4. The Basics of Banking

Contents

4.1 Introduction

Banks are traditionally depicted as financial institutions which take at-call and term deposits (of up to several years) and make loans of a longer duration. They also provide various services to customers such as payments services and loan commitments (which allow the customer to borrow funds at some future date(s)). To manage the risks associated with these activities they hold cash and marketable securities (to be able to meet *liquidity risk* of net cash outflows from customer decisions) and have equity funds provided by shareholders (to absorb *credit risk* of losses such as from loan defaults, and other losses).

Larger banks also provide services to other smaller banks and financial institutions and to foreign banks. In some countries, at some times, banks have been precluded from undertaking investment

bank activities such as underwriting issues of securities by corporate entities. The Glass-Steagall Act in the USA (which was repealed in in 1999) enforced this from the 1930s. In Australia, as in European countries, "Universal banking" (allowing both commercial and investment banking activities in the one organisation) has been the norm

Some smaller banks may not have direct access to the payments network and will (for a fee) obtain access via a larger bank's systems. (There are also specialist organisations, such as CUSCAL which have ESAs, are linked into the payments system, and provide access for Credit Unions). Non-bank financial institutions (NBFIs) which do not have accounts at the Central Bank (Exchange Settlement Accounts at the RBA) will have deposit accounts at banks which act as their liquid reserves and into which they transfer funds received from customers, and draw upon to pay customers.

There is an important consequence arising from this use of bank deposits as liquid assets by NBFIs. If a customer decides to withdraw funds from a bank to place it with a non-bank financial intermediary (perhaps in response to an offer of a better interest rate), the banking system will not have a reduction in total deposits. Ownership of bank deposits will change and, if the NBFI banks with a different bank to the customer originating the transaction, one bank will lose and the other gain deposits (with settlement between the two banks occurring by way of credits and debits to their ESA accounts.

Services are also provided to foreign banks via *correspondent banking* services. US banks will, for example, have an AUD deposit account at an Australian bank. If a customer of the US bank receives (or needs to make) a payment in AUD, the US bank will credit (or debit) the customer's USD bank account (with the USD amount based on the prevailing exchange rate). In turn, it will deposit the AUD funds received from (or withdraw the AUD funds required by) the customer as transactions on its AUD account with the Australian correspondent bank. (The precise details of how this is done obviously depend on the way the payments occur – such as by way of cheque or wire transfer etc., as discussed in Chapter 14).

While much of the focus on banks involves their funding by way of deposits, they will often also use debt funding by issuing bonds (debentures, notes) to investors.

"Debenture" is a legal term for debt instruments which may alternatively be called "bonds" or "notes". (More information is at MoneySmart and in ASIC's Regulatory Guide 69). Their key characteristic is that they are a promise to repay the capital invested plus a specified interest on certain dates. They may be secured against particular assets of the issuer, or unsecured. The issuer is required to issue a prospectus to make an issue of debentures of (up to) some specified amount over some specified time. The investor (generally) has no right to claim early repayment unless an act of default has occurred, but can sell the debenture to other investors in the secondary market (if there is one).

In contrast, bank deposits do not require issue of a prospectus (and are available to investors "on tap"), must be unsecured, may be redeemed by the investor on demand (for at-call deposits), may allow for the bank to change the interest rate on offer at future dates, and cannot (except for negotiable certificates of deposit) be sold to other investors. In general, banks are not allowed to raise money by issue of secured debentures (the exceptions being via issue of covered bonds or repurchase agreements). "Basic banking products" (ie deposits) also escape the legislation on requirements for financial advice applicable to debentures and other financial products.

Should a bank become insolvent, the priority in recovery of funds of its debenture holders and depositors will depend upon the laws of the country, and generally deposits of up to some specified value will be guaranteed by a government run deposit insurance scheme. In Australia, deposits of up to $250,000 per depositor are guaranteed under the Financial Claims Scheme and deposits that are uninsured have priority over debentures in claim on the bank's remaining assets (if any). In some jurisdictions, deposits and debentures have equal standing.

One feature of debenture issues by non-bank companies is that they will generally involve the use of "covenants" aimed at protecting the investors. These may require the company to either do certain things (such as maintaining a debt/equity or interest coverage ratio below some specified number) or not do certain things (such as issuing higher ranking debentures). Due to the nature of banking, such covenants would unreasonably restrict the normal business of banking, and thus there are generally few covenants attached to bank debenture issues.

Modern banks do much more than take deposits and make loans, but it is useful to start with a simplified model of a bank before moving on to consider the additional complexities created by other activities. In such a model, there are two main components. One is the balance sheet position, reflecting the various financial claims held by the bank (as well as other assets such as physical premises) and claims (of depositors, creditors, shareholders etc) on it. (There are also typically significant Off-Balance-Sheet (OBS) items, described in notes to the accounts, reflecting other contracts with customers involving rights and obligations about future possible transactions between the parties or positions in derivatives). Table 1 provides a highly simplified example (to be expanded upon later).

TABLE 1: A SIMPLIFIED BANK BALANCE SHEET

Assets (A)	Liabilities (L)

Cash	C	D	Deposits
Securities	S	B	Debt
Loans	L	E	Equity

The balance sheet is a stock (point in time) depiction of the bank and focuses upon the bank as a portfolio of assets and liabilities – and prompts analyses from that perspective.

The other component is the income statement showing sources of income and expenses and the profit/loss arising over a specified period. Table 2 provides a simplified example, together with definitions of some commonly used metrics. (Note that in the financial accounts for Australian banks, the information is generally presented in one column showing first income, then expenditure, then profit). This is a flow (per period) depiction of the bank as an operational entity – and prompts analyses from that perspective.

TABLE 2: SIMPLIFIED BANK INCOME EXPENDITURE STATEMENT

Income		Expenditure	
Interest Income	II	Interest Expense	IE
Non-Interest Income	NonII	Operating Costs	OC
(fees, trading income)		(wages, rent, inputs, depreciation)	
		Credit Impairment Charge	CIC
		Income Tax Expense	T
Profit after tax	π		

Net Interest Income (NII) = Interest Income (II) – Interest Expense (IE)

Return on Assets (ROA) = (Profit after tax)/Total Assets

Return on Equity (ROE) = (Profit after tax)/Equity

Cost/Income Ratio = OC/(NII + NonII)

The two components are interrelated such that neither is sufficient for a full understanding of banking activities, performance, and resulting risks. And, of course, the real world is more complicated than depicted in these simple examples. One complication arises from the legal structures of banks to which we now turn. Another arises from the internal organisational structures involving a number of business units whose activities are aggregated together to derive the overall bank balance sheet and income statement. This is considered subsequently.

4.2 Bank Legal Structures

An important distinction to be aware of is that between branches and subsidiaries. Banks can operate in many different geographical locations (including in other jurisdictions). A branch is generally thought of as a physical premise in some location, but it has no separate legal identity from the bank itself. A customer may operate a deposit or be granted a loan through a particular branch – but the legal contracts and obligations are with the bank, not the branch. The branch is simply part of the way in which the bank organises itself to best interact with customers. Internally the bank may operate a set of management accounts for all branches to track their performance, but they are purely an internal management tool. Larger banks will also structure their activities by dividing them across particular business units – such as retail, business, corporate, and institutional, and will include information on the performance of those business units in their financial reporting. Physical branches, which deal mainly with retail and small business customers, are likely to come under the responsibility of the retail business unit. Branches in offshore locations sometimes may involve not much more than a name-plate on a building and minimal staff (but in other cases are heavily engaged in international financial markets), and will generally come under responsibility of a wholesale or institutional business unit.

A subsidiary is a separate legal entity. The parent holds all (or a controlling share) of the equity of the subsidiary and thus exerts control over the subsidiary's activities by appointing directors and management. The subsidiary will be required by law to produce its own set of accounts, and customer transactions are legally with the subsidiary, rather than the parent (although the latter my guarantee some such transactions). The amount of equity invested by the parent in a subsidiary may be quite small, but not always. Customers of a subsidiary may look at its equity capitalisation (equivalently the excess of its assets over liabilities to customers) to assess the risk of dealing with it – knowing that the parent could simply "walk away" from a failing business and let it be liquidated. More significantly, if the subsidiary is a bank operating in another jurisdiction, it is likely that the host regulator will demand maintenance of some minimum level of equity capitalisation to protect depositors with that bank. The New Zealand regulator (RBNZ) has required that the Australian banks operate their main New Zealand activities by way of separately capitalised subsidiaries such that there is a dedicated equity buffer to absorb losses and protect New Zealand depositors against a bank failure.

It is also important to note that a "bank" will often itself be part of a corporate group. It might be owned by a holding company (common in the USA), which is often a non-operating holding company (NOHC). There has been an ongoing shift in the USA towards bank holding companies (BHC) having an important range of non-bank subsidiaries, such that focusing on BHC's does not necessarily provide good insights into "traditional banking" activities – but does reflect the increasing financial complexity

of financial conglomerates. In the UK and the EU that increasing complexity has been accompanied by recommendations (the Vickers Report in the UK (implemented in 2019) and the Liikanen Report in EU) for "ring-fencing" of retail banking from other activities. In the USA, the Volcker rule (part of the Dodd-Frank Act) aims to achieve a similar purpose of reducing risk spill-overs from what some have called "casino" (investment) banking to "utility" (commercial) banking by prohibiting banks from proprietary trading and restricting their investments in hedge funds and private equity. Correa et al examine whether there have been changes in the risk profiles of large US BHCs as a result and find that while organisational complexity has reduced somewhat, some types of risk have increased relative to years prior to the GFC.

"Ring Fencing" requires banks to adopt a form of holding company structure in which payments services, and retail lending and deposit taking are conducted in a subsidiary which is not allowed to engage in "excluded activities" such as investment and international banking. These must be conducted in different subsidiaries. Limits on transactions between the subsidiaries are required to limit spillover of risks.

Proprietary Trading is where a bank has a dedicated trading desk which enters transactions in forex, interest rate, commodities markets etc with the intention of making profits for the bank from such trading. A problem in clearly identifying "prop" trading is where a bank may acquire a large exposure position (such as in forex) from providing a hedge to a client, and then wishes to remove that exposure by dealing with other banks in the market.

A stylised illustration of a typical US Bank Holding Company (BHC) structure is shown in the figure below taken from an article by Avraham et al, which also explains the historical evolution of that model.[1] Following the Gramm-Leach-Bliley Act in 1999, many BHCs registered as Financial Holding Companies which enables a broader range of financial activities – although strict limits still exist on investments in non-financial companies. While the Federal Reserve has supervisory responsibility for holding companies, bank regulation and that of non-bank financial activities may be undertaken by a range of other entities. Stackhouse provides a discussion of reasons, such as restrictions on types of equity issues following the Dodd-Frank Act, why a holding company structure has become less desirable for some mid-sized US organisations, although there still remain benefits.

[1] The items in brackets in the figure refer to the financial reports required by regulators). See also the short article by N Cetorelli and S Stern for more information on historical evolution of BHCs.

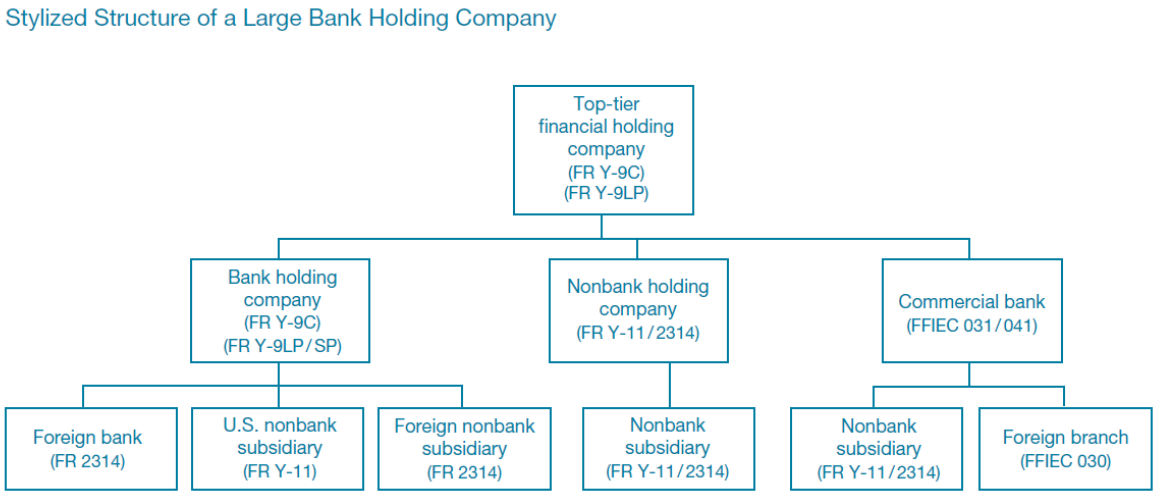


FIGURE 1: ILLUSTRATIVE US BANK HOLDING COMPANY STRUCTURE

4.3 Australian Bank Structures

An alternative structure is that the bank is the parent company of the group (typical in Australia) with a range of subsidiaries undertaking other types of financial business or undertaking banking business in other jurisdictions (although that can also be done via branches).

This leads to a distinction between "Level 1" (the Australian bank business plus overseas branch activities), "Level 2" (also including banking subsidiaries) and "Level 3" (including other subsidiaries' activities) definitions of a bank for regulatory purposes, as shown in Figure 2 for CBA. (Note that since the date of that figure, CBA (and other major banks) have undergone programs of divestments of entities shown).

NOHC structures are found in Australia for Macquarie (see Figure 3), Suncorp and AMP – each of which has other significant non-banking financial activities. Whereas equity capital is issued by the parent bank in other cases (and some of it disallowed by APRA in the calculation for regulatory purposes as being invested in other non-level 2 activities) the NOHC's issue equity capital and allocate some of it to the bank subsidiary. They may also issue debt and on-lend it to the bank subsidiary, or the latter could borrow in its own name.[2]

Macquarie converted its structure to a NOHC structure in November 2007. In the explanatory memorandum it noted that under the previous structure, where the parent company was a bank, many of the APRA regulations applicable to banks constrained its freedom to engage in some non-banking activities. The NOHC (MGL, which is the entity listed on the ASX) would still be subject to some

[2] In mid 2019, APRA raised a problem requiring rectification for the NOHCs operating in Australia in that the loans provided to the bank subsidiaries had conditions attached providing for recall with less than 30 days notice which meant those loans could not be counted as stable funding for the purposes of meeting the Liquidity Coverage Ratio.

APRA regulation (such as capital requirements), but by locating non-banking activities in a separate subsidiary to the bank (MBL), these would not be subject to APRA's banking prudential standards. Many services (Treasury, HR, IT, Risk Management etc) are provided at the group level via an operating company subsidiary of the NOHC. While some amounts of non-banking activities (funds management, real estate, commodities) were retained as subsidiaries of the bank (MBL) these were not included for APRA regulatory purposes at the level 2 bank definition and similar activities are also undertaken within the non-banking subsidiary.

