financial sector and a sharp drop in economic activity. In contrast, of the seven countries that experienced a real estate boom but not a credit boom, only two went through a systemic crisis and they, on average, had relatively mild recessions.

### ***Wealth and supply-side effects***

Real estate is an important, if not the most important, storage of wealth in the economy. Additionally, the majority of households tend to hold wealth in their homes rather than in equities. Typically, in advanced economies less than half of households own stock (directly or indirectly), while the home ownership rate hovers around 65 per cent. In addition, the supply-side effects can be substantial. In most advanced economies, house price cycles tend to lead credit and business cycles (Igan et al (2009)). This suggests that fluctuations in house prices create ripples in the economy through their impact on residential investment, consumption and credit, while the reverse effect is not as prominent, implying that the housing sector can be a *source* of shocks. Recessions that coincide with a house price bust tend to be deeper and last longer than those that do not, and their cumulative losses are three times the damage done during recessions without busts. Again, by contrast, recessions

that occur around equity price busts are *not* significantly more severe or persistent than those that do not (Claessens et al (2008)).

### ***Illiquidity, opacity and network effects***

Boom-bust cycles are an intrinsic feature of real estate markets. This reflects delays in supply response to demand shocks, and the slow pace of price discovery due to opaque and infrequent trades, as well as illiquidity owing to high transaction costs and the virtual impossibility of short sales. In other words, real estate prices and construction activity can be expected to display large swings over long periods, even absent the distortions due to institutional features of real estate finance and policy actions. Network externalities also complicate the picture. Homeowners in financial distress have diminished incentives to maintain their properties and do not internalise the effects of this behaviour on their neighbours. Similarly, foreclosures reduce the value of neighbouring properties beyond their effect through fire sales. The double role of real estate as investment and consumption good may reduce mobility and increase structural unemployment, as households in negative equity may be reluctant or unable to sell and take advantage of job opportunities elsewhere. Hence, a housing bust may weaken the positive association between employment growth and mobility.

## **Policy options**

The crisis has lent some support to the camp favouring early intervention in real estate boom-busts. If we accept that intervention may be warranted although it is difficult to separate good from bad booms, the question arises as to which policy is the best to stop the latter. The main risks from real estate boom-busts come from increased leverage in both the real (in particular, households) and financial sectors. Then policies should, whenever possible, aim at containing these risks rather than price increases. In that context, policies should target two, non-mutually exclusive objectives: (i) preventing real estate booms and the associated leverage build-up altogether, and (ii) increasing the resilience of the financial system to a real estate bust.

What follows are explorations. The narrative focuses on residential real estate, but several (although not all) of the measures discussed would easily apply to commercial real estate booms as well. We examine the potential role of monetary, fiscal, and macroprudential policies by discussing the benefits and challenges associated with each option and using case studies of countries with experience in the use of particular measures and, where possible, cross-country evidence.

### ***Monetary policy***

Can monetary tightening stop or contain a real estate boom? An increase in the policy rate makes borrowing more expensive and reduces the demand for loans. Besides, higher interest payments lower affordability and shrink the number of borrowers that qualify for a loan of a certain amount. Indirectly, to the extent that monetary tightening reduces leverage in the financial sector, it may alleviate the financial consequences of a bust even if it does not stop the boom (De Nicolo et al (2010)).

Yet monetary policy is a blunt instrument for this task. First, it affects the entire economy and is likely to entail substantial costs if the boom is limited to the real estate market. Put differently, a reduction in the risk of a real estate boom-bust cycle may come at the cost of a larger output gap and the associated higher unemployment rate (and possibly an inflation rate below the desired target range). Obviously, these concerns are diminished when the boom occurs in the context (or as a consequence) of general macroeconomic overheating.

A second concern is that, during booms, the expected return on real estate can be much higher than what can be affected by a marginal change in the policy rate. It follows that monetary tightening may not directly affect the speculative component of demand. If that is the case, it may have the perverse effect of leading borrowers towards more dangerous forms of loans. For instance, in the Czech Republic, Hungary and Poland, monetary tightening led to decreased domestic currency lending but accelerated foreign currency-denominated loans (Brzoza-Brzezina et al (2007)). Moreover, under free capital mobility, the effectiveness of monetary policy may be limited, especially for not fully flexible exchange rate regimes. Finally, the structure of the mortgage market also matters: in systems where mortgage rates depend primarily on long-term rates, the effectiveness of monetary policy will depend on the relationship between long and short rates.

