18. Bank Capital Structure

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18.1 Introduction

Scholars have attempted to apply capital structure theories, found in the corporate finance literature to banks, despite the significant differences between banks and non-financial companies. Those differences include: high leverage of banks; debt funding taking primarily the form of deposits with quite different characteristics to other forms of debt; quite different assets held (portfolios of loans and securities etc., compared to real assets); capital regulation applied to banks. Another is that banks approach the capital structure decision using the concept of "economic capital" which, as discussed in Chapter 16, is based on risk considerations. Although that may be consistent with a maximisation of firm-value approach assumed in corporate finance, the relationship is not a simple one.

Underpinning the application of corporate finance theories is a desire to answer a number of important questions. First, why is bank leverage so high (equity/assets well below 10 per cent) compared to other companies (with equity/assets typically 40 per cent plus)? Second, does capital regulation prevent banks from achieving their optimal capital structure? Third, if so, what are the consequences for the cost of bank funding and loan interest rates charged by banks? Fourth, how do banks determine their actual capital structure and adjust it over time?

It is worth emphasizing that the corporate finance approach typically examines capital structure in terms of market values of equity and debt (or assets), whereas discussion of bank capital structures focus upon book value magnitudes. To the extent that banks have a ratio of market value/book value (MV_E/BV_E) near unity, this may not matter too much. But often (as for major Australian banks) the ratio can differ quite substantially from unity and over time.

In this chapter, a brief history of bank capital structure is first given, emphasising the large fall in capital ratios over the century or so leading up to the GFC (and which has since been somewhat reversed due to Basel 3). The evolution of Australian regulatory views on appropriate bank capital structure is also briefly outlined. Then the applicability of corporate finance capital structure theory to banks is considered. This is followed by consideration of several studies which attempt to determine empirically whether factors that determine capital structure of non-financial companies are also relevant for banks. Then, the magnitude of the effect of capital regulation on bank funding costs and loan interest rate setting is considered. That question is often posed in the form of asking what would be the impact of a specified increase in the regulatory capital ratio requirement?

The analysis then considers bank decisions about accessing external equity finance versus reliance on internally generated funds in achieving a preferred capital position, and the speed with which banks will adjust towards their preferred capital positions. The Basel requirements have had some

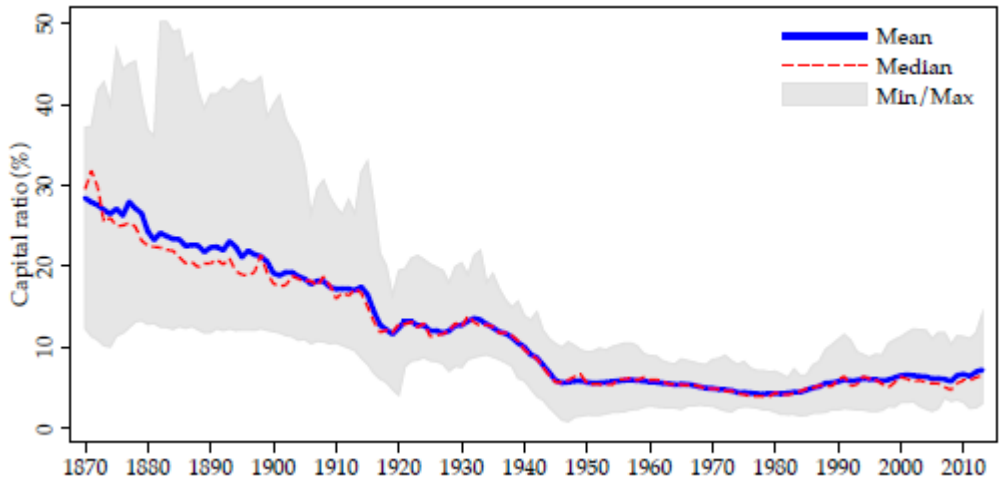
significant effects which make the empirical analysis of bank capital decision-making more complex. One is the extent to which banks feel the need to have a "buffer" of capital in excess of regulatory minimum requirements (and determinants of the size of that buffer). A second is the concern that the nature of the Basel arrangements can lead to pro-cyclicality in bank capital positions, which can aggravate business cycles. Another is requirements for documented capital planning arrangements in banks, and the use of non-equity forms of financing for satisfying part of regulatory capital requirements. Particularly relevant here is the growth of "bail-in" capital instruments – which is discussed in the final section.

18.2 A Brief History of Bank Capital[1]

Some Historical Facts

Capital ratios were generally very high before the 20th Century. Banks (worldwide) generally operated with equity/asset ratios of 20 per cent plus – and owners were often subject to double or unlimited liability. Jorda et al (2021) have recently created an historical global database of bank leverage stretching back to the late 1800's (for 17 (current) OECD economies) and a summary of that is shown in Figure 1.

FIGURE 1: CAPITAL RATIO, AVERAGES BY YEAR FOR 17 COUNTRIES. *SOURCE: JORDA ET AL 2021*



Nowadays, economic capital modelling is used to suggest that equity/asset ratios of 4 or 5 per cent (or less) are consistent with a probability of failure of (say) 0.1% p.a (ie a failure once in 1000 years) or less. A quick glance at the historical record might call the robustness of that statistical modelling into question – and, in any event, the historical failure record reflects the risk management benefits

[1] See also Kevin Davis (2012).

provided to banks through government and central bank support mechanisms. In particular, implicit guarantees and central bank liquidity facilities provided by the State enable private banks to profit by "riding the yield curve" and with lower leverage at much less risk of depositor runs and costly fire sales of assets than would otherwise occur.

The similar experience for Australia is shown in Figure 2 (splicing together data from two RBA sources – with obvious concerns about strict comparability). Since other industries have equity/assets at a minimum generally of 30-40%, an important question is why bank capitalization is so low, and why it declined so much over the long run. There are a number of competing hypotheses, prominent among which is the view that the introduction of deposit insurance and implicit government support (including stronger oversight by supervisors) has (a) reduced creditor concerns about such high leverage and (b) induced greater risk-taking (via higher leverage) by bank owners.

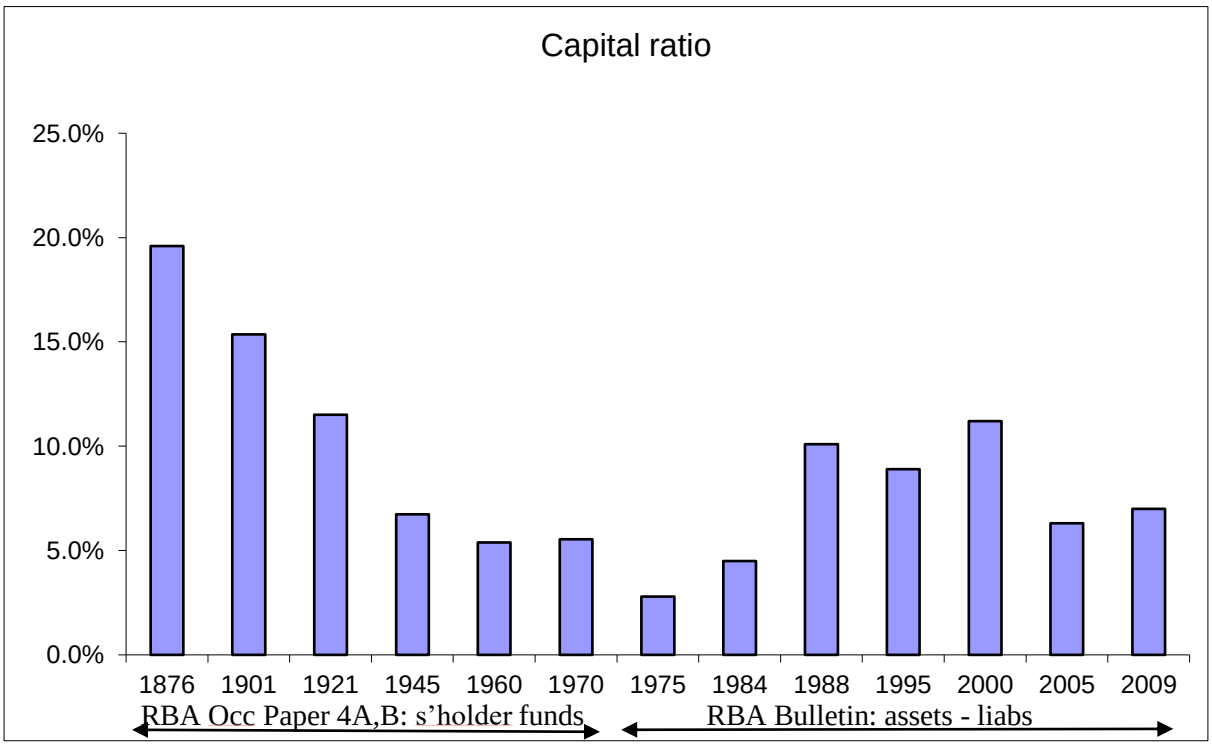


FIGURE 2: AUSTRALIAN BANK CAPITAL RATIOS (EQUITY/ASSETS)

Until the Basel capital requirements in 1988 popularised the notion of Risk Weighted Assets (RWA) bank capital was usually calculated using the ratio of equity/assets, which is generally referred to as a "leverage ratio", based on book value of equity and assets. However, it was not necessarily a major issue of focus until deregulation of banking occurred in the 1980s, and accounting practices had often allowed banks to disguise their capital position via having substantial "hidden reserves".

18.3 Historical Australian views on the importance of bank capital

The Australian Royal Commission on the Monetary and Banking System of Australia of 1937 commented (para 296) "while the ratio of shareholders' funds to total liabilities is some indication as to whether a bank is overtrading, too much reliance must not be placed upon it". It argued that bank solvency depended more on its liquidity and soundness of its advances than on such a capital ratio.

In its Interim Report (1980) The Campbell (Australian Financial System) Inquiry noted (p286) that "While the Reserve Bank does not have specific powers to determine benchmarks or guidelines for the adequacy of banks' capital resources relative to the liabilities that they underpin or might be called upon to underpin, it does monitor the capital gearing of all banks subject to the Banking Act."

In its 1981 Final Report the Inquiry did "not seek to specify precisely appropriate minimum capital requirements", but argued that any new bank needed to have substantial paid-up capital and that shareholders should be in a position to contribute additional capital if need. While it did specify (para 19.68) that "banks should in future be subject to capital adequacy requirements specified by the Reserve Bank", it was not prescriptive on how those might be determined – although it did not favour the recently introduced UK "risk asset" ratio approach (which could be seen as a forerunner to the subsequent Basel approach).

The Wallis Inquiry gave little attention to bank capital requirements in its 1997 Final Report, noting that the introduction of the Basel capital requirements in 1988 and their application in Australia by the RBA had led to a strengthening of bank capital positions.

The Murray Inquiry Final Report (2014) drawing on the experiences of the GFC had as its first recommendation: "Set capital standards such that Australian authorised deposit-taking institution capital ratios are unquestionably strong". Exactly what constituted "unquestionably strong" was left to the discretion of the regulator, although guidance that Australian banks should have capital ratios which placed them in the top quartile of international peers, which was not currently the case, was indicated. To facilitate that, it was also recommended that measures should be taken to improve cross-country comparability of capital positions. This also addressed concerns expressed by Australian banks that APRA's approach to implementing the Basel standards meant that reported capital ratios were biased downwards relative to calculation using standards applied in other countries.

