This doctoral dissertation investigates the regulatory environments in both Australia and Canada, comparing the components of bank balance sheets that provide insights into funding preference, liquidity positions and early indicators of procyclicality within the banking sector. Analysis is undertaken to assess how recent regulation has impacted the way commercial banks can now fund their balance sheets and hold liquid assets in order to identify potential balance sheet solutions that promote capital and liquidity efficiencies or may contribute to liquidity stress. The ‘evergreen’ methodology is identified and described as a solution for both transforming bank balance sheets under Basel III and furthering their ability dealing with liquidity stress.
Declaration

I declare that this doctoral dissertation has not already been submitted for any degree and is not being submitted as part of candidature for any other degree.

I also declare that the doctoral dissertation has been written by me and that any help that I have received in preparing this doctoral dissertation, and all sources used, have been acknowledged in this doctoral dissertation.

I retain all copyright and intellectual property relating to this doctorate and give consent for the final version of my dissertation to be made available worldwide when deposited in the University’s Digital Repository, subject to the provisions of the Copyright Act 1968.

Nathan John Gooley
Acknowledgements

I gratefully acknowledge the selfless support of my partner Toni. Her unwavering encouragement helped me maintain discipline and focus, ensuring I consistently sustained inspiration for my doctoral research. I would also like to thank my immediate family members, John, Sylvia, Andrew and Mitchell, who, along with Toni, deserved much more of my time and attention over the past (nearly) six years. I love you all very much and now look forward to refocusing my attention to each of you, as it is you that matter the most.

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My deep gratitude also extends to Daniel Moses, Colin Roden and Alexandra Holcomb of Westpac Banking Corporation for their valuable advice and support at different stages of my doctoral study. Without them this research, including the commercialisation of my evergreen methodology, would not have been possible. Particularly I would like to thank both Daniel and Colin for generously sharing their rich experiences and insights, which provided a depth to this doctorate that would otherwise not have been achieved.

Finally, I acknowledge my supervisor Dr Sajid Anwar for his efforts and duly express my thanks.

The financial support provided by Westpac Banking Corporation is thankfully acknowledged. I wish the organisation, and others, success in their adoption and continued use of my evergreen innovation.
Abstract

Government mandated institutions in Australia and Canada have continuously progressed banking regulation throughout time by making gradual alterations to prudential frameworks and supervisory practices. This has included the prompt domestic adaptation of the three Basel accords. A main objective is to ensure banking organisations become more resilient to stresses that impact their capital and liquidity adequacy. Banking organisations are faced with the task of transforming their balance sheets and funding profiles to not only strengthen their balance sheets but to curb heightened liquidity costs that have been brought on by regulatory reform.

A review of existing literature on the components of bank funding, liquidity and procyclicality recognises their significance in ensuring individual bank stability and the prevarication of broader systemic implications in the wider economy. This dissertation has examined the historical evolution of the regulatory environments in both Australia and Canada and compared the components of bank balance sheets that offer insights into their funding preference and liquidity holdings, and provide early indicators for procyclicality within the banking sector. It has also had the goal of developing existing research and knowledge of liquidity stresses within bank balance sheets.

This research has endeavoured to further balance sheet innovation, through action research that has been carried out over a five year period, to provide banking organisations with options to alter their balance sheets in order to meet the Basel III package of reforms and better deal with liquidity pressures, such as those that were evident in many countries throughout the most recent financial crisis. A new methodology for balance sheet transformation under Basel III, “evergreen” is articulated, with a suite of evergreen asset and liability products and balance sheet exposures being assessed for impact and acceptance within the banking industry. Verification of the evergreen method is demonstrated by the banking industry including it within their strategy for future balance sheet innovation; banks designing and constructing evergreen capability; the regulator encompassing it within
prudential standards; and widespread acceptance of evergreen by investors and other financial market participants.

Whilst components of evergreen are increasingly becoming a greater part of the banking industry within Australia, it is recognised that the concepts and models of evergreen, are at a primary juncture in their development and require substantial additional focus and research. The usefulness of this dissertation will be established through the particulars of future research settings and must be appraised to the degree that it appears correct, original and apt.

Regarding deposits, this dissertation finds that: the existence of voluntary deposit insurance schemes would allow the competitive landscape for retail deposits to become about more than just price; operational deposits are not immune from procyclical competition; Australian banks have a much greater appetite and tolerance for at-call deposit raising; liquidity regulation has permanently shifted the ‘market rate’ for deposit funding above its ‘natural rate’; and foreign currency deposit raising may lead to banks running unhedged positions or developing a larger reliance towards United States Dollars.

For wholesale funding, it is observed that: liquidity regulation has increased the reliance of banks on domestic financial markets to fulfil their financing needs; the volume of short-dated prime bank paper being issued in Australia has declined where there are consequences for the Bank Bill Swap Rates; and large differentials in the semi/quarterly spread can substantially impact the profitability of banking book products.

The domestic implementation of the Basel III package of reforms on liquidity in both Australia and Canada has, in many ways, imitated the historical approach taken towards bank capital regulation. This dissertation deducts that, as there is for capital, the concept of ‘regulatory’ and ‘economic’ liquidity now exists. Furthermore, regulation has introduced a predisposition to government bonds, which may have unintended consequences for both government sponsored issuers and bank investors. Finally, procyclicality must be monitored
and managed by the government sponsored institution tasked with the role of implementing monetary policy, rather than institutions that implement and enforce prudential regulation.
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<td>ABCP</td>
<td>Asset-backed Commercial Paper</td>
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<td>ADI</td>
<td>Authorised Deposit-taking Institution</td>
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<td>AFMA</td>
<td>The Australian Financial Markets Association</td>
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<td>APCA</td>
<td>The Australian Payments Clearing Association</td>
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<td>Australian Prudential Regulation Authority</td>
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<td>Bank Bill Swap Rates</td>
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<td>BCBS</td>
<td>Basel Committee on Banking Supervision</td>
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<td>Bills/OIS or FRA/OIS</td>
<td>The spread between the current BBSW or CDOR rate and the respective spot OIS rate in the respective currency</td>
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<tr>
<td>Economic Liquidity</td>
<td>The process where banks attribute liquidity to cover the economic effects of liquidity risk-taking activities</td>
</tr>
<tr>
<td>HQLA</td>
<td>High quality liquid assets</td>
</tr>
<tr>
<td>LCR</td>
<td>Liquidity Coverage Ratio</td>
</tr>
<tr>
<td>Liquid Asset Carrying Cost (LACC)</td>
<td>The cost that is associated with investing in eligible liquid assets, or HQLA securities</td>
</tr>
<tr>
<td>Liquidity Duration Funding Factor (LDFF)</td>
<td>The bank’s funding cost over the swap curve or the premium that the individual bank faces for raising funds a particular duration</td>
</tr>
<tr>
<td>NSFR</td>
<td>Net Stable Funding Ratio</td>
</tr>
<tr>
<td>OBS</td>
<td>Off-Balance Sheet</td>
</tr>
<tr>
<td>OSFI</td>
<td>The Office of the Superintendent of Financial Institutions</td>
</tr>
<tr>
<td>RBA</td>
<td>Reserve Bank of Australia</td>
</tr>
<tr>
<td>Regulatory Liquidity</td>
<td>The minimum amount of liquidity that banks must set aside to meet their prudential obligations</td>
</tr>
<tr>
<td>RMBS</td>
<td>Residential mortgage Backed Securities</td>
</tr>
<tr>
<td>RTGS</td>
<td>Real Time Gross Settlement</td>
</tr>
<tr>
<td>SIV</td>
<td>Structured Investment Vehicle</td>
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<tr>
<td>USD</td>
<td>United States Dollar</td>
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Chapter One: Introduction

Banks’ actions impact financial markets, the macroeconomic performance and economic development of nations, whilst influencing the apportionment of capital and the performance of non-financial firms and their industries (Berger, Demirgüç-Kunt, Levine, & Haubrich, 2004; Demirgüç-Kunt, Laeven, & Levine, 2004). As deposit-taking institutions, banks accept and subsequently allocate the savings of societies, support payments systems, offer working capital, trade and investment functions whilst suppling non-financial industries with contingent liquidity. Small customers can use banks to obtain funding when they have limited ability to source from other external avenues (Berger, Kashyap, & Scalise, 1995; Chava, Oettl, Subramanian, & Subramanian, 2013).