Foreign banks can enter the Australian market in either branch or subsidiary form. However if they operate as a branch they are essentially excluded from operating as retail deposit takers. This is because legislation requires that depositors must make an initial deposit of at least $250,000. This does not preclude them from engaging in retail lending activities such as home mortgage lending.
At the start of 2021, Foreign subsidiary banks were: Arab Bank Australia Limited; Bank of China (Australia) Limited; Bank of Sydney Ltd; Citigroup Pty Limited; SBC Bank Australia Limited; ING Bank (Australia) Limited (trading as ING); Rabobank Australia Limited

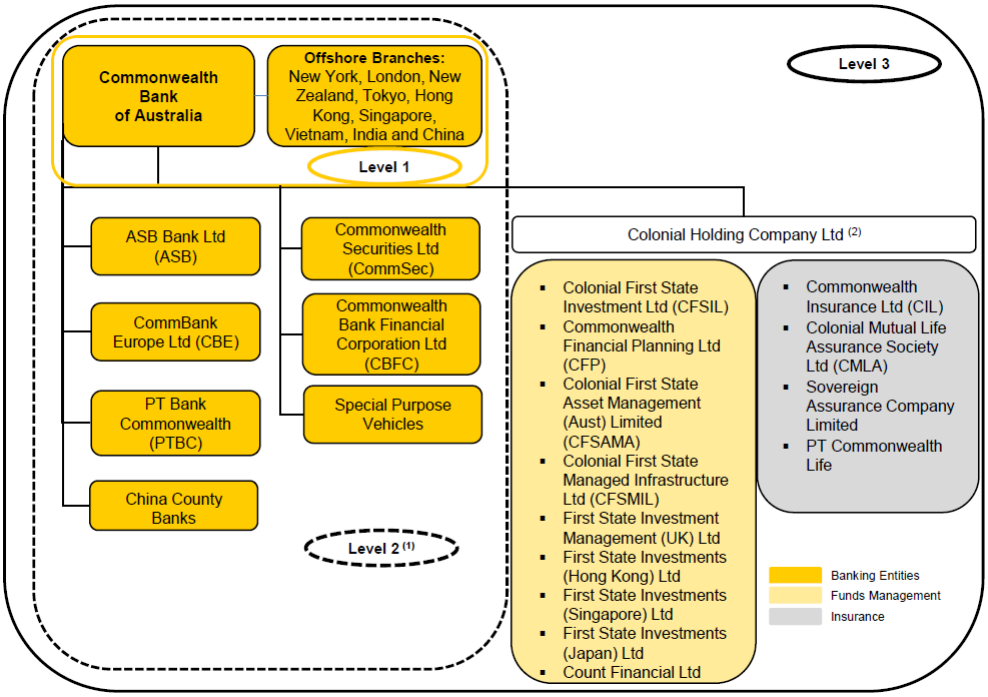


FIGURE 2: CBA GROUP STRUCTURE

SOURCE, PILLAR 3 REGULATORY DISCLOSURE AT JUNE 2016

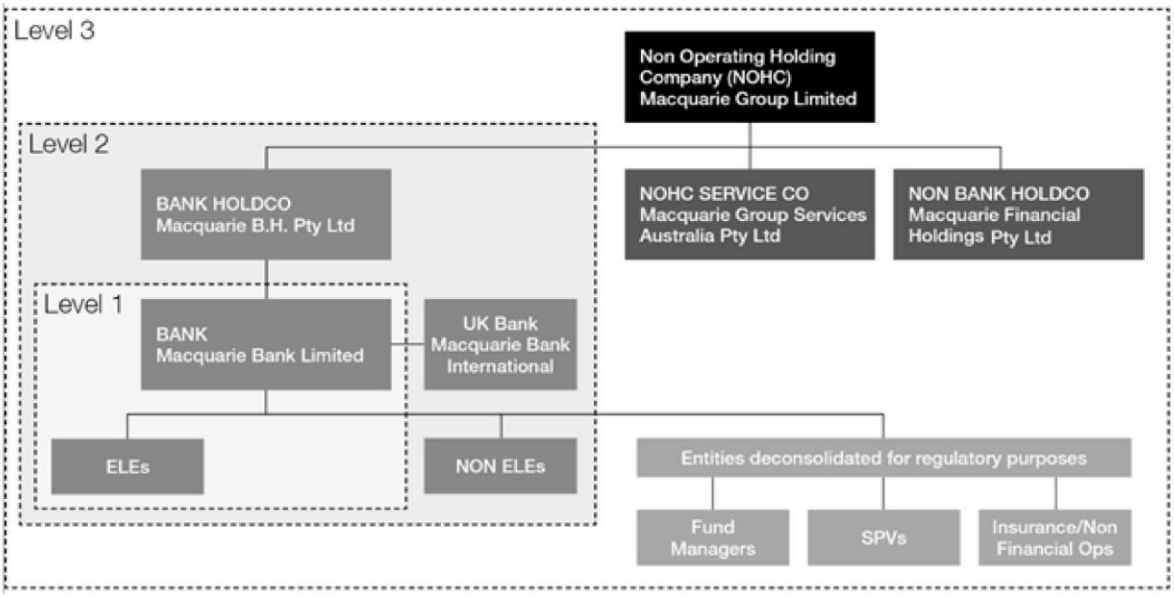


FIGURE 3:MACQUARIE GROUP STRUCTURE: SEPTEMBER 2016:

SOURCE - BASEL 3 REGULATORY DISCLOSURE

Bank Structure & Account Consolidation – Which figures?

Because banks undertake non-banking activities via (generally fully-owned) subsidiaries, an obvious question arises of which set of accounts should be looked at? Australian banks will present financial statements for the "Consolidated Group", which corresponds to the "Level 3" framework outlined above and thus incorporates some non-banking activities. Some will also present financial statements for the "Bank" (CBA) or "Parent" (WBC) or "Company" (NAB) which corresponds to the "Level 1" framework, incorporating Australian (and overseas branch) banking operations. (Those that don't present that information in their audited financial statements will, however, provide information on the performance of the banking businesses in the notes to the accounts and other disclosures). Operations of overseas subsidiaries (such as in New Zealand) will be included in the Group, but not the "Bank" figures. The "Group" figures thus involve the consolidation of accounts for the "Bank" and its subsidiaries (and the practice of accounting consolidation is not necessarily a simple one!)

Banking analysts with a focus on the bank share price will tend to focus on the consolidated accounts for the group – since this reflects all the activities of the bank and its subsidiaries which contribute to the profit of the listed entity. At the same time, figures presented for the "Bank" (level 1) are also of interest, giving some information on the banking activities – although some banking activities are conducted in subsidiaries which are part of the "level 2" grouping. Moreover, since bank regulatory requirements are based primarily on the "level 2" grouping, these also need to be considered.

So, level 1 financial statement data will correspond to "The Bank" financial statements in the annual accounts (including transactions between the bank and subsidiaries). Thus, "The Bank" financial statement data will incorporate such things as customer deposits and loans at the offshore branches. The Consolidated financial statements will incorporate all Level 3 entities – where control applies,[3] and it is this Level 3 data which is relevant for determination of the banking group share price on the ASX.

Unfortunately, the Level 1 balance sheet data, because it includes offshore branch positions, does not provide information about an important aspect of the bank's financial condition. Under the Banking Act (Section 13A, (4)), Australian incorporated banks (including subsidiaries of overseas banks operating in Australia) are required to maintain domestic assets greater than domestic deposit liabilities (ie items "booked" in Australia with either residents or foreigners). These correspond to the figures shown in APRA's *Monthly Authorised Deposit-taking Institution Statistics* (MADIS)– but only a subset of information is provided there. (Aggregated data is provided in *Quarterly authorised deposit-taking institution performance statistics* (QADIS)). In theory, a bank (Level 1) could have assets greater than liabilities, but not meet the domestic assets/liabilities requirement if, for example, the foreign branches had made many more loans than deposits they had raised. (The reason it matters is that the contracts of the foreign branch with its customers would be dealt with under the legal system of the foreign jurisdiction if the bank failed, complicating resolution of the bank and availability of the bank's remaining assets to repay domestic depositors). Unfortunately, the regulator (APRA) is unwilling to provide full disclosure of bank financial statements provided to it monthly as part of its data collection.

In terms of regulation, APRA (and supervisors elsewhere) apply capital and other requirements at all of the level 1, 2, and 3 frameworks. The capital adequacy standard (APS110) applies at both a level 1 and level 2 basis, and banks generally report the level 2 figure (which corresponds to total banking activities whether by branch or subsidiary) in their briefings and disclosures. At the level 3, conglomerate level, APRA applies certain prudential standards regarding governance and risk management to eight groups (the four majors, Macquarie, Suncorp, AMP, and Challenger). APRA has not implemented specific conglomerate capital requirements as at early 2021 (although having signalled several years prior that it was looking at this issue). For the four majors, designation as a Domestically Systemically Important Bank (D-SIB) with additional capital charges can, to some extent, be regarded as an alternative.

[3] It is important in using international databases such as Moody's (Bureau van Dyke) BankFocus (previously known as BankScope prior to 2017) to be careful as to whether consolidated data for the group or bank-level data is being used.

It is worth noting that many (but not all) of the misconduct problems for the banks exposed by the Hayne Royal Commission related to activities conducted by entities outside of the level 2 framework (but part of level 3). These include financial advice, insurance, wealth management.

Australian Bank Business Unit Structures

A further dimension of the complexity of bank operations lies in the ways in which they structure themselves into separate business units. Table 3 shows the structures of the five largest Australian banking groups as shown in their 2018 Annual Reports. Over the years the banks have experimented with a variety of structures (influenced by various consulting firms) involving different groupings by way of products, customers, geography. Within each business unit there will be risk officers responsible for risks emanating from that unit's activities, in addition to risk officers at higher levels in the organisation overseeing overall specific types of risks arising from the various divisions. An important component of overall bank management is the way in which delegation of pricing and risk management responsibilities occurs to business unit managers, as well as performance evaluation of the business units (and their sub-units and by products). Internal funds management transfer pricing practices and divisional capital allocation and risk assessment are crucial in this regard.

Putting Macquarie to one side (because of its NOHC structure and relative importance of non-banking business), all have retail/consumer business units and New Zealand operations, but vary slightly in terms of how they separate corporate, institutional and business banking and wealth management and international (non-NZ) activities. For ANZ, for example, an "Australian" business unit combines retail, corporate and commercial activities whereas Westpac has separate "Consumer" and "Business" units (but in March 2021 announced that it was combining them). Typically, the Head Office/Corporate Functions is a cost centre, relying on charges made to other business units (although treasury trading income is also relevant in some cases). Mortgages provide the largest contribution to profits for the four majors, with some part of that activity located in business banking – in addition to personal/retail banking.

Each of the banks will present financial statement information for each of its business units in annual reporting and presentations to analysts. The way in which these figures are derived depend upon managerial accounting methods such as funds transfer pricing, activity based costing, and economic capital allocation which are considered later.

TABLE 3:AUSTRALIAN BANK BUSINESS UNIT STRUCTURES

	CBA	NAB	WBC	Macquarie
Head Office/ Corporate Functions				
Corporate Centre, Digital Banking, Group Operations & Services, Technology	Group Strategy, Marketing, Corporate Affairs, Treasury	Technology & Operations, Risk, People, Customer products & services, People, Finance	Treasury, Technology, Core Support	Corporate
Business Units responsible for Mortgage Portfolio				
Australia (Retail, Corporate and Commercial)	Retail Banking Services Bankwest Business & Private banking	Consumer Banking and Wealth Business and Private Banking	Consumer Business	Banking & Financial Services (Personal Banking)
Other Business Units				
Institutional	Institutional Banking and Markets	Corporate and Institutional Banking	Institutional	Corporate and Asset Finance
New Zealand	Wealth Management	NZ Banking	BT Financial	Macquarie Asset Management
Wealth Australia	New Zealand		New Zealand	Commodities and Global Markets
Asia Retail & Pacific	IFS (International)			Macquarie Capital

Australian Bank Reports and Presentations

There are three main sources of information about individual bank positions and performance. One is the Annual Report and Financial Statements. A second is the various presentations made by senior bank staff to analysts and investors (which can be found on bank web sites or announcements to the ASX). The third is the required Basel 3 regulatory disclosures (also found on bank websites). The risk disclosures are quarterly, but the full and half year ones provide the more comprehensive information. Capital disclosures are updated as banks issue (or retire) funding instruments which count as regulatory capital.

Unfortunately, APRA does not provide much useful public information about individual banks. While it collects a lot of relevant data (such as through regular D2A (Direct to APRA) reports filed by banks),

it is bound by confidentiality clauses in legislation (and available resources) which reduce its willingness to make this data available. This is quite different to, for example, the USA where the bank Call Reports are publicly available and very detailed. However, APRA is in the process of considering how much more of the data collected about individual banks can be made publicly available.

4.4 Bank Balance Sheet Fundamentals

Understanding the balance sheet of a bank is a crucial part of analysing banks. The balance sheet shows the collection of assets and liabilities arising from their activities, and can provide important information about the financial products provided and the risk position of a bank. Being a point in time (stock) measure, the balance sheet can only show so much, however, and is often only available to the public and analysts at infrequent intervals. It does not, for example, provide information on the processes by which those assets and liabilities are created or acquired and whether delivery and distribution mechanisms used are efficient or keeping up with technological changes. Nor does it provide information on a bank's commitment to, and strategies in, the increasingly important area of ESG (Environmental, Social, and Governance) matters. For this type of information it is necessary to look to other parts of bank disclosures.

A simplified bank balance sheet

Putting to one side the complexities associated with bank organisational structures, in its simplest form a bank balance sheet can be represented as shown in Table 4.

TABLE 4: SIMPLIFIED BALANCE SHEET

Assets (A)		Liabilities (L)	
Cash	C	D	Deposits
Securities	S	B	Debt
Loans	L	E	Equity

Typical features of such a balance sheet include:

1. High leverage[4] (E/A quite small, e.g. 0.05)
2. Average maturity of loans (L) much greater than that of deposits (D), some of which will be available to depositors "at call"
3. Cash holdings (C), including deposits at the Central Bank, are a relatively small fraction of total assets

[4] Note that the "leverage ratio" capital requirement introduced as part of Basel 3 and defined as "equity/exposures" is the inverse of standard corporate measures (assets/equity or debt/equity) and includes off-balance sheet credit exposures in its calculation of the denominator, and disallows some part of equity in the calculation of the numerator.

4. Debt finance (B) is generally small relative to deposits (D), and may include "hybrid" instruments (which have some equity-like features)

Each of these characteristics may be subject to regulatory restrictions such as capital adequacy, stable funding, or liquid asset holdings, requirements – which are all features of the international prudential regulation standards (currently) known as Basel 3 introduced in 2011.

Such a balance sheet presentation prompts a number of questions:

1. How are assets and liabilities valued? The balance sheet is an accounting document and thus the items are valued according to prevailing accounting standards. Historical cost accounting is used for the majority of items, but some (such as tradeable securities held) will involve "mark to market" valuation.
2. If full repayment of loans made is in doubt, how is that reflected in the balance sheet? For example, a borrower's circumstances may have changed such that a loan previously made for $100 is now unlikely to be repaid in full – and only $80 expected. The bank will make a "loan loss provision" of $20, and deduct this from the "gross loan" amount of $100 to give a "net loan" amount of $80 which is the figure now shown on the balance sheet. This raises the following fundamental question.
3. If the value of assets falls, what adjusts to ensure the balance sheet balances? The answer is that the value of equity recorded on the balance sheet must fall (by $20 in the example above) to ensure that the balance sheet balances! Equity is a residual item in the balance sheet equal to the difference between the value of assets and the value of liabilities.