18.4 Bank Capital and the GFC

Figure 3 and Figure 4 provide a recent perspective, showing what happened to the market value of bank equity capital (market capitalization) for a number of major global banks and Australian banks during the GFC. For some of the leading US and European banks, their market capitalization (ie their share prices) fell by over 70 per cent. Some part of this reflected the losses on loans and securities

which were known, but also uncertainties about other potential exposures. Over the period 2007-10 loan loss rates for UK and US banks were around 7-8% (and somewhat less for Euro area). Several major US and European Banks experienced near- death experiences (as reflected in the market capitalization declines in Figure 3) and some others did, in fact die. (The subsequent rebounds in market capitalisation reflect both price changes and the raising of new equity capital). The major Australian banks suffered substantial (around 50 per cent) equity price declines reflected in the market capitalization figures shown in Figure 4, but nowhere near the magnitude experienced by northern hemisphere banks. This GFC experience prompted the massive tightening of Basel capital regulation discussed in Chapter 17.

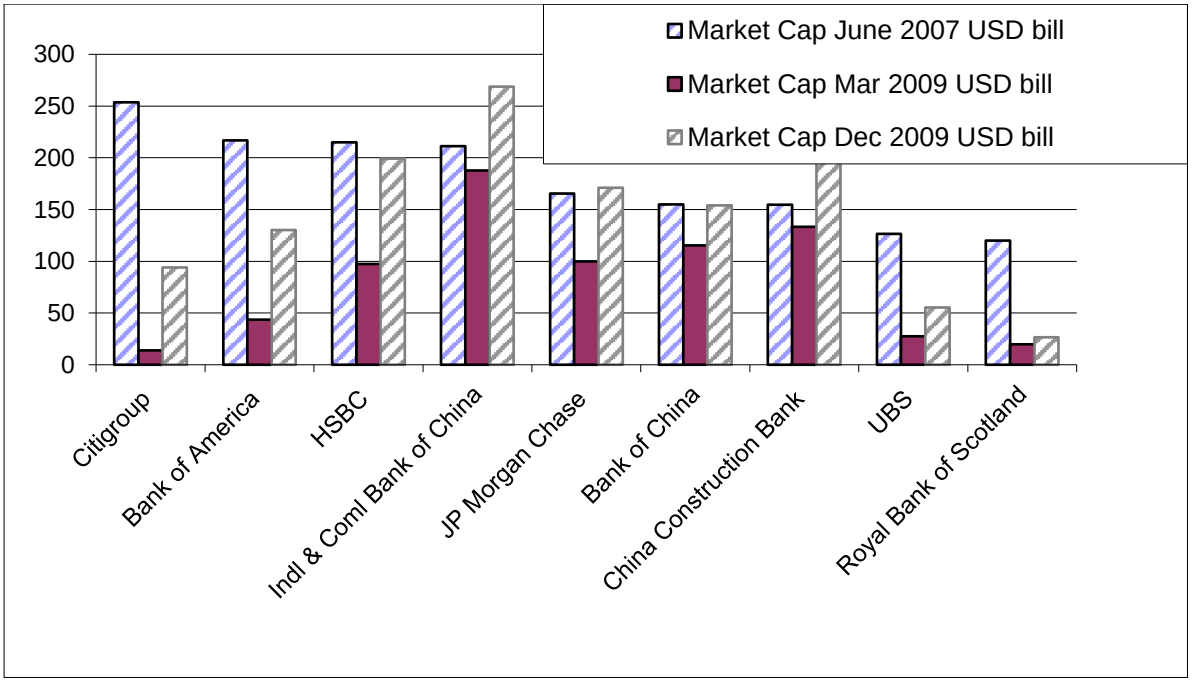


FIGURE 3: GFC BANK CAPITAL EXPERIENCES (SOURCE: FINANCIAL TIMES)

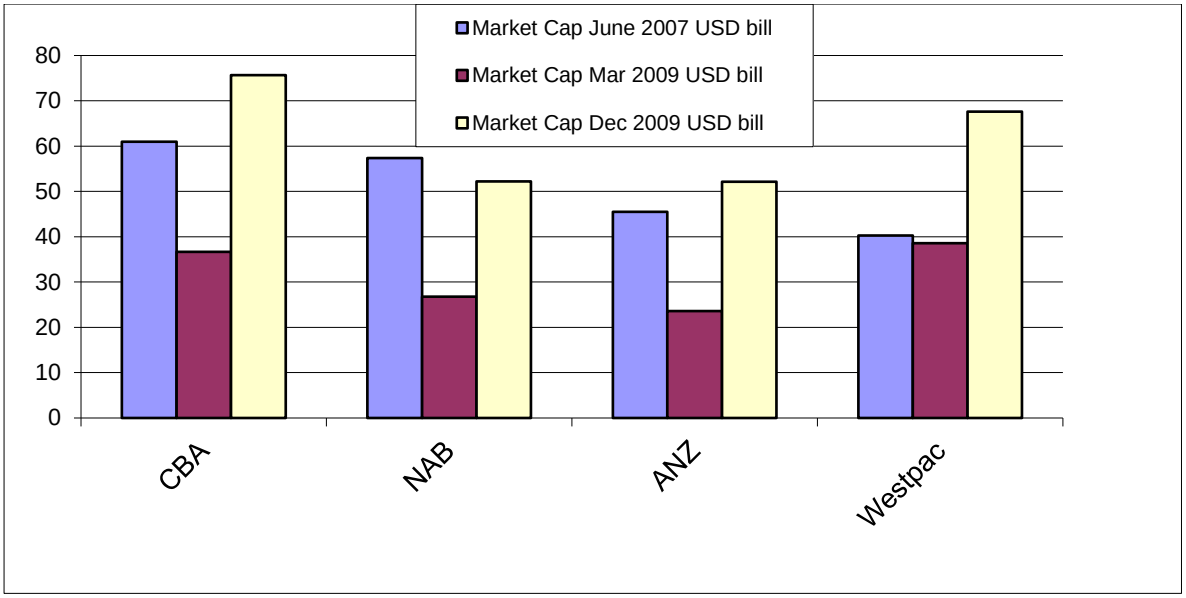


FIGURE 4: AUSTRALIAN BANK GFC CAPITAL EXPERIENCES (SOURCE: FINANCIAL TIMES)

18.5 Capital Structure Theory: MM and Banking

Bankers (both in Australia and overseas) generally claim that higher capital requirements will significantly increase the cost of bank funding with adverse effects for the economy.[2] This view arises because bankers: (a) assume that debt is cheaper than equity – although note that there is no readily observable cost of equity (which is the required return of shareholders); (b) ignore the possibility that lower leverage will reduce the cost of (both existing and new) equity (because of lower risk to equity), which could mean no, or only a small, increase in the overall cost of bank funding.

A well known theorem in finance (the Modigliani-Miller (MM) capital structure irrelevance theorem) presents conditions under which overall cost of funding will be unaffected by leverage (such that there is no optimal capital structure). Those conditions (essentially an assumption of perfect markets) include: no costs of financial distress, no tax distortions to financing, perfect information, and ability of investors to "undo" corporate leverage decisions by personal leverage.[3]

While the required conditions don't hold generally, (a) there are good reasons to believe that there is a substantial "MM" offset effect – such that the overall effect of higher capital requirements is much less than often claimed, and (b) understanding why MM may not work helps identify whether

[2] See Admati, A., Hellwig, M (2013) (This is related to their book: Admati, A., Hellwig, M., 2013. The Bankers' New Clothes. Princeton University Press. Princeton, NJ).
[3] Miller, M., (JBF,1995). Mark J. Flannery (ARFE, 2012), section 3-5

higher capital requirements actually involve a social cost (rather than a private cost to bank shareholders).

One reason why MM may not work is that depositors/ debt holders[4] do not demand appropriately higher rates of return from higher leveraged (more risky) banks, because of perceptions of government implicit or explicit guarantees, or lack of knowledge of risk involved.[5] Higher leverage then provides private gains to bank shareholders at the expense of taxpayers or depositors. A second is that deposit/debt finance may be tax-advantaged (under "classical" tax systems) relative to equity. There are then private benefits to bank shareholders from higher leverage – but no social benefits. There may be some other market imperfections giving a bias towards deposit/debt finance (more managerial discipline from having "runnable" deposits/debt), but it is arguable that extremely high leverage levels are needed to achieve this.[6]

Does an "MM" effect operate? Answering this question is complicated by the fact that the cost of equity capital is unobservable (and refers to the rate of return required by shareholders on the market value of equity holdings, whereas bankers operate to targets for an accounting return on equity based on the book value of equity). But there have been some studies, including one from the Bank of England (summarized in the box below), which imply that only relatively small increases in bank funding costs would follow from large increases in capital requirements – and that the social benefits of reduced risk of financial crises outweigh those costs. [7]

"… even proportionally large increases in bank capital are likely to result in a small long-run impact on the borrowing costs faced by bank customers. Even if the amount of bank capital doubles our estimates suggest that the average cost of bank funding will increase by only around 10–40 basis points (bps) (a doubling in capital from current levels would still mean that most banks were financing more than 90% of their assets with debt.) But substantially higher capital requirements could create very large benefits by reducing the probability of systemic banking crises." Miles et al (2013)

[4] Deposits differ from debt in a number of ways including seniority and issuance/redemption arrangements. They also generally pay lower interest rates, but create operational costs for the bank due to services provided. Flannery (2012) notes that empirical evidence supports the intuition that banks will use debt as a marginal source of finance – once the full marginal cost (interest plus operating costs) of deposits equals the marginal cost of debt. Hence, no distinction is made in this discussion.

[5] Note that banks can raise "debt" funds in the form of deposits – which provide liquidity services as well as explicit interest to depositors. If, for example, depositors value those liquidity services more than the operational (and risk management) costs the banks incur in providing them, the total costs of deposits (interest and related operational costs) to the bank may be less than the cost of equity or straight debt borrowing costs to either the bank or shareholders.

[6] It can also be argued that high leverage, such as banks operate with, is not consistent with the risk exposure created for stakeholders other than equity holders (who benefit from risk taking but gain protection of their other wealth from limited liability structures).

[7] Admati and Hellwig (2012) provide a robust attack on bankers' views about costs of being required to use more equity financing because of higher capital ratios. They also stress the point (appropriately) that common use of the term "hold more capital" induces misperceptions of what is involved – which is solely a change in the mix of funding of assets.

There is no strong argument or evidence supporting the view that bank capital ratios as low as currently exist (even after recent regulatory increases) are socially optimal, nor arguments to show that any social costs (of possibly marginally higher bank funding costs) from higher capital ratios would not be outweighed by social gains from greater financial stability. It is not even clear that higher capital ratios would involve a private cost to bank shareholders whose required returns would fall because of lower risk of bank equity, such that they would be content with lower bank roe's.[8]

Bank management prefer lower capital ratios perhaps, partly, because they are exposed to less market discipline in raising deposit and debt funds compared to equity raisings.

