



IMF Working Paper

Bank Capital Adequacy in Australia

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IMF Working Paper

Asia and Pacific Department

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Authorized for distribution by Ray Brooks

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Abstract

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The paper finds that, given Australia's conservative approach in implementing the Basel II framework, Australian banks' headline capital ratios underestimate their capital strengths. Given their high capital quality and the progress in their funding profiles since the global financial crisis, the Australian banks are making good progress toward meeting the Basel III requirements, including the new liquidity standards. Stress tests calibrated on the Irish crisis experience show that the banks could withstand sizable shocks to their exposure to residential mortgages. However, combining residential mortgage shocks with corporate losses expected at the peak of the global financial crisis would put more pressure on Australian banks' capital. Therefore, it would be useful to consider the merits of higher capital requirements for systemically important domestic banks.

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I. INTRODUCTION

The Australian banking system was resilient during the global financial crisis, attributed in part to intensive supervision and sound regulation. The banking sector is profitable with capital above regulatory minimums and is dominated by four major banks (all Australian-owned). They are individually and collectively large relative to the size of the banking system and their combined assets are large relative to GDP.

Banks' main vulnerabilities are their exposure to highly indebted households through residential mortgage lending, together with their sizable short-term offshore borrowing. Household debt is high at about 150 percent of disposable income but is held mainly by higher income households. Moreover, exposure to high-risk mortgages is small. The potential risks associated with household lending are mitigated by a number of factors, including banks' prudent lending practices and Australian Prudential Regulation Authority (APRA)'s conservative approach in implementing the Basel II framework. Banks also have reduced their use of short-term offshore wholesale funding by increasing deposits and lengthening the tenor of their funding, but short-term external debt remains sizable.

The paper finds that the four major Australian banks have capital well about the regulatory requirements with high quality capital. While their headline capital ratios are below the global average for large banks in a sample of advanced and emerging market economies, Australia's more conservative approach in implementing the Basel II framework implies that Australian banks' headline capital ratios underestimate their capital strength. For example, a comparison with Canadian banks highlights the impact of Australia's more conservative approach. The four major Australian banks are well-positioned to meet the higher capital requirements under Basel III, and with the improvements in their funding profiles since the global financial crisis they are making good progress toward meeting the Basel III liquidity standards.

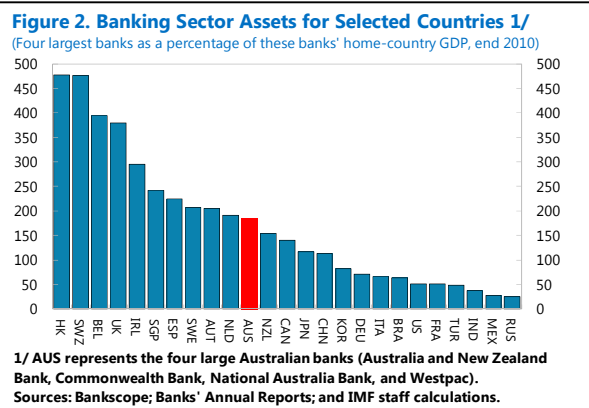
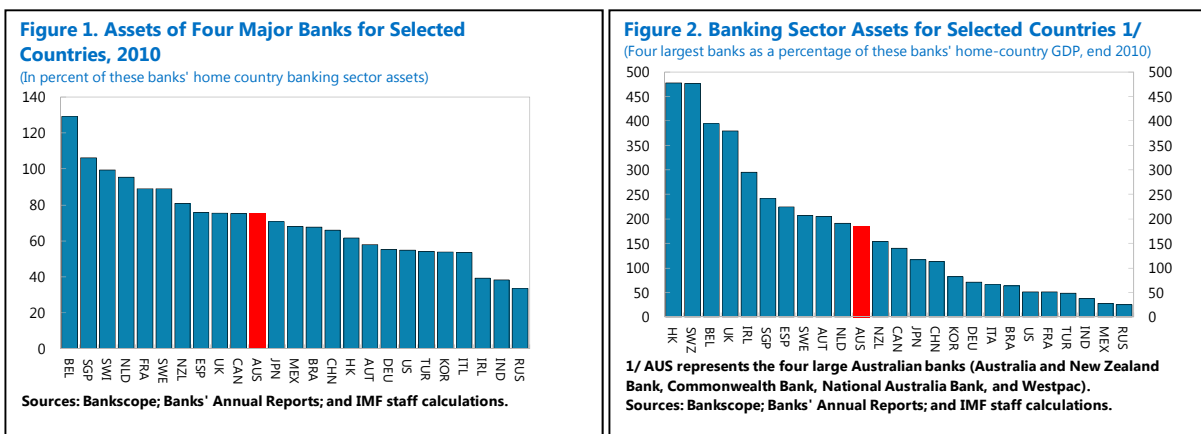
Stress tests calibrated on the Irish crisis experience show that the banks are largely able to withstand sizable shocks to their exposure to residential mortgages. However, combining residential mortgage shocks with corporate losses expected at the peak of the global financial crisis would bring down the banks' average total capital ratio below the regulatory minimum. Given high bank concentration and market uncertainty, therefore, the merits of higher capital requirements need to be considered for systemically important domestic banks, taking into account the currently evolving international standards.

II. FEATURES OF THE AUSTRALIAN BANKING SYSTEM

The Australian banking system is dominated by the four major banks and banking concentration increased in the wake of the global financial crisis. The assets of the four major banks are around 75 percent of total banking sector assets and 80 percent of the residential mortgage market. The increase in concentration was due to the slower growth of smaller

banks normally reliant on securitization, constrained by reduced access to funding; reduced lending by foreign-owned banks in the wake of the crisis; and acquisitions of two medium-sized banks by the larger banks in 2008 (St. George by Westpac and BankWest by Commonwealth Bank of Australia, the latter purchase being of a foreign-owned bank).

For international comparison of the dominance of the four major banks, the combined assets of the four largest banks in a sample of advanced and emerging market countries are compared to total banking sector assets and to GDP. Relative to the size of the total banking sector, Australia lies in the middle of the distribution (Figure 1). The combined assets of the four major banks in Australia are about 180 percent of GDP. This is towards the center of the distribution for the sample of countries and in the middle of similar countries (Figure 2).