This last point highlights the need for good bank accounting practices, so that the equity figure shown in the balance sheet is a good reflection of the bank's solvency. A bank with a number of bad loans which it has failed to disclose might appear solvent when, in fact, it is not.

It is also important to emphasise that bank equity (ie bank capital) is an item on the liability side of its balance sheet. It is thus not something "held" by the bank – despite the widespread use of this term by bankers and regulators. The bank "holds" assets and it is the excess of these over liabilities which determines the amount of recorded equity capital. (A far better expression would be to say that the bank "maintains" or is required to maintain a certain level of equity (or capital) in its funding of assets.

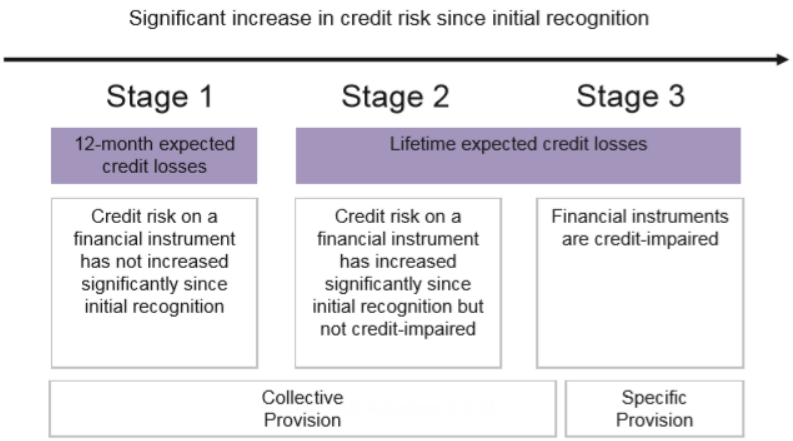
Another way to think of the role of equity is that it is one of the sources of funds (along with deposits and debts) available for holding assets. If for example a regulator requires a bank to raise more equity that means the bank has more funds available to purchase additional assets (make loans). An increase in required equity does not mean (as some wrongly suggest) that the bank will be less able to finance loans.

Bank Accounting

In July 2014 the IASB (International Accounting Standards Board) introduced the revised standard *Financial Instruments IFRS 9* for introduction by January 1, 2018. The Australian implementation is AASB9. The new standard has three main elements relevant for bank accounting.

First, it is possible to value an instrument either as "fair value through profit or loss" (implying that changes in market value, even if unrealised, are reflected in the balance sheet and affect current period profits). This is applicable to trading portfolios (books). It is also possible to value an instrument at amortised cost, but only if (a) the asset is planned to be held to maturity and thus not available for sale and (b) the future contractual cash flows are principal and interest amount receivable on specified dates. This applies to most of the "banking book". A further option is measurement at fair value through other comprehensive income if the intention is to hold the asset but where it is also available for sale, which would be applicable to portfolios where there is less frequent trading than in the trading book.

Second, impairment of assets is now based on expected credit losses (rather than incurred losses). The loss amount can be calculated as either (a) expected lifetime losses on the asset from possible default events in the next 12 months or (b) expected lifetime losses from future default events at any time over the life of the asset. If an asset is impaired, then the recognition of interest income due from



the asset is appropriately adjusted. Earlier recognition of credit losses is a consequence as is smoother provisioning over the cycle.

FIGURE 4: AASB9 PROVISIONING (SOURCE: NAB)

The third element of AASB9 relates to disclosures.

A short summary of IFRS9 implications for banks is provided by the Financial Stability Institute

NAB implemented IFRS9 in 2014, ahead of the required start date and provided an analyst/investor presentation on the consequences in March 2015. This states that there was an increase in collective provisions offset by reduced GRCL (no P&L impact) and had a negative effect of 13 bp on the CET1 ratio. ANZ 2018 Annual Financial Statements notes that AASB9 applies with the Sept 2019 accounts and reduced net assets by $813mill and reduced the CET1 ratio at Level 1 by 12 basis points.

4.4 Capital Measurement Problems

Equity Capital is the "buffer" to absorb losses and protect depositors/creditors. Regulators pay particular attention to the size of such a buffer – including how to measure it in such a way that it appropriately shows the quantum of net assets available for the buffer/loss-absorbing role.

In practice, bank failures have often involved sudden recognition of long standing, but previously unrecorded, losses. These could be due to loans which have been recorded in the accounts at the amount owed, even though the prospect of recovery is slim. Another reason is the discovery of long standing fraudulent practices leading to overstatement of the value of assets or understatement of liabilities.[5]

Once recognized these require a write down of asset values (or writing up of liabilities)[6] to their "true" value. Since the balance sheet must balance, this implies a corresponding write down of equity capital.

In calculating the value of equity capital which is available to serve as a loss absorbing buffer, regulators make a number of adjustments. For some assets (not shown on the simplified balance sheet above), balance sheet measures are estimates of what might be realized only if the asset was sold while the bank was a viable, going concern. These include such things as goodwill, investments in subsidiaries, and deferred tax assets. Their value is likely to decline just when it matters most! Hence they are commonly deducted in calculating eligible regulatory capital.

Capital Measurement Problems: US Examples

The experience of the US FDIC provides some good examples of how reported accounts may not provide a timely indication of the true state of a bank. Information can be found on the immediate pre-failure balance sheets reported to the regulator, and how much the deposit insurance fund lost as a result of the failure.

One such example is the Alabama Trust Bank (ATB) which closed on May 18, 2012. At March 31, 2012, six weeks earlier, it had reported approximately $51.6 million in total assets and $45.1 million in total deposits, and (after other liabilities) a positive equity value. The FDIC entered into a purchase and assumption agreement with Southern States Bank, Anniston, Alabama. This, essentially, involved that bank taking on (assuming) the deposit (and some other) liabilities of ATB, and obtaining the good assets (loans) with the shortfall of assets relative to deposits made up by a payment from the FDIC. It was estimated at the time that the cost to the Deposit Insurance Fund (DIF) would be $8.9 million.

Capital Measurement: Alternative Perspectives

Capital is a balance sheet "residual", which is the difference between assets and other (non-equity) liabilities. There are alternative approaches to measuring assets and liabilities which lead to different

[5] This FDIC paper states that "material insider abuse and internal fraud were present in approximately 457 (37 percent) of the 1,237 U.S. failed commercial and mutual savings banks (hereafter, banks) between 1989 and 2015".

[6] Understatement of a liability might arise if, for example, the terms of the contract require, as a result of some event, a higher payment to the creditor than is recorded in the accounts.

measurements of "capital". Measurement also needs to reflect the value of contingent assets and liabilities.

There are, at least, three different perspectives which can be considered.

The Owner's Perspective

Capital is a measure of the wealth of a group of stakeholders (owners), and from their perspective is wealth tied up in the organisation. Their equity holding provides entitlement to the residual income stream of the bank, and also control rights. The appropriate measurement of capital from their perspective is on an opportunity cost basis – what could the equity be sold for. This is reflected in the share market value for banks listed on the stock exchange – and could be quite different to the equity value recorded in the bank's accounts.

The owners expect (require) a rate of return on their capital sufficient to compensate for the risks involved. The return is measured by the stock market return (dividends and capital gains), and the rate of return is measured against a base of the stock market value of the shares. This may be only loosely related to the accounting value of equity and the accounting rate of return on equity.

The Market Value of Mutuals and Cooperatives

Obviously for mutual or cooperative banks, there is no stock market value, but it is in principle possible to determine what a stock market value would be if they were demutualized, with tradeable shares issued to members and/or other investors in such an IPO. The hypothetical market value should be equal to the accumulated retained earnings plus "franchise value" reflecting the present value of the expected abnormal future profit stream (ie in excess of the required return of investors) if operated as a joint stock firm. (See

APPENDIX 1: The Residual Income Model, for an explanation of the link between book and market value).

The accumulation of significant stocks of retained earnings gives incentives for "carpetbaggers" to lobby for demutualization and the conversion of that communal wealth into private wealth. While many would argue that the history of substantial demutualisations in the finance sector reflects conversions to a more efficient organizational form, others see it as more a result of attempts to expropriate communal wealth built up by the mutual over generations to underpin the provision of financial services to future generations. (See, for example, Davis (MF, 2005))

The Manager's Perspective

Equity (book) capital consists of the funds initially provided to operate the business from share issues adjusted for retention of subsequent earnings or losses made by the business. Those funds, unlike deposits or debt raisings, do not require contractual payment of interest, but management will be judged at least in part on the rate of return on equity capital. Of course, in an ongoing entity, the balance sheet identity means that book equity is a residual given by the difference between the value of assets and the value of liabilities. The accounting standards which are used to value assets and liabilities are thus important in the calculation of the amount of "book" equity.

The quantum of such funds is not equivalent to the stock market value of equity which will reflect both financial (book value) capital, "knowledge capital" (franchise value) and "growth opportunities". Likewise, the accounting and stock market measures of rate of return differ. The accounting return on equity (ROE) relates accounting profit to book value of equity. The stock market rate of return (capital gains and dividends relative to market value of equity) may differ substantially from this. One complication this creates is that of translating the equity investor's required rate of return (derived from the CAPM or alternative approaches and applying to the market value of equity) into a target rate of return for an accounting ROE to be used by bank management in pricing and performance evaluation.

Customer and Regulator Perspective

For depositors/creditors and regulators, the key role of equity is to act as a buffer to absorb risk. The providers of capital rank below liabilities to customers, and regulators are particularly focused on the buffer available to protect depositors. Thus, from their perspective the buffer could consist of equity or alternative subordinated debt or credible guarantees over deposits from third parties. Naturally any providers of such guarantees will also be interested in the extent of equity and subordinated debt available to absorb loss and avoid a call on their guarantees. Thus the cost to the bank of such guarantees could be expected to depend upon its capital ratio (somehow measured), or guarantors might require maintenance of some minimum capital ratio. Regulators are also concerned with systemic stability and with having the ability to resolve (close down, sell to a third party, restructure) a troubled institution quickly and without significant financial sector disruption. A recent trend has

been to augment more traditional measures of capital with requirements that systemically important banks have sufficient TLAC (Total Loss Absorbing Capacity)[7] through the issue of subordinated debt (or perhaps preference shares) securities which can be converted into equity or written down to prevent a troubled bank needing to be liquidated.

Alternative Capital Measurement Approaches

Roughly corresponding to these alternative perspectives the value of bank capital can be estimated in at least three ways based on different perspectives/uses/ relevance. But it must always be remembered that capital is the difference between some measurement of assets and liabilities.

Book value (historical cost) involves measuring assets and liabilities at their original cost, written down for repayments, recognised (or expected) losses, and (for real assets) depreciation. Book value could include some figure for goodwill, where assets (including takeovers of other firms) have been purchased for more than their net asset value. Accounting treatment of R&D expenditures (as either expenditure to be written off or capital items to be depreciated) can also differ between banks and hinder comparisons.[8]

"Mark to market / mark to model" involves valuing assets and liabilities at their current market value. For example a $1 mill 5% govt security will have a market value of less than $1 mill if the current market rate of interest is above 5%. If market prices are not available, an alternative is to use estimates of inputs to model valuation. For example the value of an option could be estimated by inputting a volatility estimate etc into a generally accepted formula.

Market value is simply the stock market value of equity. In theory it reflects the present value (PV) of the expected future income stream discounted at a suitable risk adjusted discount rate. That could, if one wished, be written as PV(Equity) = PV(Assets) – PV(Liabilities) retaining the relationship of equity being the difference between assets and liabilities. In doing so, the present values would involve discounting future cash inflows and outflows of assets and liabilities respectively, and where those cash flows incorporated the bank's operating costs as well as interest and principal cash flows.

In practice, the accounts for banks are prepared using a mix of historical value and mark to market/model. For assets and liabilities which are held in the "banking book" and not for sale,

7 An overview can be found in this RBA Bulletin Article and the FSB published a review of global implementation in July 2019. In the EU, a minimum requirement for own funds and eligible liabilities (MREL) applicable to all banks on an institution specific basis has been in force since 2014. EU G-SIBs are thus subject to both requirements

8 This RBA Bulletin article illustrates how a requirement to book goodwill resulting from the merger of Bendigo and Adelaide Banks caused a significant increase in book equity of the combined entity and contributed to lowering its ROE.

historical value is used. For "trading book" or "available for sale" assets (and contingent, off balance sheet, items) mark to market/model is used.

4.5 Bank Equity: Book Values v Market Values

There can be quite a gap between the book value and the market value of a bank (or other company). Figure 5 illustrates for the major Australian banks, and shows that (a) the ratios have generally been well in excess of unity (b) a major fall occurred at the time of the GFC, with a recovery until around 2013 (c) a general downward trend since 2013 and (d) a sharp decline in 2020. These changes reflect primarily changes in the market price of bank shares, with a small effect from new issues of shares.[9] For example, the share price of NAB fell by almost 40 per cent between September 2007 and September 2008 and by a similar margin between September 2019 and September 2020.

Unlike the majors, the smaller banks have generally had a market to book ratio below unity.[10]

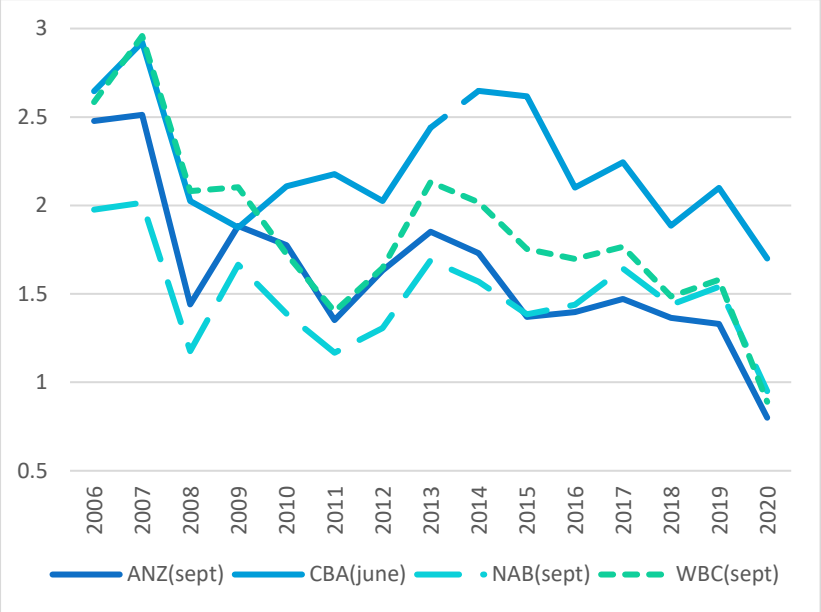


Figure 5: Australian Major Bank Market/Book Ratios

(*Source: Bank Annual Reports and author calculations)*

[9] If shares are issued at the current market price, the equal increase in both the numerator and denominator will cause a small reduction in the ratio if the M/B ratio is above unity, while if issued at a discount to market price the effect will be greater.