To a large extent, empirical evidence supports these concerns, leading to the bottom line that monetary policy could in principle stop a boom, but at a very high cost. Policymakers would have to “lean against the wind” dramatically to have a meaningful impact on real estate prices and credit, with large effects on output and inflation. This is confirmed by a panel vector autoregression, which suggests that, at a 5-year horizon, a 100 basis point hike in the policy rate would reduce house price appreciation by only 1 percentage point, compared to a historical average of a 5 per cent increase per year (see Crowe et al (2011) for details). But it would also lead to a decline in GDP growth by 0.3 percentage points.

### ***Fiscal tools***

A variety of fiscal measures (transaction taxes, property taxes, deductibility of interest payments) has a bearing on the decision to invest in real estate. The result is often a socially driven favourable treatment of home ownership (and sometimes housing-related debt). In theory, some of these fiscal tools could be adjusted cyclically to influence house price volatility, while preserving the favourable treatment of home ownership on average over the cycle.

Yet if the net present value of all future taxes are capitalised in property prices, adjusting taxes countercyclically around the same expected mean would not affect the prices. Also, the evidence on the relationship between the tax treatment of residential property and real estate cycles is inconclusive: during the most recent global house price boom, real house prices increased significantly in some countries with tax systems that are highly favourable to housing (such as Sweden), as well as in countries with relatively unfavourable tax rules (such as France). Similarly, appreciation was muted in countries with both favourable systems (eg Portugal) and unfavourable ones (eg Japan). Overall, taxation was not the main driver of house price developments during the recent global housing boom (Keen et al (2010)).

Technical and political economy problems may further complicate implementation of cyclically adjusted fiscal measures. In most countries, tax policy is separated from monetary and financial regulation policies, making it extremely hard to implement changes in tax policies as part of a cyclical response with financial stability as the main objective. Instead, local governments may use lower property or transaction taxes to attract residents during good times if the burden in the case of a bust is shared with other jurisdictions. The ability of cyclical transaction taxes to contain exuberant behaviour may be further compromised if homebuyers do not respond to these taxes fully, because they consider them to be an acceptable cost for an investment with high returns and consumption value. Also, during a boom phase, the incentives to “ride the bubble” may increase efforts to circumvent the measure by misreporting property values or folding the tax into the overall mortgage amount. Finally, as with most tax measures, the distortions created by a cyclical transaction tax may make it more difficult to evaluate a property, which already tends to be a hard task, and also make the mobility of households more difficult, with potential implications for the labour market.

## **Macroprudential regulation**

At least in theory, macroprudential measures, such as higher capital requirements or limits on various aspects of mortgage credit, could be designed to target narrow objectives (for instance, household or bank leverage) and tackle the risks associated with real estate booms more directly and at a lower cost than with monetary or fiscal policy.

Against the benefit of a lower cost, these measures are likely to present two shortcomings. First, it may be easier to circumvent them as they target a specific type of contracts or group of agents. When this happens, these measures can be counterproductive, as they may lead to liability structures that are more difficult to resolve/renege in busts. Second, they may be more difficult to implement from a political economy standpoint since their use could be considered an unnecessary intrusion into the functioning of markets and since winners and losers would be more evident than in the case of macroeconomic policies.

We focus our analysis on three specific sets of measures: (1) capital requirements or risk weights that change with the real estate cycle, (2) dynamic provisioning (the practice of increasing banks' loan loss provisions during the upswing phase of the cycle), (3) cyclical tightening/easing of eligibility criteria for real estate loans through loan-to-value (LTV) and debt-to-income (DTI) ratios. These tools may be able to achieve both objectives: (i) reducing the likelihood and/or magnitude of a real estate boom (for instance, by imposing measures to limit household leverage), and (ii) strengthening the financial system against the effects of a real estate bust (for example, by urging banks to save in good times for rainy days).

A major limitation in assessing the effectiveness of macroprudential tools stems from the fact that macroprudential policy frameworks are still in their infancy, and only a handful of countries have actively used them. And these measures have been typically used in combination with macroeconomic policy and direct interventions to the supply side of housing markets (such as in Singapore), further complicating the challenge of attributing outcomes to specific tools.