The large size of the four banks relative to GDP and the banking system behooves careful attention to their vulnerabilities and resilience to shocks.² Any distress among these banks could have a sizable impact on the financial sector and the real economy in Australia and New Zealand.³ Moreover, they may be perceived by the markets as too big to fail, which implies they could pose a potential fiscal liability. Against this backdrop and in the context of the ongoing discussion for systemically important global banks, the merits of higher capital requirements, complemented by intensive supervision, need to be considered for systemically important domestic banks.⁴

² APRA takes a graduated risk-based approach to supervision through its Probability and Impact Rating System (PAIRS) and Supervisory Oversight and Response System (SOARS), whereby banks are assessed and assigned an undisclosed overall risk of failure (PAIRS) which is then combined with an assessment of impact of such a failure. The outcome of this is to place an institution into a supervisory category (SOARS). The four categories which are not publically disclosed are normal; oversight; mandated improvement; and restructure. See APRA (2010b) and APRA (2010c).

³ Subsidiaries and branches of the four major Australian banks control 90 percent of the assets of New Zealand's banking sector.

⁴ See BCBC (2011) for capital requirements for global systemically important banks, and Financial Stability Board (2010) for recommendations on enhancing the effectiveness and intensity of SIFI supervision.

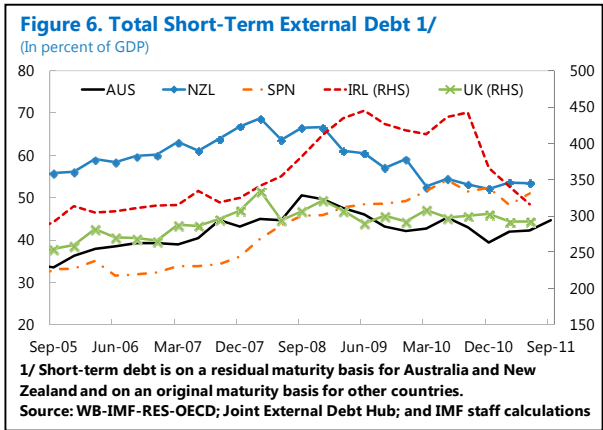
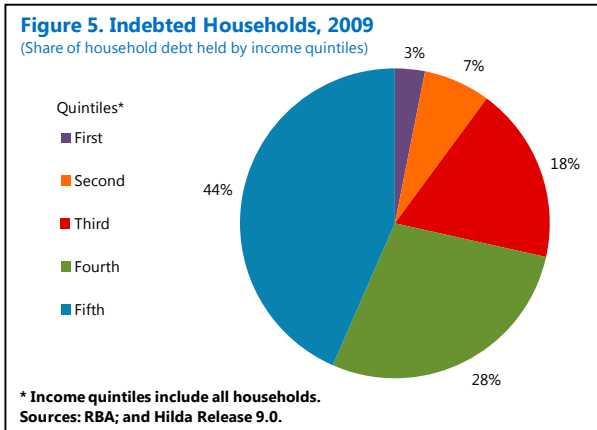
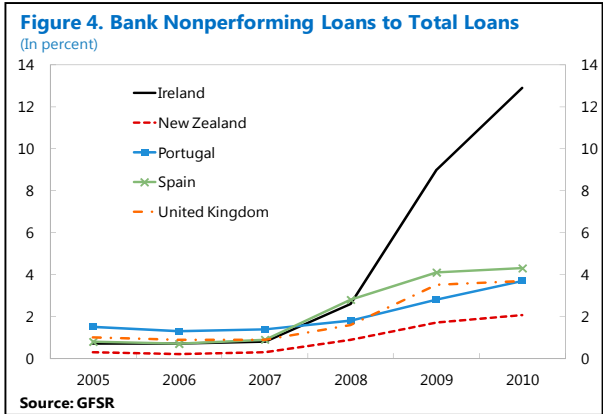
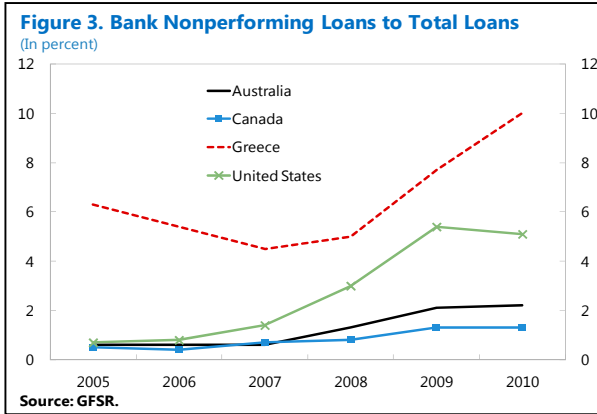
The four major banks' key financial soundness indicators are summarized in Table 1, which highlights some of their strengths. All the four banks are profitable with capital above regulatory minimums. Capital adequacy has improved, driven both by increases in capital and declines in risk-weighted assets, and the quality of bank capital is high, as it is mainly common equity.

	ANZ		NAB		CBA		Westpac 1/	
	Sep-11	Sep-10	Sep-11	Sep-10	Jun-11	Jun-10	Sep-11	Sep-10
Profitability								
Return on assets	1.0	0.9	0.8	0.7	1.0	1.0	1.1	1.1
Return on equity	16.2	15.5	15.2	13.5	19.5	18.7	16.0	16.4
Net interest margin	2.5	2.5	2.2	2.2	2.2	2.1	2.2	2.2
Capital adequacy								
Tier one capital ratio (Basel II)	10.9	10.1	9.7	8.9	10.0	9.1	9.7	9.1
Total capital ratio (Basel II)	12.1	11.9	11.3	11.4	11.7	11.5	11.0	11.0
TCE/Total Assets 2/	5.2	5.2	4.6	4.6	4.5	4.3	4.8	4.6
TCE/Tangible Assets 3/	5.3	5.2	4.7	4.7	4.5	4.4	4.9	4.7
Assets quality and provisioning								
Past due 90 days plus/total loans	0.5	0.4	0.4	0.5	0.8	0.7	0.4	0.5
Gross impaired to total assets	0.8	1.1	0.8	0.9	0.8	0.8	0.7	0.7
Net impaired assets to equity	1.2	1.7	11.6	11.9	8.5	9.1	7.2	7.4
Specific provision to gross impaired assets	7.8	12.3	23.1	23.3	40.1	38.2	31.7	35.4
Total provision to gross impaired assets	36.5	30.9	62.3	70.7	97.2	104.1	87.6	102.7
Liquidity								
Cash to total assets	4.2	4.0	3.6	3.8	2.0	1.6	2.4	0.7
Cash and due from banks to total assets	5.7	5.1	9.8	9.3	3.5	3.1	3.7	2.8
Sources: Banks' disclosure statements, and Fund staff calculations.								
1/ Includes St. George.								
2/ TCE = tangible common equity = total equity minus intangible assets (including goodwill).								
3/ Tangible assets = total assets minus intangible assets (including goodwill).								