[10] Of course, for mutual banks a M/B ratio cannot be calculated since there is no share market price for their equity. But it could be expected to be low because of their low ROEs.

Financial accounting academics have developed a relatively simple framework (known as the residual income model) within which to study this type of issue. It posits that the aggregate market value (MV) and book value (BV) of equity of a firm at any date t are related as:

$MV_t = BV_t$ + Present value of expected future abnormal earnings,

or, in symbols,.

$$MV_0 = BV_0 + \sum \frac{e_t - rBV_{t-1}}{(1+r)^t} = BV_0 + \sum \frac{(roe_t - r)BV_{t-1}}{(1+r)^t}$$

Denoting earnings in period t as e_t which equals $roe_t.BV_{t-1}$, abnormal earnings at any future date τ are given by $(roe_\tau - r_\tau)BV_{\tau-1}$, where roe is the accounting rate of return achieved and r is the required rate of return of shareholders, both applied to the book value at the start of that period. The formula includes the expected value of such abnormal earnings into the distant future, and these need to be discounted to a present value to allow for the delay and risks.

The intuition is straightforward (even if the maths is not – see Appendix 1)! If investors think that managers will be able to use the financial resources (book value of capital) available to them to generate a return (roe) greater than that required (r), they will be willing to bid up the share price (market value) above its book value. In an efficient market, the share price (market value) will settle at a level which investors believe is consistent with their receiving just their required rate of return.[11]

This provides some insights into why such a decline in M/B ratios has occurred. Essentially, investors must have downgraded their expectations of the banks' abilities to generate an accounting return on equity in excess of the rate of return required by investors, or expect that growth will be lower. Relevant factors include: reduced confidence in bank profit-making ability due to economic conditions (resulting from the GFC and Covid crisis and risk of loan defaults) or increased competition from other intermediaries or a low interest rate environment (when bank profits are typically less); higher capital requirements reducing the benefits to equity holders from leverage.[12]

4.6 Loan Impairment, Provisioning and Bank Capital

Credit losses on loans made are a major source of risk for banks and historically one of the major causes of bank failures. In Australia, the early 1990s was a period in which a number of banks suffered major such losses due to previously lax business lending standards and a down turn in commercial property values (reducing the value of loan security). Rodgers (2016) estimates losses of around 8.5

[11] As a simplistic example, suppose that a company could earn $20 p.a. in perpetuity on a capital base (book value) of $100 (ie a roe of 20 per cent p.a.), but investors only required a 10 per cent rate of return. Investors would bid the share price (market value) up to $200, such that their return is 10 per cent p.a.
[12] With a given ROA, a lower leverage will imply a lower ROE.

per cent of average bank lending between September 1989 and September 1994 (compared to 2.5 per cent at the time of the GFC). The proportion of non-performing loans to business peaked at around 13 per cent in 1992 and credit losses were the major source of a marked decline in ROE (to below zero) in 1991. Two State government owned banks (SBV and SBSA) effectively failed while ANZ and Westpac faced troubled times. (See Appendix 4.2 of the Study of Financial System Guarantees, and this FirstLinks (formerly CuffeLinks) article).

Banks deal with the potential for credit losses in three main ways. One is via pricing of loans to allow for expected losses, such that on average the expected return on loans (allowing for defaults) is at the required level. A second is via having equity capital which (among other roles) acts as a buffer to absorb unexpected losses in excess of those expected. A third is by making provisions – in effect redesignating part of the equity capital as the amount which is be expected to be depleted by credit losses. There are two main types of provisions. *Individual (specific) provisions* are where a specific loan is recognised as having the potential for default and incomplete recovery of the amount owed. Banks typically will make such a provision when a loan is 90 days past due (where scheduled repayments have not been met for 90 days). *Collective (general) provisions* are made for particular types of portfolios of similar loans, such as credit card receivables. The bank will recognise that there will be some proportion of loans made which will default, even though it is not sure which specific loans those will be. Hence a general provision equal to some proportion of the total loans is made. Banks will transfer identified troubled loans from the collective to the individual provision, and should recovery be deemed not possible, write-off of the loan will occur. To the extent that a troubled loan has been fully provisioned (with past credit impairment charges for the loan reducing profits in prior periods), the write off will have no impact on current period profits, instead showing up as a reduction in individual provisions. Sometimes, the bank may also make a *direct write off* where a loan which had not been subject to provisioning is suddenly recognised as valueless.

Accounting standards and bank practices for dealing with potential credit losses have recently undergone significant changes, as discussed earlier.

Previously, accounting standards were “backward looking” meaning that banks could not make estimates of expected loss and provision against those. One reason was that these were thought to be subjective in nature and provided potential for discretionary income smoothing through adjustment of provisions. For banking regulators, the concern was that such an approach meant that cyclical downturns and risk of loan losses could lead to large increases in provisions, reducing bank capital and thus inhibiting further lending and aggravating the downturn. Moreover, without having previously anticipated and provisioned against such possible losses, bank capital may be insufficient to absorb such losses leading to bank failure.

That has changed since the GFC with pressure for forward looking provisioning from banking regulators leading to a change in accounting standards. IFRS9 (AASB9), which was mandatory from July 2018 and allows for provisions based on expected value.

Impairment, Provisioning, and "Non-monetary defaults"

When full recovery of a loan is no longer expected, a bank must classify the loan as impaired. A common trigger is when the loan is 90 days past due, but it may be that the bank has sufficient security that even in that case of a non-performing loan there is no expectation of loss. In some cases, borrowers meeting repayments may find their loan classified as impaired if the bank is of the view that ultimate recovery is in doubt. A good example would be a small business loan where the viability of the business is questionable and the value of underlying security (eg buildings) has fallen sufficiently to be inadequate to ensure repayment if sold or breaching covenants imposed on the loan.

In some such cases, banks may invoke "non-monetary default" clauses to call in the loan, such as happened in the highly publicised case of CBA treatment of BankWest borrowers. (See, for example the PJCCFS 2016 report on Impairment of Consumer Loans, but also Royal Commission discussion (p3046-7) of this matter, tending to support CBA's actions (if not its communications with borrowers)). Controversy over this has led the Australian Bankers Association to revise its Banking Code of Practice to clarify when and how such actions may occur.

Once a loan has been identified as impaired, a bank must make an accounting provision for the expected loss (APRA Prudential Standard APS 220). This effectively involves an accounting reduction in shareholders equity (retained earnings) equal to the "provisions" amount. The Australian approach is to show "net loans" (post-provision) as an asset and disclose the amount of provisions in the notes to the accounts. There are two relevant consequences of making provisions, one for the income statement and one for the balance sheet. First, the making of the provision (denoted as a credit impairment charge (CIC)) implies an equivalent reduction in the bank's income for that period. Second, the amount of shareholder's equity is reduced on the balance sheet by the stock of provisions, (denoted as either Allowance for Loan Losses (ALL) or Loan Loss Provisions LLP)) with consequences for regulatory capital requirements.

Under APRA's prudential standards, (explained here, and analysed in this KPMG article) both the numerator and denominator of the bank's risk-weighted capital ratio are affected by the stock of provisions. The amount of Tier 1 capital is reduced (the numerator) while the loan exposure (risk weighted) is also reduced (the denominator). The net effect is (generally) to reduce the bank's capital ratio.

4.7 Bank Balance Sheet Structures

A more detailed (but still incomplete) balance sheet depiction, focusing purely on financial assets and liabilities is shown in Figure 6. In practice, there will also be holdings of real assets (bank premises) or lease obligations, goodwill, amounts due or owed on derivatives transactions, etc.

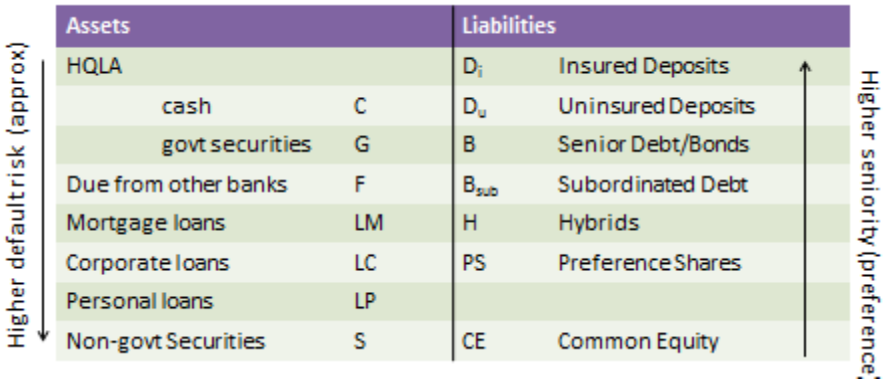


FIGURE 6: MORE DETAILED BANK BALANCE SHEET

Figure 6 shows major classes of assets in approximate order of default risk, although personal (non-mortgage) loan and corporate loan default risk depends on the nature of the counterparty and thus cannot really be ranked as shown. And poor lending practices (such as the "NINJA" (No Income, No Jobs or Assets) loans made in the US Sub-prime crisis) mean that mortgage loans can be highly risky,

Figure 7 provides a more detailed depiction of liability priority, reflecting an assumption of depositor preference over unsecured creditors (as in Australia, but not found universally), and the special position of a number of bank collateralised financing positions.

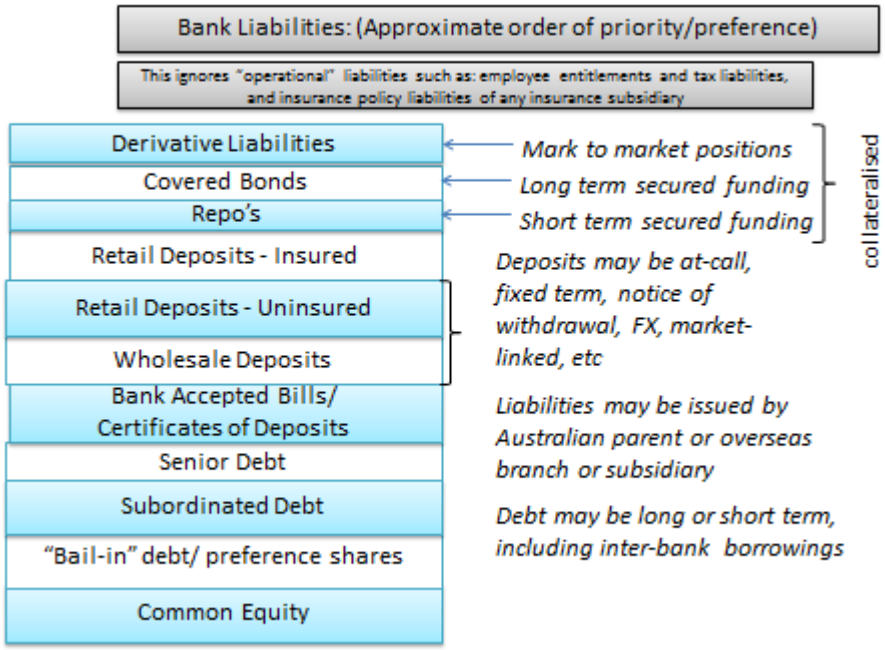


FIGURE 7: BANK LIABILITY PRIORITY

4.7 Off Balance Sheet (OBS) Items

Banks undertake a range of activities which lead to future expected revenues or costs and exposures to risk. These are wide-ranging, but the categorisation of types of OBS positions given in the original Basel 1 Capital Requirements, and still applicable in the Standardised Approach for Basel 3, is a useful framework. That categorisation was focused on credit (non-market related) risk and market risk arising from those positions. For the former group, the Basel 1 standards required converting the positions into an "on-balance-sheet" equivalent using a "credit conversion factor". These are shown in brackets. (The Basel 1 approach then converted this into a risk weighted assets (RWA) amount by applying the risk weight applicable to the counterparty).

Non-Market Related OBS exposures

- Direct Credit substitutes, Assets sold with recourse (1)
  - An example of a direct credit substitute would be a guarantee given by the bank over a loan made by a third party to a bank customer. If the customer defaulted on the loan, the bank would be required to compensate the third party for the loss involved. The bank thus has an exposure to credit risk loss equivalent to that which would have occurred if it had instead lent directly to the customer. (The bank obviously would charge the customer a fee for providing such a guarantee).

  - If the bank sold a loan made to a customer to a third party, where the third party had recourse to the bank for any resulting losses, the bank's credit risk exposure is the same as if it had retained the loan on its books.

- Repos, Forward Asset Purchases (1)
  - A Repo (Repurchase Agreement) is equivalent to making a loan to a third party which is secured by the bank taking ownership of some collateral of equal or greater value provided by the third party. The loan is expunged by the third party repurchasing the collateral back from the bank at a price previously agreed upon. (Because the loan is secured, and margining generally applied, the credit risk and the risk weight applied to the on-balance-sheet equivalent amount (which is the repo amount) will generally be quite low).
  - A forward asset purchase could expose the bank to the obligation to pay out an agreed amount for the asset (such as a company issued bond) which is above its worth due to a decline in the credit rating of the issuing company.
- Performance related Contingent items (0.5)
  - A bank may have provided a commitment to provide a loan to a company bidding for a tender if its bid is successful. Another example would be a commitment by a bank to pay a foreign exporter of goods to one of its customers should the customer not make payment upon satisfactory delivery of the goods.
- Note Issuance and Revolving Underwriting Facilities (0.5)
  - If the bank has an agreement with a customer to underwrite its issuance of, say, commercial paper and the market is unwilling to accept that commercial paper, the bank will be obliged to buy that paper and thus be exposed to resulting credit risk.
- S-T self-liquidating trade-related contingencies (0.2)
  - A bank may make a short-term trade-finance loan to a customer exporting goods where the contract requires that sales proceeds accrue directly to the bank to meet repayment of the loan with the residual credited to the customer's account. There has been considerable disquiet in the banking industry that the capital requirements resulting from the credit conversion factor inhibit such trade finance arrangements.
- Long term revokable commitments (0)
  - If the bank has the option to withdraw a commitment to provide loan funds to a customer on request over some future period, then it will not be locked into providing such funds to a customer whose credit rating has fallen since the agreement was entered into.

Market Related

Banks deal in a range of derivatives markets such as: Futures, Forwards, Swaps, Options. These positions leave them exposed to gain or loss from future movements in the value of the underlying items, such as interest rates, FX, commodities. In general, the current market value of such positions

will be "marked to market" such that gains or losses accrued to date will be recorded on the balance sheet as the "fair value" of such positions. But even if the fair value is zero, such as when a swap contract is entered into, there is a risk that future movements in the underlying prices could lead to the positions causing "market related" losses to the bank. Regulatory capital requirements (related in some way to the scale of the position and volatility of the underlying asset price) are imposed on banks to reflect this possibility.

