INTERNATIONAL MONETARY FUND

KEY ASPECTS OF MACROPRUDENTIAL POLICY—BACKGROUND PAPER

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Glossary

ACE	Allowance for Corporate Equity
AE	Advanced Economy
BCBS	Basel Committee on Banking Supervision
BoE	Bank of England
BOI	Bank of Israel
CBIT	Comprehensive Business Income Tax
CCB	Countercyclical Capital Buffer
CGFS	Committee on the Global Financial System
CFR	Core Funding Ratio
DTI	Debt-To-Income
ECB	European Central Bank
EME	Emerging Market Economy
EU	European Union
FAT	Financial Activities Tax
FCA	Financial Conduct Authority
FPC	Financial Policy Committee
FSC	Financial Stability Contribution
FTT	Financial Transaction Tax
FX	Foreign Exchange
LCR	Liquidity Coverage Ratio
LGD	Loss Given Default
LTV	Loan-to-Value
MSL	Macroprudential Stability Levy
NSFR	Net Stable Funding Ratio
PD	Probability of Default
PRA	Prudential Regulation Authority
RBNZ	Reserve Bank of New Zealand
SOE	Small open economy
TBTF	Too-Big-To-Fail

MACROPRUDENTIAL TOOLS—EXPERIENCE AND EFFECTIVENESS

A. To Enhance Resilience: Countercyclical Capital Buffer[1]

1. The countercyclical capital buffer (CCB) was proposed by the Basel committee to increase the resilience of the banking sector to negative shocks.[2] The interactions between banking sector losses and the real economy highlight the importance of building a capital buffer in periods when systemic risks are rising. Basel III introduces a framework for a time-varying capital buffer on top of the minimum capital requirement and another time-invariant buffer (the conservation buffer). The CCB aims to make banks more resilient against imbalances in credit markets and thereby enhance medium-term prospects of the economy—in good times when system-wide risks are growing, the regulators could impose the CCB which would help the banks to withstand losses in bad times.[3]

2. The CCB may also help to reduce the procyclicality of bank lending.[4] It is expected that the build-up of additional capital during a boom may diminish the desire of banks to lend excessively.[5] Conversely, in a downturn the release of the CCB may avoid a credit crunch, by reducing the pressure on banks to deleverage to meet regulatory capital requirements. However, the effectiveness of the CCB in smoothing the credit cycle and therefore procyclicality of credit will depend on the level of capital that banks hold in excess of what the regulator requires. Issuing new equity is relatively cheap in a boom, reducing the effect of the buffer on credit expansion.[6] More generally, effects on overall credit and the real economy will depend on the extent to which non-financial firm can find substitute credit from non-regulated financial intermediaries and in markets.

3. Under the Basel Committee on Banking Supervision (BCBS) proposal, the exact shape of the CCB framework will be at national discretion. Since financial cycles differ across countries, the CCB will be determined at the national level for all exposures to counterparties in that country. National regulators will have the discretion to decide when the buffer should be implemented and when it should be released. Banks will have to meet the CCB with common equity Tier 1 or they will

[1] Prepared by Ivo Krznar (MCM).

[2] An extensive overview of the countercyclical capital buffer regime is provided by BCBS (2010), Galati and Moessner (2011), Repullo and Saurina (2011) and Elliot (2011).

[3] Notice that there will be a certain degree of overlap between the considerations to be addressed through the banks' Pillar II assessments and the considerations that form the basis for the countercyclical capital requirements.

[4] See Lowe (2002), Allen and Saunders (2003), Amato and Furfine (2004) and De Nicolò, Favara, and Ratnovski (2012) for sources of procyclicality.

[5] Since capital requirements are linked to the amount of credit, banks may cut lending to satisfy the requirements.

[6] Leverage ratio might be more effective in reducing procyclicality and taming leverage cycles. For details on leverage cycles see Adrian and Shin (2009) and Geanakoplos (2010).

be subject to restrictions on dividend distributions.[7] To give banks time to meet the additional buffer, the buffer add-on decision would be preannounced by up to 12 months before it takes effect.[8] On the other hand, the buffer reduction would take effect immediately to reduce the risk of credit crunch.

4. Although the CCB will be applied nationally, the reciprocity principle will be a cornerstone of the CCB framework. The framework contains international reciprocity to make the CCB more effective and to ensure a level playing field between domestic and foreign banks which operate in more than one jurisdiction—each country authority will be responsible for ensuring that the banks they supervise impose the CCB on exposures held in the host jurisdiction which has imposed the CCB. Therefore, internationally active banks with exposures in various countries will face the CCB as a weighted average of the CCBs in all countries where they have exposures.[9] In this way, the jurisdictional reciprocity will also preclude incentives to circumvent the CCB.[10]

5. Additional guidance issued by the BCBS encourages a consistent international implementation of the CCB framework. The BCBS formulated five principles to guide the authorities in using the CCB: (i) the CCB should aim at building the resilience of the banking sector; (ii) the credit-to-GDP (the credit gap) is a useful common reference point in taking the CCB decisions; (iii) in addition to the credit gap other indicators should be used to arrive at buffer decisions; (iv) the CCB should be released promptly in times of stress; and (v) the use of the CCB should be complemented with other macroprudential instruments.

6. According to BCBS guidance, the credit gap should be a starting point for assessing the build-up of systemic risks. The CCB should be activated when credit growth is judged to be excessive and associated with an increase in systemic risks. In particular, the CCB should be imposed if the credit-to-GDP ratio exceeds its trend value.[11] This indicator was put forward in the BCBS proposal as a common reference guide based on analyses by Drehmann and others (2010 and 2011). The authors conclude that among potential variables, including trend deviation of the credit-to-GDP ratio, credit growth, GDP growth, property prices and bank profitability variables, the credit gap is the most powerful indicator for banking crises. Calculating the credit gap requires calculation of the credit-to-GDP ratio and estimation of the gap. In calculating the credit-to-GDP ratio a broad measure of credit to the private sector, comprising all lending by domestic and foreign financial institution as well as debt raised in financial markets, is recommended. To estimate the gap, the

[7] The use of other fully loss absorbing capital is still under consideration.

[8] The requirement will be phased in gradually from 2016 to 2019. However, countries may consider an accelerated phase in.

[9] The buffer add-on on international exposures is important in so far the source of the banking stress is related to a spillover from a foreign shock.

[10] For example, with reciprocity the branches of foreign banks will be treated in the same way as subsidiaries of foreign banks.

[11] The trend value is interpreted as the equilibrium credit-to-GDP ratio.

BCBS suggests that a trend should be extracted from the ratio by using the Hodrick-Prescott filter with relatively high smoothing parameters (lamda equal to 400 000 instead of 1600 for quarterly data).[12] This is justified by the fact that credit cycles tend to be longer than business cycles.

7. The BCBS recommends a formula that translates the credit gap measure into activation of the CCB. Threshold values of the gap are used to define the range of the gap at which the buffer should be deployed. If the gap is below the lower threshold, the CCB is zero and if the gap is above the upper threshold the CCB should be set at its maximum of 2.5 percent of risk-weighted assets.[13] Between the lower and upper threshold the CCB should vary with the extent of the build-up of systemic risk.[14] The values of 2 percent and 10 percent for the lower and upper threshold are found to provide a reasonable and robust specification based on historical banking crises (but depend, however, on the smoothing parameter). Moreover, the performance of the buffer methodology based on these common thresholds does not seem to vary significantly across jurisdictions (BCBS, 2010).

8. There is an open discussion on what variables should be used for the release phase of the buffer. Since credit usually lags the business cycle, the credit gap does not work well as an indicator for releasing the buffer (Drehmann and others, 2010).[15] Moreover, it is unlikely that any single measure would capture both the build-up phase and the release phase since the former requires leading indicator properties and the latter must be a contemporaneous indicator of banking distress. In general, a prompt and sizeable release of the buffer is desirable as a gradual release would probably reduce the buffer's effectiveness. Some measure of aggregate banking sector losses, possibly combined with high frequency market based indicators like credit spreads (Drehman, Borio, and Tsatsaronis, 2011) or "near-coincident" indicators of systemic stress (Arsov and others, 2013) seems best for signaling the beginning of the release phase. To ensure that banks use their released capital to absorb losses, dividend distribution should be prohibited even when the CCB is fully released.

9. Instead of relying mechanically on the credit gap, authorities are expected to use all information available to analyze systemic risks when deciding on implementation of the CCB. Even though imbalances in the credit market are normally reflected in abnormal behavior of the credit gap, certain problems of the credit gap indicator (some of them mentioned in the BCBS proposal) call for assessing a broad set of information before making buffer decisions.

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[12] One sided filter is used to circumvent the end-point problem i.e. inability of the two sided filter to calculate the final value of the trend for the last observation.

[13] Jurisdictions can impose the CCB higher than 2.5 percent, but the reciprocity arrangement will not apply to the additional amounts. The analysis carried out by the Top-down Calibration group of the BCBS shows that the maximum amount of the CCB, together with the capital conservation buffer, would have been adequate to absorb the mean losses in the past financial crises.

[14] The lower threshold should be set to balance the trade-off between timely detection of systemic risks and false alarms.

[15] See for example Giannone and others (2012) or Repullo and Saurina (2011).

- Using credit gap as a trigger for the CCB might increase procyclicality i.e. impose the CCB when GDP growth is low. Repullo and Saurina (2011) show that in major advanced countries the credit gap is negatively correlated with GDP growth. This is due to the inability of the indicator to differentiate between excessive credit growth and recessions (the indicator is driven by both the GDP and the loan stock). To weaken the impact of a fall of GDP on the indicator (which is then interpreted as a sign of excessive credit growth) Kauko (2012) uses a differenced credit-to-GDP indicator (with a smoothed, moving-average version of GDP).[16]
- The combined information that arises from analyzing the joint behavior of several indicators generally provides a better signal than relying on a single indicator. Most crises were associated with a real estate bust and current account reversal. Kaminsky and Reinhart (1999) show that weak exports and a resulting current account deficit are frequently observed before financial crises. Barrel and others (2010) find strong evidence on the ability of current account deficits and housing prices to predict banking crises. Reinhart and Rogoff (2009) provide further evidence on the ability of housing market bubbles to predict financial crises. Jorda and others (2010) show that credit growth emerges as the single best predictor of financial instability, but that the correlation between lending booms and current account imbalances has grown much tighter in recent decades. Borio and Lowe (2002), Borio and Drehmann (2009) and IMF (2011a) show that combinations of credit and asset price deviations from long-term trends are the best leading indicator of banking distress.

10. Judgment in the setting of the buffer will be necessary as excessive credit growth may sometimes not imply an alarming sign of credit market exuberance. Previous studies have shown that rapid credit growth and credit booms signal a banking crisis (Laeven and Valencia, 2010) a couple of years before the event (IMF 2011a; Lund-Jensen, 2012, Dell'Ariccia, Igan, Laeven, Tong, 2012, BCBS, 2011). Even so, out-of-sample analyses show that credit growth (and gap measures) produced very low (but increasing) probabilities of crisis (IMF, 2011a). Moreover, Dell'Ariccia and others (2012) show that not all credit growth booms end up in a crisis. Good booms are financed by stable sources of funding and are used to expand the productive capacity of the economy. Thus, while deciding on when to act, policy makers need to take into consideration the imperfect nature of the signal and the possibility of over-regulation. Applying some judgment in the setting of the buffer is therefore necessary. However, judgment coupled with communicating buffer decisions and evaluating the buffer's performance is key to promoting accountability and help banks manage uncertainty about future capital requirements.

11. Real world experience with using the CCB is rare. With the exception of a few theoretical exercises, and assessments that are numerically simulated, the limited world experience with dynamic capital regimes means that empirical studies of how the CCB mechanism actually works are

[16] IMF (2011a) shows that the change in the credit-to-GDP ratio is a better indicator than the credit gap as the latter misses too many crises.

absent.[17, 18] Switzerland and the United Kingdom (U.K.) are two of a few countries that had some experience with the CCB.[19] While Switzerland has recently deployed the CCB for the first time, the U.K. government has laid down the CCB framework and proposed making the Financial Policy Committee (macroprudential authority) responsible for the buffer decisions. The main differences of the CCB framework in the two countries reflect the institutional arrangement of macroprudential policy. However, heavy involvement of the central bank, an institution that is not under immediate political influence, is present in both cases and is important to overcome the inaction bias when a crisis is distant, but the risks are steadily building.

Example 1: the United Kingdom

12. The U.K. government plans to give the Financial Policy Committee (FPC) control over the CCB. The responsibility of the FPC relates to the identification, monitoring and taking action to remove or reduce systemic risks.[20] The U.K. treasury issued a consultation document in September 2012 on the FPC's powers, including the responsibility for decisions on the CCB.[21] The CCB's objective is to build loss absorption capacity of the financial sector, dampen credit cycles and boost medium term GDP growth. The FPC would raise the CCB when threats to financial stability emerge and reduce it when threats to resilience recede (with decision taking effect immediately) taking into account that in periods of acute uncertainty, banks may find it hard to fund themselves at lower capital ratios. The buffer would apply to all U.K. incorporated banks, building societies and large investment firms (broker dealers). The FPC would monitor the extent to which the introduction of the CCB would result in "leakages" to the non-regulated sector and might recommend to the Treasury to expand the set of institutions to which the CCB applies. Moreover, the FPC would be

[17] Angeloni and Faia (2013) build a DSGE model with a CCB and show that the best policy for a crisis prevention is the combination of mild CCB and a monetary policy that leans against the wind. Angeloni, Faia, and Winkler (2011) show, using the model of Angeloni and Faia (2013), that the CCB have a significant stabilizing effect of the economy. Agenor and others (2011) using a similar model show that the combination of the credit augmented Taylor rule and the CCB may be optimal for promoting overall economic stability. Angelini and others (2011) using a plethora of models show that the CCB has the biggest quantitative role in reducing volatility in comparison to other Basel III instruments (increase in capital ratios and liquidity requirements).

[18] Repullo, Saurina and Trucharte (2010) and Drehmann and Gambacorta (2012) provide a counterfactual simulation exercise with the CCB. They find that the CCB help to reduce credit growth during booms and attenuate the credit contraction once it is released. Jimenez and others (2012) find that the CCB help smooth credit supply cycles and have positive real effects. The effects in bad times are stronger because, in contrast to good times, firms can hardly find substitute credit from the non-regulated financial sector. A number of other studies have found that increasing capital requirements in general may indeed reduce credit supply (Kishan and Opiela, 2000; Gambacorta and Mistrulli, 2004; MAG, 2010).

[19] Other countries include China that implemented the CCB in 2010, New Zealand that proposed the CCB framework in December 2012 in the new Capital adequacy requirement guideline that will incorporate Basel III principles. The proposal of implementing the CCB is consistent with BCBS principles. The CCB can be applied in times of excessive credit growth from January 1, 2014.

[20] The FPC was established in December 2012 under the Financial Services Act.

[21] The responsibility for the CCB decisions refers to giving Directions to regulators (Prudential Regulation Authority (PRA) or Financial Conduct Authority (FCA)) to adjust specific macroprudential tool. The regulators will be responsible for monitoring compliance of the CCB.

given a power of direction over sectoral capital requirements which would be a more targeted tool than the CCB.

13. The FPC will identify and publish a list of core indicators of systemic risk. While the FPC would review them regularly to provide guidance about the use of the CCB, judgment will play an important role in all FPC decisions given the complexity of the financial system and its tendency to evolve over time. The choice of indicators will evolve over time as the FPC learns from experience and as new research is undertaken. To support its judgment when to use the CCB but also other macroprudential instruments, the FPC will review the core indicators set which will include: (i) measures of balance sheet stretch within the financial system and borrowers; (ii) measures of terms and conditions in financial markets; (iii) indicators of risks concentrated in particular sectors; and (iv) indicators of changing patterns in the distribution of risks across financial institutions, households, and corporations.[22] The likelihood of activation of the CCB will depend on whether the indicators convey a homogenous picture of systemic risk. The policy decision and Directions issued to the PRA or the FCA will be published in the quarterly FPC Record while explanation of the background to those decisions including benefits and costs of its actions will be published in the Financial Stability Report.

Example 2: Switzerland

14. Switzerland has recently activated a CCB that focuses on a specific segment of the credit market—the residential mortgage market.[23] The Swiss CCB is a time-varying capital requirement that can be implemented on a broad basis or can be targeted at specific segments of the credit market. The CCB has to be in the form of common equity Tier 1 capital amounting to a maximum of 2.5 percent of the risk weighted assets in Switzerland. The early introduction of the CCB framework in July 2012 was justified by concerns about the risks of imbalances in the mortgage and real estate markets. The decision to activate the CCB in February 2013 requires banks to comply with the additional capital requirement of one percent of risk weighted direct and indirect mortgage-backed positions secured by residential property by end of September 2013 (seven months following the announcement). The authorities expect that the CCB should dampen mortgage lending (and as a consequence house prices) while at the same time build resilience of the banking sector against a correction of the imbalances in the mortgage and real estate markets.