Australian banks' conservative lending practices, together with robust supervision by APRA and the Australian economy's strong performance since the global crisis, have contributed to a low nonperforming loan ratio compared to other advanced countries (Figures 3 and 4).⁵ Despite banks' high exposure to residential mortgages (56 percent of total loans at end-2010), exposure to high-risk mortgages is small, as less than 10 percent of owner-occupiers had mortgages with loan-to-value ratios higher than 80 percent and debt service ratios greater than 30 percent.⁶ Moreover, debt is mainly held by higher income households, with households in the top two income quintiles holding almost three quarters of household debt (Figure 5). The full recourse nature of mortgage lending also helps limit strategic loan defaults.

⁵ Australia was one of the few advanced economies to avoid a recession in recent years, reflecting its strong position at the onset of the global financial crisis and a supportive macroeconomic policy response.

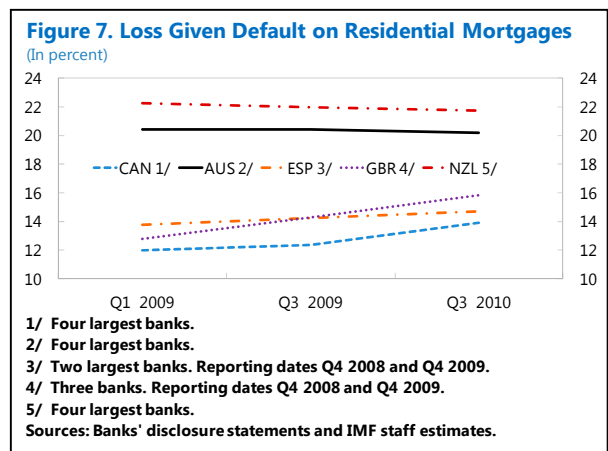
⁶ See Reserve Bank of Australia (2010a).



Australian banks’ use of short-term offshore funding creates an additional vulnerability as the banks are exposed to potential disruptions in global capital markets. Short-term debt (mostly held by banks) has declined from its pre-crisis peak but remains sizable at 45 percent of GDP at end-September 2011 (Figure 6). In a favorable development, the maturity profile of short-term debt has also been extended, with a greater share maturing in the six-month to one year window.

III. BASEL II IMPLEMENTATION AND CAPITAL RATIOS

A conservative approach to bank regulation and supervision helped maintain financial sector stability in Australia. In implementing the Basel II framework, APRA required banks to adopt a more conservative approach in several cases than required by the Basel II framework, as noted in the IMF’s Basel II Implementation Assessment in 2009. Most importantly, a 20 percent loss given default (LGD) floor was adopted for residential mortgages, above the Basel II floor of

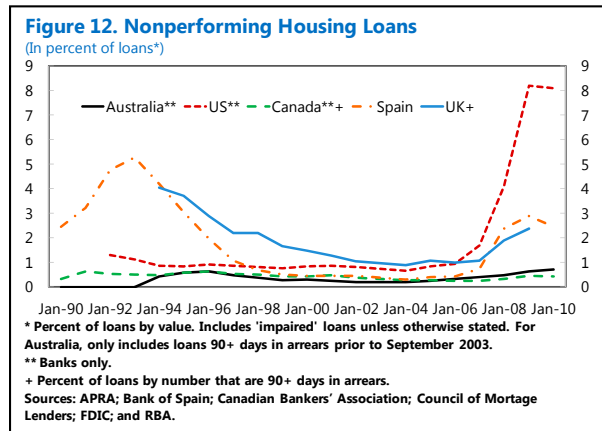


10 percent. As a result, Australian banks' loss-given-default rates are higher than those of many other countries' banks (Figure 7). In addition, higher risk weights were required for certain residential mortgages under the standardized approach. Moreover, reduced risk weights, which are permissible in the Basel II framework's standardized approach, were not introduced for retail lending. Until June 2011 banks' capital requirements under the advanced approaches remained subject to the 90 percent floor of the Basel I capital requirement, instead of the 80 percent floor applicable in the second year. APRA has also exercised caution in other choices regarding the framework, such as requiring banks using the advanced approaches to hold capital against interest rate risk in the banking book.

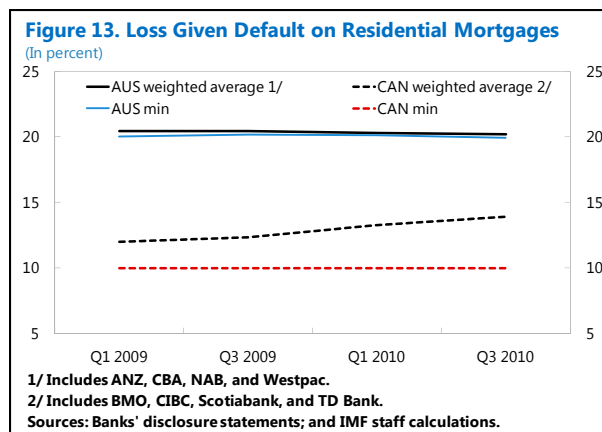
The headline regulatory ratios for the four major Australian banks are lower than for other countries (Figures 8 and 9). However, differences in regulatory rules relating to the calculation of required capital suggest that different jurisdictions' capital ratios should be interpreted with caution. In particular, the risk weighted assets numbers are not directly comparable across countries. APRA's requirements for computing risk-weighted assets likely imply that risk-weighted assets in Australia are higher than for comparable banks in other countries, resulting in lower headline capital ratios for the same amount of capital. Moreover, due to APRA's conservative capital eligibility and deduction rules Australian banks tend to hold higher quality capital and this is reflected in their higher rankings in tangible common equity ratios compared with their rankings in total and Tier 1 capital ratios (Figures 10 and 11).



Although regulatory differences relating to the calculation of required capital ratios imply that comparisons of banks across jurisdictions should be interpreted with caution, the Pillar 3 disclosure statements facilitate comparisons of banks, both within and across jurisdictions. This paper uses information from these statements to compare the capital ratios of the four major banks in Australia with those in Canada, providing a detailed analysis of the impact of APRA's conservative approach in implementing the Basel II framework relating to residential mortgages. Canada was chosen as a comparator country because nonperforming housing loan ratios in Australia and Canada have been broadly similar in recent years (Figure 12).⁷ All the eight banks in the two countries studied in this paper are rated by Fitch AA or AA- and adopted the advanced internal ratings based approach under Basel II.