National regulators and international bodies therefore develop and subsequently impose prudential standards to manage and influence banks’ behaviour (Laeven & Levine, 2009), whilst central banks concurrently utilise open market operations as an intervention tool to alter banks’ balance sheets. Prudential standards typically have the objectives of promoting competition and efficiency; unassailability of bank operations; consumer protection; stability of the wider financial system; and for broader social objectives (Bernanke, 2006). Modern bank regulation is a function of its history, where regulators have made constant refinements throughout time and banks have subsequently adjusted their environments.

1.1 Research Problem

In recent history, international regulators have recommended the domestic implementation of large amounts of new bank regulation, which will inevitably have wide ranging consequences for domestic institutions and organisations, whilst impacting financial markets, capital allocation and the growth of industries. This regulation has directly targeted components of bank balance sheets, significantly altering the way by which banking organisations go about acquiring funding, conducting maturity transformation, structuring assets and holding liquidity. Although the economies of both Australia and Canada were far less impacted by
the global market turmoil that erupted in many financial centres in late-2007, their domestic regulators have been early adopters of many pieces international regulation. An evolved prudential environment provides a new lens for assessing the liquidity risk profile of banks in Australia and Canada to better understand how they may be able to safeguard their financial solidity during periods of instability.

Australian and Canadian banks are mandated to hold a specific proportion of liquid assets, which is a function of their exposures and the regulator’s runoff factor. The Liquidity Coverage Ratio (LCR) was implemented in its entirety in both Australia and Canada from 1 January 2015. Under the LCR, balance sheet exposures can be allocated a 0 per cent runoff factor until they fall within the 30-day residual maturity threshold. Once within the 30-day period, exposures must be included within a bank’s outflow considerations with corresponding holdings of unencumbered high quality liquid assets that match the runoff. This new prudential liquidity regulation has created the opportunity for balance sheet innovation. It incentivises banks to structure their balance sheets and develop liquidity risk management practices around the LCR’s constraints in order to attempt to economise on liquid asset holdings, which can be viewed as a tax on the deposit-taking institution (Gooley, 2013). Without innovation, there is a gap in banks’ traditional product offerings due to the liquid asset carrying costs these products incur under the LCR (Debelle, 2014b).

The potential for shortages in the available supply of qualifying high quality liquid assets in many currencies can mean that domestic governments and central banks may need to assist banks in satisfying their liquidity needs (Allen & Carletti, 2013). By implementing Basel III, the Australian and Canadian prudential regulators have introduced a predisposition to government bonds, which may have unintended consequences for both government issuers and banks in different ways.

Bank strategy setting and consequential balance sheet management is procyclical and regulators need to be aware of the financial variables that may impact bank capital and gearing throughout economic cycles (Landau, 2009). Australian and Canadian bank funding
preferences, liquidity profiles and balance sheet compositions need to be better understood throughout the business cycle.

1.2 Research Aim

This dissertation aims to assist banking organisations in becoming more resilient to stresses that impact their capital and liquidity adequacy. Specifically the research has the goal of representing the evolution of the liquidity risk profiles of Australian and Canadian banks, developing the existing research and knowledge of their funding preferences and liquidity holdings, whilst attempting to better understand procyclicality within both jurisdictions.

A primary objective of the research has been to postulate a substantive methodology for banks to transform their balance sheets and funding profiles to not only strengthen and transform their balance sheets but to curb heightened liquidity costs that have been brought on by Basel III regulatory reform.

1.3 Scope of Research

The scope of the research in this dissertation is focused towards the main factors that can contribute to liquidity stress and is therefore limited to the areas of bank funding (deposits, wholesale and secured funding); customer lending and liquidity facilities; liquidity considerations; and procyclicality. The chief jurisdiction of interest of this study is Australia where Canada is used for comparison and cross-reference. The use of comparative research in this study overcomes the risks of omitting associations, parallels and disparities that may not be present if Australia was solely explored. The Australian and Canadian deposit-taking institutions within this study are large, accounting for a significant proportion of the domestic financial assets within their respective jurisdictions. Action research has been focused towards balance sheet innovation given the regulatory constraints introduced by the Liquidity
Coverage Ratio (LCR), with findings to have direct relevance for banking organisations within other international jurisdictions that have, or are planning, to implement the LCR.

An examination of the potential implications of other regulation, components of banks’ balance sheets and jurisdictions are outside the scope of this dissertation. The inclusion of these factors and marketplaces would add further rules and constraints and enlarge the data collection requirement, making the study markedly longer. The principle findings would be primarily uniform. Finally, despite the fact that both the Australian and Canadian marketplaces are comprised by a number of smaller firms that make up the mutual or Credit Union and Building Society (CUBS) industries, these are not included in the sample due to: data availability; and a higher rate of firm consolidation over time; and the fact that these institutions comparatively make up small parts of the total financial markets in both jurisdictions. The dissertation also does not extend its scope to the securitisation, managed funds, general insurance and shadow banking sectors.

1.4 Overview of the Dissertation

The dissertation has a structure consisting of seven chapters.

*Chapter Two* provides a detailed examination of the literature pertaining to the theories of bank regulation including institutional theory, which is the chosen theoretical framework directing the logic of this study, followed by the free banking and dual banking theories. The remainder of the chapter analyses all of the literature covering the aspects bank funding, liquidity and procyclicality that are of consideration to both regulators and bank management in their operation of deposit-taking institutions and consideration of the factors that can create liquidity stress. This includes the literature on main market structure determinants, deposits, wholesale funding, secured funding, intraday liquidity, and the non-liability drivers of liquidity. It highlights the deficiencies of the current literature and provides a structure for designing future studies on bank funding and liquidity management in addition to liquidity stress.
Chapter Three affords a concise account of the research methods that are employed within the dissertation. As the study employs a mix of qualitative and quantitative research methods, this chapter provides clarity on the structure and sequence of the utilised methods in order to accomplish the research objectives.

Chapter Four is divided into three parts, examining the components of bank balance sheets that can produce liquidity stress. Bank funding, liquidity and procyclicality are each examined over time where the results to the analysis are exhibited.

Chapter Five presents the findings to the analysis conducted in the previous chapter.

Chapter Six presents the evergreen methodology, providing thorough descriptions of the results to this dissertation’s action research.

Chapter Seven concludes the dissertation with future research areas being described.

Finally, a meticulous historical account of the evolution of banking regulation in Australia and Canada has been carried out, where findings are detailed within Appendix One and Appendix Two respectively. An overview of the three main components of Basel III that influence bank funding and liquidity can be found in Appendix Three.
Chapter Two: Review of the Literature

Banks’ actions impact financial markets, the macroeconomic performance and economic development of nations, whilst influencing the apportionment of capital and the performance of non-financial firms and their industries (Berger, Demirgüç-Kunt, et al., 2004; Demirgüç-Kunt et al., 2004). As deposit-taking institutions, banks accept and subsequently allocate the savings of societies, support payments systems, offer working capital, trade and investment functions whilst suppling non-financial industries with contingent liquidity. Small customers can use banks to obtain funding when they have limited ability to source from other external avenues (Berger et al., 1995; Chava et al., 2013).

National regulators and international bodies therefore develop and subsequently impose prudential standards to manage and influence banks’ behaviour (Laeven & Levine, 2009), whilst central banks concurrently utilise open market operations as an intervention tool to alter banks’ balance sheets. Prudential standards typically have the objectives of promoting competition and efficiency; unassailability of bank operations; consumer protection; stability of the wider financial system; and for broader social objectives (Bernanke, 2006). Modern bank regulation is a function of its history, where regulators have made constant refinements throughout time and where banks have subsequently evolved within their environments.

Bank strategy setting, and consequential balance sheet management, is procyclical and regulators need to be aware of the various financial variables that may impact bank capital and gearing throughout economic cycles (Landau, 2009). New liquidity regulation incentivises banks to develop liquidity risk management practices around new prudential accords in order to attempt to economise on liquid asset holdings, which can be viewed as a tax on the deposit-taking institution. There is the potential for shortages in the available supply of qualifying high quality liquid assets in many currencies, thereby requiring domestic governments and central banks assess the need for assisting banks in satisfying their liquidity prerequisites (Allen & Carletti, 2013).
This chapter details a literature review in parts. It commences with a detailed examination of the literature pertaining to the theories of bank regulation including institutional theory, which is the chosen theoretical framework directing the logic of this study, followed by the free banking and dual banking theories. The remainder of the chapter analyses all of the literature covering the aspects bank funding, liquidity and procyclicality that are of consideration to both regulators and bank management in their operation of deposit-taking institutions and consideration of the factors that can create liquidity stress. This includes the literature on main market structure determinants, deposits, wholesale funding, secured funding, intraday liquidity, and the non-liability drivers of liquidity. It highlights the deficiencies of the current literature and provides a structure for designing future studies on bank funding and liquidity management in addition to liquidity stress.