Taxation

Under a classical tax system, increasing leverage reduces the total government tax receipts from a given level of business activity. The reason is that interest on debt is deductible in calculating income for corporate tax purposes, and equity holders are taxed on dividends paid to them from after-corporate-tax earnings. There is thus "double taxation" of firm income distributed as dividends on equity but single taxation of interest on debt (often referred to as the "interest tax shield"). De Mooij R and Keen, M. (JMCB, 2016) examine the effect of debt on bank capital structures globally and find that the sensitivity of bank leverage to corporate tax rates is similar to that for other companies. They find that removing the tax distortion associated with a corporate tax rate of 25 per cent (by removing interest deductibility) would suggest a doubling of bank capital ratios for all but the largest banks – whose capital structures appear to be less sensitive to taxation.[9]

But the tax shield argument as a motive for higher leverage has substantially reduced significance in Australia where a dividend imputation tax system applies. If all shares in a company earning income in Australia are held by Australian residents and where there is a 100 per cent dividend payout rate, corporate tax payments are completely "washed out" by lower personal tax payments due, as a result of franking credits attached to dividends. In practice, banks have some overseas income, some non-resident shareholders and less than 100 per cent payout rates partially reducing the "washout" effect. Nevertheless, tax incentives for higher leverage are significantly reduced by the dividend imputation tax system. One consequence is that the "tax" cost to Australian banks of higher equity ratios is much less than for the majority of banks globally who are not subject to such integrated tax systems. (The resulting consequences of high dividend payout rates reducing bank retention of

[8] Although note that Baker and Wurgler (AER, 2015) argue that there is evidence of a "low risk anomaly" in equity returns generally, whereby lower risk stocks have higher actual (and by implication required) returns which also applies to banks. If so, stricter capital requirements may reduce risk but increase required equity returns.

[9] Schepens, Glenn. (JFE, 2016) examines the effect of a tax change in Belgium, finding that a more equal tax treatment of debt and equity led a significant increase in bank capital ratios.

capital and impeding balance sheet growth, can be overcome partly via dividend reinvestment schemes – and is otherwise only an issue of significance if there is some economic rationale for owner (rather than manager) preference for financing growth by internal finance (retained earnings) rather than externally provided equity finance).[10]

Practical Limits to Leverage

If there is such a tax advantage to leverage, what inhibits firms from becoming almost entirely debt financed? While there is a lot of variability, the debt-assets ratios of non-financial businesses tend to average around the 0.3 – 0.5 mark. Banks, aggregating deposits with other debt securities on issue, have debt-assets ratios typically around the 0.95 mark or higher. Why is that so?

The main market imperfection generally perceived to inhibit excessive leverage is the cost of financial distress. Higher leverage and risk of failure increases the probability that available resources will need to be used to deal with such risks or that customers (particularly where long term implicit or explicit contracts are involved) may be less willing to deal with a company with higher risk of failure. That is, at some level of leverage there is some reduction in the expected future free cash flows generated by the company which are available to provide returns to providers of finance.

Where the marginal costs and benefits of increased leverage cancel out to determine the optimal leverage for a firm depends on a number of factors. Among those factors are firm characteristics such as the volatility of product demand and tangibility of assets (and thus potential recovery rates of creditors in the event of firm failure). [11]

Optimal Bank Leverage

Why should banks have such high leverage relative to other types of businesses? One possibility may be that deposits are different from debt. And indeed they are – particularly at call deposits.[12] One (academic) argument as to why banks finance themselves with deposits rather than debt is that the balance sheet fragility created by using withdrawable deposits / short term debt acts as a mechanism for ensuring bank management is incentivised in managing the asset side of the balance sheet (loans). But that is an argument related to use of deposits (and short term debt) rather than long term debt, and does not explain why leverage should be so high.

[10] A large literature exists on the topic of this "pecking order" theory of capital structure.

[11] There are some studies that argue that there is no optimal leverage – rather it is the product of historical factors such as availability of, and preference for, internal financing or historical managerial choices of raising equity or debt to "time the market" conditions for favourable cost conditions. Even though there is some evidence to suggest that these arguments are relevant, it remains the case that there is some "clustering" of leverage ratios for different industries and particular characteristics of firms.

[12] While deposits generally pay lower interest rates than debt, this (at least partly) reflects the associated operating costs from providing deposit facilities etc.

Another such argument is that high leverage enables bank managers to own a larger share of the bank's equity and thus aligns their incentives with those of owners. Perhaps this is relevant for a (very) small bank, but unlikely to be relevant for large banks – which can also design managerial remuneration contracts to provide alignment. Goetz, et al (2020) find that for US banks, insider ownership can be relatively high (an average of around 30 per cent) for their sample, and that high inside ownership can inhibit external issues of equity.

A third academic argument is that because assessing bank risk-taking is difficult for outsiders, issuing debt with fixed payoffs which are insensitive to risk (except in the low probability event of bankruptcy) is a better way to overcome this information asymmetry problem than using equity financing. (Flannery, 1994, discusses these theories, and Gropp and Heider (2010) find that a range of variables found relevant for explaining capital structure differences in non-financial firms also apply in the case of large European and US banks).

Another possible reason is that the nature of bank business is low risk. If, for example, their only activity was to take depositor funds and invest them in (particularly short-term) government securities (and cash and deposits at the Reserve Bank), there would be little reason not to be highly levered. Even if the assets held are a diversified portfolio of loans to different businesses and individuals, the diversification reduces the overall risk of changes in the value of that asset portfolio. But variability in the value of the bank's assets (due to default and market risk) at some high level of leverage creates risk of insolvency. (And leverage – use of deposit funding – also creates liquidity risk for banks arising from the mismatch of asset maturity and deposit maturity. A bank which was 100 per cent equity financed would have no liquidity risk!)

There is ongoing debate about what are the determinants of bank optimal capital ratios and whether decisions based on private costs and benefits are socially optimal. Specifically, do banks tend to operate with levels of equity which are "too low" from a social perspective, giving rise to a risk of failure which is excessive. Underpinning those concerns are the social costs of failure of an individual bank and the potential for spillover effects (externalities) causing disruption throughout the financial system. "Contagion" and runs on other banks are one such possible effect, as are "fire-sales" of assets by troubled banks which by depressing asset prices involve pecuniary externalities for others.

It is clear that banks operate with dramatically higher levels of leverage than do firms in other industries. So one question of interest is why is that? Does it reflect some unique characteristic of banking which makes high leverage, and associated financial fragility, optimal? Or does it reflect some market distortion, such as expectations of government support of troubled banks, which leads to private decisions generating bank leverage higher than some socially optimal level.

A second question is: what is a socially optimal level of bank leverage? If regulations are required to achieve such a level, how are they best designed?

In July 2017 APRA released its policy on capital requirements necessary to make Australian banks "unquestionably strong" as recommended by the Australian Financial System (Murray) Inquiry Final Report (and endorsed by the Government in its response to that report).

Determinants of Optimal Bank Capital

Prior to the GFC there was relatively little attention paid to the determinants of optimal bank capital structure. Various authors addressed the topic from the traditional approach to corporate capital structure, de-emphasising the fundamental differences between deposits and debt. Others focused on the nature of bank intermediation and the opacity involved to argue that financial fragility was an inherent feature of banking structure needed to deal with agency problems and imperfect information.

18.6 Determinants of Optimal Bank Capital Strcture

There have been many recent papers which have examined whether the factors that have been found empirically to determine corporate capital structure are also relevant in explaining bank capital structure. Berg and Gider (JFQA, 2017) argue that asset risk explains up to 90 per cent of the difference in the equity/assets ratio (of around 9% for banks versus 50% for non-bank commercial companies). Bank assets are diversified portfolio of non-bank debt etc which is less risky than assets of borrowers (such as non-bank commercial companies). Similar explanatory variables to those used in empirical corporate finance studies of capital structure (excluding banks) help explain bank capital structure. Gropp and Heider (RF,2010) also find bank leverage can be explained by standard corporate finance variables and time-invariant unobserved firm fixed effects. But while the marginal effects of those variables are similar, the constant term in bank regressions is much higher than that for non-banks, implying a higher, unexplained, level of leverage (although perhaps indicative of the effects of implicit government guarantees).

Identifying the Socially Optimal Leverage of Banks

There have been a number of studies which have tried to undertake cost-benefit analyses of imposing higher capital requirements on banks in order to identify a socially optimal level for bank capital requirements. Most adopt a similar perspective. Higher capital involves a cost for society if the cost of bank equity funding is higher than the cost of deposit/debt funding (and Modigliani-Miller capital structure irrelevance issues need to be addressed in this context). Then, higher loan

interest rates will result and reduce aggregate physical investment and real output costs. The benefits are from the potential for less financial crises.

There are numerous complications and assumptions required in undertaking such a study. First, some private costs of higher capital (such as less use of interest tax shields or reduced value from implied guarantees) are not necessarily a social cost. Second, it is unrealistic to assume that other forms of intermediation will not adapt – and could affect both costs and benefits. Third, how will banks react to higher capital requirements in terms of pricing and output decisions and thus how will the effects flow through the economy? Fourth, will the costs be of the form of a one-off lower reduction of output level, or a change in the growth rate of output? Fifth, how can the change in probability of a crisis be estimated as well as the economic benefit arising from a lower probability (or severity). Sixth, should the analysis be done in terms of a non-risk-weighted leverage ratio or on a risk-weighted basis.

There is a large literature on the determinants of bank leverage – here are a few references

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De Jonghe, Olivier, and Özde Öztekin. "Bank capital management: International evidence." *Journal of Financial Intermediation* 24.2 (2015): 154-177.
Basel Committee on Banking Supervision "Literature review on integration of regulatory capital and liquidity instruments", Working Paper No 30, March 2016
Thakor, A. V. (2014). "Bank capital and financial stability: An economic tradeoff or a Faustian bargain?" *Annual Review of Financial Economics* 6: 185-223

18.7 Empirical Evidence on Bank Value and Bank Capital

Until recently there have been relatively few articles which empirically test whether higher bank capital ratios add or reduce value for bank shareholders and/or for society. Even if there were, the problem exists that any finding that value falls with higher capital ratios could be due simply to the existence of implied or under-priced deposit insurance or government guarantees.

One study (Mehran and Thakor, 2011) which attempts to examine this question does so by considering whether the acquisition price paid in US bank takeovers increases more than one-for-one with the capital position of the target bank. (The price and capital position are both deflated by the target bank's assets to enable comparability, and other potential determinants of the acquisition price are controlled for). The results indicate that an increase in the capital/assets ratio of 0.01 leads to approximately a 0.014 increase in the acquisition price/assets ratio. The implication is that higher capital has a more than one for one effect in increasing the market value of the bank. Interestingly, the Chairman of UBS, Axel Weber was recently quoted as saying that "banks that had adopted the Basel III capital rules ahead of schedule – such as Australian and Swiss banks – were being rewarded by the market with higher valuations" (The Australian, February 22, 2014)

A study by Miles et al (EJ, 2013) from the Bank of England uses historical data on British bank equity returns and leverage to assess how higher capital ratios affect bank cost of funding and to estimate an optimal capital ratio for banks. They find that while the MM effect doesn't operate fully, there is a significant partial effect, such that a doubling of equity ratios (eg from 8 to 16 per cent of assets) would increase the overall cost of bank funding by only around 40 basis points. (The figure derived varies somewhat when different assumptions are used, but not dramatically).

Berger et al (JBF, 1995) finds that for US Banks in the 1980s higher capital ratios led to higher subsequent ROE (and that ROE also contributed to subsequent higher capital). Jordan et al (JBF, 2011) find in a study of the effect of the TARP on US banks following the financial crisis, that bank market/book ratios were positively related to tier one equity capital ratios.