Yet much can be learned from case studies. Following the Asian crisis, some countries in the region took a more heavy-handed approach to dealing with the risks posed by real estate booms. Countries in Central and Eastern Europe experimented with various measures to control the rapid growth in bank credit to the private sector in the 2000s. Others put in place a dynamic provisioning framework. On the whole, success stories appear to be few, perhaps to some extent reflecting the learning curve in expanding the policy toolkit, improving the design of specific tools, and sorting out implementation challenges. But when policy succeeded in slowing down a boom and avoiding a systemic crisis in a bust, it almost always involved some macroprudential measures (a detailed account of these cases is in Crowe et al (2011)).

## **Higher capital requirements/risk weights**

Capital regulation has a procyclical effect on the supply of credit. During upswings, better fundamentals reduce the riskiness of a given loan portfolio, improving a bank's capital adequacy ratio and its ability to expand its assets. In a downturn, the opposite happens. Procyclical capital requirements could help reduce this bias. Further, by forcing banks to hold more capital in good times, it would help build buffers for future losses.

For real estate loans, the procyclical element of capital regulation is largely absent. In most countries, existing rules do not take collateral values into consideration or reflect the heterogeneity among loans backed by real estate, other than the commercial-residential distinction. Under Basel II's standard approach, risk weights for property loans are fixed (50 per cent for residential mortgages and 100 per cent for commercial property loans). As a result, mortgage loans with predictably different default probabilities (for instance, because of different LTV ratios or exposure to different aggregate shocks) are often bundled in the same risk category and no adjustment is made over time to account for the real estate cycle. In this

context, capital requirements or risk weights linked to real estate price dynamics could help limit the consequences of boom-bust cycles. By forcing banks to hold more capital against real estate loans during booms, these measures could build a buffer against the losses during busts. And by increasing the cost of credit, they might reduce demand and contain real estate prices themselves. Finally, weights could be fine-tuned to target regional booms.

A few caveats are in order. First, absent more risk-sensitive weights, an across-the-board increase in risk weights (or capital requirements) carries the danger of pushing lenders in the direction of riskier loans. Thus, the introduction of procyclical risk weights for real estate loans should be accompanied by the implementation of a finer cross-sectional risk classification as well. Second, as with any other measure increasing the cost of bank credit (when credit is in high demand), procyclical risk weights may be circumvented through recourse to nonbank intermediaries, foreign banks, and off-balance sheet activities. Third, these measures will lose effectiveness when actual bank capital ratios are well in excess of regulatory minima (as often happens during booms). Fourth, while improving the resilience of the banking system to busts, tighter requirements are unlikely to have a major effect on credit availability and prices. Put differently, they are unlikely to reduce vulnerabilities in the real (household) sector. Finally, regulators may be reluctant to allow banks to reduce risk weights during a bust (when borrowers become less creditworthy).

The empirical evidence on the effectiveness of these measures is mixed. In an effort to contain the rapid growth in bank credit to the private sector and the associated boom in asset markets, several countries have raised capital requirements and/or risk weights on particular groups of real estate loans. Some attempts (such as in the cases of Bulgaria, Croatia, Estonia, and Ukraine) failed to stop the boom; others (such as in the case of Poland) were at least a partial success. Yet it is not easy to say why measures taken in one country may have been more effective than those taken elsewhere or how much other developments account for the observed changes. Furthermore, even in countries where tighter capital requirements appeared to produce some results in controlling the growth of particular groups of loans, real estate price appreciation and overall credit growth remained strong.

### ***Dynamic provisioning***

Dynamic provisioning (the practice of mandating higher loan loss provisions during upswings, one of the elements in Basel III) can help limit credit cycles. The mechanics and benefits are similar to those of procyclical capital requirements. By forcing banks to build (in good times) an extra buffer of provisions, it can help cope with the potential losses that come when the cycle turns (see, for example, the case of Spain). It is, however, unlikely to cause a major increase in the cost of credit, and thus to stop a boom. That said, one advantage over cyclical capital requirements is that dynamic provisioning would not be subject to minima as capital requirements are, so it can be used when capital ratios maintained by banks are already high. Provisioning for property loans could be made a specific function of house price dynamics. In periods of booming prices, banks would be forced to increase provisioning, which they would be allowed to wind down during busts. As in the case of risk weights, provisioning requirements could depend on the geographical allocation of a bank's real estate portfolio.