Australian banks' high LGD rates required by APRA result in higher Pillar 1 risk weighted assets for the same amount of residential mortgages, compared with most other countries' banks (Figure 13).⁸ This in turn leads to lower capital ratios for the same amount of capital. For example, if Australian banks' LGD rates are reduced to the Basel II 10 percent floor, which is the rate for one of the four Canadian banks,⁹ the four major Australian banks' weighted average Tier 1 and total capital ratios are estimated to increase by almost 100 basis points, respectively



⁷ Canadian banks weathered the global financial crisis well without big increases in nonperforming housing loans. To address housing market concerns and rising household debt levels, however, the Canadian authorities introduced the following amendments to mortgage lending regulations in 2010-11: (i) require that all borrowers meet the standards for a five-year fixed rate mortgage even if they choose a mortgage with a lower interest rate and a shorter term; (ii) lower the maximum amount Canadians can withdraw in refinancing their mortgages from 95 percent of the value of their homes to 90 percent in 2010, with a further reduction to 85 percent in 2011; (iii) require a minimum down payment of 20 percent for government-backed mortgage insurance on non-owner-occupied properties purchased for speculation; (iv) lower the maximum amortization period for new government insured mortgages from 35 to 30 years; and (v) eliminate Canadian government backing for homeowner equity lines of credit.

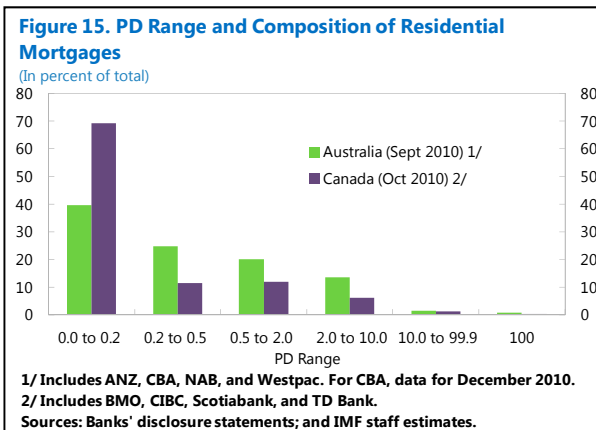
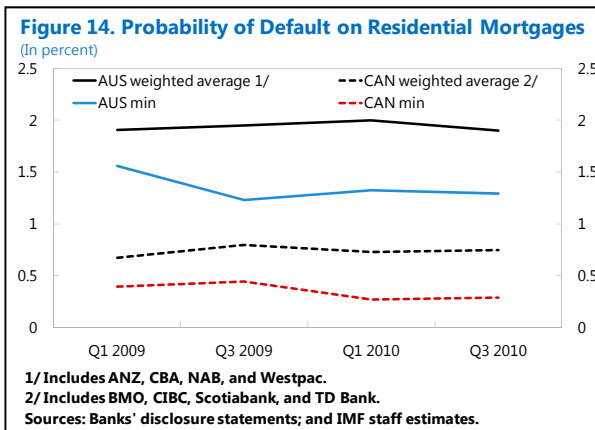
⁸ For residential mortgages, capital requirement = $LGD \times f(PD)$. See BCBS (2006), p. 70.

⁹ This bank provides about 40 percent of the total residential mortgages underwritten by the four large banks in Canada.

(Table 2). Even if Australian banks' LGD rates are lowered to Canada's four large banks' average of 13.9 percent, the four major Australian banks' Tier 1 and total capital ratios are estimated to increase by about 60 basis points, respectively.

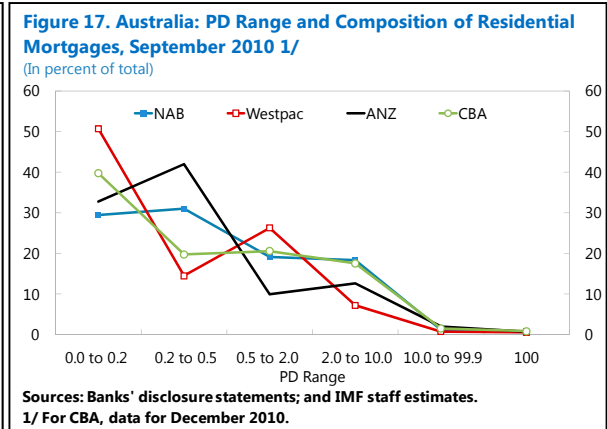
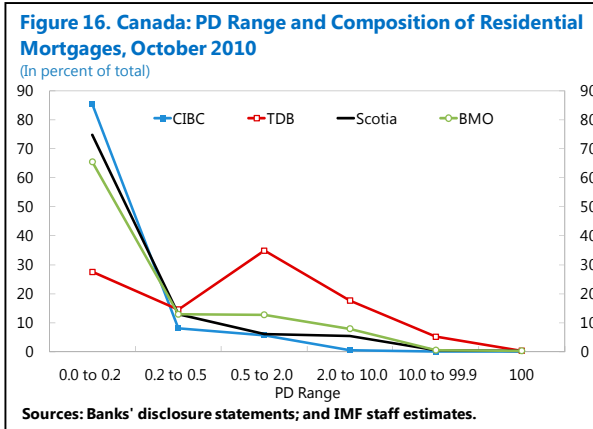
Table 2. Australia's Four Largest Banks: LGD for Residential Mortgages and Impact on Capital Adequacy Ratios (In percent)		
	Capital adequacy ratios 1/ Tier 1 capital Total capital	
Using current LGD (20.2% 1/)	9.4	11.4
Assuming LGD 10%	10.3	12.5
Assuming LGD 15%	9.9	12.0
Assuming average for Canadian 4 large banks' LGD (13.9% 1/)	10.0	12.1
1/ Weighted averages		
Sources: Banks' disclosure statements; and IMF staff estimates.		

The weighted average of the probabilities of default (PD) on residential mortgages for the Australian four major banks is 2½ times that of Canada's three large banks, although nonperforming housing loan ratios in Australia and Canada have been broadly similar in recent years (Figure 14).¹⁰ In Canada, mortgages insured by government-owned Canada Mortgage and Housing Corporation (CMHC) are assigned a zero risk weight for regulatory capital requirement purposes.¹¹ Thus, almost 70 percent of the four large Canadian banks' residential mortgages belong to the lowest risk bucket, compared with just 40 percent of the four major Australian banks (Figures 15).