Using US data, a working paper by Baker and Wurgler (SSRN, 2013) "confirm that bank equity risk is sharply increasing in leverage" but note that this has not historically been translated into higher equity returns. They interpret this as implying that required equity returns have not increased substantially when higher leverage is used (basing their argument partly on the failure of the simple CAPM to explain historical equity returns). They suggest that a proposal to increase required capital ratios by 10 percentage points (eg from say 5 to 15 per cent) could lead to an increase in the weighted average cost of capital (and lending spreads over the risk free rate) of between 60 -90 basis points. They note that this is large (compared to an historical estimate of bank funding costs of around 40 basis points over the risk free rate), that it could increase the competitiveness of shadow

banks, but that whether it is a socially beneficial adjustment in response to other issues is an open question.

A similar result can be obtained relatively simply by noting that if required equity returns are not affected by leverage (and ignoring taxes), a one percentage point increase in equity/assets (and consequent equivalent decrease in deposits/assets) increases funding costs per dollar of assets by $0.01(r_e - r_d)$. If, for example, the required return on equity (r_e) is 0.15 and deposit cost (r_d) is 0.05, this gives an increase of 0.001 or 10 basis points per each percentage point increase in the equity ratio.

Gimber and Rajan (BoE, 2019) estimate equations indicating how the historical returns on equity and senior and junior debt for banks depend on the banks' funding mix and other control variables. They use these to examine the extent to which MM "offsets" occur in the risk premia for particular components of bank funding by examining the implied effects arising from substitutions between equity, senior and junior debt funding. They find significant effects.

18.8 Bank Capital Planning and Adjustment

Bank capital planning is significantly affected by capital regulation.[13] Thus it is to be expected that theories of optimal capital structure used in corporate finance require some adaptation in application to banking. If regulatory required capital is below what the bank would have chosen anyway (ie is non-binding), there may be little adaptation of the theory is needed – although the exceptionally high leverage of banks suggests other factors are likely to be relevant. (These include the fact that liabilities are (predominantly) deposits, many of which are withdrawable on demand, and thus stochastic in nature, as well as debt, and the diversified asset portfolio of financial (rather than real) assets). But if regulatory capital requirements are binding it may be appropriate to focus instead on the "capital buffer" (capital in excess of the regulatory requirement) chosen by the bank. Such a buffer is required to avoid the potential regulatory costs associated with falling below the regulatory requirement.

In Australia, a large buffer is involved in banks meeting APRA's expectation of an "unquestionably strong" capital position of a CET1 ratio of 10.5 per cent (compared to the Basel 3 minimum requirement of 4.5 per cent plus specified buffers of 2-4 per cent, or 6.5-8.5 per cent in total). During the Covid-19 Crisis, APRA advised banks that it would not be concerned if the unquestionably strong

[13] Lewis (ANZ BlueNotes, 2020) provides an excellent overview of how a bank such as ANZ goes about its capital planning.

expectation was not met temporarily due to needs to provide adequate credit for economic recovery.

Regardless of whether a total capital or "buffer" approach is considered, there are fundamental differences with the standard corporate finance approach which focuses upon optimal capital structure in terms of market values. While, in principle, banks might determine optimal capital structure in terms of market values, regulatory requirements are expressed in book value terms. Moreover, those book value terms incorporate regulatory adjustments (disallowances) such that eligible regulatory capital is not the same as book value of equity (even ignoring the fact that some non-common-equity amounts might be acceptable for regulatory purposes).

As a result, there is a mix of academic studies which focus on either or both of book and market leverage. In general, most studies adopt an optimal capital structure framework rather than the "pecking order" hypothesis associated with Myers (JoF, 1984), or a market timing approach popularized by Baker and Wurgler (JoF, 2002).

In that framework, optimal leverage reflects cost, risk, information, and tax issues, and some special considerations relevant for banks including:

- Un- or under-priced government guarantees to other stakeholders (policy holders / depositors) etc. gives incentive to increase leverage and/ or risk of activities. There is thus a potential trade-off; higher leverage increases the value of the government safety net but reduces the probability of continuation of quasi-rents (value of bank charter).
- The imposition of risk-related capital ratios mean that capital relative to RWA might be as much of a consideration for bank managers as capital relative to total assets
- Regulatory requirements and pressure from regulators may affect the speed at which banks adjust towards their desired capital structure – and the way in which this occurs (such as by external issues of equity, retention of earnings, setting interest rates etc to affect the size and composition of deposits and/or assets, transactions in debt markets etc).

18.9 Capital Planning – ICAAP Requirements

In addition to good management practice which would suggest that banks plan ahead for their capital needs, they are subject to regulatory ICAAP (Internal Capital Adequacy Assessment Program) requirements. APRA sets out requirements for an ICAAP for ADIs in APS 110 and guidance in CPG110. Boards are required to have ownership of an ICAAP which needs to address consistency of the capital position with its risk appetite and a strategy for setting capital targets, with the detail involved proportional to the size and complexity of the ADI. Forward planning should consider potential changes in the operating environment etc. APRA expects that capital targets will take into account: risk appetite, regulatory capital requirements, business plans and strategy, profit and capital surplus volatility, dividend policy, external ratings and ability to access additional capital. For

larger ADIs, explicit economic models and stress tests are relevant ingredients of the process. "Triggers" identifying when explicit action related to the capital position might be needed, and consideration of alternative types of action, are expected. Reflecting its risk focus, the ICAAP is also expected to consider how the bank's estimate of economic capital and regulatory capital might differ, and allocation processes for economic capital. It does not directly address the issue of "optimal capital" in the sense of a capital structure which would maximize firm value (or minimize WACC).

In banking circles, the capital discussion often refers to the "capital stack" which reflects the Basel approach of allowing for different forms of liabilities to be incorporated in capital requirements depending on their loss-absorbing characteristics. Common equity is at the bottom of the stack (in the sense of having the highest level of loss absorbency). On top of that comes AT1 and then AT2 instruments. The mix of these is affected by the Basel requirements and bank preferences.

18.10 Ratings Considerations

An important consideration in bank capital planning is the determination of ratings given the bank and its debt, and hybrid, securities by the ratings agencies (Moodys, S&P, Fitch). Each of the ratings agencies has its own proprietary method of calculating capital ratios and determining what values of those ratios (in conjunction with other relevant factors) lead to different ratings. Among those other factors, the "sovereign" credit rating of the nation is an upper bound on the rating of any Australian institution, and changes in the sovereign rating can be expected to be mirrored in bank ratings.

For example, S&P determine a "stand-alone credit profile" (SACP) and an "issuer credit rating" (ICR) for banks which incorporates any upgrade dependent upon the degree of government or other (parent or investors in ALAC instruments) support expected to be available to a bank in financial difficulty. S&P commence with an assessment of economic and industry risk at a country level to obtain a "Banking Industry Country Risk Assement" (BICRA) which forms a starting point for individual bank ratings. The SACP for an institution then takes into account specific features such as business position, capital and earnings, risk position, funding and liquidity. There may also be a "comparable ratings analysis" CRA adjustment which takes other relevant factors into account. S&P (and other ratings agencies) focus on current financial metrics (and qualitative information) and their expectations over the next year or so.. Figure 5 illustrates the process.

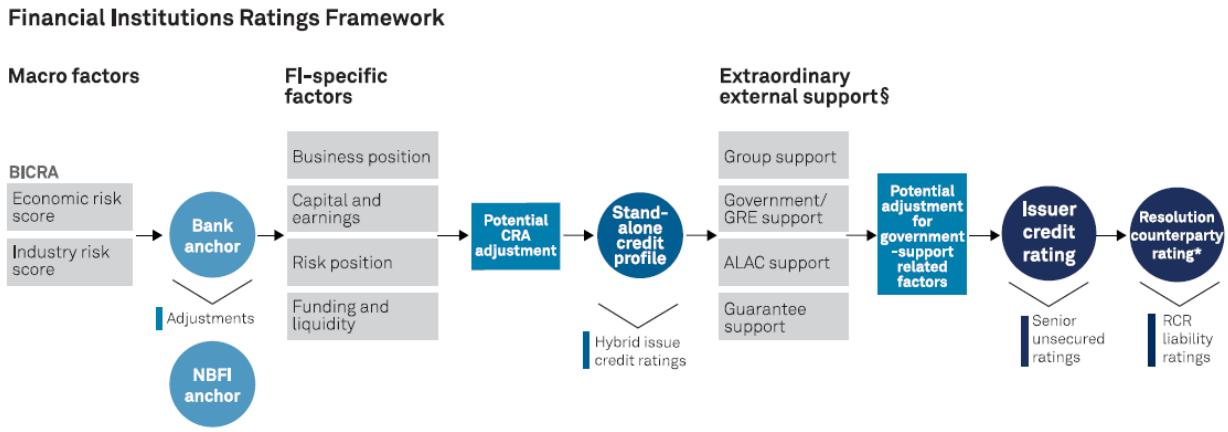


FIGURE 5: S&P RATINGS APPROACH: SOURCE S&P

The rating is thus an assessment based on more than some capital ratio But there is a high degree of correlation between the agency ratings and regulatory calculations of capital ratios, such that banks will focus heavily on the regulatory calculation. Nevertheless, the judgement of the ratings agencies are relevant and, for example, the CBA states that it "targets an 'AA' credit rating band and the maintenance of the Bank's credit rating is paramount".

The major Australian banks have typically received high credit ratings from the ratings agencies in recent decades. In general, the major banks usually all receive the same rating which has been as high as found for any banks elsewhere in the world. For example, in 2021, the majors were rated AA- by S&P, and with similar ratings (but different symbols) from Moody's and Fitch. The other larger Australian banks were one or two notches lower and the mutual banks generally rated as investment grade (BBB) – which given that their capital ratios exceed those of the major banks indicates the role of factors other than simply capital ratios. An illustration of a ratings report by S&P on Macquarie Bank (a subsidiary of the Macquarie Group) in early 2021 can be found here. It's A+ rating involves a judgement of Sovereign (crisis) support (but not Group support) which boosts its SACP (Stand Alone Credit Profile) by two notches.

18.11 Organic Capital Growth

For any entity (not just banks) an important question is that of whether internal generation of shareholder equity will be adequate given anticipated growth or whether raising external equity capital will be necessary. The expected growth in activity (ie size) determines required growth in capital if, for example, leverage is to remain constant. The profit rate (ROA denoted by ρ) determines a natural growth rate if the capital ratio (k = E/A) (where E is equity and A is assets) is to be held constant and no external capital is to be raised (or dividends paid). The change in equity can be written as:

$$E_{t+1} = \rho_{t,t+1} A_t + E_t$$

If g is the asset growth rate, then

$$E_{t+1} / A_{t+1} = \rho_{t,t+1} A_t / A_{t+1} + (E_t / A_t).(A_t / A_{t+1})$$

$k_{t+1} = \rho_{t,t+1}/(1+g) + k_t/(1+g)$ and rearranging gives:

$$\Delta k_{t,t+1} = \rho_{t,t+1} /(1+g) – k_t\, g/(1+g)$$

For k to be constant at say k* ie ($\Delta k = 0$) then:

Required ROA = $\rho^* = g.k^*$.

Equivalently noting that roe = $\rho(A/E) = \rho/k$, then roe = g is an alternative way of stating the natural (organic) growth rate relationship. To grow at a rate faster than the roe and maintain a constant capital ratio requires accessing external equity. (It is possible to restate these relationships using a capital/risk-weighted-assets ratio, and assuming a constant average risk weight. In that case, rather than raising external equity, another option is to shift into lower risk weighted assets).

Actual growth in capital is equal to earnings less dividends (ie retained earnings) plus external capital raisings (which could be negative if share buy-backs are used).