This measure is primarily targeted at protecting the banking system from the consequences of a bust rather than having a significant impact on credit and containing other vulnerabilities, such as increases in debt and leverage in the household sector. In addition, practical issues and unintended effects, such as calibration of rules with rather demanding data requirements and earnings management (which may raise issues with tax authorities and securities markets regulators), should be discussed in each country's context to design a framework that best fits the country's circumstances. There are also other shortcomings, similar to those of procyclical risk weights (being primarily targeted at commercial banks, dynamic provisioning may be circumvented by intermediaries outside the regulatory perimeter). Lastly,

application of the measure only to domestically regulated banks may hurt their competitiveness and shift lending to banks abroad, raising cross-border supervision issues.

The experience with these measures suggests that they are effective in strengthening a banking system against the effects of a bust, but do little to stop the boom itself. Spain led the countries that have adopted countercyclical provisioning and constitutes an interesting case study for a preliminary assessment of its effectiveness. Starting in 2000, and with a major revision in 2004, the Bank of Spain required banks to accumulate additional provisions based on the “latent loss” in their loan portfolios (for more details on the Spanish dynamic provisioning framework, see Saurina (2009)). Dynamic provisions forced banks to set aside, on average, the equivalent of 10 per cent of their net operating income. Yet household leverage grew by a still-high 62 per cent in Spain. At the end of 2007, just when the real estate bust started, total accumulated provisions covered 1.3 per cent of total consolidated assets, in addition to the 5.8 per cent covered by capital and reserves (for some perspective, the value of the housing stock has, so far, decreased by roughly 15 per cent in real terms). Hence, Spanish banks had an important buffer that strengthened their balance sheets when real estate prices started to decline and the economy slipped into recession.

### ***Limits on loan-to-value and debt-to-income ratios***

A limit on LTV ratios can help prevent the build-up of vulnerabilities on the borrower side. The lower the leverage, the greater the drop in prices needed to put a borrower into negative equity. This will likely reduce defaults when the bust comes as more borrowers unable to keep up with their mortgages will be able to sell their houses. In addition, in case of default, lenders will be able to obtain higher recovery ratios. On the macroeconomic front, a limit on LTV ratios will reduce the risk that a large sector of the real economy ends up with a severe debt overhang. In addition, it will reduce the pool of borrowers that can obtain funding (for a given price) and thus will reduce demand pressures and contain the boom.

Similar to limits on LTV ratios, limits on DTI ratios will rein in the purchase power of individuals, reducing the pressure on real estate prices. In particular, they will be effective in containing speculative demand: they will screen out borrowers that would qualify for a mortgage only on the assumption the house would be quickly turned around. They will also reduce vulnerabilities, as borrowers will have an “affordability” buffer and will be more resilient to a decline in their income or temporary unemployment.

Careful design of these measures is the key to limiting circumvention. For instance, in Korea, lower LTV limits for loans with less than three years of maturity spurred a boom in loans originated with a maturity of three years and one day. In the United States, during the housing boom, the practice of combining two or more loans to avoid mortgage insurance, which kicked in when the LTV ratio exceeded 80 percent, became common. Similarly, an obvious way to get around a DTI limit would be to extend sequential loans and report the ratios separately. In Hong Kong SAR, where regulators impose maximum limits on the debt service ratio, which takes into account the payments the borrower has to make on non-mortgage loans as well, supervisors often encounter cases where lenders do not report all outstanding debt obligations. Circumvention may entail significant costs, as it may result in liability structures that can complicate debt resolution during busts (for example, in the United States, it is often second-lien holders that object to restructuring). In addition, circumvention may also involve shifting of risks not only across mortgage loan products, but also outside the regulatory perimeter, through expansion of credit by nonbank, less-regulated financial institutions and/or by foreign banks, which may result in increased currency mismatches as the proportion of foreign currency-denominated loans rises.

The narrow target nature of these measures may increase political economy obstacles (as happened in the case of Israel), particularly since the groups more impacted by LTV and DTI limits tend to be those more in need of credit, such as poorer and younger individuals. In addition, unlike with more “macro” measures, the consequences of these limits are

immediate and transparent. Beyond these political economy considerations, LTV and DTI limits, by rationing sensitive groups out of credit markets, will entail a cost in terms of diminished intertemporal consumption smoothing and lower investment efficiency.