2.1 Theories of Bank Regulation

This section contains a discussion of the guiding theories of bank regulation that have been evidenced throughout time. These theories have each influenced the way with which banks fund their balance sheets and consequently hold liquid assets. A detailed analysis of institutional theory, which is the specific framework used in this dissertation, begins the section and it is followed by overviews of the free banking and dual banking theories of bank regulation.

2.1.1 Institutional Theory

Institutional theory “considers the processes by which structures, including schemes, rules, norms, and routines, become established as authoritative guidelines for social behaviour” (W. R. Scott, 2005, p. 460). Institutions themselves are broad structures that can be impervious to change, operating to provide stability across time and generations as a consequence of regulative, normative and cultural-cognitive beliefs (Hall & Taylor, 1996; Jepperson, 1991). Activity is arranged by institutions whose broad logics are postulated, or taken for granted (Hallett & Ventresca, 2006). Borders are defined by institutions with
societal, moral, legal and cultural sanctions necessary to provide clout for norms, routines and conventions to be effectual (Sewell, 1992).

Institutionalisation occurs within an organisation with time, depicting its history, groups and their vested interests, and how the organisation navigates its own environment (Hallett & Ventresca, 2006). An organisation is less likely to be institutionalised when it has clear objectives or more advanced technologies (Selznick, 1957). Rather than being rational, organisations can be conduits that embody values (Perrow, 1961). Influential individuals are dedicated to perpetuating particular interests or values and whilst those who hold those values maintain positions of sway, their commitments can be sustained (Stinchcombe, 1968). Individuals within institutions can often follow schemes, rules and routines so rigidly that it inhibits the organisation realising its objectives (Merton, 1940).

Institutions are “legitimised by its connections to the main normative structures within societies” and “implement the values” of societies (Parsons, 1960, p. 21). Banking organisations are legitimised by society when their objectives are correlated to broader cultural ideals, such as by addressing information asymmetry between borrowers and depositors and managing maturity mismatches, in addition to how well they follow established operational models postulated for banking organisations. Organisations that fulfil more appreciated values will occupy a greater amount of a society’s resources and will ultimately be deemed more legitimate (Parsons, 1953).

There is an expectation for individuals, who become part of an organisation, to embrace the rules, norms and routines of that organisation when taking actions. Organisational values constrict an individual’s decisions, making their behaviour rational (Simon, 1997). As described by W. R. Scott (2008, p. 25), “value assumptions, cognitive frames, rules and routines are the ingredients that lead individuals to behave rationally”, where performance programmes direct this conduct (March & Simon, 1958).
Neoinstitutional theory in economics analyses “the origins of cultural, political and legal frameworks and their effects on economic forms and processes” (W. R. Scott, 2001, p. 31). Under neo-classical theory, institutional constrictions are an additional, humanly fabricated limitation that also confine decisions or choices (North, 1989a). Within neoinstitutional economic theory, learning by agents contributes to a process of continuous micro and macroeconomic policy alterations, evolving the economic system and gradually changing institutional structures (Knudsen, 1993). The institutional structures mould the incentive arrangements that exist within a society, helping to shape economic performance (North, 2000).

Through institutions, individuals can maintain economic, social or political stability and moderate doubt in transactions. In combination with utilised technology, costs of transaction and production, the ultimate viability of participating in economic activity can be determined by institutions through incentive arrangements that guide both economic and political action (North, 1989a, 2000). Institutions offer formal frameworks or regulations, informal controls in addition to providing their oversight and enforcement, which subsequently act as institutional constraints to individual behaviour (North, 1968, 1989b). Informal socially or self-imposed rules and responsibilities that characterise a society are an additional facet that impact economic activity and market-mediated transactions (W. R. Scott, 2008). Stability can be offered by institutions if, in their function, they stifle the impact of relative adjustments in prices (Williamson, 1994).

Institutional evolution is an important factor when evaluating economic history (North, 2000). Through time, organisations will attempt to adapt and change so that their routines and capabilities are best suited to prevailing environments (Nelson & Winter, 1982; Winter, 2005). Importantly, organisations can be seen as historical establishments that develop capabilities and routines through their experiences (Knudsen, 1995).

Historical institutionalism holds its focus at a macroeconomic level, concentrating on big questions that involve a combination of institutions, occurrences or processes. Justifications are contextual, being influenced by institutional circumstances, being bound by certain
periods in time (Pierson & Skocpol, 2002). Historical institutionalism does not advocate for a particular form of institutional theory, however, it relies on historicist causation (Stinchcombe, 1968).

Historical research is required to discover the reasons for institutional origination and to explain their evolution, current purpose and policy persistence (Amenta & Ramsey, 2010). The authority and resilience of institutions, and their political actors, demonstrates the extent that they are instilled within a society and have access to its resources (Clemens & Cook, 1999).

Institutions confine and control conduct through the development, monitoring and enforcement of rules and regulation. These rules can come in the shape of formal statutes in addition to unwritten codes of conduct. Social behaviour will be encouraged and constrained by individual institutions, through surveillance and sanctioning that accompanies sentiments of self-reproach or virtuousness (W. R. Scott, 2008). The monitoring and enforcement function played by institutions can be costly however, it is critical to the execution and fulfilment of contracts and relevant inventive schemes (Robbins, Judge, & Millett, 2011).

Institutions, through normative systems, impose constraints on social behaviour through normative rules that establish a prescriptive, evaluative and mandatory facet into social existence, which also encourage and support social action. Both values and norms make up normative systems (W. R. Scott, 2008) and, when they are common throughout a society, they form the foundation for steady social order (Stinchcombe, 1997).

Individual’s actions are a function of their understanding and representation of social reality. Compliance with institutional norms results as individuals may perceive alternative behaviour as implausible or alternatively, because it may be routine conduct (W. R. Scott, 2008). Therefore, it can be said that institutions provide scripts for action (DiMaggio, 1997; DiMaggio & Powell, 1983).
The institutional paradigm has been frequently used by scholars in a number of ways by blending or juxtaposing it with other theories to explain the action of organisations and individuals. Whilst the range of the theory has grown, it has been often argued that a significant limitation is that it has mainly been employed to support both the persistence and the homogeneity of phenomena, thereby reducing the whole potential of the theory (Dacin, Goodstein, & Scott, 2002). Institutions will evolve with time and it has been argued that institutional theory is limited in its ability to describe phases of change (Thelen, 1999) or the development of institutions (Peters, 2012). Furthermore, Steinmo (2008) makes a case that institutional theory considers the institution as a static variable meaning that it is limited to describing what is not feasible rather than what is actually feasible in an institutional situation.

2.1.2 Free Banking Theory

Under a free banking regime, deposit-taking institutions are predominately unregulated. There are no regulatory restrictions relating to opening and operating bank branches; limited barriers to entry; no balance sheet restrictions pertaining to how funding is obtained and structured; no liquid assets or reserve holding requirements; no gearing or liquidity ratios; or constraints on the amount of credit risk that can be written (Dowd & Hutchinson, 2010; Hickson & Turner, 2002; Merrett, 1989). A free banking market may also lack a governmental agency fulfilling the role of a central bank or providing a deposit insurance scheme or guarantee (Selgin & White, 1994), however, there may be the presence of mutual assistance schemes (Hickson & Turner, 2002, 2004). Therefore, bank management will ultimately determine how the bank will operate and interact with other counterparts and customers within the broader marketplace; regardless of the risks that their operations may generate for depositors, creditors, shareholders or financial markets (Dow, 1996).

Those who advocate for free banking theory argue that the governance and regulation of banks creates instability within banking systems and financial markets, rather than unregulated banking systems themselves being the cause of the volatility. It is further
contended that the probability of default of unregulated banking systems is low (Dowd, 1989, 1992, 1993; Dowd & Hutchinson, 2010; Selgin, 1989; White, 1992).

2.1.3 Dual Banking Theory

Dual banking systems occur where there is “the simultaneous existence of different regulatory options that are not alike in terms of statutory provisions, regulatory implementation and administrative policy” (K. Scott, 1977, p. 41).