15. The Swiss National Bank plays a key role in the process leading to a CCB decision. It conducts a regular assessment of the mortgage and real estate markets to determine whether the CCB should be activated, adjusted or released based on an approach of "guided discretion." It proposes the level at which the CCB should be set as well as the implementation period of the CCB. The central bank consults with the banking sector supervisor (FINMA) regarding its view before

[22] Both changes of indicators and their absolute level will be analyzed.

[23] Therefore, the Swiss CCB could be considered as a sectoral capital requirement.

issuing a proposal to the Federal Council.[24, 25] The Federal Council takes the final decision. The central bank communicates and motivates its proposal after the Federal Council has announced its decision. FINMA supervises the implementation of the CCB at the individual bank level.

16. The central bank's decision heavily draws on indicators of domestic mortgage volumes and domestic real estate prices. If the same indicators suggest heterogeneous conclusions more discretion is used. Additional quantitative and qualitative information are used to ensure that the decision is based on a comprehensive view of developments in the domestic mortgage and real estate markets. The level of the CCB and the implementation period (that will vary between three and 12 months) each reflect the degree of imbalances. In addition to key indicators of the real estate and mortgage market, higher-frequency information and judgment will play an important role in taking the decision to deactivate the buffer.

17. To illustrate how the CCB could be used in practice, we consider what a small set of indicators might have signaled to authorities in Ireland and Spain in the period before and during the crisis. These indicators are chosen for illustration purposes. This analysis is not a comprehensive examination of all available information that might be considered. Moreover, it is worth noting that simulation results depend on and can change substantially with different starting dates of the credit gap calculation. In both cases we use 1997 as the starting date.

Example 3: Hypothetical paths of the CCB for Ireland

18. Using the BCBS formula, we calculate the hypothetical path of the CCB (relative to risk weighted assets) for Irish banks in the following way:

- We calculate the credit-to-GDP ratio as the ratio of private sector credit and nominal GDP on a quarterly frequency. Private sector credit includes credit to households, non-financial companies, insurance companies, pension funds and other financial intermediaries. We do not use the broadest measure of credit that would include domestic, international, bank-originated and market based sources of credit (household and non-financial corporate debt) since the data prior 2002 are not publically available.
- We use a one-sided HP filter to extract the trend and calculate the credit gap.

[24] The FINMA cannot block any decision regarding the CCB. In the recent episode, the FINMA said it would have preferred to wait longer before applying the new capital rules, but added that it shared the central bank's view that the real estate market is showing signs of overheating in certain segments and regions.

[25] The Federal Council is the executive branch of the government.

- We assume that the CCB would be activated for exposures to counterparties in Ireland when the credit gap measure breaches the lower threshold set to 2 percent; we set the upper threshold at 10 percent and assume that the CCB increases linearly between zero and 2.5 percent with the value of the credit gap between 2 and 10 percent.
- We use house prices and a principal component of the four biggest banks' stock prices as two indicators for the release of the CCB; once an exit signal is received the CCB is fully released.[26]
- The CCB for banks in Ireland is calculated as a weighted average of the buffers applied in the jurisdictions to which Irish banks have exposures.
  - We assume that the only exposure of Irish banks is to U.K. residents as the majority of the domestic banks' exposures are to the U.K. (about 90 percent of all foreign credit exposures and about 75 percent of all foreign claims as of June 2012).[27] The share of the U.K. credit exposure in overall credit exposure is assumed to be 30 percent to reflect the geographical distribution of domestic banks' credit exposure as of June 2012.
  - We take the Bank of England credit gap in order to calculate the CCB for U.K. exposures.

19. Figure 1 shows the hypothetical evolution of the CCB since 1997. If the BCBS proposal had been in place at the time, the additional buffer would have built up to its maximum three years ahead of the financial crisis.[28] This suggests that the credit gap measure is a good indicator for the activation of the CCB.[29] A simple calculation based on a 2008 Tier 1 capital calculation, shows that the additional buffer would have saved up to a quarter of the fiscal costs of the financial crisis for the Irish authorities.[30] Moreover, raising additional capital could have been difficult for some banks, which would then have discouraged them from lending. The likely outcome would have been to lessen the supply of loans which might have mitigated the housing price boom.

[26] Long time series for credit default swaps for Irish banks do not exist.

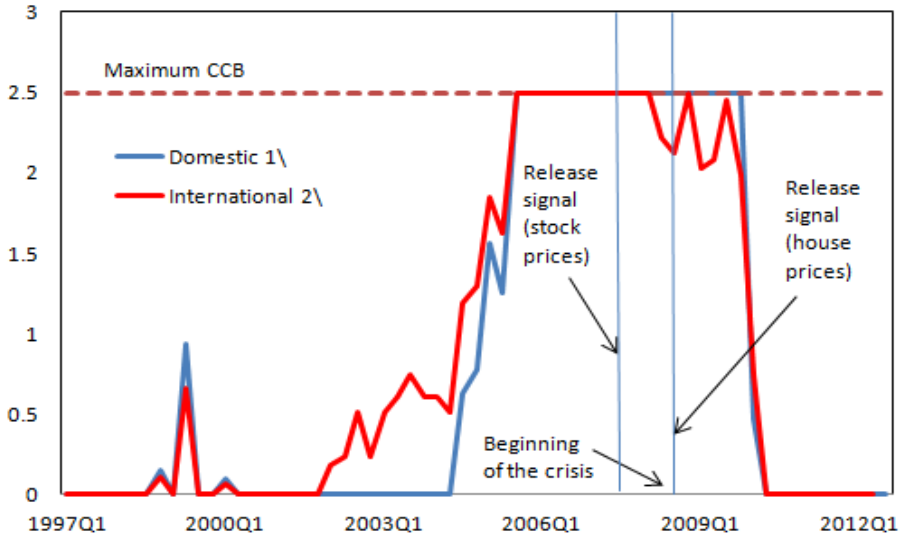
[27] For simplicity we assume that these shares did not change during the last 10 years.

[28] Laeven and Valencia (2012) define the date when a crisis started, corresponding to the first signs of significant distress followed by government intervention. In Ireland, government intervention came on September 30, 2008 with a two-year blanket guarantee of the liabilities of Irish-controlled banks. According to the same authors Irish banking crisis became systemic in 2009.

[29] The analysis highlights that the CCB may have been warranted in Ireland in the period prior to 2008. However, a more exhaustive analysis of the source and magnitudes of losses stemming from domestic credit counterparties would be necessary to draw a firm conclusion.

[30] According to Laeven and Valencia (2012) the fiscal costs related to the restructuring of the financial sector have amounted to 41 percent of GDP since 2008. We take the annualized GDP in the third quarter of 2008 to calculate the value of the fiscal costs that is then compared with the value of the additional capital.

Figure 1. Ireland: Simulated Countercyclical Capital Buffer
(In percent of risk weighted assets)



Source: IMF staff calculation.
Note: 1/ The CCB calculated assuming Irish banks do not have any international exposure.
2/ The CCB calculated assuming Irish banks have international exposure.

20. While the same indicator performs poorly for the release decision, extreme house price and stock price growth rates could have been used as indicator for the release of the CCB. The fact that the credit-to-GDP ratio remained above its trend during the crisis (Figure 2) is due to the fact that GDP experienced a period of severe contraction and credit growth was lagging behind GDP growth. This illustrates the point discussed above that indicators other than credit-to-GDP should be used for the decision to release the buffer. Extreme (two standard deviation from the mean) house price growth rates and the extreme difference in the principal component of banks' stock prices signaled the release of the CCB a year before (stock prices, Figure 3) and at a time (house prices, Figure 4) when the crisis hit the Irish economy even as the credit gap continued to rise.

Figure 2. Ireland: Credit-to-GDP Gap

(In percent)

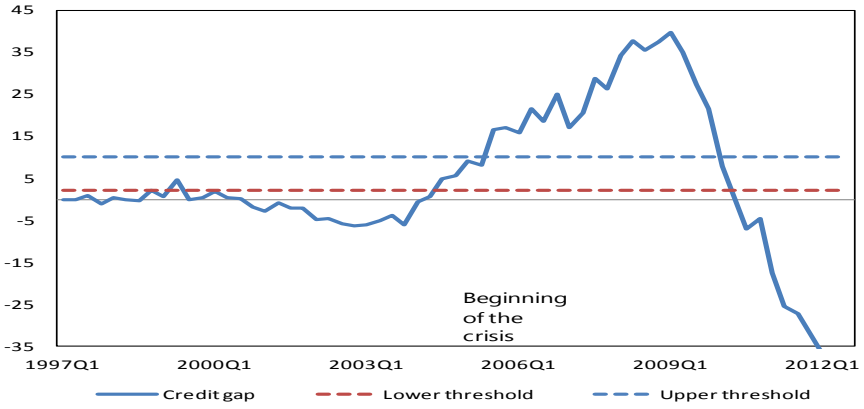


Figure 3. Ireland: Principal Component of Banks' Stock Prices

(YoY difference)

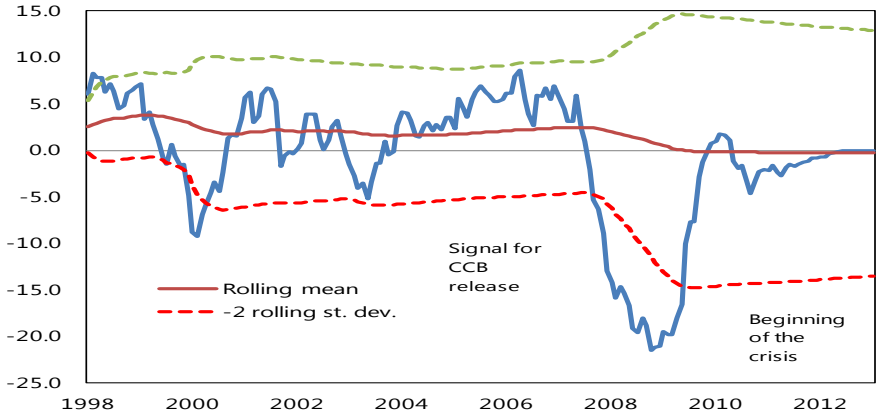
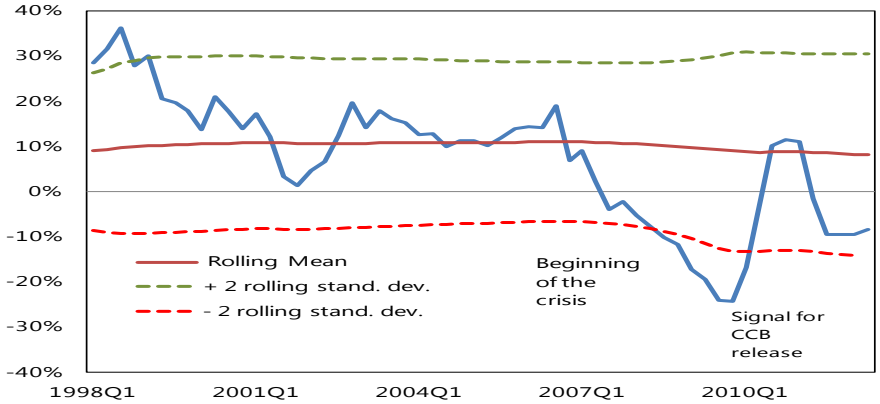


Figure 4. Ireland: House Prices

(In percent, YoY growth rate)



Source: IMF staff calculation.

Example 4: Hypothetical paths of the CCB for Spain

21. We repeat the same exercise for Spain with the following assumptions:

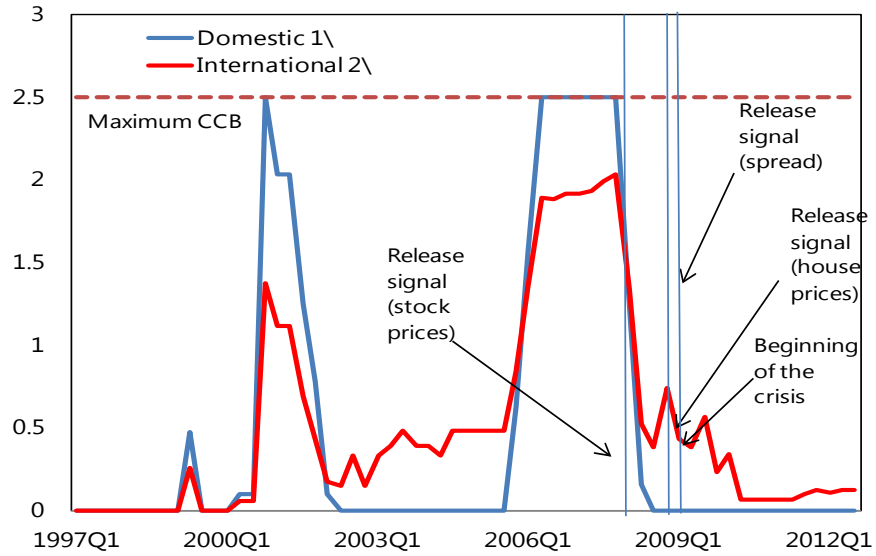
- The CCB for banks in Spain is calculated as a weighted average of the buffers applied in the jurisdictions to which Spanish banks have exposures.
  - We assume that the only exposure of Spanish banks is to the U.K. (43 percent), the United States (U.S.) (22 percent), Brazil (19 percent) and Mexico (15 percent) as about 65 percent of banks' foreign exposures (as of March 2012) correspond to those countries. The share of the foreign exposure in overall banks' exposure is assumed to be 45 percent to reflect the geographical distribution of domestic banks' exposure as of March 2012.
- The following credit measures were used in the calculation of the credit-to-GDP ratio:
  - Spain: the overall debt of nonfinancial firms and household;
  - Brazil: credit to the private sector;
  - Mexico: credit to private and public sector;
  - The U.S.: the overall debt of nonfinancial firms and household; and
  - The U.K.: the Bank of England credit gap was taken.
- We use nonsubsidized house price and a principal component of the four largest banks' stock prices as indicators for the CCB release phase. For illustration, we also use spreads on the government bond as a high-frequency indicator (the difference in yields on Spanish and German 10 year government bond).

22. Figure 5 shows the hypothetical evolution of the CCB in Spain. If the CCB framework had been in place the additional buffer would have built up three years ahead of the financial crisis.[31] The additional capital of 2 percent prior to the crisis would have saved almost all fiscal costs of the financial crisis for the Spanish authorities.[32] Moreover, the additional capital is about 70 percent larger than the estimated €24 billion in dynamic loan-loss provisioning.

[31] We follow Laeven and Valencia (2012) definition of a banking crisis and take last quarter of 2008 as a start of the banking crisis when the government decided to increase the level of insurance for bank deposits covered under the Deposit Guarantee Fund and when a Financial Asset Acquisition Fund and State guarantee scheme were set up. According to Laeven and Valencia (2012) Spanish banking crisis that began in 2008 became systemic in 2011.

[32] According to Laeven and Valencia (2012) the fiscal costs related to the restructuring of the financial sector have amounted to 3.8 percent of GDP since 2008. Note that this cost reflects the initial phase of the crisis only since the working paper was published in the midst of the crisis. We take the annualized GDP in 2008 q3 to calculate the value of the fiscal costs that is then compared with the value of the additional capital. This calculation assumes that losses are spread evenly across all financial institutions.

Figure 5. Spain: Simulated Countercyclical Capital Buffer
(In percent of risk weighted assets)



Source: IMF staff calculation.
Note: 1/ The CCB calculated assuming Spanish banks do not have any international exposure.
2/ The CCB calculated assuming Spanish banks have international exposure.

23. While in the Spanish case the credit gap might be a good indicator for both activating and releasing the CCB, it is expected the authorities look at many other indicators before releasing the buffer. Figures 6-9 suggest that extreme (two standard deviation from the mean) house price, stock price and spread growth rates are useful indicators for the release of the CCB. All three indicators signal an exit decision before or at the time the crisis hit the Spanish economy.