The scant existing empirical evidence suggests that these are promising measures. For example, in a simple cross-section of 21 (mostly) developed countries, maximum LTV limits are positively related to house price appreciation between 2000 and 2007. And back-of-the-envelope calculations suggest that a 10 percentage point increase in maximum LTV allowed by regulations is associated with a 13 per cent increase in nominal house prices (see also Duca et al (2010)).

Experiences of countries that experimented with changing mandatory LTV limits in response to real estate market developments also suggest that doing so can be quite effective. When the Korean authorities introduced LTV limits in September 2002, the month-on-month change in house prices decreased by 3 percentage points immediately and remained low until April 2003. A similar pattern applies to DTI limits, with month-on-month change dropping by 2 percentage points in August 2005 with the introduction of the measure. Interestingly, the measures had a much smaller (or no) impact on prices in “non-speculative” areas where the limits were untouched. The impact on year-on-year changes, however, has been smaller, since prices tend to start increasing at a faster pace again after the first immediate reaction. In Hong Kong SAR, prudent lending practices guided by LTV and DTI limits have been credited with pausing the house price boom briefly in 1994 and guarding the system against the fallout from the crash in 1997 (Wong et al (2004); also see Wong et al (2011)).

## Conclusion

The correct policy response to real estate booms is, like many other policymaking decisions, an art more than a science. Macroprudential measures seem to be the best option to achieve the objective of curbing real estate prices and leverage because they attack the problem at its source, adapt to specific circumstances in different locations at different times, and give the added benefit of increasing the resilience of the banking system.

Ultimately, policy recommendations depend on the characteristics of the real estate boom in question. In particular, if property prices are out of sync with income and rent and leverage is increasing rapidly, taking action is advisable. In deciding which policy option to choose, policymakers should adopt a wider view of the economy and complement targeted measures with broader macroeconomic tightening if the boom is a part or a reflection of general overheating in the economy.

## References

Bernanke, B. S., 2002, “Asset Price Bubbles and Monetary Policy,” Remarks before the New York Chapter of the National Association for Business Economics, New York, NY, Oct. 15 (available at <http://www.federalreserve.gov/boarddocs/speeches/2002/20021015/>).

Brzoza-Brzezina, M., T. Chmielewski, and J. Niedzwiedzinska, 2007, “Substitution between Domestic and Foreign Currency Loans in Central Europe: Do Central Banks Matter?” National Bank of Poland Working Paper.

Claessens, S., M. A. Kose, and M. E. Terrones, 2008, “What Happens During Recessions, Crunches and Busts?” IMF Working Paper No. 08/274.

Claessens, S., G. Dell’Ariccia, D. Igan, and L. Laeven, 2010, “Cross-Country Experiences and Policy Implications from the Global Financial Crisis,” *Economic Policy* 25, 267–293.



- Crowe, C., G. Dell’Ariccia, D. Igan, and P. Rabanal, 2011, “How to Deal with Real Estate Booms: Lessons from Country Experiences,” IMF Working Paper No. 11/91.
- De Nìcolo, G., G. Dell’Ariccia, L. Laeven, and F. Valencia, 2010, “Monetary Policy and Risk Taking,” IMF Staff Position Note No. 2010/09.
- Duca, J. V., J. Muellbauer, and A. Murphy, 2010, “House Prices and Credit Constraints: Making Sense of the U.S. Experience,” Oxford University Working Paper.
- Igan, D., A. N. Kabundi, F. Nadal-De Simone, M. Pinheiro, and N. T. Tamirisa, 2009, “Three Cycles: Housing, Credit, and Real Activity,” IMF Working Paper No. 09/231.
- Keen, M., A. Klemm, and V. Perry, 2010, “Tax and the Crisis,” *Fiscal Studies* 31 (1), 43–79.
- Reinhart, C. M., and K. S. Rogoff, 2008, “This Time Is Different: A Panoramic View of Eight Centuries of Financial Crises,” unpublished manuscript.
- Saurina, J., 2009, “Dynamic Provisioning: The Experience of Spain,” Crisis Response Note 7, The World Bank Group.
- Wong, J., L. Fung, T. Fong, and A. Sze, 2004, “Residential Mortgage Default Risk in Hong Kong,” Hong Kong Monetary Authority Working Paper, November.
- Wong, E., T. Fong, K. Li, and H. Choi, 2011, “Loan-to-Value Ratio as a Macroprudential Tool: Hong Kong’s Experience and Cross-Country Evidence,” Hong Kong Monetary Authority Working Paper No. 01/2011.