A number of implications follow:

- poor past performance creates difficulties in growing capital both internally and externally. Negative profits directly reduce shareholders equity and the likely consequence of losses leading to a poor share price inhibits new share issuance.
  - This was a problem faced by ANZ and Westpac at the start of the 1990s, and led to the issuance of an innovative form of equity capital in the form of Converting Preference Shares. (These had a basic structure that provided investors with a stream of coupons for an initial period, of around five years, and subsequent, mandatory, conversion into a fixed value of equity with the number of shares received being determined by reference to the then prevailing share price). They were aimed at investors wanting a fixed -interest like investment, but provided permanent equity via the mandatory conversion, and potentially avoided dilution of existing shareholders which would have happened if common equity had been issued instead. A complication was the potential for downward pressure on the share price at the conversion time if the investors did not want to hold the bank shares received on conversion and sold those shares in the market.
- Dividend policy is an important determinant of capital growth. The major Australian banks have typically adopted a high dividend payout ratio (in the order of 80 per cent) reflecting the attraction of franked dividends to local shareholders. While dividend re-investment schemes can partly offset the negative impact on equity (and cash-flow) the typical participation rate has been under 10 per cent. In many cases the banks obtained the shares needed to provide to participants by on-market buybacks rather than by issuance of new shares, thereby not conserving cash and not adding to the bank's capital position.

  - In July 2020 APRA took the unusual step of advising banks to defer or reduce their dividend payments (to less than half of earnings) because of the potential negative effects of the Covid Crisis on bank earnings. While banks may have adopted that strategy anyway, the APRA recommendation made such a step easier to take given the expectations of shareholders that dividends would generally be "sticky".
  - The major Australian banks were also affected by the RBNZ's decision in April 2020 to prohibit payment of dividends by the country's banks which, for the major banks would have flowed to their Australian parents. (While the non-payment of dividends would have increased the shareholder's funds in the NZ subsidiaries, the regulatory treatment of investments in subsidiaries for capital purposes meant that non-payment of dividends adversely affected regulatory capital positions of the Australian majors). The restrictions have since been eased.

- Mutual organisations are generally restricted in accessing external equity capital, by virtue of their mutual status, and hence have generally had to rely on internally generated surpluses (profits) for growth in equity. While some forms of securities could be available to them to raise funds which could count as regulatory capital, these have faced regulatory impediments.
  - A requirement that capital be permanent makes start-up of new mutual ADIs virtually impossible, since member shares (of a nominal amount each) are withdrawable on leaving the mutual.
  - Under the bail-in requirements, APRA has approved "Mutual Equity Interests" (MEIs) which could be issued, but which are not generally economically feasible or in the best interests of members. (The rate of return which investors would require on MEIs given likely secondary market liquidity is likely higher than the net returns a mutual could earn on use of those funds, and the relatively small scale of any such issue would make issuance costs relatively expensive.
  - Reliance on generating equity internally via profits implies that to keep the capitalratio constant in a faster-growing mutual, a larger profit rate is required such as by a higher net interest margin. That, involving for example higher loan interest rates and lower deposit interest rates, is not obviously in the best interests of current members, and will also tend to choke off growth.

18.12 Capital Adjustment Processes

Assuming that a bank's optimal capital ratio is known, if the actual ratio differs from that how does adjustment to the desired ratio occur and how long does it take?

There have been a large number of empirical studies addressing this issue. To illustrate the basic approach:

- First it is necessary to assume bank has a desired (albeit unknown to the researcher) capital ratio (which could be a risk-weighted ratio or not, could be in terms of market or book value, could be for the level 1 entity or level 2 (including subsidiaries involved in banking) entity)).
- Second, assume the desired ratio is determined by some set of explanatory variables such as specific characteristics of the bank and/or economic conditions.

For this illustration assume there is a desired (optimal) risk weighted book-value ratio (CAP/RWA)* where:

$$(\frac{CAP}{RWA})^* = \beta_0 + \beta_1 X_1 + \cdots \ldots + \beta_n X_n + \varepsilon$$

Here $X_1 \ldots X_n$ represent bank specific factors or market factors.

If the actual ratio differs from the desired, adjustment to desired could occur via changing either or both of the numerator (CAP) or denominator (RWA). The adjustment mechanism and speed could differ depending on whether the actual ratio is above or below the desired ratio, but ignore that complication for the moment. Assuming that the bank adjusts towards its desired ratio proportionally but with a random error, we have:

$$\Delta(\frac{CAP}{RWA})_t = \alpha[(\frac{CAP}{RWA})^* - (\frac{CAP}{RWA})_{t-1}] + u_t$$

Substituting the determinants of the optimal capital ratio for (CAP/RWA)* generates an estimating equation which is typically estimated on panel data, assuming a constant adjustment speed (α) for all banks in the sample. (In this equation $X_{i,j,t}$ represents the value of factor j for bank I at time t).

$$\Delta(\frac{CAP}{RWA})_{i,t} = \alpha[\left(\beta_0 + \beta_1 X_{i,1,t} + \cdots \ldots + \beta_n X_{i,n,t} - \left(\frac{CAP}{RWA}\right)_{i,t-1}\right] + u_{i,t}$$

One of the earliest studies in this literature was by Shrieves and Dahl (JBF, 1992), and a variety of similar approaches have been used subsequently. They assumed separate adjustment processes for capital and risk positions which both reflected a planned component and a random shock. In their approach the average risk weight was used as one measure of risk, and the concurrent change in risk was included as a determinant of desired capital level and vice-versa – along with other determinants of CAP* and RWA*. This provided an interrelationship between the capital and risk adjustment processes. Their final specification was a simultaneous equation system of the form

- $\Delta CAP_t = \alpha(CAP^* - CAP_{t-1}) + u_t$
- $\Delta RWA_t = \alpha(RWA^* - RWA_{t-1}) + v_t$

in which the determinants of the desired values (CAP* and RWA*) were substituted to produce an estimable equation.

Other related studies include Jacques and Nigro (JEB, 1997), Aggarwal and Jacques (JBF, 2001), Jokipi and Milne (JFS, 2011), Cohen and Scatigna (JBF, 2016), Bakkar et al (JBF, 2019).

Flannery and Rangan (RF, 2008) estimated an adjustment equation for the equity/assets (capital) ratio using the market (rather than the book) value of equity and incorporating regulatory (book value) constraints. Their measure of risk was asset volatility (derived from equity volatility) which

was assumed to have a positive impact on the desired capital ratio. In turn the actual capital ratio was assumed to be a determinant of asset volatility. Because they were using market values of equity, it was also necessary to make allowance for the effects of changes in the bank stock price on that ratio, by assuming a lagged managerial adjustment of the capital ratio to such changes.

Brown and Davis (JBF, 2009) apply a variant of these approaches to examine Australian Credit Union capital adjustment (over 1992-2004) incorporating the important considerations of no access to outside equity and no market value of capital for mutual organisations. There is thus no stock market discipline to penalize maintenance of a sub-optimal capital ratio. In an environment of managerial entrenchment this could lead to capital decisions reflecting a trade-off between growth and size (prestige) and safety (maintenance of managerial quasi-rent/perquisites) – and quite disparate target capital ratios. Also particularly important is that achieving a faster increase of capital requires the credit union to target a higher NIM and profit rate to generate capital internally. This is not to the benefit of current members and will likely adversely affect asset/deposit growth. Consequently, they are able to reframe the capital adjustment process in terms of managerial targeting of, and adjustment towards, a desired ROA. The speed of adjustment will balance costs of disequilibrium (not being at the target) and adjustment costs which will be related to the speed of adjustment. They find relatively slow adjustment of capital, no evidence of changes in risk as being part of the equilibration process, and no tendency for capital ratios to converge to some common level.

18.13 Bail-In Securities

"Bail-in" securities (often referred to as contingent capital) are hybrid securities issued by banks as an eligible component of Additional Tier 1 or Tier 2 regulatory capital in meeting total regulatory capital requirements. Eligibility requires that if certain "trigger" conditions (indicating risk of failure of a bank) occur, the securities are either converted into common equity or written down, such that the bank is recapitalised (in the sense of having an increase in common equity).

This effect is shown in Table 1 where the initial position of the bank which triggers the bail-in involves is assumed to be it having common equity equal to 2 per cent of total assets. Where the Bail-in securities are converted into equity (the top panel) the bank now has common equity/total assets of 10 per cent. (In the table, it is assumed that the holders of the bail-in securities (new equity) get a pro rata share of the ownership of the bank. In practice, the conversion terms could involve a differential allocation – and it should be noted that these are accounting (book value) numbers whereas the bail—in announcement could have significant (negative) effects on the market value of the bank's equity).

In the lower panel, writing off the bail-in securities means that all the benefit accrues to the original equity holders of the bank. (One consequence is that if investors expect that any future possible bail-in will occur via write-down rather than conversion, they would require a higher promised rate of return on the bail-in securities).

In both these cases, the bank has had an increase in its CET1 capital ratio (from 2 to 10 per cent if it is assumed the assets have a risk weighting of unity). However, it is possible that the bank's total capital ratio is below the required minimum. For example if the average risk weight of assets was 0.5 then the total capital ratio is 5 per cent, below the required 8 per cent. The bank would therefore need to raise new capital if it is to continue operations – and it could be extremely difficult to raise either new common equity or issue new bail-in securities given that a bail-in is bound to be perceived by the market as bad news.

TABLE 1: BAIL-IN EFFECT ON BANK CAPITAL

Bail-in conversion							
Initial					*After*		
Assets		Liabilities			Assets	Liabilities	
Loans	100	Deposits	90		Loans 100	Deposits	90
		Bail-in Secs	8			new equity	8
		Equity	2			old equity	2
Bail-in write-off							
Initial					*After*		
Assets		Liabilities			Assets	Liabilities	
Loans	100	Deposits	90		Loans 100	Deposits	90
		Bail-in Secs	8			Bail-in Secs	0
		Equity	2			Old Equity	10

Objectives of the "Bail-in" regime

The objectives of this security design feature which can be inferred from the Basel 2011 consultation document are:

- to avoid the need for taxpayer bail-outs of failing banks (by "bailing-in" holders of these securities);
- by recapitalising a troubled bank, enabling it to continue operations;
- to facilitate bank supervisors in resolving a troubled bank; and
- enhance market discipline of issuing banks through investor monitoring of bank condition, and resulting price movements of the securities.

In that consultation document (page 11), the Basel Committee also argues that the contingent capital proposal "could significantly level the playing field between small and big banks". The argument appears to be that the market will expect small banks to be allowed to fail without triggering an explicit bail-in, such that such securities issued by small banks will have a cost similar to that of subordinated debt, rather than a bail-in risk premium (a BIRP). Whereas large banks may have previously been able to raise hybrid capital at a lower cost due to market perceptions of public sector support, this cost advantage will no longer exist. However, the inability of smaller banks to issue such securities into public markets means that, to the extent that the cost of such funding is cheaper than common equity funding, they would suffer a competitive disadvantage in meeting total regulatory capital requirements through having to rely on common equity.

While the introduction of "bail-in" requirements for eligibility of non-common-equity instruments as regulatory capital are appealing in theory, there are a number of question marks about whether the approach will work in practice (which are considered later).