Figure 6. Spain: Credit-to-GDP Gap
(In percent)

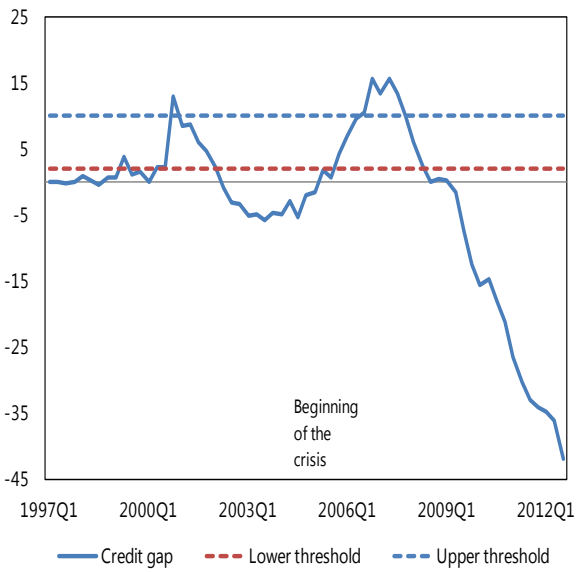


Figure 7. Spain: House Prices
(In percent, YoY growth rate)

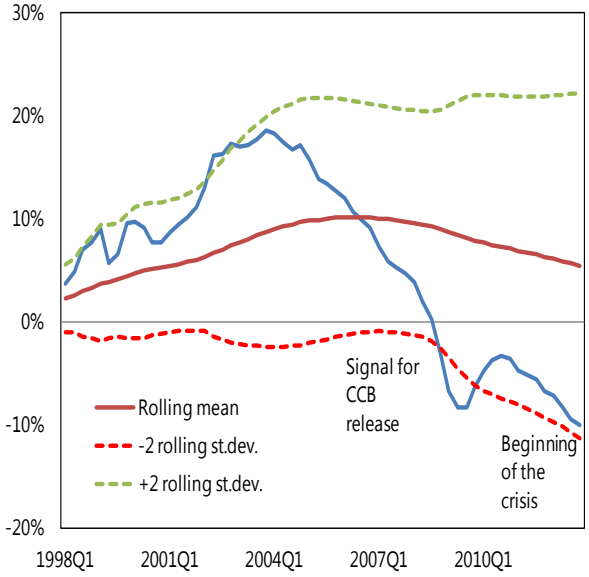


Figure 8. Spain: Spread on Government Bond
(In percent, YoY difference)

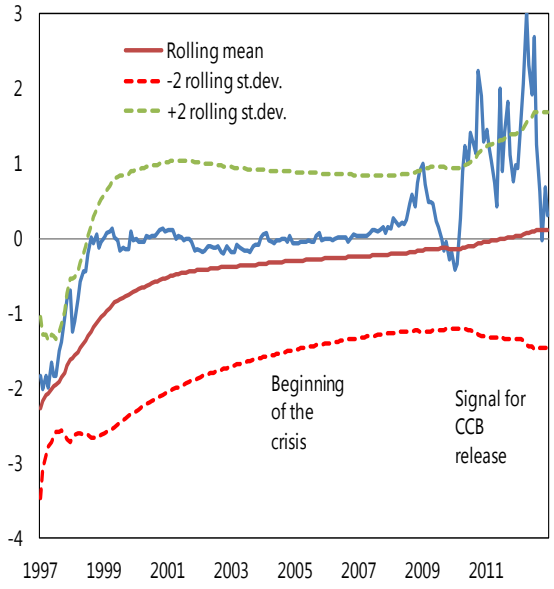
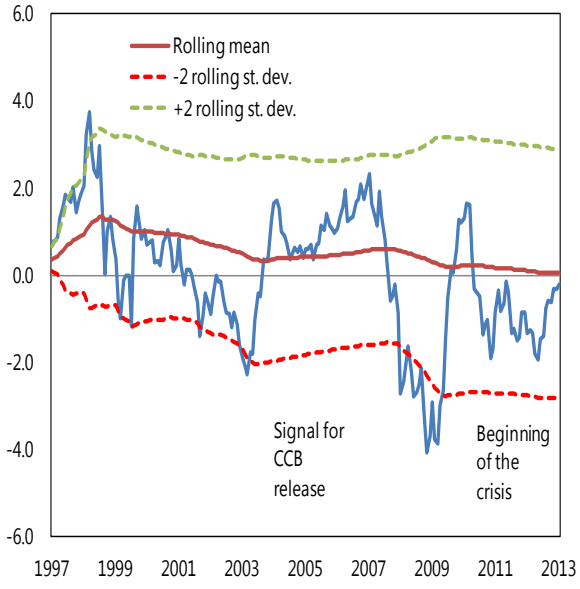


Figure 9. Spain: Principal Component of Banks' Stock Prices
(YoY difference)



Source: IMF staff calculation.

Box. How Does the Reciprocity Principle Work?

Under the BCBS agreement, each jurisdiction determines the CCB for credit exposures to counterparties in its country. According to the reciprocity principle, however, the home supervisor ensures that for an internationally active bank domiciled in its jurisdiction the CCB is calculated on a consolidated basis, according to the geographic location of its exposures. In other words, the CCB for internationally active banks will be a weighted average of the CCBs that are being applied in jurisdictions to which the bank has an exposure. The home supervisor is not allowed to impose a buffer requirement for credit exposures to a foreign country that is below the requirement set by the host supervisor. While the home supervisor can set a higher buffer requirement for foreign exposures, the mandatory reciprocity principle would not apply to the amount of the buffer above 2.5 percent. Reciprocity with respect to add-on buffers higher than 2.5 percent would be voluntary.

To illustrate how reciprocity works, assume that Country 1 and Country 2 have set the CCB on domestic exposures of their banks at 2.5 percent and 1 percent, respectively (using the credit gap guide for example). In each country we assume that there are two banks: one with domestic exposures only (Bank 1A in Country 1 and Bank 2A in Country 2) and the other one with exposures to the other country (Bank 1B and Bank 2B). In Country 1 the internationally active bank has 40 percent of its credit exposures to Country 2 counterparties and in Country 2, the share of cross-border exposures of the internationally active bank is 70 percent. According to the reciprocity principle, any loan to Country 1 counterparties, irrespective of the location of the bank making the loan will attract a CCB requirement of 2.5 percent (red arrow, Table 1). While a bank with domestic credit exposures only is subject to the full amount of the CCB determined by their supervisor, the CCB of internationally active banks will reflect the structure of their domestic and foreign exposure. For example, the CCB of Bank 1B would be calculated as: 0.6*2.5 percent + 0.4*1 percent = 1.9 percent.

Example of CCB Calculation
(In percent)

	Credit Exposure		CCB		Bank Specific CCB
	Country 1	Country 2	Country 1	Country 2	
Bank 1A	100	0	2.5		2.5
Bank 1B	60	40			1.9
Bank 2A	0	100		1.0	1
Bank 2B	70	30			2.1

Source: IMF staff calculation.

There is a similar reciprocity principle in the Recommendation of the European Systemic Risk Board on lending in foreign currencies in the European Union. According to the principle, the home supervisor of financial institutions are recommended to impose measures addressing foreign currency lending at least as stringent as the measures in force in the host jurisdiction where they operate through provision of cross-border services or through branches. This recommendation applies only to foreign currency loans granted to borrowers domiciled in the host jurisdictions.

B. To Limit Sectoral Imbalances: Limits on Loan-To-Value (LTV) Ratio, Caps on Debt-To-Income (DTI) Ratio, and Sectoral Capital Requirements[33]

24. Instruments to address procyclical systemic risk can be chosen and calibrated with respect to aggregate or sectoral variables. While aggregate instruments are calibrated to ensure that the financial system as a whole holds proper amounts of capital or liquidity from a macroprudential perspective, sectoral instruments concentrate on the relative risks stemming from exposures to a particular sector. When systemic risk is building up in the financial system as a whole, aggregate instruments may be appropriate. However, if risk is building up in a particular sector, such as consumer loans, corporate exposures, or real estate markets, sectoral instruments are appropriate tools (Committee on the Global Financial System (CGFS), 2012).

25. Sectoral macroprudential instruments can affect the credit demand-side (e.g., limits on mortgage loans) or the credit supply-side (sectoral capital requirements). These instruments aim at containing excessive credit growth in a sector, and can target specific types of loans, a particular group of borrowers, properties in a particularly heated region, or loans denominated in a certain type of currency (Crowe and others, 2011). They can be applied individually or in tandem (see Table 1).

26. Several countries used LTV and DTI to contain housing booms. Limits on LTV ratios impose a cap on the size of a mortgage loan relative to the value of a property, thereby imposing a minimum down payment, and caps on DTI ratios restrict the size of a mortgage loan to a fixed multiple of household incomes, thereby containing unaffordable and unsustainable increases in household debt.[34] Both tools will affect primarily the demand for credit.

Table 1. Number of Countries with Sectoral Macroprudential Tools

	Limits on LTV Ratio	Caps on DTI Ratio	Limits on LTV and DTI ratios	Sectoral Capital Requirements	One tool	Any two tools	All three tools
Number of Countries (Total = 46)	24 (52 percent)	14 (30 percent)	14 (30 percent)	23 (50 percent)	36 (78 percent)	18 (39 percent)	7 (15 percent)

Source: IMF staff calculation.
Note: Numbers in ( ) shows the proportion of countries with a specific instrument among the sample.

27. Stricter capital requirements on loans to a specific sector force banks to hold more capital against these loans, resulting in relatively higher costs, and thus discourage heavy

[33] Prepared by Heedon Kang (MCM).

[34] Policymakers used increases in taxes (stamp duty, capital gains tax, etc) and land or house supply to contain housing prices per se.

exposure to the sector, thereby also affecting the supply of credit. So far, sectoral capital requirements have been imposed on various types of loans, such as unsecured consumer loans, foreign currency loans to unhedged borrowers, and residential and commercial real estate mortgage loans (Table 2).

- In many countries, including both advanced economies (e.g., Ireland, Norway, and Spain) and emerging market economies (e.g., Estonia, Peru, and Thailand), capital adequacy risk weights were increased on mortgage loans with high LTV ratios.[35] The aim was to discourage financial institutions from becoming heavily exposed to real estate markets and also to help build buffers against a future bust. While residential mortgage loans were the main target in most cases, the Indian authorities also aimed at booms in the commercial real estate market.
- In Brazil, Turkey, and Malaysia, risk weights on a segment of consumer loans were raised as a speed bump, especially penalizing unsecured loans or car loans with high LTV ratios.[36]
- In several Eastern European countries, higher risk weights were applied to foreign currency or foreign-currency indexed loans to unhedged borrowers.[37]

Table 2. Use of Sectoral Capital Requirements[1/]

Unsecured Personal Loans	Foreign Currency Loans	Mortgage Loans	
		Residential	Commercial
Brazil (2010), Russia (2013), Turkey (2011), Malaysia (2011)	Croatia (2006), Poland (2007),[2/] Serbia (2006), Peru (2010), Uruguay (2006),	Argentina (2004), Australia (2004), Bulgaria (2004), Estonia (2006), Hong Kong SAR (2013), India (2008), Ireland (2006), Israel (2010), Korea (2002), Malaysia (2005), Norway (1998), Peru (2012), Poland (2007),[2/] Spain (2008), Switzerland (2013), Thailand (2009)	India (2005)

Sources: Lim and others (2011) and IMF staff (Ivo Krznar) extension.

Note: 1/ Parentheses show the time when a country started to implement a measure or tightened it since 1990.

2/ In Poland, higher risk weights applied to residential mortgage loans in foreign currencies.

[35] Under the Basel II standard approach, risk weights for real estate loans are fixed at 50 percent for residential mortgages and 100 percent for commercial real estate loans. Even though loans with higher LTV ratio have different default probabilities, they are bundled in the same risk category as loans with lower LTV ratio under Basel II. This feature incentivizes banks to extend loans with high risks for high returns and can fuel real estate booms.

[36] In Brazil, after the tightening in December 2010, the annual growth rate of credit granted to households decreased from 22 percent in December 2010 to 11 percent in December 2011. Especially the proportion of vehicle loans with maturity higher than 60 months decreased about 20 percentage points (IMF, 2012a).

[37] The measure only had limited effect, because foreign-owned banks could circumvent the tighter regulatory measure by having their host country borrowers switch their borrowing from the local affiliate to the parent bank (IMF, 2013)

28. Authorities need to consider challenges that they may face in implementing sectoral capital measures. Due to their narrow targets, they entail lower costs and smaller distortions. But, certain characteristics of each tool may reduce effectiveness, and their effectiveness can be limited by circumvention and loopholes**:**

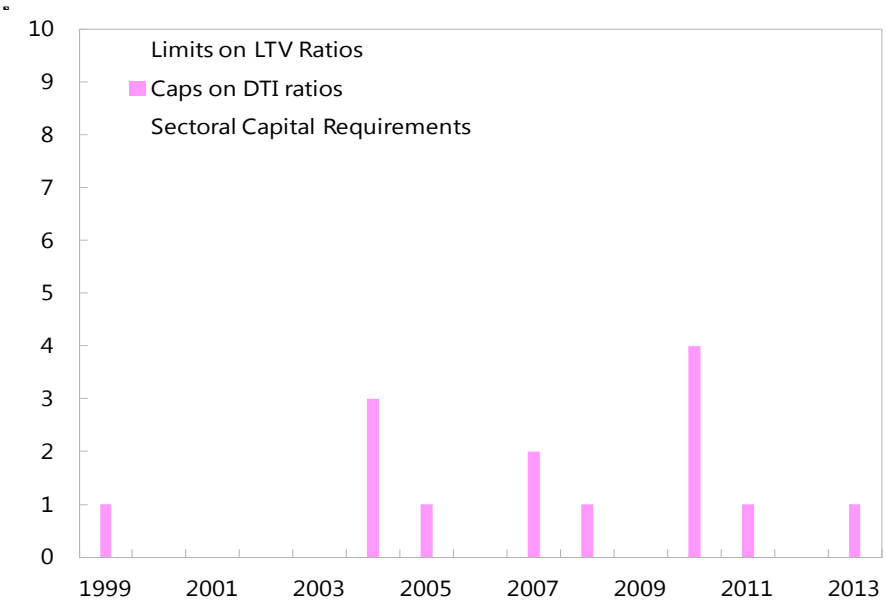
- Sectoral capital requirements will lose effectiveness when banks hold capital well above the regulatory minimum and thus need not change loan portfolio in response to the increases in the risk weight. This often happens during real estate booms when authorities hope the tool to be most effective. In contrast, if real estate booms are demand-driven and not accompanied by income growth, caps on LTV and DTI ratios can help keep effectiveness (see Table 4 and Israel case study below).
- Sectoral capital requirements may be circumvented through recourse to non-banks, foreign banks and their branches (like in Bulgaria and Serbia), and off-balance-sheet activities, which are located outside of the regulatory perimeter.[38] Limits on LTV and DTI ratios may also face circumvention toward alternative sources of mortgage loans, but they may be less prone to international leakages than sectoral capital requirements as they can be applied to all branches of foreign banks in addition to domestic banks (Bank of England (BoE), 2011).

29. The use of multiple sectoral tools has the advantage of tackling systemic risk from various angles. A combination of tools reduces the scope for circumvention and provides greater assurance of effectiveness by addressing different sources of risk. In reality, countries indeed use multiple tools simultaneously (Figure 10). From the credit demand-side angle, limits on the LTV and DTI ratios complement each other in dampening the cyclicality of mortgage loan demand, with the LTV addressing the wealth aspect and the DTI the affordability aspect, respectively. Additionally, DTI enhances LTV effectiveness in addressing excessive credit growth by restricting the use of non-collateralized loans to attain the minimum down payment of the LTV ratio. From the credit supply-side angle, higher risk weights reduce banks' exposure to risky mortgage lending and increase resilience. On the other hand, the use of multiple instruments may impose a high cost on households and financial institutions, so it is important to choose the most effective combination that can minimize any unnecessary burden.

[38] Foreign-owned banks can often evade prudential measures, by switching from domestic funding to cross-border funding, or by switching lending entities from banks to nonbanks, such as leasing institutions (owned by foreign-owned banks) outside of regulatory and supervisory perimeter. The flows that bypass the regulated financial institutions—either intermediated through non-regulated financial institutions or direct flows from abroad—can generate an excessively risky external liability structure (foreign exchange (FX)-denominated debt, especially of short duration). Even if there is no excessive borrowing on the balance sheets, borrowers may be tempted by lower interest rates of foreign direct lending into taking on excessive foreign exchange rate risk.

Figure 10. Number of Countries Adopting Macroprudential Measures to Cope with Real Estate Boom

(Number of countries)



Source: IMF staff calculation.