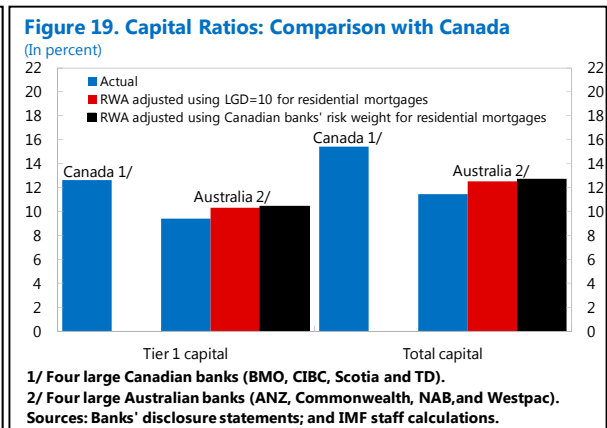
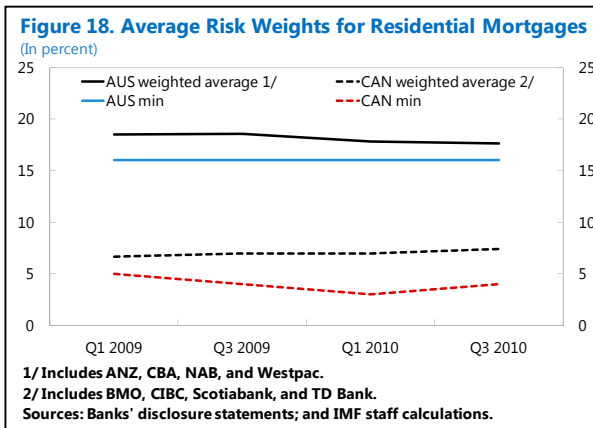


¹⁰ The Bank of Montreal (BMO)'s disclosure statements don't report exposure-weighted probabilities of default for PD ranges so that the BMO is excluded in this comparison.

¹¹ Mortgages covered by approved private insurers are assigned a slightly higher weight. CMHC accounts for about 70 percent of all outstanding mortgage insurance. Due to the regulatory capital reductions provided by mortgage insurance, about two thirds of Canadian mortgages are insured. See Kiff (2010).



Reflecting the differences in PD and LGD, the Australian banks' average risk weight is almost 2½ times the average of the Canadian banks (Figure 18). If the Canadian banks' risk weight is applied to the Australian banks, their total capital ratio is estimated to rise by more than 120 basis points and the Tier 1 capital ratio by about 100 basis points (Figure 19).



Different jurisdictions apply different approaches to the definitions of eligible capital, Pillar 1 risk-weighted assets, and capital limits, and regulators' supervisory review process of banks' own internal capital adequacy assessment could also play an important role in defining the level of capital held.¹² Given Australian banks' high exposure to residential mortgages, the above analysis focuses on factors affecting the calculation of risk weighted assets for mortgages and their impacts on capital ratios for the banks taking advanced internal rating-based approach under Basel II.

¹² APRA, for example, requires an interest rate risk in the banking book to be a Pillar 1 capital requirement in addition to credit, market, and operational risks. Other jurisdictions such as Canada and the UK do not require this. If this requirement is excluded, the four large Australian banks' average Tier 1 and total capital ratios are estimated to rise by about 40 and 50 basis points, respectively.

The above analysis does not take into account the differences in the definitions of eligible capital. A fuller analysis of all the variances would facilitate international comparisons of headline capital ratios in different countries. For example, analysis by Australia and New Zealand Bank indicates that its Tier 1 capital ratio would rise from 10.1 percent in September 2010 under Australian rules to 13.5 percent under UK rules.¹³ Westpac's analysis also shows that its common equity ratio of 8 percent in March 2011 would increase sharply to 13 percent under Canadian rules. These increases partly relate to less conservative LGD assumptions in other jurisdictions, but also relate to differences in the definitions of eligible capital.

IV. BASEL III AND AUSTRALIAN BANKS

Basel III will require banks to hold more and higher-quality capital. Given the high quality of bank capital in Australia, as it is mainly common equity, the Australian banks are in a good position to meet these new requirements.¹⁴ Under Basel II, moreover, APRA adopted several rules on the definition of capital and the calculation of RWA which are more conservative than the Basel III rules. Westpac's analysis, for example, indicates that its common equity ratio of 8 percent in March 2011 would rise to 9.6 percent if APRA's rules are fully harmonized to Basel III. APRA proposed in a recent discussion paper that Australian banks will be required to hold a minimum 4.5 percent Common Equity Tier 1 ratio and a 6 percent Tier 1 capital ratio from January 2013, ahead of the Basel III timetable. APRA also proposed introducing a capital conservation buffer of 2.5 percent from January 2016.

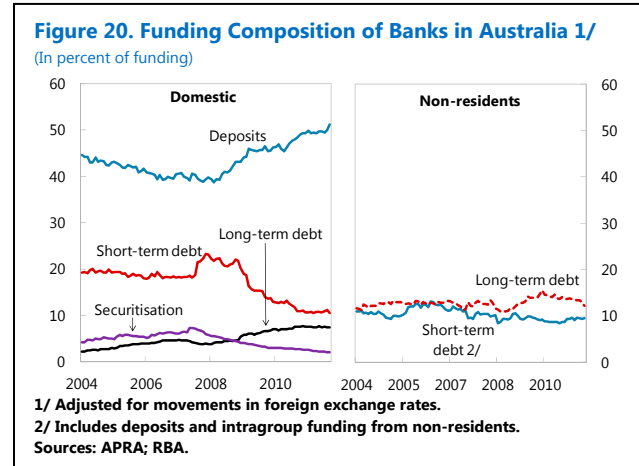
Basel III also introduces global liquidity standards—a Liquidity Coverage Ratio (LCR) and a Net Stable Funding Ratio (NSFR). The objective of the LCR is to ensure that banks have adequate high-quality liquid assets to survive an acute stress scenario that lasts for one month. In many jurisdictions, banks will meet this requirement largely through holdings of government securities. In the case of Australia, the supply of government securities is somewhat limited due to the fiscal restraint of recent governments so that an alternative approach will be necessary, as allowed for under the Basel III reforms. APRA and the Reserve Bank of Australia (RBA) have designed an approach to meet the new liquidity standard. Banks will be able to establish a committed secured liquidity facility with the RBA. This will be designed to cover any shortfall between a bank's holdings of high-quality liquid assets and the LCR requirement. The collateral for this facility includes all assets normally

¹³ See the Australian Bankers' Association (2010) for the differences between the Australian and UK rules. The main differences in the measurement of eligible Tier 1 capital relate to equity investments, dividends, and expected loss and eligible provisions, generally resulting in larger Tier 1 capital deductions under APRA rules.