Also relevant is the complex nature of the design of these securities which involves "uncertainty" rather than "risk" which can be modelled probabilistically. As a result (as discussed later), there is no solid foundation available for pricing such securities and determining the yield premium which is appropriate for that uncertainty. Markets do, obviously, generate prices for such securities but the uncertainty associated with future outcomes raises the potential of significant fluctuations in price unrelated to "fundamentals". Perhaps even more concerning, these complex securities are, in Australia and elsewhere, being marketed *inter alia* to retail investors who are particularly at risk of not fully understanding the uncertainty involved and what yield premium is warranted.

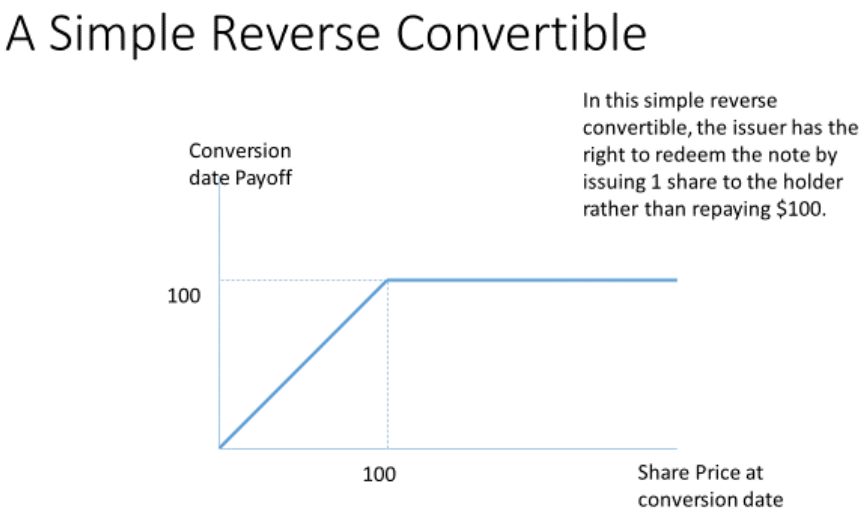
In the following section, more detail is provided on the background to and characteristics of bail-in securities. Then, an overview of the growth of this market both in Australia and elsewhere is provided, demonstrating that these securities have quickly become a significant component of capital markets. That raises the question of the merits of their design (which has been driven by regulation) and the subsequent section argues that their design is unsuitable, both as a bank resolution device and for sale to unsophisticated retail investors. One aspect of that unsuitability relates to the problems in determining an appropriate price for such securities. This raises issues about their (hoped for) role in providing price signals which impose market discipline on banks (or information for regulators) as well as financial consumer protection issues.

Academic Approaches to Bail-In

Underpinning the bail-in securities is the notion of reverse-convertible securities as depicted in the figure below. In such a case, if the issuer is experiencing difficult times, such that its share price is

below the security's strike price, the conversion into equity will improve the issuer's position by essentially writing down the outstanding debt by converting it into a lesser value of equity. Losses are clearly imposed on the holder of the security, to the benefit of the equity holders. This security is replicated by investor buying a risk-free bond and writing a put option (to the bond issuer) over one share at strike of $100. The coupon interest rate on the security incorporates the option premium and hence will be greater than risk free rate. Conversion reduces leverage of the issuer which has less debt and more equity on issue. Could some variant of this be a way to recapitalise troubled banks and prevent their failure?

The academic literature on bail-in securities as a solution to bank recapitalisation and avoiding bail-out commenced with Flannery (SSRN, 1992) who suggested a form of Reverse Convertible Debentures



(RCDs) where conversion (a "bail-in") would be triggered if the market value (or share price) of the bank fell below some specified ratio to the value of bank assets. But, unlike the simple reverse convertible, where bank equity holders gained from conversion and the convertible holders lost, Flannery proposed that conversion be into a value of equity equal to the convertible's face value. Only sufficient of the convertibles would be bailed-in to restore the equity/assets ratio to the specified level. Unless the deficiency of equity/assets was sufficiently large, convertible holders would not lose from the conversion but existing equity holders would be diluted. (If the deficiency was so large that the sum of equity value and convertibles was below the specified level, when all convertibles would need to be converted, holders of convertibles would incur losses).

Flannery argued that bank capital regulations should include a requirement for banks to have on issue some specified amount of RCDs, and that should a conversion (bail-in) occur (to restore the equity/assets ratio) new RCDs would need to be issued to restore the required level of RCDs on

issue. Whether a new issue would be feasible in these circumstances (following a bail-in) is an issue which is also relevant for the, differently designed, bail-in securities of the Basel 3 regime.

Flannery's proposal, being based on stock market prices has had appeal to many academic economists, since option pricing techniques can be applied in valuing and analysing the impact of such securities.[14] The Basel 3 bail-in securities are instead designed using accounting/regulatory data, and thus less amenable to use of such techniques – although many researchers and analysts have assumed specific linkages between those accounting values and market prices enabling them to find ways to apply various models of derivatives.

Bail-In Securities: Evolution and Design

Since the introduction of the Basel 1 capital standards in 1988, a range of hybrid securities issued by banks have been allowed to supplement common equity as regulatory capital, on the grounds that they provided a "gone concern" buffer to absorb losses and protect depositors. The experience of the Global Financial Crisis demonstrated that hybrid securities permitted as part of bank regulatory capital did not effectively fulfil their intended role of loss-absorbency to protect depositors in the event of bank failure.[15] Instead, governments intervened to protect depositors (beyond the levels required by explicit deposit insurance schemes) and ensure the survival of "too big to fail" (TBTF) banks and associated financial sector disruption. These "bail-outs" meant that investors in such hybrid securities were not exposed to losses from default which would otherwise have occurred, and which instead fell upon taxpayers. Looking ahead, perceptions of implicit guarantees by governments being exercised in similar circumstances meant that these forms of regulatory capital would not be likely to absorb losses as required unless specific requirements were put in place to prevent bail-outs, either completely, or without some prior absorption of losses by providers of regulatory capital.

To offset this concern, the Basel 3 standards (BCBS 2011a) now specify that securities other than common equity must meet specified "loss absorbency" requirements if they are to count towards regulatory capital requirements. In essence, a requirement that they should also provide a "going concern" loss absorbing buffer is now required. For securities to classify as Additional Tier 1 (AT1) capital, which is described as "going concern" capital, they must have a mandatory "bail-in"

[14] Flannery (ARFE, 2014) provides a review.

[15] Indeed, even if failure occurred, unless there was legislated depositor preference (seniority) such hybrid securities unless specifically subordinated, would not necessarily provide a buffer to protect depositors. It should be noted, however, that there were some instances in which coupon payments on such securities were suspended thus providing some form of loss absorption. The Covid-19 crisis and calls for banks to suspend dividends has raised questions about how AT1 and Tier 2 securities will perform in the crisis.

requirement. In the original Basel 3 proposals, for securities to qualify as Tier 2 ("gone concern") capital, a bail-in requirement was not necessary, but revisions to the framework in mid 2011 introduced such a requirement. In addition to Basel 3 capital requirements, additional TLAC requirements for G-SIBs can be met by issuance of bail-in securities.[16]

"Bail in" means that if a "trigger", reflecting some measure of financial weakness of the bank involved is hit, some or all of the eligible securities must be converted into equity or written down (partially or fully) thus achieving a recapitalisation of the bank.[17], Depending on the nature and terms of the bail-in, shareholders (via dilution of their interests) and/or investors in the bail-in securities may experience losses (beyond those already incurred from a reduced value of assets).[18] In a write down situation, holders of the bail-in securities bear the loss (although in some cases they may be entitled to recovery of value lost at some later date if the bank returns to good health).

The Basel standards allow for two types of "triggers" which might prompt mandatory bail-in. In the original version of the standards an undefined but "objective" pre-specified trigger was a requirement for those AT1 securities which are classified by accounting standards as liabilities (BCBS, 2011, p11). Such a trigger is a specified minimum risk-weighted CET1 (Common Equity Tier 1) ratio being reached, which is set in a number of jurisdictions at 5.125 per cent.[19] Subsequently (BCBS, 2011) the minimum requirement for both AT1 and Tier 2 securities has been deemed to be inclusion in the contract terms of a "subjective" point of non-viability (PONV) trigger requirement (unless the national laws independently provide the regulator with powers to force a write down). A declaration by the regulator that the bank is at a PONV could be expected to occur at a CET1 ratio above any specified objective trigger (such as 5.125 per cent) unless the ratio had unexpectedly declined below that value prior to the regulator becoming aware of the situation.[20]

Consequently, most AT1 securities will involve both an objective capital ratio trigger and a PONV trigger. For securities to be eligible for inclusion as Tier 2 capital, only the PONV trigger is required.

[16] To reduce systemic risks, the Basel committee issued a TLAC holdings standard in October 2016 requiring investments by banks in bail-in securities issued by G-SIBs or other banks involving deductions from that bank's regulatory capital.
[17] The theoretical academic literature on contingent capital securities surveyed in Flannery (2014) focuses on securities with a stock market price trigger, which is quite distinct from the contingent capital securities issued by banks to meet regulatory capital standards, which have triggers based on accounting ratios or regulatory determinations
[18] The terms may, for example, require that a $100 security converts into greater or less than $100 worth of shares (at current market value) affecting dilution of existing shareholders.
[19] The figure of 5.125 represents the situation where the bank has reached a capital conservation buffer of only 25 per cent of the 2.5 per cent applied on top of a 4.5 per cent CET1 minimum (and at which no distributions are permitted).
[20] That could happen if, for example, a significant proportion of loans were suddenly written down or off as bad debts.

Bail-in of AT1 securities should occur, in principle, prior to any bail-in of Tier 2 securities. Whether all of a class of securities would be bailed-in, or only sufficient of them to achieve some desired CET1 ratio is potentially at the discretion of the regulator (or may be specified contractually).

Other design requirements (which vary slightly between AT1 and Tier 2 instruments) are specified for eligibility. These include such characteristics as: subordination to other liabilities; unsecured status; perpetual for AT1 (but not Tier 2) instruments, with no incentives for redemption, but possibly callable (with regulatory approval and requirement to replace with at least equivalent quality capital) after five years; cancellable dividends/coupons which are not linked to the bank's credit standing, minimum term at issue (five years) before the bank has any option to call (redeem) the securities (and replace with new issues).[21]

National regulators thus have some discretion in the requirements they apply for AT1 and Tier 2 eligibility. Also, issuers can design preference share securities in ways which determine whether they are classed as liabilities under accounting standards or not, and thus whether an objective trigger needs to be specified.[22] Complications also exist for the design of bail-in securities for mutual/cooperative banks where absence of traded equity typically leads (in overseas markets) to inclusion of only a write down, rather than conversion, feature.[23] Similarly, for government owned banks, conversion would involve part privatisation and regulators may face political impediments to "pulling the trigger".

The "Bail-In" Market: Australia and Overseas

Issuance of bail-in securities has been significant globally. Throughout Asia, larger banks (over the equivalent of AUD assets of 30 billion for example) have been significant issuers, with the large Chinese and Japanese banks being substantial issuers. As at February 2017, Chinese banks had made over 80 issues in a range of currencies which at that time had a USD total issue value of USD 182 billion.[24] Japanese banks had made over 40 issues with a February 2017 value of over USD 43 billion

[21] In Australia, many bail-in securities involve a date (often around 8 years after issue) for mandatory conversion into equity (if not called prior, and subject to certain conditions being met). This is generally expected by analysts to lead to banks' exercising the call option (often specified as around 6 years after issue), leading investors and analysts treat the securities as having an expected life of that term.