30. The global financial crisis brought real estate boom-bust cycles to the fore of policy discussions. Policies should aim at containing risks from real estate boom-bust cycles that are associated with increased leverage, rather than from price increases per se. In that context, one can think of policies as targeting two main objectives: preventing real estate booms and the associated buildup of leverage in the household, corporate, and banking sectors, and increasing the resilience of the financial system to real estate busts.

31. Limits on LTV and DTI ratios are increasingly being viewed as a useful demand-side macroprudential measure to contain harmful boom-bust cycles in housing markets (Igan and Kang, 2011; Wong and others, 2011; Crowe and others, 2011).[39] In principle, conservatively calibrated LTV and DTI ratios can contain boom-bust cycles by controlling both credit and expectation channels and strengthening financial institutions' resilience.

- Lowering limits on the LTV ratio can tighten liquidity constraints of targeted borrowers and thus limit housing demand in targeted segments of the real estate market (and vice versa in a downturn). This can help alter market expectations and speculative incentives that play a key role in bubble dynamics.[40]

[39]They can also apply to commercial real estates, which has been the case in Hong Kong SAR.

[40] The inertia in house prices and the difficulty of breaking bubble dynamics once they set in real estate markets have been pointed out to highlight what makes real estate cycles potentially dangerous.

- Limits on LTV and DTI ratios can enhance financial institutions' resilience to house price shocks. Where leverage is high, even a relatively small fall in house prices can lead borrowers to become underwater, and increase default risks. High rates of default can reduce banks' profitability, deplete their capital cushions, and trigger fire sales, which in turn imparts further downward spirals on housing prices. LTV limits bolster banks' resilience to house price volatility by increasing the collateral backing mortgage loans and so restricting their loss given default (LGD). DTI restrictions also enhance banks' resilience to the extent low DTI lending is correlated with lower delinquency rates and probability of default (PD).

32. Several countries have used such limits to discourage loans with high LTV and DTI ratios (Table 3);[41] for example, Hong Kong SAR has operated an LTV cap since the early 1990s and introduced a DTI cap in 1994; LTV limits in Korea were introduced in 2002, followed by DTI limits in 2005.[42] During the post-crisis period, many advanced economies (AEs) and emerging market economies (EMEs), such as Hungary, Norway (loan-to-income limit, LTI), etc, recently adopted these instruments as new tools. Up until now, nine AEs and fifteen EMEs implemented caps on LTV ratios. Six AEs and eight EMEs adopted limits on DTI ratios, which complemented the limits on LTV ratio in these countries.

Table 3. Use of Macroprudential and Tax Measures Across Countries

	Advanced Economies	Emerging Market Economies	Total
Limits on LTV ratio	Canada (2008), Finland (2010), Hong Kong SAR (1991), Israel (2012), Korea (2002), Norway (2010), Netherlands (2011), Singapore (1996), Sweden (2010)	Bulgaria (2004), Chile (2009), China (2001), Colombia (1999), India (2010), Indonesia (2012), Latvia (2007), Lebanon (2008), Malaysia (2010), Hungary (2010), Poland (2011), Romania (2004), Serbia (2004), Thailand (2003), Turkey (2011)	24
Caps on DTI ratio	Canada (2008), Hong Kong SAR (2010), Korea (2005), Netherland (2007), Norway (2010, LTI), Singapore (2013)	Colombia (1999), Hungary (2010), Latvia (2007), Malaysia (2011), Poland (2010), Romania (2004), Serbia (2004), Thailand (2004)	14
Taxes (Stamp duty, capital gains tax, etc)	Hong Kong SAR (2010), Israel (2011), Korea (2003), Singapore (2010)	China (2013), Latvia (2007), Malaysia (2010),	7

Sources: Lim and others (2011) and IMF staff (Ivo Krznar) extension.
Note: Parentheses show the time when a country started to implement a measure or tightened it since 1990.

[41] Table 3 contains information from Lim and others (2013) and remains work in progress. The IMF staffs do not claim that the table captures all countries' experiences with the three macroprudential tools.

[42] Since their launch in September 2002 and August 2005, the LTV and DTI limits in Korea have targeted speculative regions in the residential real estate market, rather than the whole housing market on a nationwide basis. Their specific conditions have also been flexibly adjusted in terms of maximum limits, loan types, and covered financial institutions. Both measures were tightened six times, and loosened five times.

33. These measures have been found successful in containing exuberant mortgage loan growth, speculative real estate transactions, and house price accelerations during the upswing. Limits on LTV and DTI ratios can reduce financial accelerator mechanisms that otherwise lead to a positive two-way feedback between credit and house prices.[43] A number of studies have found empirically that a tightening of LTV and DTI ratios can slow the growth rate of mortgage loans, thereby reducing the potential for a housing bubble to emerge (Lim and others, 2011; Igan and Kang, 2011; Crowe and others, 2011; Duca and others, 2011; Ahuja and Nabar, 2011).[44] See Table 4 for an overview of the empirical literature.

- Lim and others (2011) find that (i) credit growth declines after limits on LTV and DTI ratios are introduced; (ii) the negative relationship is statistically significant; and (iii) the LTV measure reduces the procyclicality of credit growth by 80 percent.[45] Ahuja and Nabar (2011) reconfirm that caps on LTV and DTI ratios have a decelerating effect on mortgage loans in a cross-country study using the same survey.[46] They also find that both LTV and DTI require four quarters to reduce annual loan growth rates by 3.7 and 2.8 percent respectively, reflecting the slow-moving nature of balance sheet adjustments.
- Igan and Kang (2011) find that limits on LTV and DTI ratios are associated with a reduction in house price appreciation and transaction activity, and the LTV cap curbs speculative incentives, which play a key role in bubble dynamics.[47] Transaction activity in Korea drops significantly in the three-month period following LTV and DTI tightening. House price appreciation slows down a bit later, in a six-month window rather than the three-month window. Household survey data analysis offers an insight into what the channel for the impact of the policy actions may be: expected house price increases in the future become lower after tightening the LTV measure and this is more prevalent among speculative pre-owners, but not among those who do not own a property, i.e. potential first-time young buyers.[48]
- Crowe and others (2011) confirm the positive association between LTV at origination and subsequent price appreciation using state-level data in the U.S.—a 10 percentage point

[43] House prices are subject to frequent and substantial swings, and financial institution Igan and Kang (2011) show that, between 2001 and 2010, house prices and mortgage loan growth tend to move in the same direction, demonstrating the two-way feedback loop

[44] Since the active use of limits on LTV and DTI ratios in response to cyclical movements in real estate markets has a short history in most countries, limited empirical evidence is currently available on the effectiveness of the measures.

[45] For every 1 percent increase in GDP growth, credit growth increases by 0.08 percent without limits on LTV ratio, but it is dropped by 0.06 percent when the measure is implemented, leaving an overall net effect of 0.02 percent only.

[46] The study uses a sample of 49 emerging and advanced economies over the time period 2001Q1–2010Q4.

[47] The large dampening impact on real estate transaction activities may raise concern that the price discovery process is hurt by the measures because some of the buyers and sellers decide to (temporarily) exit the market, but it may also be just an artifact of the adjustment mechanism in real estate markets where transactions respond first and prices adjust at a slower pace.

[48] A DTI cap works more closely through borrowers' affordability channel than price or expectation channels by its definition (Igan and Kang, 2011).

tightening of the LTV ratio leads to a decline in the rate of house price appreciation of between 8 and 13 percentage points. Duca and others (2011) estimate that a 10 percentage point decrease in LTV ratio of mortgage loans for first-time buyers is associated with a 10 percentage point decline in the house price appreciation rate.

34. A growing body of evidence points to the benefit of LTV and DTI ratios in containing the severity of downturns, reducing fire-sale dynamics and loan losses when the housing market turns (IMF, 2011b; Lee, 2012; Wong and others, 2004, 2011).

- IMF (2011b) shows that across OECD countries over the 1980 to 2010 period, conditional on a housing bust occurring, the fall in property prices is less steep where LTV ratios are tight. Financial Services Authority (2009) also finds evidence of a correlation between higher LTV ratios and higher default rates during 2008 in the U.K.
- Housing prices in Korea fell from 2008, but the delinquency ratio on household loans remained below 1 percent even until September 2012. This implies that strict implementation of limits on LTV and DTI ratios prevented households' defaults even as house prices fell, thus reducing financial institutions' credit risks. From this standpoint, the measures were helpful to increase the resilience of financial institutions (Lee, 2012).
- Wong and others (2011) present cross-country evidence that, for a given fall in house prices (1 percent), the incidence of mortgage default is higher for countries without a LTV ratio limit (1.29 basis points) than it is for countries with such a tool (0.35 basis points). They also show that losses sustained by lenders for a given fall in house prices are lower.

35. In tandem with limits on LTV and DTI ratios, countries have sometimes been using instruments derived from other public policy areas to address real estate imbalances: fiscal (stamp duties) and structural (related to the supply side of the real estate market). Such measures are used in specific circumstances, e.g., when the pressures have localized character, when purchases are financed directly from abroad (without domestic financial sector intermediation) or when price growth is the result of more fundamental imbalances.

36. A *stamp duty* can discourage short-term speculative purchases. For example, in Singapore, an additional buyer's stamp duty on residential property purchases was imposed on top of the existing 3 percent buyer's stamp duty in December 2011, at the rate of 10 percent for foreigners and corporate entities, 3 percent for permanent residents buying the second or subsequent property, 3 percent for Singapore citizens buying their third or subsequent property.[49] IMF (2012b) shows that the stamp duty was effective at reducing demand from foreigners, who were

[49] In Singapore, the seller's stamp duty was introduced on private residential properties sold within one year of purchases at the rate of 1 percent for the first S$180,000, 2 percent for the next S$180,000, and 3 percent for the remaining balance in February 2010. It was extended to sales within three years in August 2010, and then four years with the rates increased to 16, 12, 8, and 4 percent correspondingly in January 2011.

outside of the LTV and DTI regulatory perimeter, and stabilizing housing prices, as evidenced by the sharp drop in foreign buyers' share of private residential properties in the first quarter of 2012.[50]

37. *Supply-side property market measures* can also complement demand-side instruments to contain excessive price appreciation. Places with elastic housing supply have fewer and shorter bubbles with smaller price increases (Glaeser, Gyourko, and Saiz, 2008). Policymakers often focus on demand-side instruments, since supply-side measures operate at a greater lag and are also not easily reversed. But, as long as mismatches between housing supply and demand remain, the effectiveness of demand-side instruments can become limited. Craig and Hua (2011) find that land supply is the second most important factor driving long run residential property price movements in Hong Kong SAR, following real GDP per capita.

38. The effectiveness of LTV/DTI can be reduced by their circumvention by market participants. To minimize opportunities for circumvention, the regulatory perimeter should be widened. If LTV or DTI caps are to be imposed, any financial institution engaged in mortgage lending should be included, that is, not only banks but also non-bank lenders and foreign banks' affiliates. The instruments should also be applied to all types of mortgages, but ideally only to the flow of new lending rather than the stock of existing mortgages, to avoid the situation where high-LTV or high-DTI borrowers would have to provide more collateral after a fall in house prices or income.

39. Limits on LTV and DTI ratios need to be designed carefully or be complemented with other schemes to ensure an appropriate trade-off between financial stability benefits and societal preferences for home ownership. Facing these concerns, authorities have tried to minimize unintended side-effects by tailoring the measures to country specific contexts.

- Hong Kong SAR and Canada introduced a mortgage insurance program in 1999 and 1954 respectively, complementing the LTV caps. The program ensured that first-time buyers had better access to the housing market, while imposing the caps to address systemic risks in the housing market (Genworth Financial, 2012).

- In Singapore, lowering the LTV ratio for those with more than one outstanding mortgage loan targeted speculators without affecting first-time home buyers.

- In Korea, limits were tighter for mortgage loans on properties in officially designated 'speculative zones' with high appraised value, which focused the effects of tightening the LTV measure on speculators, rather than young first-time buyers with low income (Igan and Kang, 2011; Lee, 2012).

[50] In Hong Kong SAR, the authority introduced a special stamp duty in November 2010 on residential properties resold within 24 months of purchases in addition to an existing stamp duty (of 4.25 percent). The duty rate is 15 percent for properties resold within six months but declines in steps the longer a property is held, falling to zero after 24 months. It raises the cost of buying properties and then reselling them quickly (a practice called "flipping"), thus encouraging buyers to hold property for longer.

C. To Limit Systemic Liquidity Risk: Macroprudential Stability Levy and Core Funding Ratio[51]

40. A sound liquidity profile, robust to funding shocks, is important for the survival of individual banks given their maturity transformation role, but the recent financial crisis also highlighted the need for adequate liquidity to safeguard financial stability. With financial market imperfections, i.e. limited liability combined with asymmetric information, an individual bank does not internalize its contribution to systemic risk, expanding credit excessively. The excessive credit expansion is often funded by short-term wholesale funding, because stable deposits tend to increase more slowly than credit demand. Particularly, banks in small open economies (SOE) depend on short-term, often foreign currency, wholesale funding, building a maturity and currency mismatch. Such mechanisms can contribute to capital inflow surges and sudden stops, and often end up in a twin crisis in which a banking crisis and currency crisis reinforce each other (IMF, 2011c).[52]

41. A few small open economies moved ahead of others to implement new liquidity-type macroprudential measures, while the Basel committee is still negotiating new liquidity standards, such as the Liquidity Coverage Ratio (LCR) and Net Stable Funding Ratio (NSFR). For example, Korea put into effect in August 2011 a price-based Pigovian tax on banks' non-core foreign currency liabilities, the so called Macroprudential Stability Levy (MSL), and New Zealand implemented from April 2010 a quantity-based minimum requirement on core funding, the so called Core Funding Ratio (CFR).[53] These instruments aim to discourage excess reliance on short-term funding in a credit boom and induce banks to internalize the negative systemic risk of fragile funding strategies. The significant liquidity provision which central banks and/or governments were forced to provide during the financial crisis, naturally calls for such preventive measures (Perotti and Suarez, 2010).

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[51] Prepared by Yitae Kim and Heedon Kang (MCM).

[52] For example, prior to the global financial crisis, Swedish banks contributed to a credit boom in Baltic countries through their subsidiaries and branches, raising funding in foreign currencies—mainly Euros—from the global wholesale market and lending it to unhedged private borrowers with local currency earnings. When a severe shock hit, the maturity and currency mismatch triggered severe real and financial sector downturn in this region (IMF, 2011c).

[53] As in Perotti and Suarez (2011), in principle, the two types of instruments have relative strengths, depending on the source of banks' heterogeneity, such as profit-making capacity and risk-shifting incentive.

- When banks only differ in profit-making capacity, such as the ability to extract marginal profit out of short-term funding, a price-based tool like the MSL is efficient in containing risk and preserving credit quality.
- When banks differ in risk-shifting incentives, a quantity-based tool, i.e. the CFR, is best to contain excess credit expansion.
- If authorities can use capital-type instruments, such as countercyclical capital buffer, to address risk-shifting incentives, the price-based tool is superior to the quantity-based tool, because (i) the latter entails a deadweight loss; and (ii) the former is easier to adjust than the latter.
- In general, combining the two tools may be adequate for controlling risk-shifting incentives and internalizing negative externality and systemic risk.

42. A levy on non-core liabilities or a minimum required ratio of core funding can address two aspects of systemic risk: they can curb not only maturity and currency mismatch but also overall credit growth. Since retail deposits, the main part of core liabilities of banks, grow in line with the aggregate wealth of the private sector and thus are slow-moving, the pool of retail deposits is not sufficient to fund the rapid credit expansion in a boom. Other sources of funding, non-core liabilities, must then be tapped to fund the expansion. In this way, excessive credit growth is mirrored in greater reliance on non-core liabilities.[54] Therefore, liquidity instruments can be effective tools to contain excessive credit expansion of banks, in addition to excessive leverage and excess reliance on non-core funding. Furthermore, since the non-core funding is often raised in wholesale financial markets, the instruments can play a role to reduce domestic or cross-border cross-exposures among financial institutions and thus address the cross-sectional dimension of systemic risk (Shin, 2010a and 2010b). If successful, this will lower the likelihood of fire-sales during financial stress and limit amplification of the initial shock.

Liquidity measures—the case of Korea

43. In Korea, banks rapidly increased short-term non-core FX borrowing from 2005, creating sizable FX mismatches.[55] This surge suddenly stopped, when the international wholesale funding market froze and both domestic banks and foreign banks' branches were unable to roll over their maturing short-term external liabilities after the Lehman Brothers bankruptcy. The rollover ratio of short-term external debt fell rapidly right after the financial crisis, from 99.8 percent in September 2008 to 39.9 percent in October 2008 (Lee, 2012). The Korean won depreciated rapidly and the CDS premium on government bonds rose to become much higher.