More recently, following the GFC, OBS risks related to implicit guarantees given to SIVs and Conduits established by banks have become recognised as important. Reputational concerns may for example lead to a bank supporting a SIV by repurchasing assets at a loss, or injecting funds to prevent a liquidity crisis, even if not legally required. The regulatory response has been to try and prevent such OBS risks.

Valuation Adjustments

A relatively recent development in bank accounting and management has been the growth of various "valuation adjustments" (some mandated for regulatory calculations) for assets and liabilities, sometimes referred to as XVAs. These are particularly relevant for derivative positions with a Credit Valuation adjustment (CVA) being the most well known. The CVA adjusts the model-based value of a derivative (eg using a Black-Scholes formula) for the possibility of a default by the counterparty, such that the amount owed on an in-the-money position may not be received. Large banks will have a CVA desk (and other XVA desks) focused on the cost of hedging and managing those counterparty exposures, and allocating the costs across internal divisions. A Funding Valuation Adjustment (FVA) incorporates differences between the bank's actual funding costs and the risk-free rate which is assumed in theoretical valuation models. A Capital Valuation Adjustment (CVA) allows for requirements that bank regulatory capital positions are affected by derivative positions.

4.8 The Trading Book and the Banking Book

Table 5 provides an alternative depiction of a bank balance sheet, useful when discussing regulatory arrangements (and internal bank structures). It shows a separate category of assets – securities held for trading. When these are combined with positions held by the bank's trading desk in market related off balance sheet (OBS) items (such as swaps, futures options etc), we obtain the "trading book" of the bank which is distinguished from its "banking book" of assets and liabilities generally held until their maturity.

TABLE 5: TRADING AND BANKING BOOK

Assets		Liabilities	
HQLA		D_i	Insured Deposits
cash	C	D_u	Uninsured Deposits

govt securities	G	B	Senior Debt/Bonds
Due from other banks	F	B_{sub}	Subordinated Debt
Mortgage loans	LM	H	Hybrids
Corporate loans	LC	PS	Preference Shares
Personal loans	LP		
Securities held for trading	S	CE	Common Equity

Thus, in the notation used above:

Trading Book = S + Market-related OBS

For the trading book, mark to market (mtm) accounting is required (every day) in accordance with AASB 13 (Fair Value Measurement). The mtm values (as explained previously) could be either current market prices or (where not available) derived from theoretical models or management estimates.

The risk characteristics of the two books are quite different with the trading book (reflecting the activities of the bank's trading desks) involving taking on market risk in search of profit. In contrast, the banking book positions involve primarily exposures to credit risk on loans and interest rate and liquidity risk arising from the way in which those positions are funded. Of course, operational risk is pervasive, and some of the largest losses of banks worldwide have arisen in the trading book from activities of "rogue" traders.

The distinction between the books is not always clear-cut. For example, government (or other) securities held in the banking book as liquid assets which generate interest income could be shifted to the trading book if opportunities arose to make a quick profit from their sale. Regulators have put in place constraints on shifting positions between the two books to prevent "arbitraging" of different types of capital requirement regulations applying in the two books.

Loss Absorbing Capacity (LAC)

Another feature of the balance sheet structure which is worth noting is that of how much "loss absorbing capacity" (LAC) it provides. This has become a major focus of regulators since the GFC, and is focused upon the protection afforded to depositors arising from other sources of bank funding having lower ranking claims. Thus Loss absorbing capacity (LAC) is liability items which protect deposits (& possibly some senior creditors) from loss by absorbing credit, trading, or other losses.

It is common to identify two types of LAC. One is "going-concern" LAC which corresponds to common equity (CE) which acts as the buffer absorbing losses (and profits) when the bank is solvent. The other is "gone-concern" (liquidation) LAC (or GLAC) calculated as the amount of losses which can be absorbed by claimants with lower-ranking claims to depositors before depositors (or governments)

start to bear losses in insolvency. In terms of the notation above, in principle, GLAC = CE+PS+H+Bsub+B.

In practice matters are more complicated. First, if governments/taxpayers "bail out" non-depositor creditors when a bank gets into difficulty GLAC is less relevant and essentially much less. Second, the Basel 3 introduction of "bail-in" requirements has meant that some hybrid securities which are eligible as regulatory capital, convert mandatorily into equity if specified "point of non-viability" trigger points are hit. If such conversions enable the bank to continue operation (although there is no evidence that "bail-in" would not adversely affect confidence in the bank and lead to its failure), this would increase going-concern LAC above the current level of CE.

4.9 Bank Balance Sheets and Bank Funding

The liability side of the bank's balance sheet shows its sources of funds (deposits, debt, equity). Figure 8, from the RBA Chart Pack, illustrates trends in the composition of bank funding since the early 2000's. In looking at that figure, however, two points should be noted.

First, a figure for "Securitisation" is included. "Traditional" securitisations generally won't show up on the balance sheet, since the process involves the bank selling loans it has made to a Special Purpose Vehicle (SPV) in return for cash which can be used to make further loans. So while the amount of securitisation it has undertaken won't be recorded on the balance sheet, this can be thought of as a form of funding for the bank. (Some forms of securitisation such as covered bonds will show up as liabilities on the bank balance sheet, and be matched by recording of the loans involved in the securitisation as assets on the balance sheet. "Self-securitisations", where the bank creates asset backed securities which it holds itself involve more complicated accounting which is explained in Chapter 11). The marked decline in securitisation after the GFC is apparent.

A second point worth noting is the introduction in 2020 of the Term Funding Facility, introduced as part of Covid response measures, which involves the RBA providing banks with access to a specified amount of cheap funding.

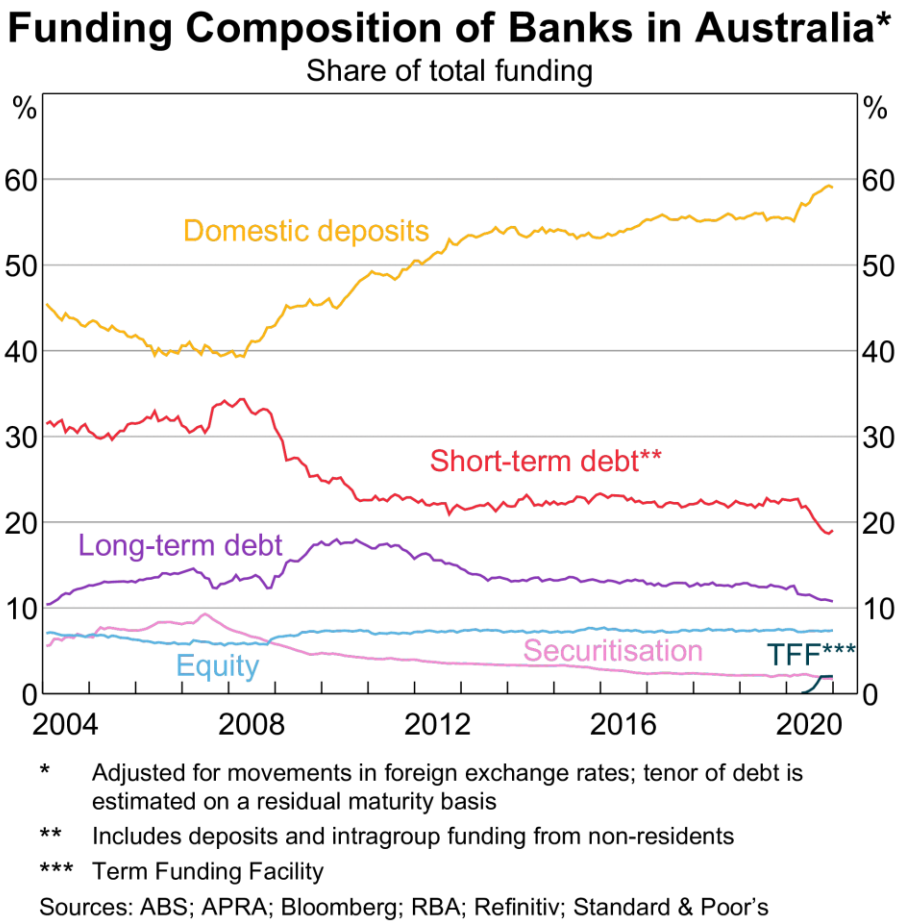


FIGURE 8:BANK FUNDING COMPOSITION AND TRENDS (SOURCE: RBA CHARTPACK)

The stand-out trend in the figure is the post GFC substitution of domestic deposits for short-term and (to a lesser extent) long-term debt as sources of bank funding. The GFC demonstrated the liquidity risk associated with wholesale debt funding when capital markets are in crisis and rolling over maturing debts is problematic and/or expensive. The Australian banks have become more "prudent" in the funding mix, relying more on deposits which tend to be "sticky", and this change has been reinforced by liquidity regulations introduced after the GFC. But also relevant is the relative cost of funding sources. Wholesale debt cost incorporates a risk premium (which increased markedly at the time of the GFC, but has since fallen back to more usual values). In contrast, it can be argued that there is no or little risk premium incorporated into the interest rate cost of many bank deposits. This is particularly the case for deposits of less than $250,000 which, following the introduction of the Financial Claims Scheme in October 2008, are guaranteed by the Australian government.[13]

Figure 9 (from the RBA Chart Book) shows the composition of deposit funding of the major banks. Household deposits account for just under half of total deposits, and a significant increase in at-call deposits has seen them increase to around 70 per cent of the total compared to around 30 per cent

[13] The initial level of coverage when the scheme was introduced was $1 million and reverted to $250,000 in 2011.

for term deposits. Some part of that increase in at-call deposits may reflect increasing use of housing loan offset accounts.

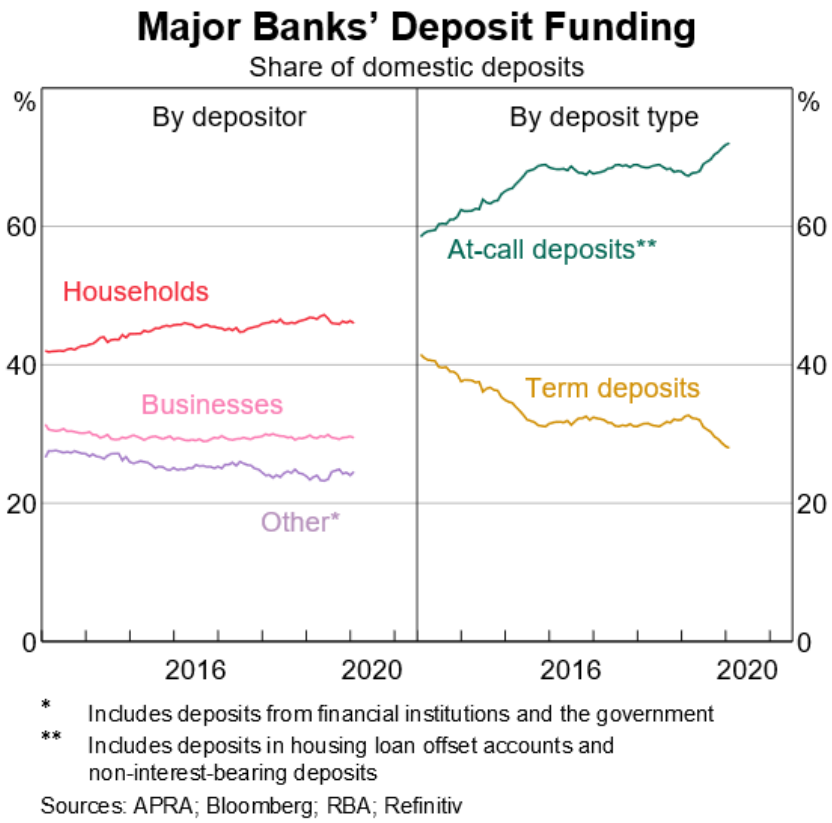


FIGURE 9: DEPOSIT FUNDING TRENDS (SOURCE: RBA)

Another trend which is less noticeable, is the increase in the equity share of bank funding after the GFC. The relative constancy of the share since about 2010 at around 8 per cent may appear surprising, given the increase in regulatory capital ratio requirements and "headline" figures of a much higher percentage. The explanation can be found in the fact that regulatory capital ratios are calculated on a "risk-weighted" basis. One cause of higher bank capital ratios has been an increased allocation of funds to assets with lower risk weights (such as housing), reducing the denominator of the capital ratio calculation.

4.10 Bank Assets

The asset side of bank balance sheets is more complex than depicted in the simple balance sheet examples given earlier, although loans, liquid investments (eg cash) and securities held (either in the banking or trading book) account for the bulk of assets. To illustrate, at September 2020, the ANZ accounts (for the consolidated, level 3, group) showed the following composition of total assets

Asset Category	Percentage of Total
Net loans and advances	59.21%
Derivative financial instruments	12.98%
Cash and cash equivalents	10.35%
Investment securities	8.96%
Trading securities	4.88%

All other assets listed were each under 1.5 per cent of the total. These included; goodwill; Physical assets (branch and investment properties, equipment); deferred tax assets; settlement balances owed from other banks; collateral paid.

For a smaller (mutual) bank such as BankVic, which does not engage in trading activities, Loans and Advances were 74.8% of total assets and Cash and Deposits with other financial institutions were 24.6%.

More detail about the components of the various items (including types of loans) , and complications in examining the banking activities separate from those of the consolidated entity is available in other chapters.

4.11 Bank Finances: Income and Expenditure

Most analysis of bank profitability and efficiency starts with the Income Statement which shows sources of income, costs incurred, and profit as the difference between income and costs. A simplified example is shown in Table 1 which also outlines the calculation of some commonly used financial ratios. The Income Statement is for a specified period, such as a year, and is part of the link between the bank balance sheets for the start and end of the period. In the absence of any external equity raisings, that link can be expressed as:

$S_t - S_{t-1} = \pi_t - d_t$

where S_t, S_{t-1} are shareholder's funds (equity) shown in the balance sheet at the end of year t and t-1 respectively, π_t is profit after tax in year t shown in the income statement, and d_t is dividends paid in year t (so that $\pi_t - d_t$ is retained earnings).

In practice, the relationship is complicated by:

- External equity raisings (including reinvestment of dividends by shareholders) by the bank which if denoted by X_t would change the relationship to $S_t - S_{t-1} = \pi_t - d_t + X_t$

Repurchases of shares by the bank, which reduce bank equity, would involve a negative figure for X.

- Lags in the actual payment of dividends, such that d_t is dividends declared for that year, even though the actual dividend payment (cash flow) may not occur until after the end of the year. For example, the three major banks that have a financial year ending on 30 September (ANZ, NAB, Westpac) will generally declare an interim dividend in April/May, to be paid in July, and announce their final dividend for the financial year just ended in October/November when the annual results are announced, to be paid in December or January.