[22] IAS 32 provides an illustration "If an entity issues preference (preferred) shares that pay a fixed rate of dividend and that have a mandatory redemption feature at a future date, the substance is that they are a contractual obligation to deliver cash and, therefore, should be recognised as a liability. [IAS 32.18(a)] In contrast, preference shares that do not have a fixed maturity, and where the issuer does not have a contractual obligation to make any payment are equity. In this example even though both instruments are legally termed preference shares they have different contractual terms and one is a financial liability while the other is equity."

[23] APRA has previously proposed that "mutual equity interests' could be created by mutuals which would satisfy the bail-in requirement, but the logic and practicality of the concept is far from clear. The Hammond Review considered options for capital instruments for mutual financial institutions.

[24] This has been approximated by using the total value of AT1 and Tier 2 securities which have been issued after January 1, 2012.

while Korean banks had made 47 issues with value of over USD 14 billion. A notable feature of Asian bail-in structures is that the most likely form of bail-in is via write-down of the value of the securities rather than conversion into equity.

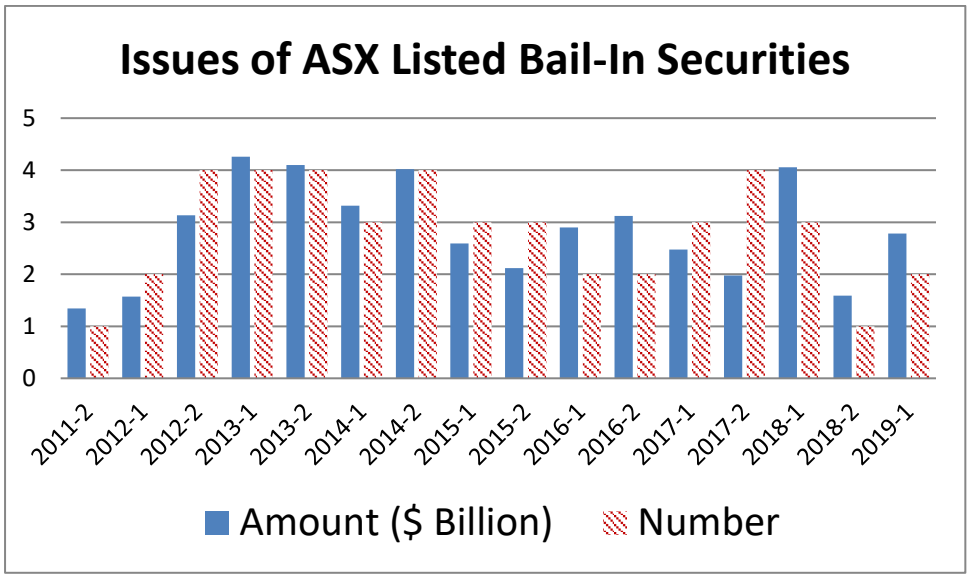
European banks have also been significant issuers of bail-in securities. In the three years to early 2016, European banks had issued over USD 100 billion of AT1 bail-in instruments. Notably US banks have not been issuers of bail-in securities, reflecting the fact that regulators have resolution powers to achieve a similar outcome of allocating losses to subordinated security holders. (The fact that the binding capital constraint is a leverage ratio (based on equity) rather than the Basel risk weighted assets approach which incorporates other non-equity regulatory capital is also relevant).

Figure 6 shows the size and development of the ASX-listed Bail-In Securities market from inception in 2011 to mid 2019. There have generally been between two to four issues per half year by banks and insurers with an average aggregate issue value of about $3 billion per half year, giving a total amount on issue at mid 2017 of around $36 billion. The issues by the major banks have typically been of more than $1 billion each while those of the smaller banks and insurers have been less such that the average issue size has been around $1 billion.

There have also been substantial unlisted issues, of similar order of magnitude, into wholesale markets – mostly being Tier 2 capital instruments (with unfranked distributions). For example, at mid 2017 ANZ Bank had 12 Tier 2, Basel compliant[25], securities on issue in a variety of currencies contributing $6.3 billion of regulatory capital. It had 6 AT1 instruments contributing $7.1 billion of regulatory capital.

[25] Some additional older Tier 2 instruments without bail-in features are counted towards regulatory capital via grandfathering over a transition period until they are no longer eligible.

FIGURE 6: BAIL-IN ISSUANCE IN AUSTRALIA



All Australian domestic listed issues to date have been floating rate securities (with quarterly or semi-annual resets) typically paying a franked coupon amount of (BBSW + margin)*(1-t) where t is the corporate tax rate. (For example, if BBSW = 4.00 per cent, the margin is 1.5 per cent, and the corporate tax rate is 0.3, the cash distribution rate would be 3.85 per cent p.a. on the face value amount, and the investor would receive imputed income and tax credits of 1.65 per cent).[26] Foreign investors, who are unable to use the tax credits are thus generally not participants in this market.

While most of the ASX listed securities are perpetual, but with a mandatory conversion date (subject to the bank meeting some specified conditions) it is conventional wisdom that the issuer will exercise its option to redeem the securities at face value at a specified date typically around six years after issue. Consequently, most analysts treat them as if they are a floating rate security with a fixed maturity date which is subject to a bail-in risk.

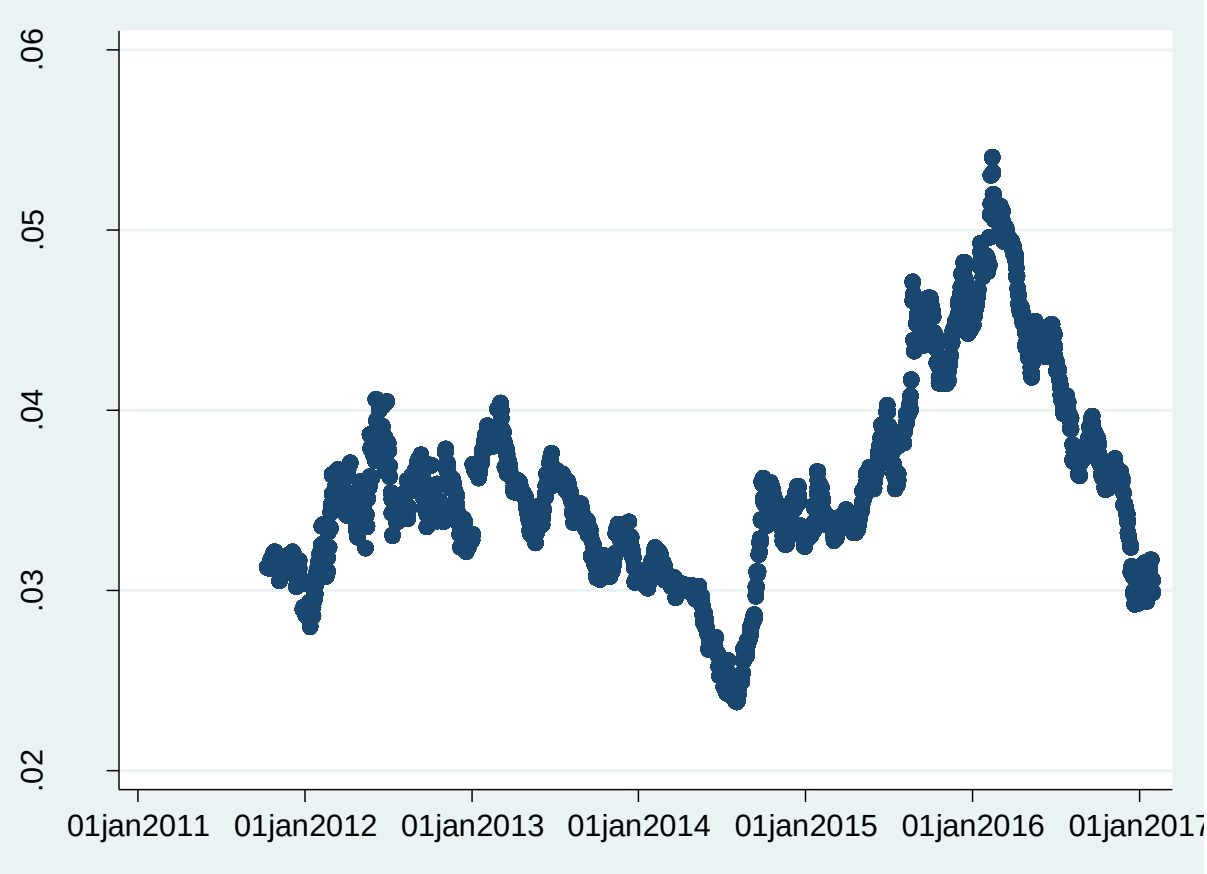
The nature of bail-in conversion is generally that a $100 security will convert into $100 of common equity with the number of shares received given by $100/$S_T$ where S_T is the VWAP share price over the five days before the bail-in.[27] Of course, the announcement of a bail-in can be expected to lead to a share price decline to (probably well) below the VWAP, such that the current market value of shares received will be less than $100.

The ASX-listed bail-in securities have been popular with retail investors, and many issues have been oversubscribed. On average between 50-60 per cent of the issue has been purchased by investors

[26] There are some cases where the distribution is partially franked or unfranked, implying a different tax adjustment factor.
[27] There is also generally a condition that if the current share price is less than 20 per cent of the issue date share price, there is a maximum number of shares received.

subscribing less than $500,000. In many cases, the banks have restricted the issue to existing security holders, other than the component which has been allocated to stock-brokers for offerings to clients. The issue margin (over BBSW) has been determined by a book-build process for an amount offered to institutional investors and issue margins have varied substantially since 2011 when these securities were first issued. For the first few years, issue margins for the major banks were in the order of 3 – 3.5 per cent (but higher for smaller banks). In 2016, they spiked to around 5 per cent, but recent issues in 2017 have had margins of around 4 per cent. (These figures are the "grossed-up" margins inclusive of franking credits, which correspond to the "margin" specified in the issue documentation for the coupon payment. For domestic investors who can use franking credits, this figure is thus directly comparable to unfranked interest payments on other securities).

FIGURE 7: AVERAGE MARGIN ON ASX LISTED BAIL-IN SECURITIES



Secondary market trading (where dollar prices are generally converted by analysts into a "trade margin to call date")[28] has been at yields which have varied in a similar fashion. Figure 7 illustrates. This raises the question of what factors have been driving the pricing of these securities over time,

[28] If, for example, a security with a margin over BBSW of "m"(which was fixed at issued date) sells for a price of P, the trade margin is essentially found by calculating the value "tm" such that P is the present value of future cash flows when discounted by (BBSW+tm).

and whether the fluctuations (and cross-sectional differences in yields between different banks) are indicative of changing perceptions of bail-in, or other risks. From the perspective of bank management, the important question is the relative cost of funding of bail-in versus other forms of funding and the appropriate use of bail-in securities in meeting capital requirements. Before considering these questions, the following section addresses the problem of how the design of bail-in securities creates significant complexities for determining their value and whether the design is suited for achieving the objectives driving their introduction.

Deficiencies of Bail-In Securities

Even without the bail-in conditions, the design of bail-in securities issued to date is complex such that risks and value are hard to assess.[29] Assessing the impact of the bail-in conditions is extremely complicated because they involve substantial uncertainty over and above the type of stochastic risks that financial engineers typically model and work with. The uncertainty involved is that it is not feasible to realistically estimate either the probability of bail-in occurring at some future date nor the consequences of a bail-in on the value of the investor's position.