44. Korea adopted the Macroprudential Stability Levy as a macroprudential tool as of August 1, 2011. The levy is imposed in proportion to each bank's marginal contribution to systemic risk, that is, on banks' daily average balance of non-deposit foreign currency liabilities of maturity up to a year.[56] Currently, 19 domestic banks and 38 foreign banks' branches are subject to the levy.[57] The rate varies from 2 to 20 basis points, depending on the maturity of the debt instrument, and can be adjusted discretionally to discourage highly volatile short-term foreign currency funding. The proceeds from the levy are accumulated as a part of the Foreign Exchange Stabilization Fund to provide liquidity to banks at times of financial stress, complementing deposit insurance.

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[54] For this reason, the core-funding ratio can be used as a good indicator of credit cycles.

[55] The key underlying structural reason was that banks bought dollar forward from exporters and asset management companies who expected trend appreciation of the Korean won, and then hedged their long dollar positions with short-term external FX borrowing. The aggregate short-term net external debt of Korean banks rose to US$106 billion in the third quarter of 2008 from US$12 billion at end-2005.

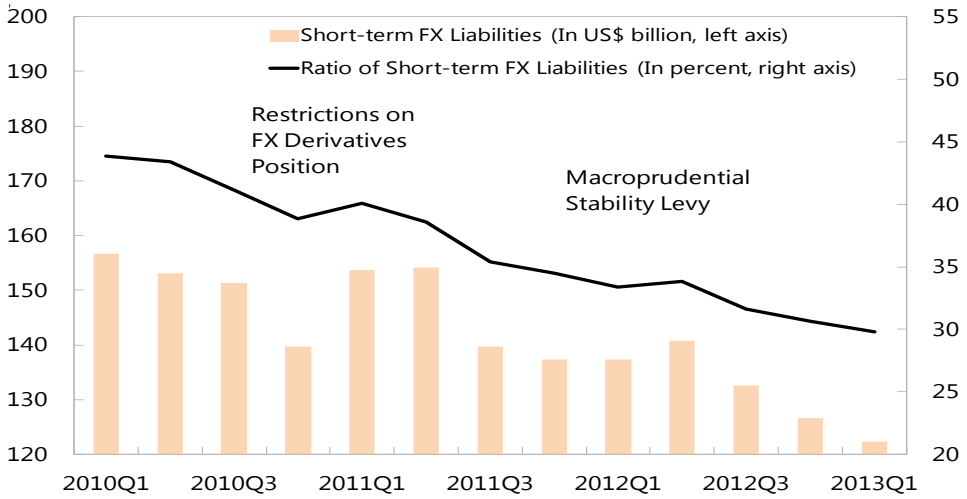
[56] A few types of liabilities are exempted, such as payable spot exchange in foreign currency, derivative instrument liabilities in foreign currency, and accounts dealing with liabilities for government policy objectives. Foreign currency deposits are also exempted, because its imposition would place a double burden as they already fall within the deposit insurance scheme.

[57] The banking sector accounted for 96 percent of the total non-deposit foreign currency liabilities as of end 2010. However, the levy can be expanded to non-banks, if necessary, without the revision of the law.

45. Korea also implemented caps on the loan-to-deposits ratio (2012) to shift banks' funding structure away from wholesale funding, and ceilings on banks' FX derivative positions (2010, 2011, and 2012). Net FX derivative positions were limited to 50 percent of capital for domestic banks and 250 percent for foreign banks' branches in June 2010, and the limits were lowered to 40 percent and 200 percent in June 2011 and were cut again to 30 percent and 150 percent in December 2012. Combining them with the levy, the authorities target both the source and the costs of the excessive dependence on short-term non-core FX borrowings, and encourage long-term and stable sources of funding.

46. These measures appear to have been effective in curbing banks' reliance on short-term FX funding and in reducing vulnerabilities from FX mismatches and exchange rate volatility (IMF, 2012c and 2013; Ree and others, 2012; Bruno and Shin, 2012).[58] Banks' short-term net external debt, including of foreign banks' branches, declined steadily from US$65 billion in June 2010 to US$43 billion in June 2012, and the short-term external debt ratio has continuously decreased to 50.7 percent in the second quarter of 2012 after peaking at 72.6 percent of total bank's external debt in the third quarter of 2008.[59] The sensitivity of capital inflows to global conditions decreased in the period following the imposition of the levy, relative to a comparison group of countries (Bruno and Shin, 2012). Rollover risks for domestic banks have diminished, as residual maturities of their external debt increased (IMF, 2012c). The sensitivity of exchange rate volatility to changes in the VIX also declined substantially since the financial crisis, reflecting lower FX liquidity mismatches (Ree and others, 2012).

Figure 11. Korea: Effectiveness of Macroprudential Stability Levy
(In percent and US$ billion)



Sources: Bank of Korea and IMF staff calculation.

[58] Since these measures were brought in recently, firm conclusions on their effectiveness would need more thorough analysis as more data become available.

[59] However, the decrease in short-term external debt may also be attributable to demand-side factors, including a cyclical bust in the shipping industry.

Quantitative liquidity requirements—the case of New Zealand

47. Similar to Korea, New Zealand's banks depended on short-term cross-border funding to provide credit.[60] Given low national saving, banks have relied on external debt to fund private sector credit. Gross external debt exceeded 130 percent of GDP in 2009, and while New Zealand's short-term external debt declined during 2009, it remained high at almost 60 percent of GDP at end-2009.

48. New Zealand banks also experienced some difficulty rolling over their short-term debt after the collapse of Lehman Brothers. The Reserve Bank of New Zealand (RBNZ) introduced broader domestic market liquidity measures and the Term Auction Facility, while the government provided domestic and wholesale funding guarantees to retain access to international markets. Parent banks in Australia also provided funding to their subsidiaries in New Zealand.[61]

49. In October 2009 the RBNZ introduced new quantity-based measures to increase banks' liquidity and reduce reliance on short-term cross-border funding, and the measures became effective from April 2010.[62] The one-year CFR is core funding divided by total loans and advances, where core funding is defined as all funding with a residual maturity of longer than one year, plus Tier 1 capital and a weighted sum of certain short-term funding instruments.[63] A minimum on this ratio aims to ensure that banks hold sufficient retail and long-term wholesale funding, to reduce the vulnerability of the banking sector to a severe liquidity shock. For the initial implementation in April 2010, the minimum CFR was set at 65 percent of total loans and advances, increasing to 70 percent from July 2011 and 75 percent from January 2013 (Figure 12).

50. Since the onset of the global financial crisis in 2008, New Zealand banks have almost doubled their holdings of liquid assets and increased retail and long-term wholesale funding. Even though it is not clear whether this was because of the RBNZ's plans to introduce liquidity requirements, the uncertain and volatile environment, or rating agencies putting pressure on New Zealand banks to reduce their exposure to rollover risk, a comparison with some other countries suggests that the liquidity measure may have played a role. Since end-2007, New Zealand's short-

[60] See the 2011 Article IV consultation staff report (IMF, 2011d) and Hoskin, Nield, and Richardson (2009).

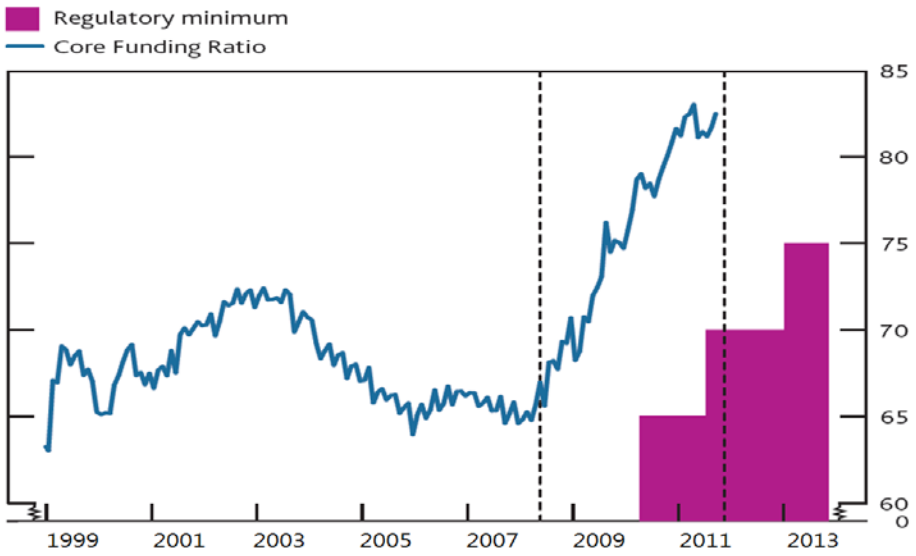
[61] The four largest banks in New Zealand are Australian banks' subsidiaries: ANZ National, ASB, Bank of New Zealand, and Westpac.

[62] The RBNZ also introduced (i) one-week and one-month mismatch ratios and (ii) one-year core funding ratio. The mismatch ratios set minimum 'zero' requirements for both one-week and one-month ratios each business day. The ratios compare a bank's liquid assets and likely cash inflows with its likely cash outflows, expressing the difference as a ratio of total funding. In this note, the one-year core funding ratio is discussed.

[63] The one-year core funding is all funding with residual maturity longer than one year, including subordinated debt and related party funding, plus (i) 50 percent of any tradable debt securities issued by the bank with original maturity of at least two years, and residual maturity (at the reporting date) between six months and one year, (ii) "non-market funding" that can be withdrawn at sight or with residual maturity up to one year, where the percentage to be included decreases with size bank, and (iii) Tier 1 capital.

term external debt declined by about 10 percent of GDP, whereas short-term external debt in percent of GDP rose for many other countries, with the notable exception of Korea and U.K..[64]

Figure 12. New Zealand: Effectiveness of Core Funding Ratios[1, 2]
(In percent)



Source: Bank of England (2011).
Note: 1/ The minimum CFR was first announced in May 2008.
2/ It was originally set to increase to 75 percent in July 2012, but in November 2011, the increase was deferred by six months to January 2013.

51. The impact of the new measure is expected to be stronger during booms, when banks tend to resort to short-term foreign currency funding markets to support credit expansion. The introduction of a minimum CFR will drive banks to either compete for more retail funding that affect their lending margins, or borrow in wholesale markets for terms longer than one year. During periods of rapid credit expansion, New Zealand banks will not have the same ability to expand domestic credit. To satisfy growing credit demand, banks will need to find funding mostly from customer deposits and longer-term markets. As a result, lending rates should move higher, reducing excessive credit growth.[65]

[64] The CFR had been scheduled to increase to 75 percent on 1 July 2012. However, the Reserve Bank decided to delay the increase until 1 January 2013. This was due to adverse funding market conditions, which meant that funding, to the extent that it was available, was unusually costly. Since July 2012, the reduction of tail risk in Europe has resulted in improved funding market conditions—the cost of issuing new debt has decreased by 50bps. Banks appear to have taken advantage of this and boosted their CFRs to well over 75 percent, with all banks holding at least a five percent buffer above (see Figure 2), resulting in the system CFR of 84.9 percent. Much of the banks' CFR increase is due to retail deposit growth, which may not continue in the future if credit growth continues to increase (RBNZ, 2013).

[65] This has a potential benefit that the RBNZ does not need to raise its policy rate during credit upswings to the same extent as in cases without the CFR being implemented.

Table 4. Summary of Literature Findings on Effectiveness of Macroprudential Tools

Reference	Instruments	Methodology	Conclusion
Cross-country analysis			
Arregui et al (2013)	LTV, DTI, risk weights, reserve requirement, provisioning requirement	Dynamic panel regression on 38 countries based on Krznar et al (2013) data (2000-2011) (see Table X)	LTV, DTI, risk weights, reserve requirement effective in contaning credit (to GDP) and house price growth; reserve requirement asociated with leakages
Ahuja and Nabar (2011)	LTV, DTI	Dynamic panel regression on the 2010 IMF Survey data (2000-2010)	LTV caps tend to have a decelerating effect on property price growth. LTVs and DTIs slow property lending growth
Almeida, Campello, Liu (2005)	LTV	Panel regression of house price growth and mortgage credit growth on a sample of 26 countries over the 1970–1999 period.	New mortgage borrowings are more sensitive to aggregate income shocks in countries with higher LTVs; house price more sensitive to income shocks in countries with higher LTVs
Dell'Ariccia et al (2012)	Differential treatment of deposit accounts, reserve requirements, liquidity requirements, interest rate controls, credit controls, open foreign exchange position limits	Panel regression with a composite measure of the six instruments	Reduce the incidence of credit booms and decrease the probability that booms end up badly
IMF (2012), Board paper on interaction between monetary and macroprudential policy	LTV, DTI, risk weights, reserve requirement, provisioning requirement	Dynamic panel regression on 38 countries based on Krznar et al (2013) data (2000-2011) (see Table X)	LTV, DTI, risk weights, reserve requirement effective in contaning credit and house price growth
Kuttner and Shim (2012)	LTVs, DTIs, risk weights on mortgage loans, provisioning rules, exposure limits to the property sector, reserve requirement, capital gains tax at the time of sale of properties and stamp duties	Panel regressions of housing price growth and housing credit growth on a sampe of 57 countries (1980-2010)	LTV and DTI effective in curbing mortgage credit and house price growth
Lim et al (2011)	LTVs, DTIs, ceiling on credit growht, reserve requirement, capital requirement, provisioning requirement	Dynamic panel regression on the 2010 IMF Survey data (2000-2010)	Reduce procyclicality of credit growth
Tovar et al. (2012)	Reserve requirement, dynamic provisioning, capital requirement etc.	Dynamic panel data vector autoregression on 5 Latin American countries (Brazil, Chile, Colombia, Mexico and Peru) during 2003–11; Macroprudential measures are captured through a cumulative dummy	Average reserve requirements and a composite of other types of macroprudential policies had a moderate and transitory effect on credit growth
Vandenbussche et al (2012)	Major prudential measures grouped into 29 categories	Error correction model on 16 Central, Eastern and Southeastern Europe from the late 1990's or early-2000's to end-2010	Changes in the minimum capital requirement and non-standard liquidity measures (marginal reserve requirements on foreign funding, marginal reserve requirements linked to credit growth) have impact on housing price inflation.
Wong et al (2011)	LTV	Panel regression data from 13 economies	Reduce the sensitivity of mortgage default risk to property price shocks; Tightening LTV caps in general would reduce household leverage

Table 5. Summary of Literature Findings on Effectiveness of Macroprudential Tools (concluded)

Reference	Instruments	Methodology	Conclusion
Individual-country analysis			
Ahuja and Nabar (2011), Hong Kong	LTV	VAR model	LTV has small effect on credit. LTV tightening could affect property activity through the expectations channel rather than through the credit channel
Craig and Hua (2011), Hong Kong	LTVs and stamp duties on property transactions	Error-correction model of house price growth	Helped slow down property price inflation.
Galac (2010), Croatia	Credit growth ceiling, marginal reserve requirement, foreign currency liquidity reserve	Regression of total private credit	Credit growth ceiling reduced domestic private but not total private sector credit growth (as domestic corporate debt was substituted with foreign). Marginal reserve requirement useful for building capital buffers.
Igan and Kang (2011), South Korea	LTV, DTI	Regression of mortgage credit growth and house price growth on their determinants and dummy variable representing macroprudential policy	Reduce house price appreaciation and transaction activity
Jiménez et al. (2012), Spain	Dynamic provisioning	Panel regression on comprehensive bank-, firm-, loan- and loan application-level data from 1999 to 2010	Mitigate credit supply cycles and have positive aggregate firm-level credit availability and real effects
Krznar and Medas (2012), Canada	LTV, DTI, amortization period	Regression of mortgage credit growth and house price growth on their determinants and dummy variable representing macroprudential policy	Reduce mortgage credit and house price growth
Wang and Sun (2013), China	Reserve requirement ratio, house-related policies, capital ratio, liquidity ratio, reserves for impaired loans to total loans ratio	Panel fixed-effects regression of loan growth, house price growht on 171 banks and 31 provinces between 2000 and 2011	The change in the reserve requirement is negatively associated with loan growth, House-related policies, capital requirement and liquidity ratios are ineffective; reserve requirement and house related policies effective with respect to the house price growth

Source: Papers cited in the table.