TABLE 6: A SIMPLE BANK INCOME-EXPENDITURE STATEMENT

Income		Expenditure	
Interest Income	II	Interest Expense	IE
Non-Interest Income	NonII	Operating Costs	OC
(fees, trading income)		(wages, rent, inputs, depreciation)	
		Credit Impairment Charge	CIC
		Income Tax Expense	T
Profit after tax	π		

Net Interest Income (NII) = Interest Income (II) – Interest Expense (IE)

Return on Assets (ROA) = (Profit after tax)/Total Assets

Return on Equity (ROE) = (Profit after tax)/Equity

Cost/Income Ratio = OC/(NII + NonII)

Bank Analysts (and management) pay a lot of attention to various financial ratios as a way of identifying trends in bank profit performance and for making comparisons between banks. The most commonly used ratios are those shown in Table 1. The major banks, in particular, provide a substantial amount of additional information in their Annual and semi-annual financial statements, their Basel 3 disclosures, and in analyst presentation materials accompanying release of financial statements or other major events (including capital raisings). These are available on the bank websites – generally under the "investor relations" or similar section. While there is much information presented, differences in presentation, terminology, and selectivity of topics and content, all combine to making it often difficult to digest and interpret.

This is not aided, for the non-accountant, by the complexity of accounting conventions and changes occurring in those – such as the switch from AASB 139 to AASB9 introduced in 2014 and required for accounting periods commencing in 2018. To give one illustration consider the ANZ accounts for 2019 and 2018. Comparing the 2018 and 2019 Annual Reports, the bank would appear to have increased in size by about 17 per cent in one year. But based on the different (compared to the 2018 Report) 2018 figure presented in the 2019 report the increase was a more realistic 4.25 per cent. Looking more closely at the accounts, it is possible to identify that the difference in the two figures for 2018 is primarily due to an increase in the "loans and advances" item recorded in the balance sheet, roughly matched on the liabilities side by an increase in deposits. There is no easily found disclosure in the reports of why this reporting change has been made!

	2019 Annual Report		2018 Annual Report
Year	2019	2018	2018
Assets ($ bill)	981,137	943,182	840,747

Another accounting change has been the introduction of AASB 15 which has led to line fees being reclassified from net fee income to net interest income.

Also complicating matters is the presentation of financial accounts for both the bank (or holding company) and consolidated accounts. NAB presents accounts for both the "Company" and "Group" where Group incorporates subsidiaries; CBA for the "Group" and "Bank" where the Group incorporates subsidiaries; Westpac for the "Parent Entity" and "Consolidated"; whereas ANZ now only presents results for the "Group" which incorporates controlled entities.

4.12 Commonly Used Performance Indicators

Among the main ratios which get considered are the following – in Australia generally only available every 6 months following release of annual and semi-annual results statements.

- Net Interest Income (NII) = Interest Income (II) – Interest Expense (IE)
- Return on Assets (ROA) = (Profit after tax)/Total Assets
- Return on Equity (ROE) = (Profit after tax)/Equity = ROA x (TA/E)
- Cost/Income Ratio (CTI) = OC/(NII + NonII)
- Net Interest Margin (NIM) = NII/Average Interest Earning Assets = NII/AIEA

They are calculated primarily from information provided in the bank's Income Statement, and Table 7 provides an illustration using ANZ's accounts for the year ending September 2020. In looking at those figures a number of prior explanations are needed. First, these are the figures calculated by ANZ for

its "continuing operations" – taking out the amounts for "operations discontinued" during the year in order to present a more informative picture of how the bank might perform in future years. (In this case, including discontinued operations would have had relatively little effect and would have led to an roe figure of 6.0 rather than 6.2. In some cases, such as when there are sales of substantial businesses, the effect can be significant). Second, by removing discontinued operations, the profit figures are what the banks refer to as "cash" profits rather than "statutory" profits based on official accounting standards. Again, the reason the banks prefer to refer to "cash" profits is because it is claimed they give a better idea of ongoing profitability. Third, an item not shown in the table is "comprehensive income" which adds to the profit figure those valuation changes not currently (perhaps never) classified to P&L (incl losses/gains on hedging instruments). The change in shareholders funds recorded in the balance sheet is linked to comprehensive income.

TABLE 7: ANZ INCOME STATEMENT (AND OTHER) INFORMATION, 2020)

	Year ending September 2020, $M
Net interest income (NII)	14,049
Other operating income (NONII)	3,703
Operating income (OI = NII +NON)	17,752
Operating expenses (OE)	(9,383)
Profit before credit impairment and income tax	8,369
Credit impairment charge (CIC)	(2,738)
Profit before income tax (PBT)	5,631
Income tax expense (T)	(1,872)
Non-controlling interests	(1)
Cash Profit (π)	3,758
Average interest earning assets (AIEA)	862,882
Average deposits and other borrowings (L)	679,336
Funds under management (FUM)	36,714
Earnings per share (basic) (eps)	132.7
Ordinary share dividend payout ratio (D/π)	45.3%
Profitability Ratios	
Return on average ordinary shareholders' equity (roe)	6.2%
Return on average assets (roa)	0.36%
Net interest margin NIM)	1.63%
Net interest income to average credit RWAs	3.81%
Efficiency Ratios	
Operating expenses to operating income (CI)	52.9%
Operating expenses to average assets (OE/A)	0.89%
Full Time Employees	37,506

Source: ANZ

There are several immediate points to note, which are relatively common across commercial banks.

1. Net Interest Income (NII) is the main source of income (and doesn't include the credit impairment charge – which reflects actual/expected losses on loans)

2. The NIM =NII/(AIEA) is used as a measure of the interest "spread" being earned by the bank from its intermediation activities. Note that the denominator is average interest earning assets for the year – which is typically in the order of 90 per cent of total assets.
3. Non-Interest Income (NONII) – fees, trading profits etc., is also important. Some part of this will reflect income from off-balance-sheet (OBS) items such as fees for guarantees or provision of loan facilities.
4. Australian banks like to use a "cash" income concept (rather than the official accounting measure of statutory profit) to enable comparisons of performance across periods. The difference is normally relatively small when considering performance measures such as ROE.
5. The Credit Impairment Charge (CIC) is the amount by which annual profit is reduced by allocations to loan loss provisions to cover future loan losses (or direct write-offs of unexpected loan losses not covered by provisions). In general, when a loan defaults this will be charged against loan loss provisions, and thus not affect current period profitability (except to the extent that a decision is made to make a CIC against current income to restore provisions to a desired level).
6. Comprehensive income incorporates the effects of some transactions not passed through P&L but directly affecting the balance sheet –comprehensive income is used in calculating changes in shareholder equity.
7. ROA (based on average assets for the period) in the vicinity of 1 % p.a. has been a typical result for Australian banks in normal times – but 2020 was a bad year for Australian banks with much lower ROAs being recorded.
8. Use of "Return on Risk Weighted Assets" (RoRWA) has become more used as a performance measure since the introduction of RWA as part of Basel capital requirements. RWA is calculated by applying "risk weights" to each asset category (and off-balance sheet items). For a commercial bank, a figure of RWA/Assets of around 0.5 is not uncommon. In a very general (approximate) sense this standardises return measures so as to reflect differences in risk-taking by the bank.
9. ROE has generally been in the order of 10-15 times ROA due to the high leverage of banks.

Figure 10 provides a way of breaking down ROA and ROE into the various items ("drivers") which determine their values. It shows approximate typical values for Australian major banks during normal years over the recent past – although note that from around 2016, the ROE's have fallen from the mid-teens to around ten.

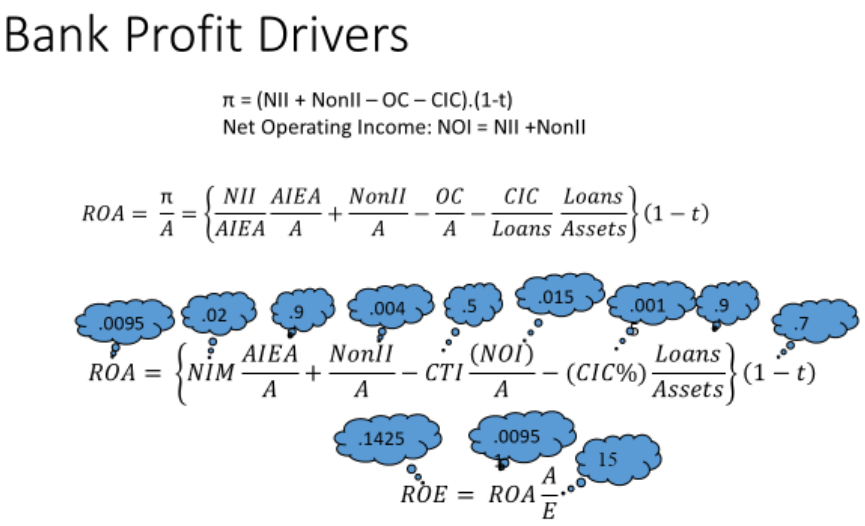


FIGURE 10: BANK PROFIT DRIVERS

4.13 Net Interest Margin Behaviour

The NIM is a major driver of bank profit performance. Over the past two decades the NIMs of the major Australian Banks have fallen markedly by over 100 basis points (as Figure 1 illustrates for the period since 2000). Why has this fall occurred? Various explanations can be hypothesised:

- A transition to a lower interest rate environment – since some proportion of bank deposits pay zero interest, lower interest rates on assets will automatically reduce NIM (assuming other deposit/debt funding rates fall equivalently). Hack and Nicholls (RBA, 2021) examine the international evidence on the effects of low interest rates on bank profitability, including studies which examine the consequences of negative interest rates being paid on deposits. They conclude "In the short run, most studies find at most a modest negative effect of lower interest rates on bank profits in aggregate, but larger effects for smaller banks." When interest rates are low for longer periods of time, there is stronger evidence of a decline in profits.
- Increased competition in some loan markets – particularly the housing market as a result of the growth of securitisation and non-bank lenders since the mid 1990s (although the GFC interrupted this growth for several years after 2008). This is discussed by Kirkwood (ER, 2010) and (Liu & Skully (ISBAF, 2008) find evidence of a negative relationship between securitisation market share and major bank loan spreads (relative to securitisers) for Australia over 1994-2003.
- A shift into less risky lending – with lower interest rates (offset by lower expected losses, ie provisions). Illustrative of this is the case of ANZ which had a ratio of RWA/Assets of 70% in 2007 and a significantly reduced ratio of 46% in 2019. Note, however that there have been

substantive changes in the calculation method for RWA over that time, and the risk weights are not necessarily the ideal measure of risk. Nevertheless, the shift is dramatic.

- Increased use of deposit funding relative to wholesale market borrowing – lower interest rates but higher operating costs. Domestic deposits of the major banks have increased as a share of their total funding from around 45 per cent at the time of the GFC to nearly 60 per cent in 2021.
- Higher capital ratios – more equity and less interest-paying funding of interest earning assets. (NIM = $(r_A.A - r_D.D)/A = r_A - r_D.(D/A)$, so an increase in D/A reduces NIM *cet par*. However, note that banks will incorporate a cost of equity into loan pricing, which will work in the opposite direction – if banks have some market power in loan pricing - since the cost of equity will be higher than the cost of deposits). Again using ANZ as an illustration, the Tier 1 capital ratio was 7.9% in 1999 (which incorporated some non common equity amounts meaning that the CET1 ratio was slightly lower), while the CET1 ratio in 2020 was 11.3%.
- Different pricing structures – higher loan fees offset by lower loan interest rates and/or higher fees for deposit services accompanied by higher deposit interest rates.

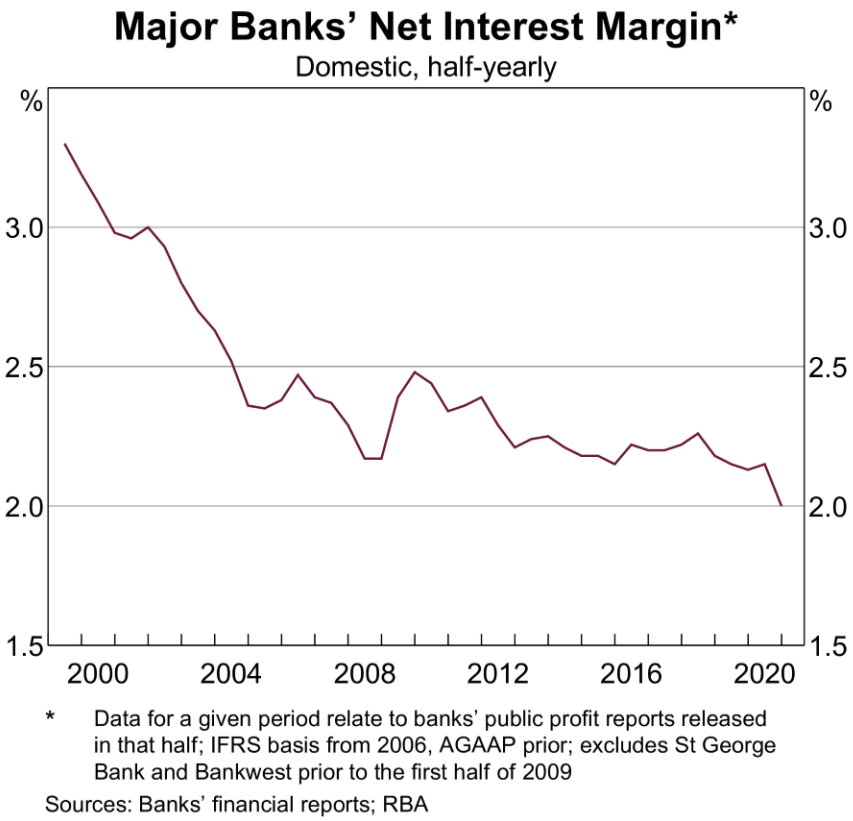


FIGURE 11: NIM TRENDS FOR MAJOR AUSTRALIAN BANKS (SOURCE: RBA CHART BOOK)

One factor affecting the declines in NIMs in the very recent past has been the growth of "switching" by mortgage borrowers. Historically, the "back book" has been an important source of income for the

banks, with existing customers not taking advantage of opportunities to switch banks and take advantage of special rates lower than the standard variable rate on offer to new borrowers. Also relevant has been a shift of borrower composition from higher rate loans (interest only and investor) to principal and interest and owner-occupier. Whether banks have attempted to push up NIMs by not passing on (fully) RBA cuts in the cash rate to mortgage rates is contentious, although the relationship between the cash rate and the banks' cost of funding (interest expense) is complex and variable.

ANZ and NAB generally have had substantially lower NIMs than CBA and WBC and over the three years 2018-20 the latter two had NIMs of around 2.1 compared to around 1.8 for ANZ and NAB.

Some Theory and Empirics

While the marked decline in Australian bank NIMs indicates that there are a variety of factors influencing their behaviour over time, one question addressed by a range of theoretical and empirical studies has been: what determines the level of the NIM (or the "spread" between loan and deposit rates?)[14] The Ho and Saunders (JFQA, 1981) model based on dealer spreads has been influential and the basis for many empirical studies examining this question, although a more easily understood version, more applicable to Australia is McShane and Sharpe (JBF, 1985). The models are based on earlier models of a "market-maker" who maintains an inventory of stock so as to be able to meet buy and sell orders of customers and make a profit from the buy-sell spread – but facing the risk that price movements could lead to gains or losses on the inventory position. The models are of a single bank which is able to set its loan and deposit interest rates with the effect of market competition occurring via the elasticity of loan demand and deposit supply.