Supporters of dual banking systems contend that they provide deposit-taking institutions with the opportunity to change the set of prudential standards by which they are governed. Dual banking systems protect commercial banks from “the extension of harsh, oppressive, and discriminatory supervision to institutions without recourse to alternative arrangements” (Brown, 1968, p. 12). This argument supports bank managements’ ability in determining the value of prudential standards rather than the view of what should be an independent regulator, or supervisory body, that is commissioned with the task of protecting depositors’ investments within the bank. Criticism can be levelled towards this argument if the regulator is attempting to achieve a better result for society through the extension of certain regulation. Deposit-taking institutions, like any corporate enterprise, could change their charter in the attempt to maximise the banks equity value if it believes that additional future profits could result. Banks should not be given an opportunity to attempt to maximise shareholder value if it is at the expense of depositors, the health of the banking system and stability of financial markets. Moreover, the argument ignores the paradigm of agency theory where management are charged by banks’ shareholders with full accountability for administering the firm (Friedman, 1970; Jensen, 2010; K. Scott, 1977).

Dual banking structures provide state regulators with the opportunity to try new types of regulation on banks in the areas of bank powers, structures and consumer protection. Banking regulators may be influenced by a desire to attract banks to take up state banking charters, designing standards to achieve this feat. There is a risk that regulators could reduce
regulatory standards due to competition for charters. If the number of banks under their supervision falls, regulators not only risk losing government funding but their significance as a body would be reduced (Abbott, 2005; Blair & Kushmeider, 2006; Smith, 2003).

In markets where the central bank assumes the role of regulatory watchdog, banks have been found to have higher amounts of non-performing loans. Where there are multiple supervisory agencies, banks have been shown to display lower holdings of capital reserves whilst running greater liquidity risks (Barth, Dopico, Nolle, & Wilcox, 2002).

The National Banking Act, ratified in 1864 in the United States of America, created a dual banking system allowing deposit-taking institutions to either operate under state or federal charters, meaning banks would be subject to the prudential standards of respective regulators (Mitchener, 2005; Rauch, 2010). Following the introduction of the National Banking Act, government authorities throughout the USA have enacted regulation, containing rules that differ significantly, especially relating to prudential standards that concern branching; providing appropriate monitoring powers to supervisors; setting appropriate terms in office for supervisors; granting banking charters; shielding supervisors from lobbyists; setting principles for banks on liquidity and capital buffers; and whether a process is available to liquidate banks outside of the court system. Furthermore, it has been found that legislators have often passed new banking laws if there was evidence of banking instability to protect depositors’ interests, whilst state and national regulators have contested for the membership of banks within their span of control by providing differing types of prudential standards that may suit banks’ interests (Anari, Kolari, & Mason, 2005; Martimort, 1999; Posner, 1974; Stigler, 1971; Wacht, 1968; Wheelock, 1993; White, 1992).

The external economic events of the Great Depression cannot alone explain the high rate of bank failures across the USA and it is argued that the dual banking system contributed to financial market instability through inconsistent regulation. In most states of the USA, banks operating under a state charter experienced higher failure rates when compared to their nationally chartered counterparts (Carlson, 2010; Mitchener, 2005; Wheelock, 1993). Dual banking produced differences in market structure, providing an explanation for banking
failures that were not unmistakably caused by deteriorating national income, the removal of liquidity from the market, or a lessened demand for credit created by diminished economic output. Inconsistencies in branching laws within many states of the USA led to unit banking structures, where banks were restricted in their ability to operate multiple branches across various geographical regions (Wacht, 1968). Canada, which faced similar economic turmoil to the USA, permitted branching, however, it has been argued that this market structure helped prevent bank failures, although many Canadian banks were insolvent at a particular interval during the Great Depression (Kryzanowski & Roberts, 1993).

2.2 Bank Funding and Lending Facilities

2.2.1 Deposit Funding

2.2.1.1 Insured Deposits

Insured deposits are those covered by an explicit government guarantee or deposit insurance scheme. In some jurisdictions these arrangements may also be complemented by privately run deposit insurance schemes. The application of deposit insurance has varied throughout time and across international jurisdictions. The coverage of deposit product suites has differed and so too has volume caps or the types of customers that qualify for state protection of their deposit principal. The literature does not provide conclusive evidence of the runoff rates that a bank can assume for insured deposit pools, however, it is clear that presence of a government guarantee does not wholly remove the motivation for the customer to withdraw their insured deposit from a distressed bank (Iyer & Puri, 2008). The credibility or financial ability under macroeconomic conditions, of the government guarantor to indemnify depositors plays a critical role in balance stability and runoff rates (Angkinand & Wihlborg, 2010; Benston & Kaufman, 1994; Levy-Yeyati, Martínez Pería, & Schmukler, 2010).
It has been shown that banks can come to rely on a government guarantee of deposits when it is in place. This reliance enhances the possibility of a banking or financial market crisis developing, especially where the market structure is categorised by a soft institutional environment and interest rates are deregulated. The further that the government guarantee reaches, the greater the impact to banking stability, particularly where the guarantee is run and funded by the government instead of the private sector (Demirgüç-Kunt & Detragiache, 2002). During the most recent financial crisis, there is evidence that banks with lower capital adequacy ratios did not offer higher interest rates on deposits than their better capitalised peers and there are instances during 2009-2010 where these banks were even able to offer lower yields. The significant reason for this was that these banking firms were experiencing considerable declines in credit provisioning, lessoning their need for deposit funding during this period (Ben-David, Palvia, & Spatt, 2011).

### 2.2.1.2 Uninsured Deposits

There is consistency within the literature that deposits, which are not covered by an explicit government guarantee or insurance scheme, display higher runoff factors than their insured equivalents (Imai & Takarabe, 2011; Martinez Peria & Schmukler, 2001). In periods of stress, individual, business or trust account balances have been shown to withdrawn roughly three times as quickly (Davenport & McDill, 2006). Furthermore, it has been found that there are statistically significant correlations between the runoff factors of asset-backed commercial paper (ABCP) programmes and uninsured deposits (Covitz, Liang, & Suarez, 2013).

The market demands a greater yield premium from deposit-taking institutions where no government guarantee or insurance scheme exists, reflecting investors’ degree of risk intolerance (Acharya & Mora, 2013).
2.2.1.3 Core Deposits: Retail and Wholesale Deposits

Core deposits are bank liabilities that are principally rate inelastic, stable and are both sourced at a lower rate and reprice less frequently, when compared to other balance sheet liabilities, when interest rates increase. This deposit class therefore adds to banks’ organisational value. Generally, core deposits are those that are sourced from retail and small business customers rather than from wholesale customers. Banks obtain core deposits from customers who hold multi-product or alternative relationships with the bank. Within the Australian marketplace, these deposits can include transactional demand deposit accounts, time or evergreen deposits with small principal amounts that historically have provided banks with a stable source of funding, shielding it from funding cost volatility (Gooley, 2013). In the United States of America, core deposits include insured deposits or certificates of deposit, savings accounts, money market deposit accounts, negotiable order of withdrawal accounts, and automatic transfer service accounts. Consequently, higher proportions of core deposits allow banks to offer smoother interest rates on customer loans despite credit or liquidity volatility (Berlin & Mester, 1999).

Core deposits can reduce banks’ probability of default (Sheehan, 2013), lower its loss-given-default (Bennett & Unal, 2011), lessen the costs of resolution, and increase the price that is required to be paid for a failed banking enterprise (Osterberg & Thomson, 1995). There is a positive correlation between a bank maintaining lending facilities to a customer during periods of financial market stress and the presence of core deposits held at the bank by that customer (Cornett, McNutt, Strahan, & Tehranian, 2011).

Traditional ‘non-operational’ deposit products carrying short-dated contractual maturities, such as overnight at call investment accounts and time deposits, have historically been used by banks as core deposits due to their long behavioural lives. With the implementation of the Liquidity Coverage Ratio, the attractiveness of these deposits diminishes depending on the type or classification of the investor, rate elasticity, repricing frequency and customer yield. This is due to the outflow rates that will apply once there are less than 30 calendar days to maturity. Consequently, corresponding liquid asset carrying costs may be factored into the
returns and yields that are offered on deposit products that occupy banks’ liquidity (Debelle, 2014b; Ramirez, 2011).

Many core deposit products are revolving in nature, carrying no contractual maturity. This makes forming a valuation problematic as the bank holds the option to change interest rate on these products when they desire; depositors’ principal changes regularly throughout time; and many demand deposit accounts are linked to payables and receivables payment services. There is no consensus in how banks should best approach demand deposit valuation with various quantitative methodologies available (Entrop, Wilkens, & Zeisler, 2009). Replicating portfolio models analyse the optimal outcome where the available volume of demand deposits are invested into an asset portfolio (Frauendorfer & Schürle, 2006); the no-arbitrage discounted cash flow approach discounts “the expected cash flows from its payment schedule” (Dewachter, Lyrio, & Maes, 2006, p. 2); and the Kaplan–Meier estimator can be used to conduct survival analysis (Okechukwu, Ogbogbo, & Bilesanmi, 2013) to find the survival function, or behavioural maturity, of a portfolio demand deposits from a long running dataset.