POLICY NOTES

A. Taxation and Financial Stability[66]

This note discusses three tax issues of potential macroprudential importance: tax incentives to excess leverage (debt bias) under the corporate and personal income tax; special taxes and levies on the financial sector; and the impact of taxation measures on asset prices.[67]

Debt Bias

The issue

52. Corporate income tax systems generally encourage the use of debt rather than equity finance. This is because interest paid is allowed as a deduction in calculating taxable profits, but the return to equity is not. This favorable tax treatment of debt at the corporate level is for the most part not offset by taxes at the personal level, so that corporate taxes typically create a 'debt bias.' A large empirical literature suggests that the impact is sizable: it suggests that, on average, a 10 percentage point lower corporate tax rate—a reduction, for example, from 30 to 20 percent—reduces the debt-asset ratio of nonfinancial companies by between 1.7 and 2.8 percentage points. There is some indication that this effect has increased over time (De Mooij, 2011).

53. This debt bias leads, on average, to more highly leveraged banks. The literature on debt bias, including the empirical literature just mentioned, deals almost exclusively with nonfinancial companies. This neglect is unfortunate, since while excess leverage is certainly cause for concern in nonfinancial companies, any excess leverage of financial companies is likely to be especially troubling from the financial stability perspective. There is a basic tension/inconsistency between regulatory measures intended to induce banks to hold more capital than they otherwise would and tax incentives for them to hold less. Banks might certainly be expected to respond to debt bias differently from other types of firms, given the regulatory capital requirements they face. However, banks typically hold buffers of equity beyond the regulatory requirements, which leaves scope for tax effects on leverage. Indeed it turns out that, empirically, the average tax response by banks is about as large as it is for nonfinancial firms: the long-run impact of a 10 percentage point change in the corporate tax rate on the leverage ratio of banks is estimated between 1.5 and 2.7 percent.[68] This means, for instance, that eliminating the bias to debt finance created by a 25 percent corporate tax rate (which, as will be seen, does not necessarily mean eliminating the corporate tax itself) might

[66] Prepared by Michael Keen and Ruud De Mooij (FAD).

[67] The first and third of these issues are discussed more fully in the IMF Policy Paper, "Debt Bias and Other Distortions: Crisis-Related Issues in Tax Policy," June 2009; the second is the topic of the IMF Report to the G20, "A Fair and Substantial Contribution."

[68] The results reported here are indeed for banks, not financial institutions more generally (whose tax-responsiveness remains to be investigated).

increase banks' capital in the long run by at least 3.75 percent of their assets: an increase of more than 30 percent over current levels (Keen and De Mooji, 2012).

54. The social cost of debt bias in the banking sector is potentially very large. The evidence is that larger banks, which hold smaller equity buffers, are less sensitive to tax. This is important because they hold a very large proportion of all banks' assets. It does not mean, however, that debt bias is unimportant for the banking sector: even small changes in the leverage of very large banks could have a large impact on the likelihood of their distress or failure, and hence on the likelihood of financial crisis. There is indeed evidence that higher debt bias is associated with significantly higher aggregate bank leverage, and that this in turn is associated with a significantly greater chance of crisis. This implies that tax bias makes crises more likely and, conversely, that the welfare gains from policies to alleviate that bias can be substantial. This is not to say, of course, that debt bias provides anything like a complete explanation of the incidence of financial crises, many of which have occurred in countries with low statutory corporate tax rates and to that extent relatively little debt bias. Nonetheless, the potential impact is sizable. At, for instance, bank leverage ratios as high as they were in some crisis countries in 2008, eliminating debt bias could avoid a loss in expected output of between 1.1 and 11.9 percent of GDP (cumulative over a four-year period) (De Mooij and others, 2013). Looking forward, the significance of the potential gain from reducing debt bias would need to be assessed relative to the strengthened capital standards now envisaged.

Possible policy responses

55. One way to eliminate debt bias—establishing tax neutrality between debt and equity finance—is by adopting a 'comprehensive business income tax' (CBIT), which denies interest deductions. The base broadening this implies would also allow the statutory corporate tax rate to be reduced as part of a revenue-neutral reform. However, the CBIT has serious drawbacks: it (i) increases the cost of capital on debt-financed investment (unless compensating measures are taken); (ii) raises significant problems with the taxation of banks (not least in terms of public perception), which would become effectively untaxed on their net interest income; and (iii) significantly distorts international financial transactions unless broadly adopted. Reflecting these difficulties, no country has ever adopted the CBIT. More limited restrictions to the interest deductibility have become more popular recently in the form of thin capitalization rules. These, however, do not fully address debt bias, often do not apply to banks, and create their own problems (including, for instance, in failing to recognize sectors' and companies' differing circumstances).

56. More promising is the introduction of an 'Allowance for Corporate Equity' (ACE) form of corporate tax.[69] This would provide a deduction for a notional return on equity, in principle—assuming that firms have complete assurance that they will receive the full value of the deduction—at a risk-free rate of return on capital, but in practice at something like the yield on government

[69] A variant is the 'Allowance for Corporate Capital' form of corporate taxation, which applies a notional return to debt too. This has the attraction of removing any distinction between debt and equity for tax purposes, but (since it would increase their interest deductions) would again result in little liability for banks.

bonds. The base to which this rate would be applied is the book value of equity, minus equity participations in other firms (to avoid duplication of tax relief). The ACE is neutral not only with respect to firm's debt-equity choice, but also with respect to its investment decisions (because tax is ultimately paid only on returns to investment in excess of the normal return). It also makes irrelevant to the firm's decision both the tax rules for depreciation and the rate of inflation. And there is now ample experience from countries that have or had an ACE or some variant, including in Austria, Belgium, Brazil, Croatia, Italy, and Latvia. These schemes have encountered no particular practical difficulty and, where this has been studied, the available evidence is that they have indeed reduced leverage ratios (see in particular Klemm (2007), who surveys experience in a range of countries, and Princen (2012), who finds that the ACE led to a significant reduction in leverage ratios in Belgium).[70]The Fund has in a number of cases recommended adoption of an ACE in its TA work, and this has also been also supported, for instance, in recent U.K. Article IV reports.

57. One potential concern with adoption of an ACE is its revenue cost—but this can be substantially mitigated. Tentative calculations suggest that an ACE for advanced countries would involve an average budgetary cost of 0.5 percent of GDP (Mooij, 2011). Of course, this could be offset by other tax measures to leave total revenue unchanged; and the losses will be smaller to the extent that the reform induces more investment and thus broadens the overall tax base. In thinking of compensatory fiscal measures, it is important to note that the beneficiaries of the ACE are likely to be not only (or even mainly) the owners of equity, but also employees who see their productivity and wages increase. Importantly, the revenue loss from introducing an ACE can also be mitigated by judicious design. There are two main options. One is to apply the ACE only to new investment: this does not reduce the economic benefits of the reform, since for existing capital the equity deduction is simply a windfall gain. This was the route chosen by Italy in its recent introduction of an ACE. The main challenge with this approach is to minimize abusive transformations of old into new capital, but the Italian experience suggests that this risk can be managed. A second and in some respects more radical option is to restrict the ACE to banks (perhaps again only for new equity), for which the social costs of excessive leverage are expected to be largest. A concern with this is that any sector-specific tax treatment brings its own risks of avoidance. However, banking is a well-defined and intensely regulated sector, where special provisions are common. Though distinctly second best in tax policy terms, it may thus be worth considering an ACE for banks—supporting the buildup of capital—as an intermediate step toward adoption of an ACE more widely.

Financial Sector Taxation

Corrective taxes

58. If there are adverse externalities associated with some forms of debt finance, a case can be made for going beyond tax neutrality to actively discourage their use. Here the

[70] The introduction of ACE made the Belgium corporate tax system relatively more neutral, partly removing the incentives for debt financing. However, the scheme contributed to high corporate debt levels in gross terms, by creating incentives for substantial inter-company lending.

potential interplay between tax and regulatory policies comes to the fore. But while there has been some debate as to the relative merits of taxation and regulation in addressing financial market failures, this deep issue remains largely unresolved—intellectually at least (Keen, 2011a and 2011b).

59. Bank taxes can help correct failures in financial markets, acting as a Pigovian tax.[71] The IMF 2010 study for the G20 proposed to address systemic externalities associated with excessive risk taking by banks with a Financial Stability Contribution (FSC), linked to and financing a credible and effective resolution mechanism. A key purpose of the FSC would be to pay for the direct fiscal cost of any future government support to the sector and, in particular, for the resolution of weak institutions. In its simplest form, the base of the FSC would be uninsured bank borrowing and the charge would be paid by all financial institutions, initially at a flat rate; in broad terms, such a charge can be seen as partly offsetting the debt bias discussed above. The suggestion was that the FSC be subsequently refined to reflect individual institutions' riskiness and contributions to systemic risk—such as those related to size, interconnectedness, and substitutability—and variations in overall risk over time.

60. Around a dozen European countries—including France, Germany, and the U.K. —have adopted bank taxes that resemble an FSC as a way to support financial stability. These vary quite widely in rate, base, and in whether the proceeds feed a fund or go to general revenue. Assessment of these charges is only now beginning, but some preliminary work suggests a (perhaps surprisingly) large consequent increase in capital ratios (Devereux, Johannesen and Vella, 2013), and it is notable too that the U.K. levy has consistently raised less than expected, perhaps suggesting larger behavioral impact than anticipated. These taxes are to a large extent a work in progress, and a variety of technical issues have arisen, for instance, in terms of novel measures needed to avoid double taxation. It remains to be seen whether divergences between these taxes will create sufficiently large distortions to warrant closer convergence in their design.

Financial sector taxes less directly related to financial stability

61. There is a case for special taxes to offset distortions associated with the VAT exemption of margin-based financial services.[72] The first-best response to this exemption would be to levy the VAT on financial services—and it is now understood how this could, in principle, be done.[73] Progress in this area is slow, however, and the Financial Activities Tax (FAT) that is also proposed in the IMF's report to the G20 is a second-best way to alleviate the distortion that

[71] These are sometimes referred to as "levies;" while the usage reflects differing sensitivities and in some cases legal structures, for present purposes, we use the terms interchangeably.

[72] Meaning that tax is not charged on the provisions of services and (contrary to normal VAT practice) VAT paid on associated inputs is not refunded or credited.

[73] The difficulty is that of allocating the value added represented by the margin between borrowing and lending rates between the two sides of the transaction, as is required if the crediting mechanism of the VAT is to ensure that ultimately only value provided to final consumers is taxed. This can in principle by achieved by bringing all cash inflows to financial institution as sales, and all outflows as purchases. See, for instance, IMF (2001).

exemption creates. It does this by imposing a charge on the sum of financial institutions' profits and remuneration—which is its value added.[74] Thus, to some degree, it offsets the distortions caused by the exclusion of most financial services from the VAT.[75] Iceland, Israel, and Quebec have taxes of this type, and France and Denmark have imperfect variants. The FAT is inferior to full taxation under the VAT in that, without some special arrangements, business use of financial services would continue to be subject to tax; issues also arise over the treatment of exported financial services which, in principle, should be removed from the tax base. Importantly for present purposes, however, the primary purpose of the FAT is not to address financial stability issues, but rather to mitigate a pre-existing tax distortion that impedes the smooth operation of the financial sector.

62. The Financial Transaction Tax (FTT) has many advocates as a way to address some financial market imperfections, but few claim it addresses basic issues of financial stability. Several emerging economies (Colombia, India, Peru, Poland, Ukraine) and advanced countries (Belgium, Finland, Singapore, Sweden, Switzerland, and the U.K.) have forms of FTTs, including stamp duties that apply to a fairly narrow range of transactions. In the EU, there are plans for 11 member states to adopt a much more broad-based form of FTT, under enhanced cooperation, at the start of 2014. France and Italy have adopted forms of FTT in recent months, and have also adopted particular taxes on high frequency trade.

63. FTT's are generally regarded as inferior to the FSC and the FAT in addressing core market failures in, or raising additional revenue from, financial markets. For instance, advocates of the FTT argue that discouraging short-term trading is desirable, but there is little evidence that short-term trading is a significant source of financial risk or that it was a major factor in the crisis.[76] Nor is there convincing evidence that FTTs reduce short-term price volatility; in fact, high transaction costs are likely to increase it. Even at a modest rate, an FTT can have significant social costs due to cascading effects (tax levied on tax), increasing costs of capital, encouraging avoidance schemes, and potentially impeding socially worthwhile transactions.[77] And if revenue is the objective, a basic principle of public finance is that taxing intermediate transactions is a bad way to do this—which is why the world has moved toward a VAT, not to turnover taxes on all sales.

Taxation and Asset Prices

64. Taxes can powerfully affect asset prices. Through their capitalization in asset prices, higher future taxes of many kinds (such as capital gains taxes, stamp duties, or recurrent property

[74] The G20 report describes several types of FAT; that described here is 'FAT1.' It would be possible, for instance, to include in the base only remuneration to relatively well-paid employees.

[75] The implications of VAT exemption on the overall size of the financial sector (and government revenue) are unclear: use by final consumers is under-taxed, but that of business users over-taxed because VAT on the inputs of financial institutions is not refunded or credited.

[76] To the extent that it is very high frequency trade that is seen as undesirable, a targeted tax on such activities (as in France and Italy), or targeted regulation, is likely to be superior to a tax applying to the generality of transactions.

[77] See, for instance, the review in Matheson (2012).

taxes) can reduce current asset prices; and the announcement of future tax relief can support asset prices (Jeanne and Korinek, 2010). Countries have indeed used tax measures during the crisis to bolster house prices, for instance, by removing or reducing stamp duties on housing transactions (as in Ireland. The Netherlands and Singapore (as noted in paragraph 36) or extending mortgage interest relief (Ireland). Conversely, Hong Kong and Singapore have recently raised real property taxes in an effort to cool down sharply rising house prices.

65. The effects of tax measures on asset prices can be complex and hard to predict. Lowering taxes on asset returns, for example, will have no effect on equity prices if the marginal investor is tax exempt. Likewise, if higher property taxes finance public expenditures of equal value, house prices should remain unchanged. The price effect of stamp duties or real property taxes will also depend on supply and demand responses and the frequency of market transactions. Evidence on the price effects of tax changes is mixed (and plagued by identification problems, as tax measures are generally introduced along with regulatory changes). For example, historical evidence for the U.S. suggests a significant negative correlation between asset prices and the tax burden on equity securities (Sialm, 2009). Yet, a recent study using Swiss data finds no effect of transaction taxes or capital gains taxes on housing price dynamics (Aregger and others, 2013). The European Central Bank (ECB) has recently noted that transaction taxes appear to have had only a minor impact on asset price bubbles in Europe (ECB, 2003). In Japan, by contrast, increased land taxation immediately preceded (which of course does not mean that it caused) the collapse of prices in the early 1990s.

66. Tax changes might not only affect price levels, but also their rate of change and their volatility. Macroprudential policymakers may care not only about the level of asset prices but also their rate of growth and volatility. The impact of taxation on these aspects of asset pricing are complicated and incompletely understood. For example, if an asset yields its return only as capital gains, increasing the tax on those gains means that its price must rise more rapidly if it is to yield the same after-tax return as other assets. Moreover, transaction taxes can discourage speculative transactions and reduce volatility in prices, but can also lead to lock-in effects, thinner markets, and more price volatility.

67. Favorable tax incentives for owner-occupied housing can make households more vulnerable to shocks. Many countries do not tax (or tax only lightly) imputed rent and capital gains from housing transactions, while providing generous relief for mortgage interest. This can be a source of significant distortion (and revenue loss), as productive capital shifts into the housing sector, and as households are encouraged to borrow against housing assets, either to invest in non-housing wealth or to finance immediate consumption. This can make them more vulnerable to shocks, exacerbating transmission channels within the financial system that can trigger crisis.[78] Large and unexpected reforms in the income tax treatment of housing can have large implications for

[78] There are also indications that favorable tax incentives for housing in Europe have raised house-price volatility, see Van den Noord (2005).

home values and the financial positions of households. While this renders reform difficult, the U.K. experience—phasing out mortgage interest relief over many years—shows that it can be done.

68. The purposive use of tax policy to affect asset prices is problematic, but tax-induced distortions should concern macroprudential authorities. One potentially attractive feature of tax measures in relation to asset prices, not usually associated with discretionary fiscal measures, is that implementation lags may be short, in that tax changes are likely to be capitalized as soon as they are announced or at least are perceived as credible. The risk remains, however, that delays may result in measures becoming credible only once the immediate need has passed: in Japan, for instance, the increased land tax came only after stock prices had begun to tumble. Gaps between announcement and implementation can also create distortions: delaying transactions, for instance, in the expectation of reduced transactions taxes. The use of taxes to affect asset prices can also entrench distortions that, from a wider perspective, would be better off withdrawn: increasing transactions taxes to dampen house prices, for instance, can also worsen the performance of labor markets by reducing mobility. Given the difficulty of distinguishing bubbles from asset price movements reflecting fundamentals, the natural focus for tax policy is to ensure neutrality in the treatment of differing assets and forms of income. A macroprudential authority might usefully flag instances where tax non-neutralities risk distorting asset price levels and movements to an extent that impairs financial stability.