¹⁴ In implementing Basel III APRA has proposed to revise some existing requirements that are more conservative than the Basel III minimum requirements such as alignment of treatment of expected dividends and of unrealized gains and losses recognized with Basel III. APRA will take a more conservative approach requiring capitalized expenses and capitalized transaction costs to be deducted from capital and will remove the double counting of capital in the financial system and on investments in commercial institutions (APRA, 2011a).

eligible for repurchase transactions with the RBA and banks will be charged an ongoing fee for access to this facility.¹⁵

The NSFR requirement under Basel III, which remains under development within the BCBS, requires that banks have sufficient stable sources of funding.¹⁶ Since the global financial crisis the funding structure of Australian banks has improved, with an increase in retail deposits and long-term wholesale funding and a reduced reliance in short-term offshore funding (on an original maturity basis) (Figure 20).¹⁷ Our estimates suggest that the NSFR has improved for three of the four major Australian banks over the past three years (Figure 21). For international comparison, Figure 22 shows estimated NSFRs for the Australian banks against the same sample of banks used for the capital ratio comparison above. These ratios are not published by banks so they need to be interpreted cautiously. However, as can be seen, most banks, including the Australian banks, lie below the 100 percent benchmark, with the Australian banks at or just below the average level. Revised laws now permit Australian banks to issue covered bonds, which may help increase the share of long-term funding further.¹⁸

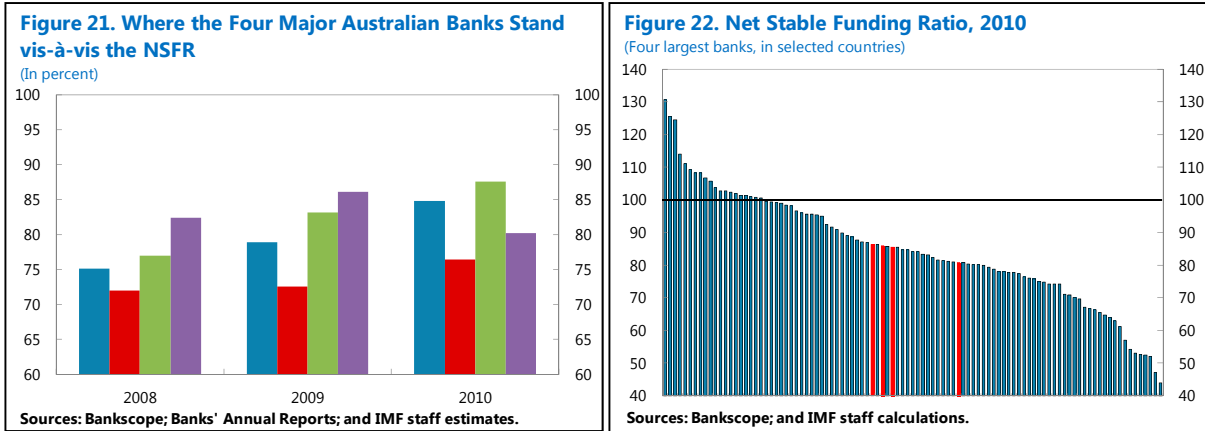


¹⁵ The fee will be 15 basis points per annum. See APRA (2011b and 2011c) and <http://www.rba.gov.au/media-releases/2011/mr-11-25.html> for additional information.

¹⁶ This metric compares an estimate of the reliable funding sources to an estimate of the required stable funding over a 1 year horizon. Differing weights, determined by their behavioral characteristics, are applied to the components of the banks' balance sheet and the requirement is that this ratio be above 100 percent.

¹⁷ Data for short-term debt on a residual maturity basis are only available for the whole economy, but private financial institutions comprise about two thirds of Australia's gross external debt, and banks presumably have a similar share of short-term debt.

¹⁸ Previously, Australian banks were not allowed to issue covered bonds because covered bondholders would have preferential access to a bank's assets, thereby subordinating other unsecured creditors such as ordinary depositors. This conflicted with the Banking Act, which enshrined in law the principle of depositor preference. In October 2011, the Australian Parliament passed legislation permitting banks to issue covered bonds. This may provide Australian banks with access to cheaper and more stable long-term funding from the wholesale debt markets.



V. HOW VULNERABLE ARE AUSTRALIAN BANKS TO SHOCKS TO RESIDENTIAL MORTGAGES?

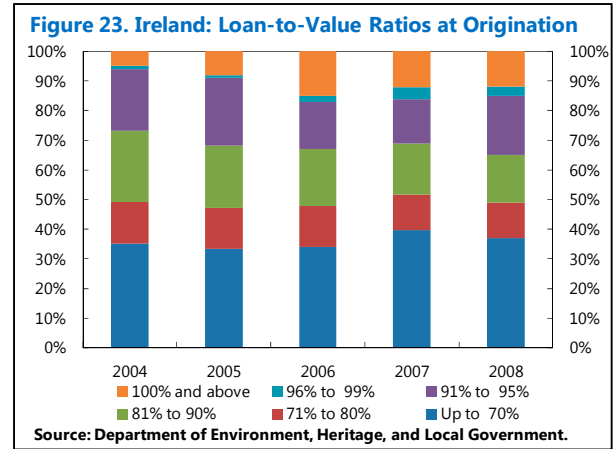
To assess the risks of residential mortgage lending, which comprises more than half of the four major banks' loans, this paper uses the September 2011 data published by the banks on their risk exposure. Following the adoption of the Basel II internal ratings-based approach, the four major banks publish a breakdown of residential mortgage, corporate, and other retail lending exposure disaggregated into seven risk categories in the Pillar 3 statements. For each risk category, the probability of default, loss given default, and risk weights are reported (see for example, data from Westpac in table 3 below).

The four major banks are exposed to residential mortgages, but the data in the Pillar 3 disclosure statements show that residential mortgage lending is considered by the banks to be less risky than corporate and other retail lending. The average risk weight for corporate lending at Westpac, for example, is four times that for residential mortgages (Table 3). Thus, although the amount of corporate lending is just a quarter of residential mortgages in the case of Westpac, the required capital for corporate lending is the same as for residential mortgages, reflecting the assessment that corporate lending is riskier.

	Exposure at Default	Probability of Default	Loss Given Default	Average Risk Weight	Risk Weighted Assets
Corporate	92,389	2.3%	45%	61%	56,792
Business lending	60,254	5.8%	32%	72%	43,661
Small business	9,974	3.9%	37%	42%	4,232
Residential mortgages	376,480	1.5%	20%	15%	56,597
Credit cards	17,376	2.3%	78%	28%	4,884
Other retail	9,553	5.3%	66%	84%	8,029
Sovereign	35,034	0.04%	9%	4%	1,492
Bank	26,677	0.08%	54%	25%	6,627
Other	72,829				52,543
Total	700,566				234,857

Source: Westpac's disclosure statement.