The model is summarised in Figure 12, where it is assumed that there is only deposit and equity funding and loans and money market cash holdings/borrowings. Loans and Deposits have the same maturity. Banks set their offering interest rates on loans and deposits (at date 0), where it is assumed that they have some market power in setting loan and deposit rates. They choose margins above and below the risk free rate for loan and deposit rates respectively. Deposit supply and loan demand are then seen (date 1) and the bank will either need to invest surplus funds or raise additional funds in the cash market at an uncertain interest rate. In setting the interest rate margins at date 0, the bank (knowing the uncertainty of the net cash flow from deposit inflows and loan outflows) will aim to maximise the expected utility of its wealth at the loan and deposit maturity date (date 2). The bank is assumed to be risk averse such that the expected wealth and its variance are relevant to its decision making. Solving the maximisation problem the optimal spread between loan and deposit rates is found to depend on the bank's market power (the sensitivity of loan and deposit flows to the rates set), the

[14] NIM is NII over AIEA, whereas the spread is simply $r_L - r_D$.

size of the potential mismatch between loan demand and deposit supply, and the volatility of the market interest rate. This provides a framework for empirical studies regressing the interest rate spread on variables such as market power (concentration ratios), interest rate volatility, loan and demand variability, and others (often using the "kitchen sink" approach). However, various theoretical extensions to the model include credit risk, operating costs, asset diversification, duration mismatch, etc. can motivate inclusion of alternative explanatory variables.

Most empirical studies of spreads cite Ho & Saunders, and are generally of the form:

- Dependent variable: $Margin_{it}$ for bank i at time t; some papers (eg Entrop et al, JBF 2015) examine spreads of the individual rates to market benchmarks jointly by incorporating longer term interest rate uncertainty into the model via assuming longer maturity for loans than deposits. (They find that this is more relevant for the loan spread than the deposit spread).
- Explanators: Concentration ratio (market power); Operating costs; interest rate volatility; excess capital; other risk variables; implicit interest; cash reserve costs; macroeconomic variables; etc.

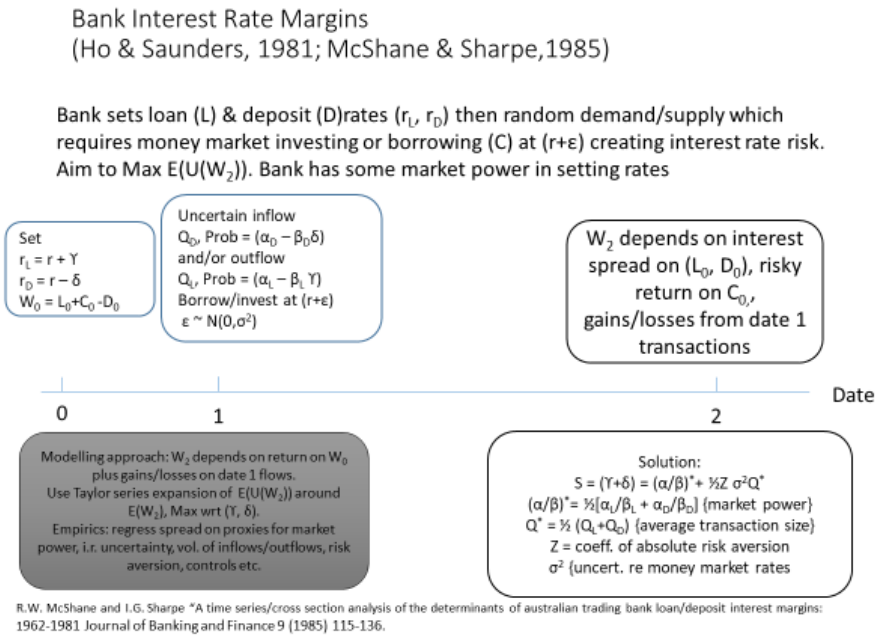


FIGURE 12: MODELLING THE DETERMINANTS OF BANK INTEREST RATE MARGINS

One study adopting the Ho-Saunders approach for Australia is by Williams (FMII, 2007). His results are shown in Figure 13. He does not find a role for market power – but this may be explained by the massive size differences between the banks in his study and the inclusion of dummies for the major banks.

Australian bank NIMs

Theory (ex sign)	Proxy (ex sign)	result	Comment
Market power(+)	Assets/Fin sector total (+)	- X	massive size diff (& dummies)
Operating costs (+)	OC/TA (+)	+ ***	cf Implied Interest (coeffs sum ≈ 1)
Manag. risk aversion (+)	Capital ratio(s) (+)	+ ***	less deposits & debt
Interest rate vol (+)	BBR90 hist vol (+)	+ ***	
Credit risk (+)	Provisions/loans (+)	- *	
Credit & market risk	Interaction term	no	
Bank Size (+)	#branches / loans (+)	no	? (to capture product mix)
Implied interest (+)	(OC-NonII)/TA (+)	+ ***	implied by profit decomposition?
Reserves cost (+)	(Reg reserves)/Liabs (+)	no	not relevant for much of period
Management quality (+)	Cost/Income (-)	- ***	implied by profit decomposition?
Liquidity risk (+)	Liq Assets/Liabs (-)	no	more of lower earning assets
Big4 & Foreign Bank dummies		+ (big4) – (for)	
Year dummies		Increasing (-ve) NIM trend (securitisation, 89-92 crisis	

Period 1989-2001: 43 banks but significant exits (foreign, state); interest rate level changes; How to rule out other theories?

FIGURE 13: DETERMINANTS OF AUSTRALIAN BANK NIMS

4.14 The NII – NONII mix

The relative importance of Net Interest Income (NII) and Non-Interest Income (NONII) in determining bank profitability varies between banks and has varied substantially over time. Understanding the impact on profitability and risk of the different activities which generate these different income streams is important for bank managers. It is also an important consideration for regulators concerned with understanding bank risk.

Academic studies – diversification and NONII

This issue is linked in the academic literature to that of diversification in banking, prompted partly by a paper by Stiroh (JMCB, 2004). He noted a significant increase in the relative importance of NONII in US banking over recent decades, involving activities which generate trading income, fiduciary income (from administration/management of assets for clients), service charges (like account keeping fees/payments charges), and fee income (loan application fees etc), rather than interest income. Within those categories, the largest banks had more focus on trading income than smaller banks. Stiroh asked whether this diversification away from "traditional" intermediation was beneficial in terms of reduced bank risk and improved risk-adjusted profits? His answer, based on US data from the late 1970s to 2001, was in the negative. Among the reasons were: greater volatility of NONII than NII; the level and growth of correlation between NONII and NII; a worse risk-return tradeoff for NONII activities than for NII.

Williams and Prather (IJMF 2010) examined the effect of diversification into NONII activities of Australian banks. They found that fee-based income was riskier, but that diversification improved risk-adjusted bank performance. Subsequently Williams (JBF 2016) examined how bank revenue composition and bank risk were related using quarterly bank data (confidentially provided by APRA) for 2002 – 2014 for 26 banks (of which 11 were ASX listed). A range of risk measures (accounting and market based) were used as a dependent variable in regression on the composition of bank revenue (using three alternatives of NONII/Total revenue, a HHI index of revenue concentration and weights of revenue share of different activities) and additional control variables. He finds that there appears to be no portfolio diversification benefit (risk reduction) from combining NII and NONII activities, and that the latter income stream is riskier. The results suggest that trading and investment activities have some portfolio diversification benefits.

Australian data

The RBA conducts an annual survey of bank fee income (see eg Crews and Lewis (2020)). This does not incorporate trading income, but focuses on fees charged to household and business customers. Deposit fee income has declined steadily as a ratio to deposits since 2000 when it was around 60 bp to below 10 bp in 2019. Likewise lending fee income as a ratio to assets has declined from over 30 bp to just over 15 bp, and other non-deposit fee income as a ratio to assets has fallen from near 30 bp to below 15 bp. The household share of the total fee income charged is around one-third.

Fee income from households (credit cards, housing loans, and deposit related fees contributing 43, 28, and 19 per cent respectively of the total in 2019) has declined in total over recent years whereas that from businesses has continued to grow. Changes in ATM charging and use have contributed to a decline in deposit related fees. “Exception” fees (for dishonoured or unauthorised transactions) have fallen in recent years. Some of the fees charged by banks to consumers (such as late payment fees) have been controversial, as indicated in this article by consumer group Choice.

Fees charged to business include *et al* loan and deposit related fees (around 40 and 7 per cent of the total), together with merchant service fees (associated with providing payments services) which contribute around 40 per cent of the total.

There is little public information available on the relative importance of trading and investment activities of Australian banks, although individual bank disclosures do provide some guidance. For example, for ANZ the RWA calculated for market risk and IRRBB for 2019 was around 3-4 per cent of total RWA. In terms of income, trading and investing activities are undertaken by the markets group within the Institutional division. In 2019, the Institutional division contributed $5.3 bill of the bank’s total revenue of $19.0 bill ($14.3 bill of NII and $4.7 bill of NONII). Of that $4.7 bill NONII, the markets

group generated operating income of $1.3 bill (around 25 per cent). Public figures for the share of the markets group in total bank expenses are not available, but the Institutional division had expenses of $2.7 bill which is around 30 per cent of total bank expenses. The institutional division contribution to overall bank Cash Profit of $6,772 bill was $1,852 bill. Assuming the markets group accounts for 25 per cent of the institutional group expenses and profits, its contribution to total profit would be less than $500 million or around 7 per cent of the total. These are ball-park figures but serve to indicate that trading and investing activities are a relatively small (but not insignificant) part of overall bank income for Australian banks. Another indicator supporting the conclusion of relatively modest reliance on trading and investing activities is from the bank's 2019 G-SIB disclosure which reported "trading and available-for-sale securities" equal to a little over 4 per cent of the bank's total exposures.

4.15 Bank Efficiency

Analysts typically refer to the banks cost-to income (CI) ratio when examining bank efficiency. That ratio defined as operating costs/(NII+NONII) is interpreted as indicating the efficiency with which inputs are transformed into outputs, and is suggestive of adherence to the production rather than the intermediation view of bank activities. A lower CI ratio is interpreted as increased efficiency.

The RBA noted in its September 2014 Financial Stability Review that the CI ratio for the major banks in 2013 of 44 per cent was down 20 percentage points from the mid 1990s. That was a massive decline, which put the Australian banks near the bottom of CI ratios internationally. The RBA pointed to the following factors contributing to that fall: adoption of new technologies; closures of branches; and restructuring. The RBA also noted that commercial banks with a focus on retail activities tend to have lower CI ratios than universal banks with more emphasis on non-interest sources of income. The Australian banks' focus on residential mortgage lending was also suggested as an explanation for lower CI ratios than commercial banks elsewhere. The RBA also suggested that economies of scale might help explain why the CI ratio for smaller regional banks was substantially higher at 57 percent than the 44 per cent of the majors.

Since that time there has been something of an increase in the majors' CI ratios to an average in 2019 of 49.7 per cent, with much of the increase occurring in 2019. The need to invest in new technologies and significant compliance costs are relevant here. Also important is a substantive amount of customer remediation costs for poor customer outcomes (in some cases this might be recorded as a reversal of non-interest income and in others as an operating cost) and penalties for regulatory non-compliance.

Empirical Studies

There are essentially two types of studies examining efficiency in banking. One type is studies attempting to discern whether there are economies of scale or scope in banking. The second type is studies which, in essence, examine "X-efficiency" – the extent to which banks are operating inside the efficient production frontier.

Economies of Scale and Scope

For many years the conventional wisdom was that there were economies of scale in banking up to the size of, for example, a mid-sized bank. The evidence, based on regressions of bank total costs on measures of size and input prices (with a functional form derived from a Cobb-Douglas production function or using a translog specification[15]), using data from around the 1980s supported such a view. Amel et al (JBF, 2004) survey this literature. Economies of scale seemed to disappear for larger banks, with the shape of the average cost curve flattening out after some level.

Since that time, the evidence has tended to point in the opposite direction – that economies of scale persist, even for very large banks. Changes in the technology of banking could be one reason for that, but a number of studies re-examining the earlier data have suggested that empirical specifications used earlier studies ignored important factors. Hughes and Mester (JFI, 2013) provide an overview of the reasons, the main ones being a neglect of risk and product difference considerations, while also acknowledging that changes in technology and regulation are relevant for the results using later data. They argue that bank management decisions incorporate risk considerations which are not considered in the standard production function approach, and that the bank's cost will depend on its risk exposure.

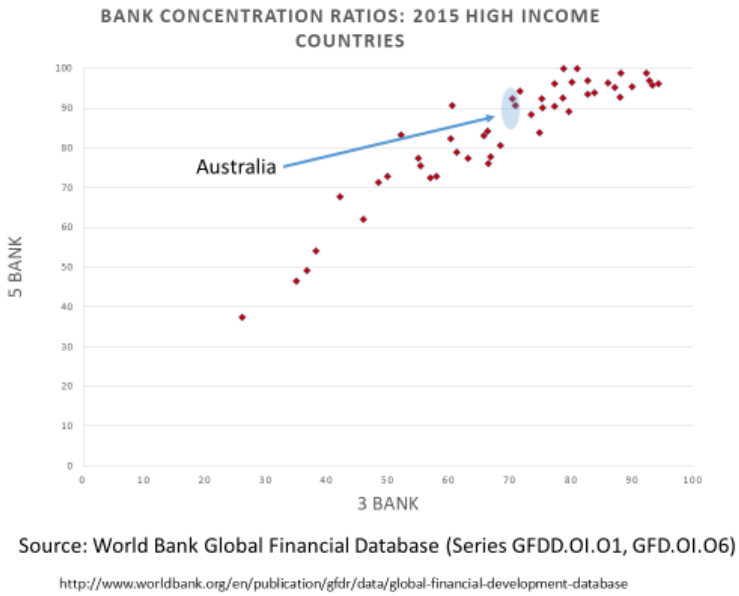
The essence of the argument of Hughes and Mester is that larger banks will have a superior risk-expected return frontier available to it than smaller banks because of increased diversification which also enables lower resource costs in achieving a specific level of risk. If a larger bank takes advantage of that difference by adopting a strategy with higher expected returns and lower risk, then average costs will tend to be lower for larger size (the economies of scale effect). But their optimal strategy could be to target a higher level of risk consistent with a higher expected return, but implying higher costs associated with management of that risk. This would lead a simple comparison of costs and output to lead to a conclusion of diseconomies of scale which is incorrect because the higher costs of the larger bank reflect a higher expected return. It is thus necessary to incorporate managerial preferences regarding risk-taking into the analysis, and incorporate determinants of risk - including capital structure choices.

[15] This involves regressing log of total cost on a function of log of output and log of input prices

Hughes and Mester identify significant differences in relevant characteristics between banks in different size categories (for US banks using 2007 data). They show that incorporating differences in equity capital ratios, by itself, into a standard cost function does not negate the traditional view of no economies of scale for larger banks. But when cost functions which incorporate differences in the risk-expected return trade-offs are allowed for, substantial economies of scale are found for large and very large banks.