B. The Role of Competition Policy in Supporting Financial Stability [79]

Traditional bank competition policy seeks to balance pressures for efficiency with incentives to take risk. The optimal market structure is characterized by an intermediate degree of concentration. The main tools are rules guiding entry/exit and consolidation of banks. There is some, albeit weak, evidence that appropriate market structures might have helped some jurisdictions weather the recent crisis. This note also suggests that bank competition policy could help deal with the too-big-to-fail (TBTF) problem, complement structural bank regulation initiatives, and following a crisis facilitate resolution by temporarily allowing higher concentration and government control of banks.

An Intermediate Degree of Bank Competition Is Optimal for Financial Stability

69. Bank competition policy has been a focus of much research and policy debate. The reason for this is the special nature of banks. In the non-financial sector, competition policy mainly focuses on efficiency (competitive pricing).[80] Yet for banks and the financial sector more generally there is another relevant dimension: systemic risk. When the degree of competition adversely affects banks' risk-taking incentives, this should be internalized by competition policy. Put differently, bank competition policy should have a macroprudential component.

[79] Prepared by Lev Ratnovski (RES).

[80] There are additional considerations for dynamic gains—incentives to make fixed investments and/or innovate.

70. The theoretical predictions and empirical results on the link between bank competition, risk-taking, and stability are somewhat ambiguous. But on net they suggest that an intermediate degree of bank competition is optimal, i.e. no excess restrictions but no unbridled competition either.

Literature[81]

71. Much of the theoretical literature warns that competition may increase bank risk-taking. Competition lowers margins and charter value (the discounted stream of profits) of banks, making them more willing to gamble and less able to withstand negative shocks (Marcus, 1984; Chan and others, 1986; Keeley, 1990; Hellman and others, 2000; Matutes and Vives, 2000; Repullo, 2004). Another channel is that competition may force banks to focus on maintaining market share instead of screening existing borrowers (Dell'Ariccia and Marquez, 2006).

72. Yet some papers highlight opposite effects where bank competition lowers interest rates in the economy, making borrowers safer and reducing risk (Boyd and De Nicolo, 2005). The effects can be reconciled in models that show an inverse U-shaped relationship between bank competition and stability. There, introducing competition in monopolistic systems initially increases stability as borrowers become safer, but high competition becomes destabilizing due to the charter value effect (Martinez-Miera and Repullo, 2010).

73. The empirical literature also offers ample evidence that too much bank competition may reduce stability. (In the papers, competition is measured through margins or concentration, and stability is captured as loan quality or probability of failure; see Keeley, 1990; Dick, 2006; Jimemez and others, 2007; Boyd and Runkle, 1993; Beck and others, 2006a and 2006b). There is evidence that competition distorted credit quality also during the recent crisis (Dell'Ariccia and others, 2012). Interestingly, some papers show that the stability effects of lower competition stem not from charter values, but from diversification benefits in large banks (Paroush, 1995; Benston and others, 1995; Craig and Santos, 1997; Beck and others, 2006a and 2006b).

74. Yet as theory predicts, too little competition may compromise bank stability. This is predominantly driven by distortions in large banks. As banks get larger and more diversified, they may increase the risks of their portfolios, or strategically choose to operate at a closer distance to default (Chong, 1991; Hughes and Mester, 1998; De Nicolo, 2000; Boyd and others, 2006). Larger banks also become subject to internal inefficiencies and increased operational risk (Beck and others, 2006; Laeven and Levine, 2007; Cetorelli and others, 2007).[82] Taken together, the two effects may—similar to the theoretical predictions—lead to an inverse U-shaped effect of bank competition on

[81] For extensive surveys see Allen and Gale (2004), Beck (2008), and Claessens (2009).

[82] An additional caveat is that when a concentrated system arises as a result of significant restrictions on entry, this may be a sign of an overall weak regulatory framework, and hence an instable system (Jayaratne and Strahan, 1998; Barth and others, 2004; Beck and others, 2006a and 2006b).

stability, as suggested in recent papers (Fernandez and Maudos, 2011; Carbó-Valverde and others, 2013).

75. Of course, beyond the ambiguous effect of risk, higher competition is beneficial—in the static sense—as it lowers costs and increases access to finance, benefitting most firms (especially financially dependent ones, see Petersen and Rajan, 1995) and households. But there are two caveats. First, competition may make banking services more arm's length and hence disadvantage information-sensitive borrowers (Berger and others, 2004; Carow and others, 2004; Karceski and others, 2005; Sapienza, 2002; Degryse and others, 2005). Second, when banks do not have good knowledge of customers, they may restrict credit during downturns (Petersen and Rajan, 1994; Bae and others, 2002; Bolton and others, 2012), increasing procyclicality.

Policy tools

76. The literature therefore suggests that an intermediate degree of bank competition is optimal. Competition should not be unbridled in order to allow banks to accumulate charter value that offsets their risk-taking incentives. But too little competition may make banks inefficient and possibly also lead to the TBTF problem.

77. The intermediate level of bank competition may be achieved by policies that focus on market structure (i.e. concentration):

- Entry/exit rules (for domestic and foreign banks);
- Consolidation policy (which may be particularly relevant around crises, when authorities can direct bank mergers; see Perotti and Suarez, 2003); and
- Restrictions on activities (non-lending activities of banks, and bank-like activities of non-banks such as insurance companies).

And by policies that affect contestability in banking services (competition given market structure):

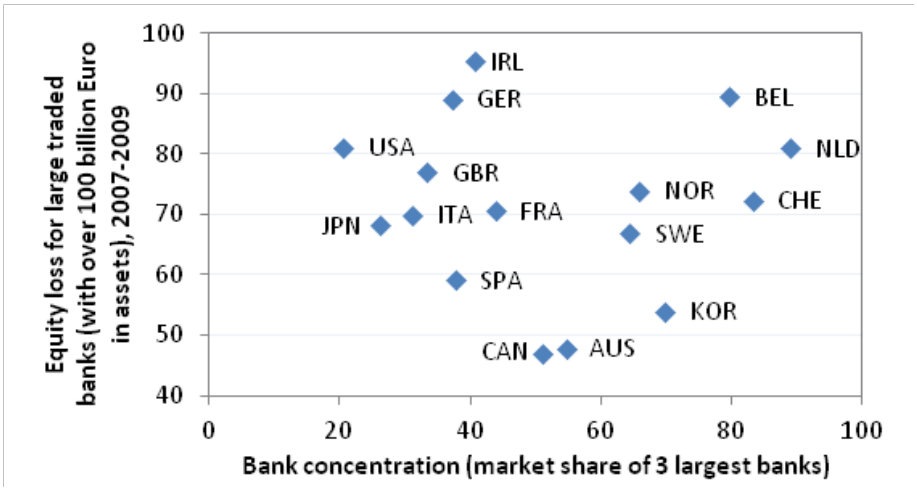
- Establishing credit registries;
- Providing equal access to infrastructure, such as payment systems; and
- Other measures that enable easier switching of banks by customers.

Evidence from the crisis

78. The evidence from the crisis on whether certain market structures have enhanced the stability of banking systems is somewhat weak. Figure 13 provides an illustration. On the one hand, the evidence is consistent with some inverse U-shaped relationship between concentration—a measure of market structure—and performance of banks during the crisis (as predicted by the standard arguments). This is driven primarily by positions of Canada and Australia, the countries least affected by the crisis.

79. Yet the robustness of this relationship is unclear. Banks from countries with similar bank concentration were vastly differently affected by the crisis (compare Canada, France, and Ireland). Other factors—notably non-core exposures funded in wholesale markets (e.g., in Germany and U.K.) along with high leverage (e.g., in Ireland or Germany)—have certainly played a larger role in explaining bank performance.

Figure 13. Bank Concentration and Performance during the 2008 Crisis
(In percent)



Sources: World Bank Financial Structure Database (Beck and Demirguc-Kunt, 2009) and IMF staff calculations (Huang and Ratnovski, 2009).

80. One reason why the link between bank concentration and financial stability is weak might relate to recent evolution of financial services provision. Progress in information technology increased the availability of "hard" (quantifiable, verifiable) information on borrowers, particularly in advanced economies. This reduced the grip that banks had over their customers thanks to "soft" (proprietary) information accumulated in existing bank-customer relationships.[83] As a result, today, banks in advanced economies may act competitively even when market structure is highly concentrated. High competition means low profits and structurally (permanently) high incentives to take risk.

81. Another reason might be that competition in the provision in financial services has become more international and cross-sectoral. The last decades saw significant international expansion of banks. This makes the structure of domestic banking industry just one factor in defining the competitive environment. There is (anecdotal evidence) that foreign bank entry might

[83] To be clear, some parts of the banking business, such as SME and syndicated lending, are still intensive in soft information. However, overall, hard information plays an increasingly important role. Modern banks in advanced economies combine activities based on hard and soft information.

have affected bank profits and risk-taking incentives in countries such as Spain and Ireland. Also, non-banks (e.g., finance companies and independent mortgage originators) have entered some lending markets (especially, prior to the crisis, mortgage markets) to compete with banks.

82. The final reason is that even when the relationship between bank market structure and stability is present, its properties are highly country-specific. Optimal bank market structure depends on financial development, quality and stringency of regulation, etc (Beck and others, 2013). This makes it hard to use a certain degree of bank concentration as a universal policy objective.

83. The fact that the link between market structure and bank risk-taking became weak has been long recognized in the literature (Claessens and Laeven, 2004; Demirguc-Kunt and others, 2004), but insufficiently reflected so far in policy debates. To sum up, while the correct market structure of banking is beneficial, it is not a panacea. Other aspects of prudential regulation should also be appropriate, especially so in modern financial systems.

Additional Lessons for Bank Competition Policy

84. The crisis experience highlighted several additional ways in which bank competition policy can support financial stability.

Addressing the TBTF problem

85. The TBTF problem is widely recognized as a major prudential concern. Banks that are complex and interconnected cannot be easily wound down, and have high incentives to take risk (O'Hara and Shaw, 1990; Flannery, 2009; Ueda and Weder di Mauro, 2012).

86. Currently, policy aims to address the TBTF problem through Basel III capital surcharges for systemically important banks (SIBs). The current measures might be insufficient to fully deal with the problem (see Haldane, 2012 and 2013). A notable reason is that the Basel SIFI capital surcharge is relatively small (up to 2.5 percent of risk-weighted assets), and might not give banks sufficient incentives to shrink or cut risks. There is then both a need and much scope to use in addition competition policy to address the TBTF problem. There are two approaches by which this can be done, a quantity- and a price-based approach.

87. The quantity-based approach is to use competition policy tools to directly restrict bank size. This can be achieved by limiting mergers, forcing spin-offs, etc. The challenge for this approach is to find a correct rationale for using such tools. Modern banks can act competitively and be efficient despite their size. Moreover, large banks may demonstrate spurious economies of scale, i.e. seem more efficient than small ones, thanks to: (i) lower cost of funds due to the TBTF subsidy, (ii) less borrower screening because they can afford more risk in lending operations, and (iii) more market-based activities, which are scalable but risky. It may therefore be hard to restrict bank size on pure competitive grounds. There are two ways around this. One way is to let competition policy adopt an explicit macroprudential objective, which would enable it to deal with large banks on the grounds of the welfare costs of possible crises. Another way, maybe more easily acceptable, is to

focus on sub-segments of bank operations where bank size may indeed be a detriment to competition. For example, large banks are generally poor in dealing with opaque customers, such as small business borrowers or other customers intensive in "local" information. Ensuring access to finance on competitive terms by such customers may offer a rationale to restrict bank size or facilitate bank entry on pure competitive grounds.

88. The price-based approach is to use competition policy to correct competitive distortions created by TBTF. Interestingly, this may reduce the underlying TBTF problem as well. A key distortion is the uneven playing field that arises because large banks have access to cheaper funding than small banks. The cheaper funding is a result of an implicit TBTF guarantee to large banks' creditors (that they will be bailed out in a crisis); the size of the funding advantage can be as high as 80 basis points a year (Ueda and Weder di Mauro, 2012). This distortion affects static competition, is a barrier to entry, and creates socially inefficient incentives for banks to grow. Correcting the uneven playing field is a natural goal for competition policy. The most direct tool to do so is to impose taxes or fines on large banks, to extract their unfair competitive advantage. (Think of a tax on wholesale funding of banks, with a rate that is increasing in bank size). From the perspective of competition policy, this would ensure a level playing field. From the prudential perspective, such taxes or fines would reduce the excess incentives of banks to grow, reducing the TBTF problem and enhancing financial stability.

Interaction with structural policies

89. The complexity of today's financial system creates scope for structural policies. Structural policies, as defined here, are prudential measures that restrict bank or non-bank activities that contribute to systemic risk (Haldane, 2012; Gambacorta and van Rixtel, 2013). Many bank failures during the recent crisis were a consequence of non-core, market-based bank activities: investing in securitized credit, wholesale loan origination (originate-to-distribute), carry trade, proprietary trading (see Acharya and others, 2010; Boot and Ratnovski, 2012). At the same time, at the aggregate level, bubbles in housing markets were amplified by the lending of under-regulated non-banks (Dagher and Fu, 2012). Recent structural policy initiatives—which aim to reduce the risks described above – affect the competitive environment, and therefore have important interactions with competition policy.

90. A number of recent proposals suggest restricting market-based activities of banks: prohibition of proprietary trading in the Volcker Rule in the Dodd-Frank Act in the U.S. or a segregation of a wide range of non-core activities in the Vickers and Liikanen proposals in U.K. and for EC. Non-core activities are risky and have low margins, so restricting them might boost charter value and increase the stability of banks. Restrictions on bank activities may ease competition policy. By separating less contestable (core) from more contestable (non-core, including international) activities, it would allow competition policy to be more targeted—that is, able to use different

approaches to the two sub-sectors, instead of focusing on banking as a whole.[84] For the core bank activities, it may mean more clarity on the competitive environment, and more precise competition policy.

91. Another possible structural measure is restricting competition in lending from non-banks. While historically lending was largely a bank-based activity, today non-banks, such as finance companies or independent mortgage originators, compete directly with banks. In the run-up to the crisis, lending by non-banks was riskier than that by banks (Dagher and Fu, 2012; Demyanyuk and Loutskina, 2012). This likely put pressures on banks to follow suit in order to maintain market share. Overall, non-bank lending amplified the mortgage bubble and led to riskier bank balance sheets. Non-bank lending was riskier in part because non-banks faced lax regulatory standards. Besides leading to more risk, the lax regulatory standards gave non-banks an artificial competitive advantage (of being less constrained by capital requirements or other prudential rules). Competition policy may help prudential policy by insisting on level playing field in lending, where non-banks can only compete directly with banks if they are subject to the same or similar prudential standards.

92. The third structural problem highlighted by the crisis is excess competition for retail deposits. Retail deposits are scarce (their supply is capped by the part of household saving that goes to banks), yet valuable to banks because insured deposits are the most stable source of funds (Huang and Ratnovski, 2009 and 2011). There were various types of excess competition for deposits in the run-up to the crisis. One was competition from non-banks (such as insurance companies, asset managers, money market funds) for household savings—as in Australia or the Nordics. Another was competition from local savings banks with implicit public guarantees that historically accumulated a large share of depositor base—notably in Germany. In any case, commercial banks were left with too little household deposits and had to rely on wholesale funding, which was a major source of vulnerability during the crisis.[85] Resolving the scarcity of deposits is a key structural challenge for policy. Competition policy might assist by establishing a level playing field in access to household savings—including by dealing with implicit guarantees and lax regulation of non-banks.

Competition policy and crisis management

93. The crisis put into sharp relief possible conflicts between bank competition policy and crisis management (Vickers, 2010; Hasan and Marinč, 2013). Normally, competition policy advocates limited government involvement in banks in order to maintain the level playing field between government-affiliated and other banks. Yet, crisis management might exceptionally require governments to take ownership in banks or offer banks guarantees in order to maintain financial stability and the capacity to lend. Also, governments might need to exercise control over banks to direct their restructuring. (These measures are not the only or most efficient paths for crisis

[84] This is similar in spirit to having distinct competition policies for, say, providers of communication network infrastructure and producers of communication equipment.