The scenarios considered in the paper apply Irish banks' residential mortgage developments during the global financial crisis to Australian banks' balance sheet. The Irish banks' residential mortgage quality has deteriorated sharply, due to the large increases in unemployment to 13.6 percent in 2010 from 4.6 percent in 2007 and a 46 percent decline in housing prices from the peak in 2007 through November 2011, together with high loan-to-value ratios at origination (Figure 23). With Australian banks' prudent lending practices, including low loan-to-value ratios, Australia would be unlikely to see such a sharp deterioration in asset quality. Nevertheless, this experience is used to calibrate tail-risk scenarios for the Australian banks in order to see whether they are resilient to such severe stress scenarios.



To apply the Irish experience to the Australian banks, the paper assumes that the shares of the three riskiest categories for residential mortgages at the four Australian banks would rise to those of the Irish banks in 2010 and the share of the next low risk category would decline accordingly (Table 4).¹⁹

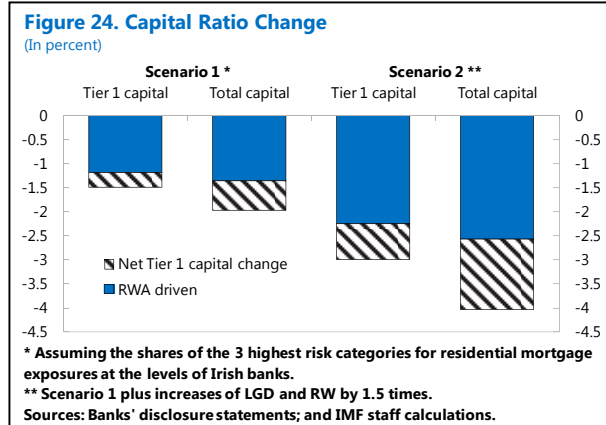
	2010	2009	2008	2007
High and Good quality	66.8	69.1	77.9	83.3
Satisfactory quality	15.0	15.8	14.6	11.7
Lower quality	2.9	2.7	2.3	2.1
Past due but not impaired	6.7	6.0	4.2	2.6
Impaired loans	8.5	6.4	1.0	0.2
Total	100.0	100.0	100.0	100.0
Nonperforming loans	11.4	8.7	2.4	0.8

Source: Banks' disclosure statements and IMF staff estimates.
 1/ Includes Anglo Irish Bank, Irish Life and Permanent plc, Bank of Ireland, and Allied Irish Banks. Includes estimates of assets transferred to National Asset Management agency (NAMA).

Under this scenario (Scenario 1), the four Australian banks' probability of default is estimated to increase sharply to 11 percent from 2 percent and the estimated losses would be larger than the banks' total provisions, resulting in a reduction in the banks' capital. The banks' Tier 1

¹⁹ The data in Table 4 are based on prior disclosure standards for banks. To improve the number and quality of disclosures the Irish authorities have recently strengthened disclosure standards. See <http://www.centralbank.ie/press-area/press-releases/Pages/CentralBankpublishesImpairmentProvisioningandDisclosureGuidelines.aspx>

capital ratio is estimated to decline by 1½ percentage points (Figure 24 and Table 5). But all the four banks' Tier 1 capital ratio would remain well above the regulatory minimum ratio of 4 percent. Under a second scenario that is scenario 1 plus an increase of the LGD and risk weights by 1½ times (Scenario 2), one bank's total capital ratio is projected to decline to below 6 percent, but the other banks' total capital ratios to remain above 8 percent. Such a large increase in the LGD is unlikely to happen, given Australia's low loan-to-value ratios and modest house price overvaluation estimated at 10–15 percent. The primary driver for the reductions in capital ratios under both scenarios is downward internal ratings migration, which pushes up the measure of risk-weighted assets and, hence, capital requirements.



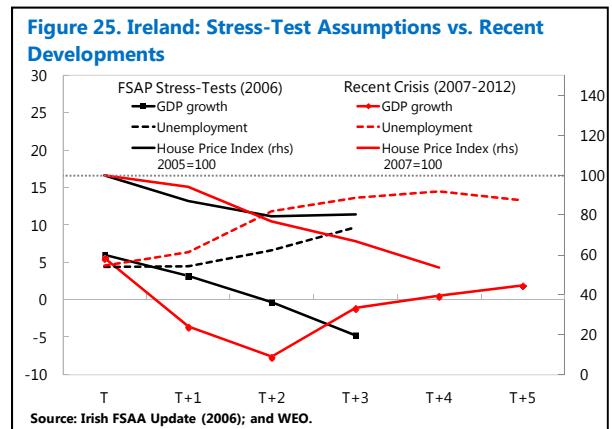
	September 2011 Actual 1/	Scenario 1 Residential mortgage exposures: assume the shares of the 3 highest risk categories at the levels of Irish banks	Scenario 2 Scenario 1 plus increases of LGD and RW by 1½ times
Credit exposure			
Residential mortgages 2/	1,204,001	1,204,001	1,204,001
Total	2,603,910	2,603,910	2,603,910
Residential mortgages			
PD (%) 3/	2.0	11.1	11.1
LGD (%) 3/	20.2	20.3	30.4
Risk weight (%) 3/	17.0	30.3	45.4
Risk weighted assets			
Residential mortgages 2/	205,058	364,223	546,334
Total	1,182,705	1,341,870	1,523,981
Capital			
Tier 1	119,002	114,863	107,666
Total	136,074	127,796	113,908
Provisions	19,499	19,499	19,499
Estimated loss	4,411	27,777	41,665
Total loss to capital	...	8,278	22,166
Capital adequacy ratio			
Tier 1 (%) 3/	10.1	8.6	7.1
Total (%) 3/	11.5	9.5	7.5

Sources: Banks' disclosure statements and IMF staff estimates.
1/ Includes Australia and New Zealand Bank, Commonwealth Bank, National Australian Bank, and Westpac.
2/ Mortgages subject to an internal ratings-based approach only.
3/ Weighted averages.

The above exercise suggests that the major Australian banks could withstand sizable shocks to residential mortgages. However, this exercise does not consider shocks to corporate and other lending, which should be considered when banks conduct stress testing. For example, Irish banks incurred heavy losses from commercial property lending, which amounted to 31 percent of total loans in 2006. The average haircut applied when commercial property loans were transferred to Ireland's national asset management agency was about 58 percent.

The four major Australian banks' corporate exposures, including commercial property lending, are about one-quarter of total bank exposures, which is sizeable. Their commercial property exposures are around 10 percent of total loans, which are well below Irish banks' exposure of 31 percent. Robust supervision by APRA implies that, even in a tail risk scenario, the Irish experience with the corporate sector and commercial real estate in particular is unlikely to be replicated in Australia. Takats and Tumbarello (2009) estimated the Australian banks' expected losses from corporate sector distress one year ahead at about 6 percent of their loans to the corporate sector during the peak of the global financial crisis.²⁰ If these losses are applied as a tail-risk shock to the banks' corporate exposures, the four banks' average total capital ratio will decline by more than 2 percentage points to about 7 percent under the above Scenario 1 and 5¼ percent under Scenario 2, which are below the regulatory minimum. Potential losses from other credit exposures such as retail lending and personal loans are not taken into account in this calculation.