### 2.2.1.4 Transactional Deposits

Banks offer transactional banking accounts to their customer base to allow them to effect their working capital and payment needs. Although the cost associated with offering on demand transactional banking accounts is expensive due from a liquidity standpoint, there is no perfect correlation between customer drawdowns on their lending facilities and their usage of their transactional balances. It is possible that customer transactional deposit balances may provide a natural hedge against wholesale commercial paper markets and undrawn committed lines of credit. In times of market stress or low liquidity, transactional accounts are shown to offer offsetting inflows, as long as the credit quality of the individual bank remains dependable and their liquidity demands are idiosyncratic (Diamond & Rajan, 2001; Gatev & Strahan, 2006). However, the offsetting action of lending facility drawdowns and customers holding greater amounts of transactional balances does not apply and is negatively correlated, when the deposits aren’t government guaranteed or covered by a deposit insurance scheme.
Deposit-taking institutions can use transactional demand deposits as a tool for monitoring changes in customer risk and behaviour (Gatev, Schuermann, & Strahan, 2009; Mester, Nakamura, & Renault, 2007).

2.2.1.5 Customer Relationships

The relationships that deposit-taking institutions develop with their customer base can greatly impact the stickiness of their liabilities. Well-established long-term multi-product relationships can add stability to banks’ liability profiles and elongate the behavioural maturities of deposits. Where a customer has a loan or line of credit from a bank, it has been demonstrated that there is reduced probability that the customer will withdraw their deposit holding from the bank in a liquidity stress event, even if the customer has no outstanding principal remaining on their loan (Berlin & Mester, 1999; Iyer & Puri, 2008). Customer deposit withdrawal will vary in situations where uninsured depositors are legally permitted to offset any deposits they hold with the bank against their outstanding loan principal. Where uninsured depositors have protection of an offset, customer deposit balances could be expected to halve, however in circumstances where uninsured depositors cannot access offset, customer deposit balances could be expected to fall by two-thirds (Davenport & McDill, 2006).

In developed countries, smaller deposit-taking institutions including community banks are found to provide banking services to the retail, or mass market, customer segments. This is in contrast to larger banks in developed countries who also service institutional customers (Avery & Samolyk, 2004; Deyoung, Hunter, & Udell, 2004; J. Scott, 2004; Stiroh, 2004). In the USA, larger banking institutions hold a smaller fraction of their assets in credit exposures, or loans, to smaller customers (Berger et al., 1995). Smaller banks, which have slighter organisational structures and communication channels, have been found to better quantify and utilise soft information, developing competitive advantages with smaller business customers (Berger, Demirgüç-Kunt, et al., 2004; Berger & Udell, 2002). Larger institutions hold briefer relationships, where they are less likely to be the sole-banker, often managing the client more remotely from a geographical perspective (Berger, Miller, Petersen, Rajan, &
Stein, 2005). Larger institutions that are more hierarchical, have access to leading technologies and advanced quantitative credit rating models have been observed to place a greater reliance on hard information when dealing with opaque customers as they are at a disadvantage to smaller banks in dealing with soft information (Keeton, 1995; Stein, 2002).

When the market structure is made up a large number of small or unit banks who transact locally, small businesses can become impacted to a larger degree and for a lengthier duration if the balance sheets of these banks are put under stress and other banks are not able to assume their chartered responsibilities (Petersen & Rajan, 2002). Regulators overseeing banks that operate in these market structures must be reactive to both local and national-level economic conditions (Kroszner & Strahan, 1999). Small businesses that hold close relationships with banks may be less likely to be liquidity constrained and more likely to be supported by their bank in periods of financial hardship (Hoshi, Kashyap, & Scharfstein, 1990). Although these relationships, regardless of their duration, have been found to result in inconsequential interest rate discounts charged on debt facilities. Even when the bank provides financial services to the business, small firms with multiple banks pay higher borrowing margins (Petersen & Rajan, 1994).

2.2.2 Wholesale Funding

Wholesale funding encompasses various short-term and long-term debt products issued by deposit-taking institutions in domestic and international retail and wholesale markets. Each issuance can be structured with different features differing by its denominated currency, duration, optionality, security or amortisation schedule. This component of bank funding provides an avenue for the diversification of balance sheet liabilities and, when part of a pragmatic liability management strategy, will assist the bank in developing and maintaining a robust funding profile. Wholesale funding can also provide banks with a price appealing method of lowering its overall cost of funds (Debelle, 2014a).
Investors in short-term debt products have less motivation, compared to longer-term investors, to analyse the institutions that they are investing in at a granular level and may rely on market sentiment and public rating agencies when deciding to hold an organisation’s securities (Altman, Gande, & Saunders, 2010; Huang & Ratnovski, 2011).

The recent financial market crises highlighted that banks can place too much reliance on wholesale funding channels and underinvest in their holdings of high quality liquid assets. However, Huberman and Repullo (2014) argue that when banks carry larger proportions of short-term wholesale funding on their balance sheet they have a greater incentive to hold less riskier assets as they need to manage more regular investor refinancing of their debt. In situations of high financial market volatility or issuer solvency difficulties, banks that increase their wholesale maturity profile can intensify rather than placate bank runs or wholesale debt withdrawals (He & Xiong, 2012).

Unsecured wholesale funding programmes can face difficulties in periods of stress if there are questions around the issuer’s solvency, the investor faces liquidity constraints, or there are systemic problems in wider financial market.

Should there be credit risk concerns, the spreads or margins on issuers’ securities will widen against the swap curve. If these interest rates become too great to be sustained then the bank will no longer be able to participate in wholesale markets (Afonso, Kovner, & Schoar, 2011; Bruche & Suarez, 2010). Investors that decide to continue to invest in the issuers’ debt when they face heightened credit or liquidity risk concerns have been shown to shorten the duration of their wholesale placements within the organisation so they have more frequent exit points if these risks become too great (Angelini, Nobili, & Picillo, 2011; Brunnermeier & Oehmke, 2013).

In the event that the investors, in a bank’s wholesale programme, face liquidity constraints of their own they may increase their own liquidity holdings and withdraw from certain portfolio
holdings including the bank’s wholesale issuance (Acharya & Merrouche, 2013; Eisenschmidt & Tapking, 2009).

Systemic problems in the wider financial system could result in wholesale funding markets shutting down (Heider, Hoerova, & Holthausen, 2009). In recent years examples of issues that caused a breakdown in the interbank market included situations where there was a large amount of asymmetric information amongst participants; there was investor uncertainty about credit quality of individual banks; when cumulative credit risk exposures were too great; or when interest rate volatility was high (Allen, Carletti, & Gale, 2009). In these situations, it is argued that a central bank needs accept the responsibility of providing the market with liquidity (Holmström & Tirole, 1998).

2.2.3 Secured Funding

2.2.3.1 Procyclicality

Throughout an economic cycle, various financial variables will oscillate around trends; break away from trends; and collectively deviate away from an equilibrium amount. These are the three elements of procyclicality (Landau, 2009). Greater procyclicality signifies larger oscillations. Banks can face two forms of procyclicality, which can impact its capital base or gearing ratio.

In situations where the economic environment is healthy, banks may generate good returns on equity enabling them to carry larger portfolios or market positions. In many jurisdictions, banks’ tradable securities receive mark-to-market accounting treatment, meaning that any positive asset returns provide the bank with instant capital gains. The literature argues that this mark-to-market process creates procyclicality in that further demand for assets will lead to the price of assets moving higher (Adrian & Shin, 2008; Committee on the Global Financial System, 2009). In a downturn, reduced asset valuations will lead to capital losses.
and may create the need for recapitalisation. Empirical evidence suggests that at these times capital is both scarcer and more expensive to acquire (Kashyap, Rajan, & Stein, 2008).

During economic cycles banks’ balance sheets grow and tighten as a proportion of their capital base. This can be a factor of the risk management strategies that banks employ (Adrian & Shin, 2008; Committee on the Global Financial System, 2009); leveraged maturity transformation, where banks use secured and unsecured short dated funding from financial intermediaries and the money market to invest in assets carrying a longer durations (Adrian & Shin, 2009, 2010a); or the market price of risk, where it has been shown that as the banking sector enlarges their balance sheets, the price charged falls for assuming credit risk. As the balance sheet grows and gets revalued from the perspective of future earnings it could result in further credit provisioning or rapid ungearing (Adrian & Shin, 2010a; Curdia & Woodford, 2009).