Assessing the probability of bail-in is stymied by the specification of the bail-in triggers. The CET1 ratio trigger depends upon accounting data which is publicly available at best on a quarterly basis with a lag of 6-7 weeks. The PONV trigger creates even greater problems since regulators have given no guidance on what situation would be likely to lead to making such a declaration. In both cases, it is uncertain what proportion of which bail-in securities on issue would be bailed-in.

Assessing the likely loss which would be incurred by investors if a bail-in occurs is also problematic, because the announcement of a bail-in could be expected to precipitate a significant decline in the bank share price and thus the value of shares received under the bail in. While, for example, a $100 bail-in security might convert to $100 worth of shares valued at the average share price of the previous 5 days, the "bad news" of the bail-in would undoubtedly mean that their subsequent market value would be much less.

Hence, valuation of such securities is hindered by the significant "uncertainties" or "unknowns" involved regarding future outcomes. These uncertainties are not like probabilistic risks which are amenable to financial valuation techniques. There is something anomalous about regulators giving banks incentives to issue very complex securities, and allowing them to be issued to unsophisticated

[29] Features of bail-in securities can be found in the regulatory capital instruments disclosures made by banks, such as is found here for ANZ Bank.

retail investors, a point emphasised in comments to the AFR by the then ASIC Chief Commissioner Greg Medcraft.

A more general issue is whether such securities will, when put to the test, achieve the outcomes desired. One such issue is the willingness of governments to permit bail-in when the effect would be to impose significant losses on retail investors (such as self managed super funds in Australia).[30] But also particularly relevant are the likely consequences from "pulling the bail-in trigger". This is likely to destroy market confidence, creating a "run" on the bank, even though it has been recapitalised. Thus, the objective of ensuring an orderly resolution process which enables the bank's essential operations to continue or be transferred to another entity would be threatened. Either a blanket government guarantee would be required, or it would be necessary to effect an immediate sale of the troubled bank to a healthy competitor. The latter outcome occurred in the only instance of a significant bail-in to date, where the Spanish regulator bailed in investors in Banco Populare in 2017 and simultaneously sold the bank to Santander for a nominal sum (one Euro).[31] In Russia, the Central Bank in its rescue (taking 75 per cent ownership) of the fourth largest bank, Otkritie Bank, in August 2017 "chose not to use a recently established mechanism to "bail in" other creditors" (The Economist, September 2, 2017, p58). One explanation for that may be that the events prompting the rescue were the beginnings of a run of depositors (18 per cent had been withdrawn in June and July) which a bail in would be unlikely to mitigate.

While bail-in securities might have significant potential hurdles involved in their fulfilling desired outcomes in dealing with a troubled bank, their existence might generate a new form of market discipline by introducing a new set of stakeholders exposed to significant potential losses. Thus it is worth examining the determinants of prices of bail-in securities, how the required returns of investors are related to those on other funding sources for banks, and thus whether movements in these prices can provide a form of market discipline.

Bail-In Securities Pricing, bank capital management and market discipline

[30] One complication in Australia is that AT1 bail-in securities have generally been bought by retail investors while Tier 2 securities have been bought by wholesale and overseas investors. The priority ranking implies that AT1 securities should be bailed in prior to Tier2, which could be expected to lead to significant political issues.

[31] Bank of Portugal wrote down 5 tranches (EUR 1.94 billion) of Novo Banco senior bonds (out of 52 senior bonds) on Dec 29, 2015. Instructed notes be moved to lender's bad bank predecessor Espirito Santo (BES) before it is wound up. Was only bonds originally issued to institutional investors, but retail investors had bought in secondary market. BES was restructured in mid 2014 and Novo Banco was bridge bank with BES's surviving assets and liabilities. (Novo Banco must be sold within two years of its creation). (IFLR, Jan 14, 2016)

Figure 7 illustrated the significant variation in bail-in security traded margins since they were first issued in 2011 (where the traded margin is the spread over the bank bill swap rate which generates a discount rate that makes the present value of future cash flows until the first call date equal to the traded price).

Those margins give a coupon yield which is significantly above the yield to maturity on senior debt securities issued by the major banks, and the fluctuations over time are not explained by changes in yields on such debt securities. Figure 8 illustrates[32] and suggests that bail-in securities of the major banks have had a yield in general in the order of 200 - 400 basis points over senior debt.

In considering bank capital management, the question is what factors would lead to a bank preferring to issue a bail-in security rather than senior debt or equity? The attraction over senior debt is two-fold. First, bail-in securities are included in regulatory capital whereas senior debt is not, and this may offset the higher cost of funds using the former. Second, however, the spread shown in Figure 8 compares the "grossed up" yield (cash plus franking credits) of bail-in securities with the cash yield of senior debt, which is the appropriate comparison for Australian investors. However, for the bank, the cash component of the bail-in margin could be as much as 200 basis points below the grossed up yield, making the spread substantially less when considered in "cash terms". For the bank, the question then becomes whether the distribution of the franking credits is a cost to it. If the bank has surplus franking credits which it is unlikely to be able to distributed so shareholders with dividends, there may be relatively little perceived cost.

In practice, the relevant comparison is not just between AT1 instruments and senior debt, because the bank can also issue Tier 2 instruments. These have generally been issued into international wholesale markets in a range of currencies and have paid unfranked distributions. For the major banks, the amounts of Tier 2 and AT1 bail-in securities issued are of similar magnitudes. Direct comparison of relative costs is complicated by differences in call dates and issue dates and other features.

However, to illustrate relativities, ANZ Bank issued in June 2014 AUD 750 million of Subordinated Notes due in 2024 with a call date in June 2019 with a coupon of BBSW90 +1.93. In March 2014 it issued AUD 1.61 billion of AT1 securities (ASX code ANZPE) with a call date in March 2022 with a grossed up coupon of BBSW180 + 3.25. At that time, BBSW was around 2.70 per cent, which meant that the cash component of the AT1 security distribution was around 150 basis points above BBSW,

[32] It is very much an approximation since: (a) it is not possible to get exactly equal senior debt maturity dates and bail-in call dates; (b) it reflects spreads for differing maturities since the time to maturity of the securities involved is decreasing over time; and (c) it compares the bail-in margins over BBSW with the senior debt margins over government securities.

making it cheaper in "cash" terms than the Tier 2 security with a cash margin over BBSW of 193 basis points. Provided that the bank had unused franking credits which would otherwise be "wasted" by not being distributed with share dividends, the availability of those franking credits enabled the bank to raise AT1 capital cheaper (in cash obligation terms) than Tier 2 capital – despite the latter having greater seniority.

The other element of the capital management decision which the bank needs to make is the comparison of the cost of AT1 and Tier 2 regulatory capital. While each bank will have a specific view on the required return of bank shareholders, a ballpark estimate might be calculated in the following way. If the bank has a CAPM beta of unity, then the required return in excess of the risk free rate (r_f) will be the market risk premium (MRP). If it is assumed that the MRP is 6 per cent p.a. in grossed up terms (ie including franking credits) then each $1 of new equity raised will require the bank to be able to generate pre-company tax earnings of (r_f + 6) per cent to meet shareholder expectations. If instead AT1 capital can be raised paying (say) a grossed up dividend of (r_f + 4) per cent, then that is a cheaper form of regulatory capital.

There are, of course, a range of other considerations which will be taken into account by the bank in making this capital structure decision, but consistent with the illustrative numbers used above, banks do appear to regard bail-in securities as a cheaper form of regulatory capital than common equity. Given that they are more senior in the capital structure, this is hardly unexpected, but it does raise a question about the Basel Committee's contention that their inclusion as regulatory capital will help level the playing field between small and big banks. If both have to meet the same overall minimum capital requirement, but only larger banks are able to issue bail-in securities (due to scale of offerings required in public markets) then they have a funding cost advantage because of that.

Another contention of the Basel Committee is that the existence of bail-in securities will enhance market discipline, through monitoring by investors and consequent price signals. However, for that to occur there are several conditions needed – neither of which would appear to be met. First, investors need to be able to value these securities, however as argued earlier the securities are characterised by "uncertainty" rather than "risk" making risk-based modelling problematic. While analysts and investors may apply risk based models, the absence of any firm foundation for determining "fundamental values" means that prices may not provide useful signals of bank risk. This is perhaps likely to be more relevant to the time series of bail-in margins, which has displayed significant unexplained variability, rather than the cross-section of differences in bank margins where pricing may be done on a "relative" basis of benchmarking bail-in securities against each other. The second problem is that in general, despite the Basel 3 capital and risk disclosures, investors (in Australia at least) still have very limited real-time information on bank conditions to

enable confident valuations. In any event, the question which needs to be asked is whether allowing use of bail-in securities to meet regulatory capital requirements increases the quantity and quality of market discipline relative to the alternative of only allowing equity as regulatory capital.

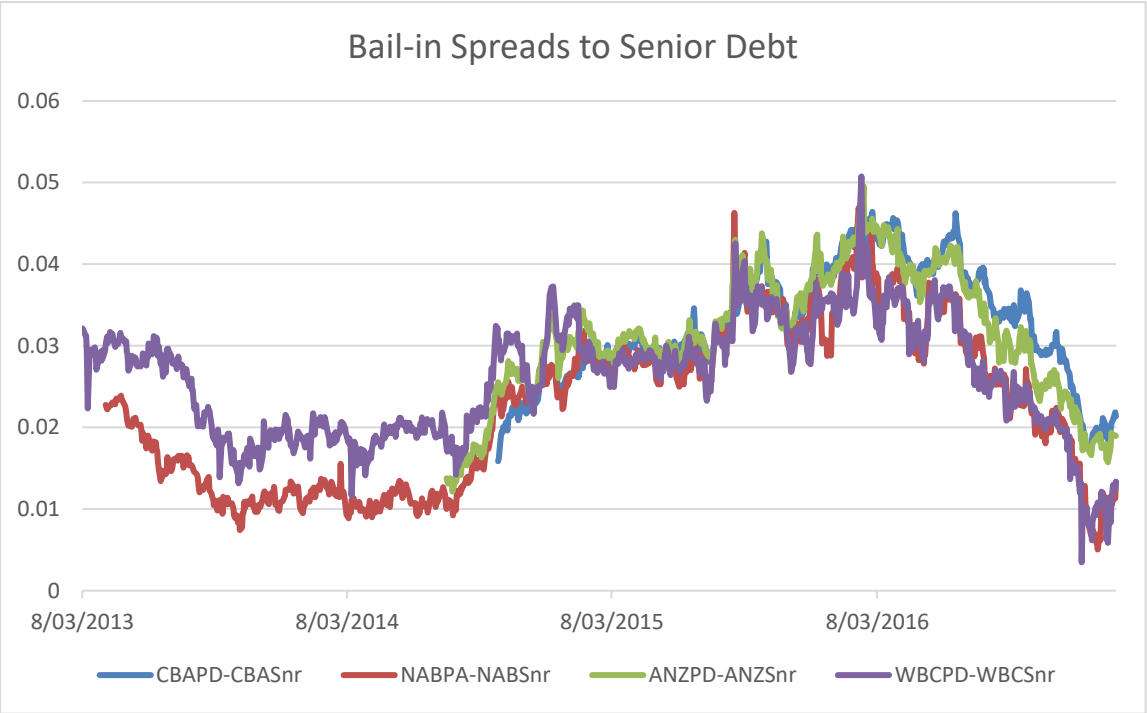


FIGURE 8: MAJOR BANK COMPARATIVE YIELDS