The economies of scale issue is an important one in considering whether concentration in the banking sector is a natural outcome of cost differentials. That in turn has significant policy considerations of two sorts. One is the effect on the level of competition in banking and potential for excess profits for larger banks and the sub-optimal resource allocation associated with imperfect competition. (On the other hand, the benefits from lower production costs may outweigh the distorting effects). The second is the impact on financial stability – and there is a large, but inconclusive, literature examining whether more concentrated banking systems exhibit more or less financial stability.

Banking sector concentration is a world-wide phenomenon as shown in Figure 14.



Source: World Bank Global Financial Database (Series GFDD.OI.O1, GFD.OI.O6)

http://www.worldbank.org/en/publication/gfdr/data/global-financial-development-database

FIGURE 14: WORLDWIDE BANKING SECTOR CONCENTRATION

Inchauspe & Cronje (ER, 2020) is a recent study of concentration in Australian banking. They estimate a system of demand and adjusted marginal cost conditions which incorporates a parameter allowing inferences to be made regarding use of market power. For the period 2004-2017 they suggest that there is a fairly competitive environment, and that the BankWest acquisition by CBA had a minor negative effect on competition.

X-Efficiency in Banking

The term "X-efficiency" was introduced into the economics literature by Leibenstein (AER, 1966) and refers to the extent to which organisations operate at less than maximum efficiency. It has led to a plethora of studies attempting to determine the extent to which that happens and, if so, why.

In the area of banking there have been two main types of studies. (They differ from economies of scale and scope studies which tend to implicitly assume efficient, cost-minimising, production). One uses "frontier regressions". The other uses a technique known as "Data Envelopment Analysis (DEA)".

The frontier regression approach estimates, for example, a standard cost function relationship but with the constraint that observations must lie on or above some efficient (albeit, *a prior* unobservable) frontier. By making specific assumptions about the regression error term such a constraint can be incorporated (although other random effects can be allowed for which permit some observations to lie below the frontier).

The DEA approach has its origin in linear programming and is suited to situations in which the entities (Decision Making Units (DMUs) is a common term) being studied produce a range of outputs with a range of inputs. Using observations from a number of entities, the approach determines (via an optimisation method) the frontier of maximum output combinations that can be achieved using a least cost combination of inputs. If a particular entity was on the frontier, it would have an efficiency score of unity, while those within the frontier would have a score reflecting distance from the frontier. Figure 15 illustrates for the simple case where banks (each represented by the stars) produce varying combinations of outputs X and Y per unit of the one input used in production. The output combinations of banks A, B, C and D define the "efficient frontier" (such that those banks have an efficiency score of 1. The efficiency scores of other banks, such as E and F, are determined by how far inside the frontier they lie (on the ray from the origin through their output combination to the frontier).

A range of different DEA approaches can be adopted, and the approach allows for multiple inputs and outputs. This immediately leads to the question (relevant for the stochastic frontier regression approach also) of what are the inputs and what are the outputs of a bank. Most studies use the *intermediation approach*. There is a plethora of studies, including of Australian banking and ADIs. Among the best known are Sathye (JBF, 2001), Avkiran (JBF, 1999). A more recent example is Moradi-Motlagh (EM 2015) who argue that efficiency declined after the GFC. They also argue that their results indicate that small banks operate in an increasing returns to scale region, but that this is not so for large banks.

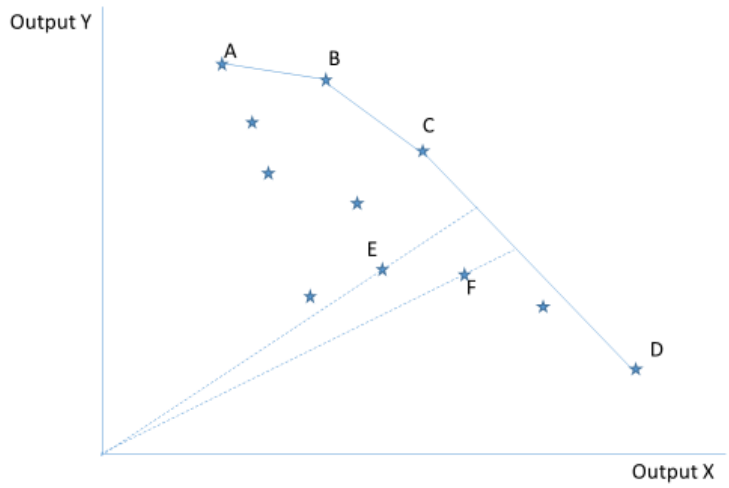


FIGURE 15: MEASURING EFFICIENCY

Bank Profitability

The profitability of Australia's major banks has occasioned much debate over recent decades. As the figure shows, the accounting return on equity (ROE) was in the mid to high teens for much of the first half of the decade commencing in 2010. But has since fallen to around 10 per cent and lower in 2020 reflecting lower interest rate levels and the Covid-19 crisis. Whether these levels reflect "monopoly profits" at a time when interest rate levels have moved to near zero is a matter of some debate. A CAPM analysis of required returns for such entities with systematic risk betas of around unity, and a market risk premium of, say, six per cent would suggest that expected returns should be substantially below 10 per cent. However it should be noted that the figures above are accounting rates of return based on book value of equity. Given market to book ratios for bank equity still significantly above unity (although less than in earlier years), such that scaling by the M/B ratio is relevant, the difference may be somewhat exaggerated.

FIGURE 16: MAJOR BANK PROFITABILITY (SOURCE: KPMG 2019)

One recent study of Australian bank performance (an earlier study is Kirkwood and Nahm (ER, 2006)) is by Hoang et al (ER, 2020),. They examine 73 ADIs over 2000-15, considering NIM, ROE, Tobin's Q

ratio (Q) and an economic value-added ratio (EVAR) as measures of performance. They regress the measures of performance on its lagged value, measures of market structure (concentration), market power (Lerner index), measures of bank efficiency and control variables for bank, industry and macroeconomic characteristics. Their results suggest diseconomies of scale for the four major banks, perhaps supporting the Four Pillars policy and "the conclusion that 'the banking sector is competitive, albeit concentrated' drawn by the 2014 financial system inquiry may be supported by the empirical evidence of this study."

APPENDIX 1: The Residual Income Model

This short appendix demonstrates the mathematical equivalence of the Residual Income Model to the more familiar Dividend Discount Model (DDM) for share market valuation. Starting with the DDM, it uses the fact that the book value (BV) of shareholder equity will increase by the excess of earnings (e) over dividends (d) paid out in that period. (There are specific assumptions about the accounting principles involved, generally referred to as "clean surplus" accounting, whereby all profits and losses are assumed to be recorded in the income statement and directly affect shareholders funds (book value). In practice, some valuation adjustments can be added, or subtracted from, shareholders funds, without being recognised in the income statement). The algebra simply involves using the second equation to substitute for d_t in the first equation, and then writing out the summation in full and manipulating that.

$$MV_0 = \sum \frac{d_t}{(1+r)^t}$$

$$BV_t = BV_{t-1} + e_t - d_t.$$

$$MV_0 = \sum [\frac{e_t}{(1+r)^t} + \frac{BV_{t-1} - BV_t}{(1+r)^t}]$$

$$MV_0 = \sum \frac{e_t}{(1+r)^t} + \frac{BV_0}{(1+r)} - \frac{BV_1}{(1+r)} + \frac{BV_1}{(1+r)^2} - \frac{BV_2}{(1+r)^2} + ...$$

$$MV_0 = \sum \frac{e_t}{(1+r)^t} + BV_0 - \frac{rBV_0}{(1+r)} + \frac{BV_1 - (1+r)BV_1}{(1+r)^2} + ...$$

$$MV_0 = \sum \frac{e_t}{(1+r)^t} + BV_0 - \sum \frac{rBV_{t-1}}{(1+r)^t}$$

$$MV_0 = BV_0 + \sum \frac{e_t - rBV_{t-1}}{(1+r)^t}$$

APPENDIX 2: Bank Deposits as an Option

A useful way of thinking about some key features of banking is to draw on option pricing theory (although this also disregards many important features of banking).

Consider a one period scenario in which depositors provide a bank with funds D = $90 in return for a promised repayment $D(1+r_D)$ at the end of the year, where r_D is the promised rate of interest. The bank uses deposits and own equity funds E =$10 to invest in assets (loans) costing A = D+E =$100 which promise an interest return of r_A and thus a total repayment of $A(1+r_A)$ at the end of the year. It's accounting balance sheet is shown below.

Assets		**Liabilities**	
Loans	100	Deposits	90
		Equity	10

The current "mark to market value" (ie present value) of the loans (A) may differ from their cost (D+E) reflecting market power of the bank. The assets are risky – repayment may not happen, or only be partial. Assume that the loans and deposits have a one year maturity (ie ignore maturity transformation by the bank and thus liquidity risk issues), and ignore bank operating costs. Assume the promised interest rate on deposits is $r_D = 0.05$, such that amount promised to depositors is 94.5, and the contractual loan interest rate is $r_A = 0.10$. For simplicity we ignore the bank's operating costs.

The promised loan repayment = 110, but allowing for the probability of full or partial default, assume the expected loan repayment is 109. Reflecting the risk involved in the loan we assume the bank requires an expected rate of return on the loan of 7% (0.07) for the loan to have a zero NPV. Given the contractual loan rate and expected repayment, the loan has a positive NPV to the bank – the mark to market value (A_{MV}) is A_{MV} = 109/1.07=101.9, for an NPV of 1.9.

We can identify two possible end of year outcomes. If loan value (repayment) is: (a) >94.5, depositors get promised repayment of 94.5; (b) <94.5, bank is liquidated, shareholders get nothing and depositors get the value of loan. These outcomes are shown in Figure 17.

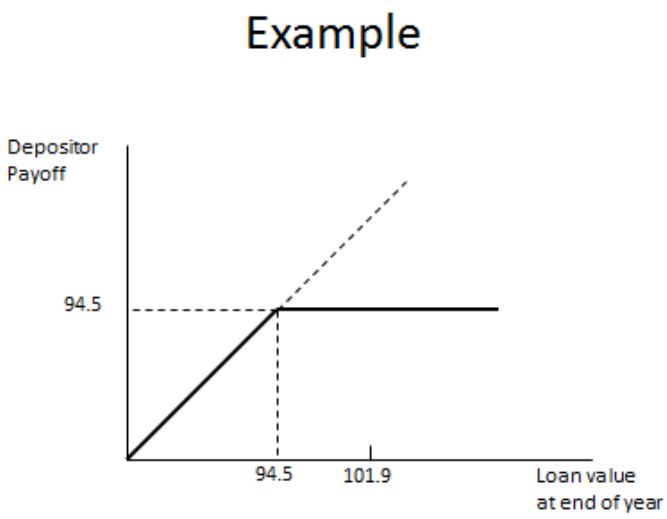


FIGURE 17

As the figure makes apparent, we can think of deposits as equivalent to depositors having made a risk free investment of 94.5 but also having written a put option over the bank's assets. The put option gives the bank owner's the right to put the assets of the bank to the depositors at a price of $94.5. At the end of the year, if A> $D(1+r_D)$, the "strike price", the put option is not exercised by the bank and depositors receive $D(1+r_D)$ = $94.5. But if A < $D(1+r_D)$ depositors receive A (the bank is in liquidation and, effectively, the assets are put to the depositors in exchange for bank not paying the amount owed ($D(1+r_D)$ which is the strike price). These outcomes can be expressed as:

Depositor Payoff = Min [A, $D(1+r_D)$] = (as shown below) = $D(1+r_D)$ – Max [$D(1+r_D)$ - A, 0]

Min [A, $D(1+r_D)$] = Min [A - $D(1+r_D)$,$D(1+r_D)$ - $D(1+r_D)$] + $D(1+r_D)$ = Min [A - $D(1+r_D)$,0] +$D(1+r_D)$

= - Max [$D(1+r_D)$ – A, 0] + $D(1+r_D)$ = $D(1+r_D)$ - Max [$D(1+r_D)$ – A, 0]

This is equivalent to making a risk free investment promising $D(1+r_D)$ and a written put option over assets of the bank with a strike price D(1+rD) as shown in Figure 18.

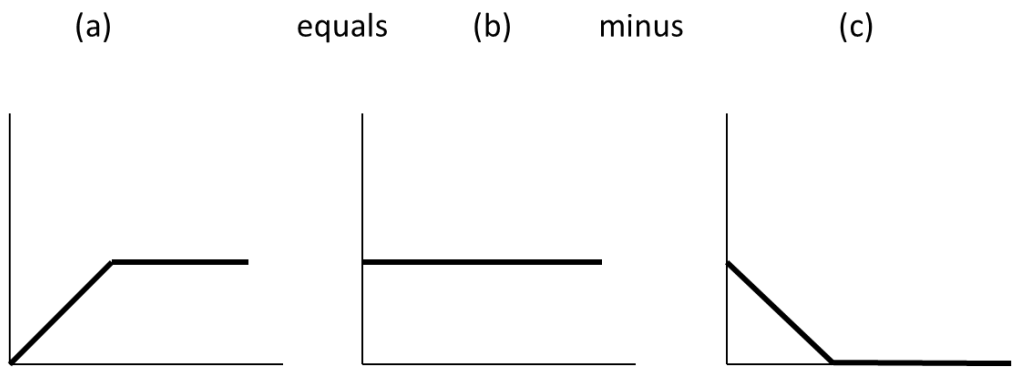


FIGURE 18

From the Bank shareholder (owner) perspective (drawing on put-call parity), owners have a portfolio comprising: (i) Assets (loans made); (ii) Liability: promise to pay $D(1+r_D)$ to depositors; (iii) Option to put assets to depositors at strike price of $D(1+r_D)$. Exercise of the option implies default on promise.

Equivalently, using Put –Call Parity, the owners' equity in the bank is equivalent to having a call option over the assets of the bank with a strike price equal to promised deposit repayment:

Long Call = Long Put + Long Asset – Short Risk free asset promising strike price

Insights from the Option Perspective

Informed depositors, who recognise the risk, would adjust the interest rate demanded such that $D(1+r_D)/(1+r_F) - P = D$, ie they would adjust r_D such that the present value of a risk free deposit promising r_D minus the value of written put option (P) equals the amount deposited (D).

If depositors do not adjust r_D to reflect risk, the bank receives cash amount of deposit D in return for a promise which has fair (present) value less than D.

Even if r_D does reflect the perceived risk at the time the deposit is made, a moral hazard problem exists. The bank owners can, after the deposits are made, increase the value of the call option they possess in several ways. One is to invest in higher risk assets, and charging a correspondingly higher loan interest rate, than originally expected to be the case. They get the upside of a higher loan return when the loan does not default, whereas if the loan payoff is below the amount promised to depositors, their payoff remains at zero. A second method is to reduce the amount of their own equity invested in the bank and replacing it with further deposits (higher leverage).

Of course, if depositors have the right to withdraw deposits at call, and can observe the bank's subsequent actions, they can protect themselves from such wealth transfers by threat of withdrawal of deposits. In practice, they are unlikely to be able to observe such risk-increasing actions and regulation instead provides some form of protection by linking capital requirements to the riskiness of bank assets.

The option approach (modified to reflect more complicated situations, and drawing on option pricing theory) can be used to examine issues such as testing whether more risky banks pay higher interest rates on their deposits.