Banks’ secured funding transactions experience procyclicality. Bank management must be cognisant of procyclicality arising from sources relating to their mark-to-market asset valuations; repo haircuts; the velocity of their pledged collateral or collateral rehypothecation; and any adjustments to counterparty credit risk limits that might be adjusted at different stages of the economic cycle due to the counterparty’s observed soundness (Financial Stability Board, 2013; Singh, 2013).

Repo transactions, or repo liabilities, have been a considerable factor behind the growth in bank gearing prior to the recent financial crisis (Adrian & Shin, 2008). Within short-term money markets, dealers and brokers were proven to dramatically shrink their exposures, leading to reduced market-wide liquidity (Brunnermeier & Pedersen, 2009). In situations where there is limited market-wide liquidity, repo haircuts will be larger and market participants will start conserving their liquidity (Biais, Heider, & Hoerova, 2012; Gai, Haldane, & Kapadia, 2011; Jurek & Stafford, 2010).
The velocity of a banks’ pledged collateral, which can be described as how often stock gets reused, has been shown in the literature to be churned at a factor of four times (Singh, 2011). This component of secured funding provides the financial system with liquidity and must form a part of banks’ liquidity risk management strategies. Changes made to rehypothecation regulation during the latest financial crisis to tighten the list of eligible securities that could be pledged as collateral and reduce the churn of securities resulted in lower levels of financial market liquidity (Financial Stability Board, 2013; Singh & Stella, 2012). Central banks and domestic banking regulators need to consider the implications of rehypothecation regulation on secured funding, liquid assets and the money supply (Debelle, 2012).

2.2.3.2 The Repo Market

In many financial centres the repo market consists of repo financing, which includes any bilateral or tri-party repo trading, in addition to inter-dealer repo where trades take place between dealers directly with parties mainly centrally clearing the settlement of their trades1 (Adrian, Begalle, Copeland, & Martin, 2013; Duffie, 2013; Financial Stability Board, 2013). Traditionally, repo markets operated as a mechanism for brokers and dealers to fund portfolio holdings by obtaining cash from commercial banking organisations, however, the market structure of repo markets has evolved where banks now also use this channel to source funding, whilst non-bank financial institutions2 and corporates often assume the role of providers of funding (Tuckman, 2010). From a credit risk perspective, repo markets provide counterparties with an avenue of secured lending that is both stable and well-priced. Additionally, collateral swaps and rehypothecation are critical components for consideration for banks engaging in secured funding and lending.

In instances of financial market volatility, banks have demonstrated an ability to both source funding and lend via repo where collateral is of a high quality (Fleming, Hrung, & Keane, 2012).

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1 There may also be instances in some markets where bilateral trades will occur within the inter-dealer repo market.

2 The non-bank financial institutions that participate in repo-markets typically include non-leveraged funds, insurers and life companies
Conversely repo transactions that relied on collateral that was of inferior credit worthiness, or had shallower liquidity characteristics, generated liquidity stress for banks during the latest financial crisis (Duffie, 2013; Gorton & Metrick, 2012; Singh & Aitken, 2009).

2.2.3.2.1 Tri-Party Repo

In tri-party repo transactions the two trading counterparties entering into a repurchase agreement commission a third counterparty to assume custodial responsibilities and assist in facilitating trade settlements. The third counterparty does not, like a central counterparty, become a principal to the trade. Unlike the bilateral repo market, repo haircuts and funding availability proved quite constant within the United States’ tri-party repo market during the latest financial crisis (Copeland, Martin, & Walker, 2011; Krishnamurthy, Nagel, & Orlov, 2014).

2.2.3.2.2 Inter-Dealer Repo

An inter-dealer repurchase agreement generally involves two counterparties who trade directly with each other. A common driver behind a counterparty entering into an inter-dealer repo trade is when one party requires short-dated loan funding and provides eligible collateral to their counterpart as security against the loan. An alternative frequent motive for an inter-dealer repo trade is when an organisation has a desire to borrow a particular line of stock and provides their trading counterpart with cash in return. Both of these trades are common for banks to execute in overnight cash markets, where they will be seeking to manage their reserve requirements to facilitate payments or hold a particular tradable security. The inter-dealer repo market is generally centrally cleared in Europe, Japan and the United States of America (Financial Stability Board, 2013). The bilateral inter-dealer repo market is vulnerable to information asymmetry in times of financial market stress when there are individual counterparty concerns or unknown risk around the credit worthiness of securities that constitute eligible collateral (Gorton & Metrick, 2012; Jurek & Stafford, 2010; Krishnamurthy et al., 2014).
2.2.3.3 Collateral Swaps

Collateral transformation involves a firm swapping a line of stock with a counterpart for alternate set of securities. Banks use collateral swaps to alter the profile of their liquid asset portfolios by swapping less liquid or creditworthy collateral, such as asset-backed securities, for eligible high quality liquid asset securities, such as government bonds. Banks also utilise the swapped assets as collateral for executing new derivative trades or to source funding from repo markets. With the introduction of the Basel III capital accord, banks could have greater desire to engage in collateral transformation in order to meet prudential obligations covering liquidity (Basel Committee on Banking Supervision, 2012a).

Collateral swap trades are subject to margin call requirements and have the potential to generate procyclicality (Bank of England, 2011). Given the potential for rehypothecation, collateral swaps could contain both unwind risk and added unknown counterparty exposures for the parties to a trade (Stein, 2013).

2.2.3.4 Rehypothecation

Rehypothecation is a process where tradable securities that have been pledged as security for a trade are reused by the counterparty, which is usually a prime broker, who is accepting the collateral. Collateral is rehypothecated to either directly fund the trade or to provide alternative funding to the organisation’s business to fund other operations. Securities firms, institutional or investment banks commonly act as prime brokers. Should a prime broking firm fail to continue operating as an ongoing concern, the other counterparty to the trade becomes an unsecured creditor for the consideration amount of their reused collateral (Singh & Aitken, 2009). Therefore banks need to understand the liquidity impact that a failed prime broker will have on their funding and liquid asset holdings (Singh & Stella, 2012).
2.2.4 Customer Lending and Liquidity Facilities

Banks’ customers establish lending or liquidity facilities in order to draw funds or gain access to liquidity when they require it. Customers use these facilities for various reasons including funding working capital shortfalls, when making asset purchases, or to provide liquidity coverage for their commercial paper programmes. The allocation of lending limits to customers creates contingent balance sheet exposures for banks as provisions need to be allocated against facilities in the event of customer requests to drawdown.

The literature has long argued that when deposit-taking institutions combine the provision of lending and liquidity facilities with deposit taking, banks may net off, or naturally hedge, customer drawdowns with deposit inflows (Gatev & Strahan, 2006; Jarrow & van Deventer, 1998; Kashyap, Rajan, & Stein, 2002). This argument has proven to hold true when there is system wide volatility, however, in the event that an individual bank is experiencing difficulties, customers have reason to both draw down their lending facility and withdraw uninsured deposits (Diamond & Rajan, 2001; Santos, 2014). Furthermore during the last financial crisis, customers have shown that they will draw on arranged bank lines: to gross up their balance sheets and increase their cash levels if there is volatility within the marketplace; when alternative methods of financing become more expensive; or if deposit and investment yields or margins move above their cost of funds (Berrospide, Meisenzahl, & Sullivan, 2012; Ivashina & Scharfstein, 2010).

Liquidity facility drawdowns have been shown to take place during the last financial crisis when securitisation vehicles were unable to rollover commercial paper issuance after asset back security markets experienced difficulties (Acharya & Mora, 2013; Kacperczyk & Schnabl, 2010; Kapan & Minoiu, 2013). Concerns around the credit worthiness of individual banks, including external credit rating agency downgrades, led to banks experiencing lessoned deposit inflow as some off-balance sheet structures were no longer permitted under their constitutions to leave their deposits with banks holding an external credit rating below what was permitted within the constitution of the off-balance sheet vehicle (Acharya & Mora, 2012).
2.3 Liquidity

2.3.1 Intraday (Daylight) Liquidity

When releasing both customer and their own settlements, it is suggested that banks consider the costs associated with postponing real-time gross settlements and central bank loans and make trade-offs between the two based upon cost (Bech & Garratt, 2003). Central banks typically charge for the provision of intraday funding in the form of standing facilities, or ‘open repo’, which are offered to banks that maintain settlement accounts with the central bank. If these facilities were free then banks may have an incentive to over rely or utilise them. These facilities are typically collateralised with high-quality liquid assets. Once pledged the liquid assets become encumbered and banks can access funds at a market rate of interest, typically the government’s overnight cash rate target (Reserve Bank of Australia, 2014a).