[85] While banks were losing their deposit market share between 2004 and mid-2008, they have regained it back in the wake of the global crisis as a consequence of a "flight to quality."

management, but may be necessary under some conditions; Laeven and Valencia, 2012). In such exceptional circumstances, competition policy should acknowledge the trade-off between the need for effective bank resolution versus preserving the level playing field, and aim to strike a balance. Also, competition policy might need to temporarily allow higher banking system concentration, when that is necessary to allow banks to rebuild charter values or to facilitate the shrinking of a previously over-expanded banking system.

Conclusions

94. This note offers two main lessons as to how competition policy might support financial stability. The first lesson is that, because the degree of competition affects bank risk-taking, bank competition policy should have a macroprudential component. Sometimes there is a need to sacrifice some competition to ensure more financial stability. Therefore, bank competition policy may require rules that are distinct from those for non-financial firms. (This is similar to bank resolution laws that have different procedures than those in regular bankruptcy codes; Marinc and Vlahu, 2012). Regardless, the competition authority needs to cooperate with the prudential regulator.[86] And there is a strong rationale to have financial stability as one of the objectives of the financial competition authority. Sometimes, there might be rationale to transfer some responsibility for bank competition (inasmuch as it affects financial stability) to the prudential regulator. The second lesson is that bank competition policy can also help respond to specific prudential concerns. It can help dealing with the TBTF problem, help address some structural (related to the scope of activities) sources of financial instability, and—by temporarily allowing higher concentration or government control of banks—may help facilitate effective crisis resolution.

CASE STUDIES

A. Ireland: Competition and the Crisis[87]

95. This case study highlights the role excessive competition played in the run-up to the crisis in Ireland. Ireland's membership of the euro created opportunity for foreign institutions to expand their operations in Ireland. At the same time, it created access to cheap foreign funding for domestic credit institutions. Foreign banks gained a significant market share by lowering their lending standards. Irish banks responded by adjusting their lending practices and tapping wholesale funding to support credit expansion. Under this "excessive" competitive environment, credit expanded rapidly, lending standards deteriorated and banks' balance sheets became weaker.

96. Competition has been argued to have been one of the main factors contributing to the Irish banking crisis in 2008. With hindsight, according to Governor Honohan, "a rapid and 'unwise'

[86] This may not come easily, as the two authorities traditionally differ in objectives approaches, regulatory perimeter, etc.

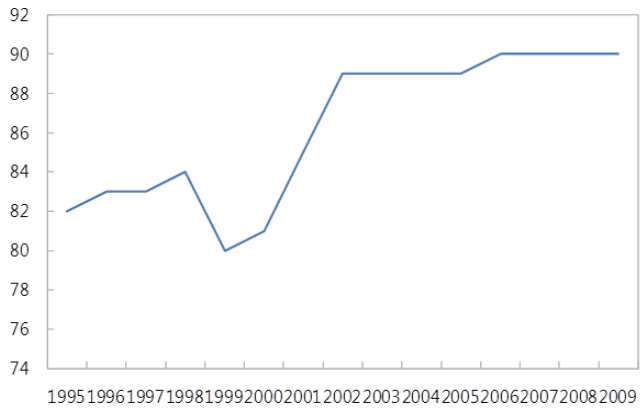
[87] Prepared by Jiaqian Chen (MCM).

expansion by U.K. lenders contributed to Ireland's financial crisis."[88] However at the time, the Irish authorities had a very different view on bank competition and financial stability. Before the crisis, a key preoccupation of Irish policy makers was the danger of too little competition in the domestic banking market, leading to too little credit (see Nyberg, 2011). Little attempt was therefore made to regulate the competition from foreign banks.

97. Establishment of the euro, combined with other factors, created an opportunity for domestic Irish banks to expand their balance sheets using cheap cross-border funding (either via wholesale market or direct deposits from foreign investors). In 1999, Ireland together with ten other members of the European Union (EU) adopted the euro as their common currency. Creation of the euro eliminated exchange rate risk between the member states and also led to a decrease in nominal and real interest rates. As a result, investors became more active in searching for higher yields in the peripheral economies, leading to easy access to funding for Irish credit institutions.

98. Foreign bank market presence increased significantly over the period. According to a measure by Claessens and Horen (2012), the share of foreign banks to total number of banks in Ireland increased from 80 percent in 1999 to 90 percent in 2009 (Figure 14). By end of 2012, there were in total 73 credit institutions in Ireland and 56 of them were foreign-owned.

Figure 14. Ireland: Percentage of Foreign Banks among Total Banks
(In percent)



Source: Claessens and Horen (2012).

99. Competition led to incentives for domestic banks to lower their credit standards. As a result, of competition, all the main Irish banks began to make tracker mortgages available and offered 100 percent LTV loans. Moreover, competition led to a significant change in the process of lending, as domestic institutions, seeking to differentiate themselves, began to offer more streamlined loan approval processes.

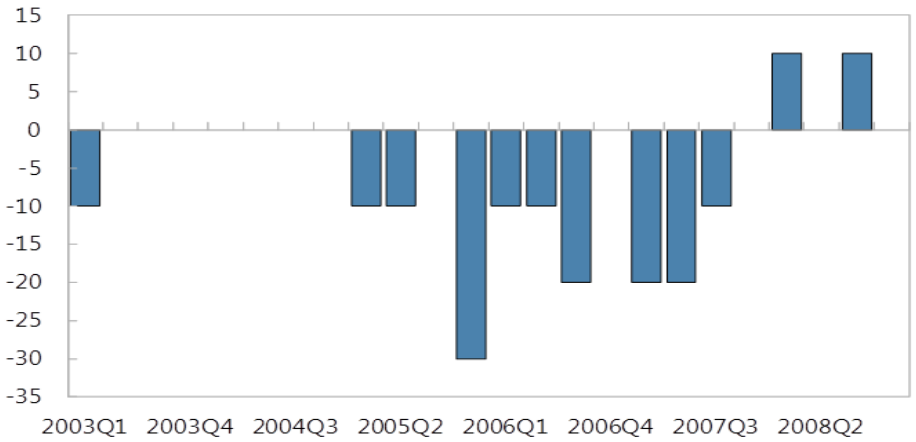
100. Regling and Watson (2010) describe the situation for a typical bank manager as a genuine dilemma. The management of individual banks could compete through ever more aggressively priced and structured products; or they could find themselves shrinking in terms of market share, which would also imply falling relative share prices and thus the risk of being taken over by a more aggressive bank.

[88] Governor Honohan made this speech at the British-Irish Parliamentary Assembly's 40th Plenary Conference in Co Cavan on 22 February 2010. A copy of the speech can be found: http://www.bis.org/review/r100223a.pdf.

101. This was particular marked at Anglo Irish Bank, as noted in Nyberg (2011). The lending culture was such that when applications were problematic, the mindset was a "yes" in there somewhere. Clearly, Anglo was reluctant to refuse loans to its customers, particularly, when competitors were all ready to take over these loans. As Anglo's profits soared, the larger and more traditional commercial banks, Bank of Ireland and Allied Irish Bank, came under intense pressure to relax their own loan approval and risk assessment practices in a struggle to keep pace with Anglo's performance.

102. These developments are also reflected in the data. The Bank Lending Survey conducted by the ECB suggests that competition from other banks lead to a significant deterioration in lending standards, in particular for mortgage loans. (Figure 15)

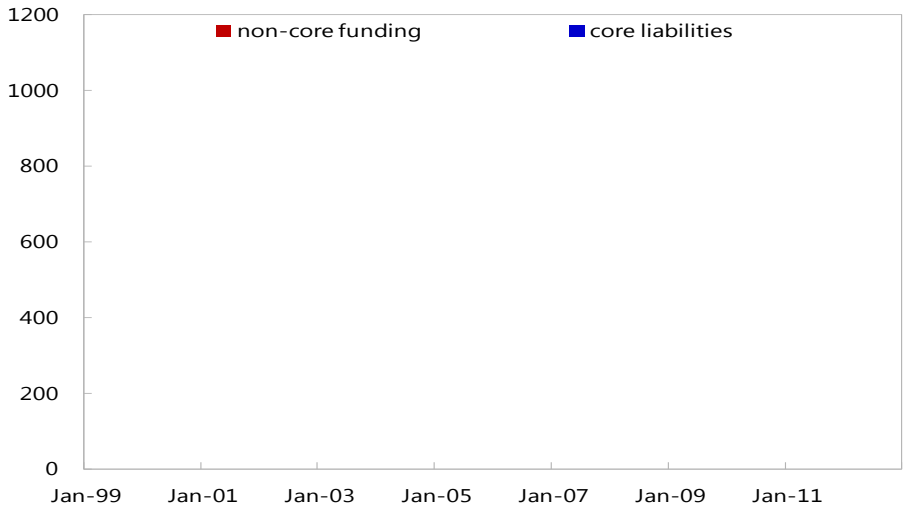
Figure 15. Ireland: Lending Standard due to Competition from Other Banks



Source: ECB bank lending survey.

103. Domestic credit institutions supported their balance sheet expansion mostly with non-core funding. Banks' total balance sheet growth vastly outstripped their traditional funding base of retail deposits. Even as total assets grew by a factor of 7.5, retail deposits only grew from €44 billion to €150 billion over the period. As a result, retail funding decreased to just 8 percent of total liabilities on the eve of the crisis. The gap in funding was made up by non-core liabilities, in particular deposits from non-Irish residents, which increased from €79 billion in 2003 to €271 billion in 2008 (Figure 16). Debt securities issued to foreign investors also contributed €54 billion toward the increase in the balance sheet between 2003 and 2008.

Figure 16. Ireland: Funding Gap of Irish Banks
(In billion Euros)



Source: IMF Monetary and Financial Statistics.

104. While bank profitability decreased significantly, banking sector stability weakened significantly over the pre-crisis period. (Figures 17 and 18). Figure 18 shows the evolution of Z-scores over the period,[89] where a higher Z-score indicates higher stability. Both net interest margins and Z-scores fell sharply from 2003, as systemic vulnerabilities from excessive competition built up.

Figure 17. Ireland: Net Interest Margin
(In percent of average interest bearing assets)

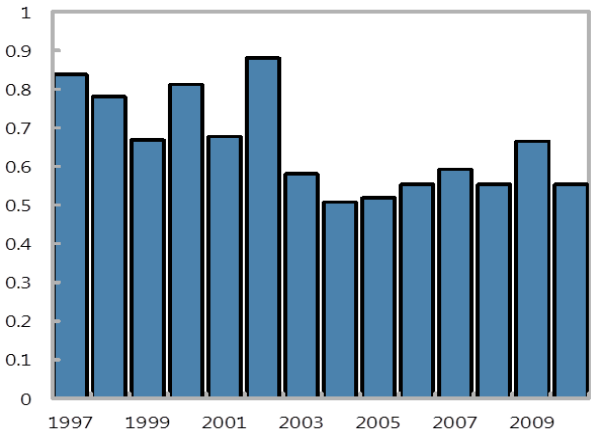
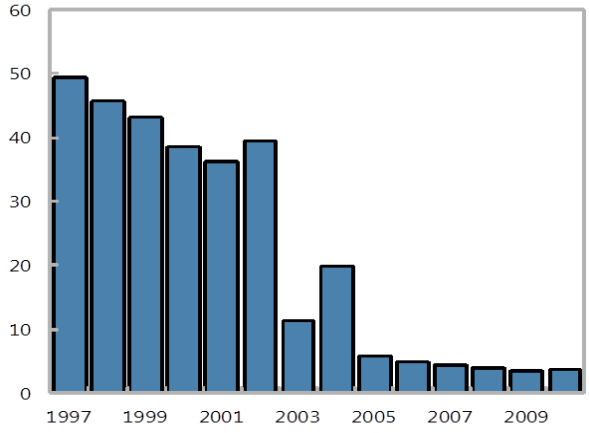


Figure 18. Ireland: Banks' Z-Score



Sources: World Bank Global Financial Development Dataset.

[89] Z-score measures bank's distance to insolvency and can be interpreted as the number of standard deviations by which returns would have to fall from the mean to wipe out all equity in the bank. See Beck, De Jonghe and Schepens (2012) for a detailed discussion.

B. Israel: Challenges in Taming Housing Booms[90]

The Context

105. At the height of the global financial crisis in 2008, the Bank of Israel (BOI) slashed policy interest rates from 4.25 percent in September 2008 to 0.5 percent by April 2009. These reductions, along with other measures to improve liquidity, enabled output to recover quickly; signs of recovery emerged by mid-2009. The sharp interest rate reductions also spurred housing market activity, as lower interest rates encouraged households to invest in real estate.[91] With parts of the corporate sector damaged by the crisis, banks were also eager to diversify their portfolios by lending to households. Land supply in Israel is limited, and building regulations are cumbersome, constraining the speed at which land is approved for use and new building can start. With supply restricted, the boost in demand from lower interest rates fed an increase in prices that eventually came to cause concern.

The Policy Response to Rising Risks from the Housing Market

106. The BOI faced a dual challenge stemming from its responsibilities both for conducting monetary policy and as the supervisor of banks. With the economy among the first to recover from the global crisis, policy interest rates were gradually raised starting in September 2009, to reach 3.25 percent in June 2011. During this period, the housing market remained buoyant and banks expanded mortgage lending aggressively. Between 2008Q4 and 2011Q1, real house prices surged by 38 percent. In mid 2009, the BOI called for stronger risk management in banks, and starting in 2010 it adopted macroprudential policy measures to address the building risks to financial stability. The measures included:

- requesting banks to tighten their risk management, scrutinize the mortgage loans to households, and enhance disclosure, particularly with respect to loans carrying floating interest rates that were extended to households (August 2009);
- instituting a supplementary reserve requirement of 0.75 percent for all outstanding mortgages with a LTV ratio that exceeds 60 percent (July 2010);
- imposing a capital charge of 100 percent (instead of 35 percent) on all loans over a threshold of NIS 800,000 that have a floating interest rate component that applies to more than 25 percent of the principal of the loan and involves a LTV ratio that exceeds 60 percent (October 2010); and
- requiring that the adjustable interest rate component of a mortgage loan apply to no more than one-third of the principal amount of the loan, and that banks notify customers whose mortgage

[90] Prepared by Piyabha Kongsamut (EUR).

[91] The fast recovery in Israel and its solid record of economic management ahead of the crisis also spurred short-term capital inflows in 2010-11, to which the Bank of Israel (BOI) responded with regulatory measures and stepped up foreign exchange intervention. That episode is not covered in this note, as the inflows did not affect the housing market developments.

loans carry a floating interest rate component that applies to one-third or more of the loan (May 2011).

107. Real house price growth moderated from 2011Q1, but picked up again in 2012, and the BOI adopted further macroprudential policies starting in July 2012. By this time, however, the economic environment had worsened and, with inflation on the decline, the BOI gradually lowered policy interest rates to support economic activity. At the same time, it tightened financial policies further. Measures included:

- imposing a 100 percent capital charge on groups of borrowers that collectively bought property for residential projects and engaged third parties to execute the construction and development of the property (July 2012)

- Imposing a limit of 70 percent on LTV for housing loans—excluding first-time buyers, for which a maximum LTV of 75 percent would apply. In addition, LTV for mortgage loans for investment purposes could not exceed 50 percent (November 2012)

- In February 2013, further measures were proposed, including increased capital requirements (though graduated risk weights by LTV levels), and higher provisioning for housing loans.

Policy Challenges

108. Central banks also responsible for bank supervision need to be prepared for the potential for tension between the objectives of price stability and financial stability. In Israel, this tension was not present in the recovery episode as both the economy and the housing market picked up; the BOI's interest rate increases and its adoption of macroprudential policies went in the same direction. By contrast, in 2011, global economic conditions were volatile and particularly uncertain, threatening Israel's recovery, and inflation subdued, while house prices looked to be picking up strongly again. Price stability and financial stability objectives were pointing to policy actions in opposing directions: loosen monetary and tighten financial. The BOI implemented looser monetary policy to address price stability issues and tightened macroprudential policy to contain financial stability risk.

Other Challenges

109. *Communications and accountability*. Communications of policy objectives and intentions, always tricky, can be particularly challenging in circumstances when policy actions seem to go in opposing directions. The BOI has taken care to explain its decisions carefully, signaling its concern on the housing market and linking this to macroprudential policy actions taken in this context. At the same time, it made publicly clear that monetary policy decisions were separate from macroprudential policy decisions. The Monetary Committee was responsible (and accountable)

for the interest rate decision, while the decision on LTV was the responsibility of the Supervisor of Banks.

110. *Social and political sensitivities*. Housing is a politically sensitive issue; in 2011, large public protests took place, including to call for more affordable housing. The BOI's actions to restrain house price inflation have sometimes generated some negative commentary in the press, particularly with respect to reducing access to mortgage loans, when LTV limits were tightened.

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