APRA may want to consider a more severe downside scenario together with funding risk and a longer risk horizon when conducting stress testing next time. In 2010, APRA conducted stress testing together with the New Zealand authorities (see Laker, 2010). The joint stress test results suggest banks' resilience to sizable but plausible shocks. However, a more severe downside scenario of a sharp fall in commodity and house prices and a jump in global longer-term interest rates could hurt growth and raise unemployment for a substantially longer period than in the recent stress tests. Given Australian banks' high exposure to residential mortgages, a longer time horizon could be considered to take into account the impact of sustained high unemployment. The risk horizons of the recent FSAP stress tests for United Kingdom, Germany, and Netherlands are five years (Table 6). The recent Irish experience also shows severe shocks for a longer period than the stress test assumptions of 2006 (Figure 25). Moreover, funding risk also needs to be explicitly



²⁰ The potential losses were calculated using information from Moody's KMV implied CDS spreads at end-April 2009.

included in future scenarios, encompassing a disruption to bank funding and a large increase in longer-term real interest rates. The latter could come from a rise in global rates and an increase in Australian banks' risk premium.

While continued strong bank supervision plays a significant role in maintaining financial stability, the merits of higher capital requirements need to be considered for systemically important domestic banks, taking into account the currently evolving international standards. The large market share of the four banks in the domestic market implies that they could be perceived as too big to fail and pose a potential fiscal risk. Analysis of the appropriate capital requirements could be undertaken over the next year (including using stress tests) in the context of the 2012 update of the Financial Sector Stability Assessment with the IMF. More robust capital levels for systemically important banks would be beneficial, particularly in times of market uncertainty.

	Australia		Germany	Ireland		Netherlands	New Zealand	UK
	FSAP stress tests (2005/06)	APRA stress tests (2010)	FSAP (2011)	FSAP stress tests (2006)	EBA test (2011)	FSAP (2010)	APRA stress tests (2010)	FSAP (2011)
Stress test horizon (years)	3	3	5	3	2	5	3	5
GDP growth 1/ (number of SD from beginning year's outturn) 2/ (number of SD from historical mean) 2/	-1	-3	2.6 SD from baseline (also consider prolonged slow growth over five years)	-4.8	-1.6	Two SD from baseline	-2.3	Two SD from baseline (also consider prolonged slow growth over five years)
	-2.3	-2.4	-3.3	-3.3	-0.2		-0.1	-2.6
	-2.4	-3.5	-2.3	-3.0	-2.0		-2.3	-3.5
	-1 percent in year 1 then V-shaped recovery	-3 percent in year 1 then V-shaped recovery	- 1 percent in year 2 then 2.7 percent in year 3	-5 percent cumulatively over 3 years	-1.6 percent in year 1 then a 0.3 percent increase		-2.3 percent in year 1 then V-shaped recovery	V- negative growth (yoy) for nine quarters
Unemployment 3/ (number of SD from beginning year's outturn) 2/ (number of SD from historical mean) 2/	9	10.8	2.6 SD from baseline	9.7	15.8	Two SD from baseline	9.8	12
	2.4	3.2		1.1	0.4		1.8	1.7
	0.8	1.9		-0.3	6/ 0.9		1.7	1.6
House price inflation 4/	-30	-25	0	5/ -20	-33		-25	-14
Funding risk	Yes	No	Yes	Yes	Yes	Yes	No	Yes

Sources: Various stress test reports and IMF staff calculations.

1/ The lowest growth rate assumed.
2/ Based on the data from 1981-2005.
3/ The highest unemployment rate assumed.
4/ Cumulative.
5/ House prices in Germany have been flat for more than a decade.
6/ Owing due to double digit unemployment rates from 1982-1997. The average unemployment rate for 2000-05 was 4.3 percent.

References

- Australian Bankers' Association Inc., 2009, *Comparison of Regulatory Capital Frameworks: APRA and the UK FSA*, June.
- Australian Prudential Regulation Authority (APRA), 2010a, *Insight*, Issue 2.
- _____, 2010b, *Supervisory Oversight and Response System*, November.
- _____, 2010c, *Probability and Impact Rating System*, November.
- _____, 2011a, *Implementing Basel III Capital Reforms in Australia*, September.
- _____, 2011b, *The RBA Committed Liquidity Facility*, Media Release, November.
- _____, 2011c, *Implementing Basel III Liquidity Reforms in Australia*, November.
- Basel Committee on Banking Supervision (BCBS), 2006, *International Convergence of Capital Measurement and Capital Standards: A Revised Framework*.
- _____, 2009, *Strengthening the Resilience of the Banking Sector*, December.
- _____, 2011, *Global Systemically Important Banks: Assessment Methodology and the Additional Loss Absorbency Requirement*, November.
- Bologna, Pierluigi, 2010, "Australian Banking System Resilience: What Should be Expected Looking Forward? An International Perspective," IMF Working Paper No. 10/228 (Washington: International Monetary Fund).
- Davis, Kevin, 2011, *The Australian Financial System in the 2000s*, paper presented at the Reserve Bank of Australia, Annual Research Conference, August.
- Debelle, Guy, 2011, *Collateral, Funding and Liquidity*, Address to Conference on Systemic risk, Basel III, Financial Stability and Regulations, June.
- European Banking Authority, 2011, *2011 EU-Wide Stress Test: Methodological Note*, March.
- Financial Stability Board, 2010, *Intensity and Effectiveness of SIFI Supervision: Recommendations for Enhanced Supervision*, November.
- _____, 2011, *Peer Review of Australia*, September.
- International Monetary Fund, 2010, *Australia: Basel II Implementation Assessment*, IMF Country Report No. 10/107, May.

Kiff, John, 2010, “Canada’s Housing Finance System: Policy Backdrop,” in *Canada: Selected Issues Paper*, IMF Country Report No. 10/378 (Washington: International Monetary Fund).

Laker, J.F., 2010, *The Australian Banking System Under Stress?*, Australian Business Economists, Sydney, June 9.

Reserve Bank of Australia, 2010a, *Financial Stability Review*, March.

_____, 2010b, *Australian Implementation of Global Liquidity Standards*, Joint Media Release, December.

Takats, E., and P. Tumbarello, 2009, “Australian Bank and Corporate Sector Vulnerabilities—An International Perspective,” IMF Working Paper No. 09/223 (Washington: International Monetary Fund).