Despite being intraday, payment delay can lead to other costs for banks and the broader market in that customers receive their funds later; operational risk at banks increases; bank staff and technological systems need to be employed to manage intra-day liquidity; and credit risk exposures between payment system participants can be greater. Significant delays of payments can result in gridlock at the close of the day putting pressure on the payment system and making daily liquidity forecasting harder for bank’s treasury departments (Basel Committee on Banking Supervision, 2012b; Bech, 2008; Bech & Hobijn, 2007; Marshall & Steigerwald, 2013). Many markets are now moving from batch or deferred net payments to more liquidity demanding RTGS or batch processing that is settled between banks on a number of occasions each day. In the case of Australia, the banking industry is working towards the new payments platform to make low value payments real time (Australian Payments Clearing Association, 2014).

International prudential guidelines offer domestic banking regulators guidance for setting regulation on intraday liquidity so that banks can fulfil all settlement commitments in a timely fashion under both stable and volatile financial market conditions (Basel Committee
on Banking Supervision, 2010b, 2012b). For banks to adhere to this framework they must hold High Quality Liquid Assets (HQLA) that can be sold or used as collateral for the purpose of funding both intraday and short-to-medium term liquidity positions (Ball, Denbee, Manning, & Wetherilt, 2011). Where regulation permits banks to deploy its HQLA for intraday funding, the bank will lessen its ability to cope with other significant liquidity events such as deposit runs and prolonged liquidity pressures (Ball et al., 2011). However, it is argued that advanced management of liquidity, rather than simply increasing minimum buffers, will provide banks with a better outcome (Ackermann, 2008; León, 2012). Additional liquid asset buffers will raise the price of intraday liquidity, with prevailing intraday interest rates acting as a metric to show the pressure on domestic payment systems (Jurgilas & Žikeš, 2012).

2.3.1.1 Factors Influencing the Banking System Liquidity

From a cash market perspective, the amount of liquidity that is in the banking system is made up of the cumulative total of reserves left with the central bank. The amount of reserves that banks hold is a factor of their settlement obligations in addition to any surplus deposits that they hold in exchange settlement accounts. Banks manage their reserve closing positions tightly due to the opportunity costs associated with leaving them at-call with the central bank (Reserve Bank of Australia, 2014a). The final end of day closing position of banks is not a reflection of the funds that they require for payment obligations throughout the day. Central banks can influence the amount, or supply, of liquidity in the market through their open market operations (Keister, Martin, & McAndrews, 2008).

Repo auctions are a form of open market operations that introduces liquidity into the banking sector as participating firms can offer eligible collateral to the central bank in return for short-term funding. Secondary money markets can be used by banks if they over subscribe to a repo auction and accept more funding than is required. Current interbank interest rate volatility does not impact the repo auction tendering process; however, the outcomes of a repo auction will influence bank actions when attempting to acquire liquidity through either liquidity facilities or future repo auctions. Larger banking firms pay reduced margins in repo
auctions and can better utilise interbank money markets than smaller banks. Banks face opportunity costs in repo auctions when deciding which lines of eligible securities that they will offer to the central bank as collateral as each line will have different values (Bindseil, Nyborg, & Strebulaev, 2009).

### 2.3.1.2 Conserving Liquidity in the Payments System

Liquidity can be conserved in payment systems when there are diminished reasons for banks to postpone their settlement obligations. Bilateral or multilateral payment matching is a method that can be utilised to lessen pressure within the domestic payment architecture and is particularly useful in jurisdictions where banks hold minimal at-call cash within their exchange settlement accounts and rely on the central banks’ standing intra-day facilities, including open repo (Martin & McAndrews, 2008).

### 2.3.2 Lender of Last Resort

Financial market volatility has the potential to create liquidity issues for banks, thereby necessitating the need for centralised government sponsored liquidity providers. The classical notion of the lender of last resort is that the institution or organisation acting as the lender of last resort will safeguard the money supply that is produced by banks from tightening and take action to expand it in the event of bank runs or wider financial market instability or panics. Action can be taken through the provision of pre-announced loans to in need creditworthy institutions that have access to high-quality collateral, but are unable to source this funding from alternative avenues. This lending is discretionary and offered at a rate of interest that is materially large enough to be considered a ‘penalty’ in order to lessen moral hazard (Feldstein, 2010; Humphrey, 2010; Selgin, Lastrapes, & White, 2012).

Throughout time, government sponsored liquidity providers have behaved in manners that do not align with the classical doctrine of the lender of last resort. By way of example, the Federal Reserve of the United States of America has departed more frequently away from this
doctrine during occasions of financial market volatility than abiding by it (Selgin et al., 2012). In the course of the Great Depression, the US Federal Reserve initially did not provide support to a number of illiquid but solvent banks. Furthermore at another point in the depression, it intentionally contracted solvent banking institutions stock of liquid free reserves (Humphrey, 2010). At other points in time, the US Federal Reserve has offered substantial discount window funding to insolvent banks, where these banks collapsed shortly after receiving credit (A. Schwartz, 1992). In more recent times a number of government sponsored liquidity providers have accepted securitised assets as collateral, including those backed by mixed asset and residential home loans; or additionally purchased securitised assets from banks at their marked-to-market face values or by applying a significant discount premium (Feldstein, 2010; Humphrey, 2010; Selgin et al., 2012).

Prudential regulation can impact bank utilisation of these funding lines, such as standing facilities, by either encouraging banks to draw on facilities more often than expected or, by contrast, discouraging their use which reduces their value in dealing with liquidity shortfalls and interest rate volatility (Furfine, 2003). In some cases, banks may not draw on standing facilities if they believe the regulator will view it negatively (Peristiani, 1998). In many markets, there may be multiple agencies providing emergency liquidity to different types of deposit-taking institutions in crisis scenarios. Rather than complementing each other, ineffective regulation may provide banks with the opportunity to arbitrage agencies if one source of contingency funding is cheaper than another (Ashcraft, Bech, & Frame, 2010).

2.3.3 Liquid Assets and Counterbalancing Capacity

Liquid assets are financial instruments that have deep liquid markets, high volumes of trading activity, low levels of credit risk, exhibit little interest rate sensitivity and maintain their value in times of severe stress. Due to these characteristics, these assets generate smaller returns when compared to other assets that banks hold within their balance sheets. In other words, liquid assets have a cost of carry (Raubenheimer & Kruger, 2010). Banks are obligated to hold liquid assets to meet regulatory requirements, and this can be viewed as a tax on the deposit-taking institution (Allen & Carletti, 2013). Banks continuously seek out methods to
strengthen their liquidity risk profile so that they can safely reduce reserves of liquid assets, whilst managing their holdings in an efficient manner. It is possible for authorised deposit-taking institutions to economise on liquid asset holdings if customer deposit and loan commitments are not positively correlated, with low yielding demand deposits providing a subsidy against expensive liquidity holdings (Mester et al., 2007).

Typically, the majority of assets that banks hold on their balance sheets are in the form of customer loans, which are highly illiquid and usually held by a bank until their maturity (Altman et al., 2010). Banks’ liabilities are significant drivers of their unencumbered high quality liquid asset requirements (Feldstein, 2010); however, banks must consider a number of other factors that can trigger cash outflows, such as customer loan commitments and other assets, derivatives, collateral in addition to payments.

Asset sales by banks have been shown to occur when liquidity or solvency issues are being faced by the organisation (Shim & von Peter, 2007). These sales can trigger market-wide asset price reductions and in turn require the bank to sell an even greater quantity of assets to meet their liquidity requirements (Bolton, Santos, & Scheinkman, 2011; Wagner, 2009). By investing a portion of their balance sheet assets into high quality liquid assets, banks will be better at dealing with systemic events within financial markets than if they simply hold greater capital buffers (Cifuentes, Ferrucci, & Shin, 2005).

In many jurisdictions there is a lack of supply of high quality liquid assets, which have deep liquidity and low levels of credit risk, thereby requiring domestic governments to meet market demands or supply liquidity facilities to overcome supply deficiencies. Governments have the ability to tax their constituents and therefore are able to provide funds at economical rates on behalf of their nation to the private sector firms, including banks, that require liquidity (Gorton & Lixin, 2004; Holmström & Tirole, 1998). In times of liquidity stress, it is argued that governments should provide the marketplace with additional liquidity and withdraw it once it is no longer required (Bolton et al., 2011; Holmström & Tirole, 2011).
Prior to the recent financial crisis many banking institutions were purchasing investment grade tradable securities issued by other banks, corporates and securitisation vehicles to meet their liquidity needs (Allen & Carletti, 2013). If the underlying assets to securitised transactions experience difficulties, or information asymmetry about certain securities exists, the market liquidity and credit rating of the securities can become impacted, leaving investors with illiquid assets (Gorton, 2008). When governments supply banks with liquidity facilities to overcome a shortage of risk-free high quality liquid assets the bank must hold other securities that a central bank deems as acceptable collateral to access the liquidity facility. This may mean that banks are left holding bonds, commercial paper, tradable notes or bank bills to meet regulatory liquidity ratios that are not ‘risk-free’. Consequently these securities carry credit risk and require the bank to set aside capital against any portfolio holdings. In monitoring the credit risk relating to their bond holdings, banks typically need to use publically available information, which is inferior to information that can be obtained when lending directly to a customer (Fama, 1985).

Interbank deposits create greater banking linkages, which ultimately increase the potential for contagion and systemic risk (Allen & Carletti, 2013). Allen and Gale (2000) argue that interbank deposits provide investing banks with liquidity insurance but subject the financial system to contagion. They further stipulate that markets with greater banking linkages will be more resilient as losses are borne by a greater number of participants.

2.3.4 Other Liquidity Considerations

2.3.4.1 Securities Lending

In securities lending trades, owners of tradable instruments or securities will transfer the legal title of their securities to another counterpart for a period of time in return for a fee, to generate incremental revenue from their assets. Lenders of securities usually require collateral from the borrower for the duration of the loan and may also retain an option to recall their securities by giving prior notice (Ali, Ramsay, & Saunders, 2014). These transactions are comparable to repo trades from an economic perspective where one
counterparty will be seeking to borrow either cash or a specific line of stock (Ruchin, 2011). Where repo markets are mainly concentrated towards fixed income securities, securities lending can involve both fixed income and equity asset classes. Despite limited public availability of data on securities lending, it has been argued in the literature that the practice enriches price discovery, market depth and liquidity, however in times of financial market stress, it can also play a role in liquidity withdrawal from the market (Adrian et al., 2013).

Commonly banks or other firms may borrow securities: to cover their short positions; when hedging themselves against positions created when they act as market makers for their customer base; for executing arbitrage trades; or to meet settlement obligations. Banks can often assume the role of a broker or facilitator of securities lending trades and may provide a guarantee to the security lender of the borrower’s credit worthiness. These arrangements, if significant, can impact a bank’s capital and liquidity buffers (Dreff, 2010).

2.3.4.2 Money Market Funds

Money market funds form part of the shadow banking sector as they engage in credit intermediation activities but have historically been significantly less regulated than banks. These funds are highly sophisticated financial market participants and, due to their interconnectedness with the banking sector, they are highlighted within this dissertation (C. Schwartz & Carr, 2013). Within some international jurisdictions, including the United States and Europe, money market funds facilitate large volumes of collateral transformation, including collateral lending. There is empirical evidence of high rates of redemptions from money market funds in times of liquidity stress, especially from institutional investors. At points in the recent global financial crisis, there were instances of money market funds being required to suspend customer redemptions (Ansidei, Bengtsson, Frison, & Ward, 2012; Bengtsson, 2013). As a consequence of the liquidity issues faced during the crisis within the United States, the US Federal Reserve established two emergency liquidity facilities that also contained a guarantee programme (Baba, McCauley, & Ramaswamy, 2009).
2.4 Procyclicality & Competition in the Banking Sector

The Basel capital accords have each engendered procyclicality through their capital holdings requirements (Arjani, 2009; Covasa & Fujitab, 2010) and whilst the regulation has made banks more secure, the evolution from Basel I to Basel II led to greater amounts of procyclicality (Repullo & Suarez, 2013). There are consequences for a jurisdiction’s implementation of monetary policy, which requires additional research attention (Adrian & Shin, 2008, 2010b).

The banking sector experiences procyclical competition amongst deposit-taking institutions. During upswings in the economic cycle, where a jurisdiction is experiencing positive economic growth, banks are likely to be competing for assets. Following a period of financial market volatility, the focus of bank management shifts to the liability side of the balance sheet where competition intensifies for funding (Reserve Bank of Australia, 2014f).

Prudential supervision and regulation has significant bearing on the competitive landscape and risk appetites of competing banking organisations within a jurisdiction (Claessens, 2009). Banks determine the price of risk and therefore influence economic conditions (Adrian & Shin, 2010b). A competitive banking market will encourage innovation; product and service delivery and efficiency; better access to credit for the consumer and business segments; economical product pricing; and a greater degree of available products within the market (Tirole, 1988).

Within a domestic banking market there can be a number of homogeneous deposit-takers that are highly interconnected and, in the event that a single institution collapses, the entire banking market can face greater systemic risk and instability. Further, greater levels of competition can also amplify risk and deteriorate lending standards (Vives, 2011).
Banking products are typically priced to reflect the capital and liquidity costs faced by the bank, in addition to any competitive forces, when entering into a customer transaction (Beck, 2007). Where there are fewer regulatory constraints to new deposit-taking institutions establishing themselves, a greater degree of competition will be evident (OECD, 2011). Simply the threat of new entrants can limit established banks in applying market power (Reserve Bank of Australia, 2014f). The market structure of a banking sector can be concentrated but still considered to be competitive if incumbents have curbed ability to set prices, the market is contestable, and critical resources can be efficiently obtained through banks’ external environments (Davis, 2007).

Both price and non-price competition is evident in banking market structures. Competition occurs when banks’ use price mechanisms such as interest rates and fees or, alternatively, through non-price factors including loyalty schemes, credit limits, or products’ associated legal contract or terms and conditions. The literature propositions analysis of banks’ net interest margins as a method of assessing the amount of competition within the banking market, however, net interest margin is influenced by a large number of factors including, but not limited to: the credit worthiness of the institution; the success of banks’ asset and liability management; their ability to obtain funding from domestic and international debt markets in various currencies; their retail transactional banking market share (Berkelmans & Duong, 2014).

Most market structures have significant barriers to entry for firms wishing to accept deposits, including regulatory barriers associated with obtaining banking licencing, in addition to other business related costs such as IT and marketing to investors. Financial market conditions are likely to affect deposit competition (Reserve Bank of Australia, 2014f). The cost and availability of other bank funding channels, in addition to liquidity and capital regulation, will influence banks’ desire to compete for deposits. With the development of online banking in many banking marketplaces, banks can market to and attract deposits from a wider customer base without investing in physical branch networks. Regulatory developments foster innovations and banks can attempt to gain competitive advantages over their peers by developing new products or transforming their balance sheets (Chris & Thompson, 2007).
Commercial banks with foreign ownership, operating outside of their home jurisdictions, can encounter competitive disadvantages. This may be a result of operating at a distance, managing distinctive economic and regulatory environments and administering hard and soft information. Foreign owned banks might have a competitive advantage over domestic banks in meeting the customer requirements of domestic institutional and non-financial multinational corporations through their access to capital, technology, product and services. On average, these advantages are likely to prevail over the disadvantages for foreign firms when operating within developed marketplaces, however, it is probable that the disadvantages will prevail in developing markets (Berger, DeYoung, Genay, & Udell, 2000; Claessens, Demirgüç-Kunt, & Huizinga, 2001; Deyoung & Nolle, 1996).

State-owned banks are features of many economies, frequently possessing large market shares within developing nations and holding goals other than generating a return on shareholder equity (Berger, Demirgüç-Kunt, et al., 2004). These institutions may support specific customer segments, industries and geographical territories. From a regulatory perspective, state-owned banks may not be subject to the same prudential standards and rigour as privately held banks (Barth, Caprio Jr, & Levine, 2004). These institutions can often be found to receive government subsidies, which may lower their motivation to be a competitive force (Barth, Caprio Jr, & Levine, 2002). This also applies to banks that are ‘too big to fail’ (Reserve Bank of Australia, 2014f). Many empirical studies have confirmed that there is less competition and inauspicious economic effects within economies where the market structure contains a great number of state-owned banks (Berger, Hasan, & Klapper, 2004; La Porta, Lopez-De-Silanes, & Shleifer, 2002).

Several studies have shown that following an acquisition of a small bank by a large bank, small business lending of the consolidated bank has been discovered to moderate due to the Net Present Values (NPV) of the assets (Berger, Saunders, Scalise, & Udell, 1998; Sapienza, 2002; Stein, 2002). However, it is argued that advancing technology is assisting larger banks gather customer information in new ways supporting them in conducting financial transactions at a distance (Petersen & Rajan, 2002).
From a social perspective prudential regulation that results in market structures with high
degrees of bank competition are favourable, however where supervisors constrict
competition, less advantageous outcomes relating to customer pricing, access to funding and
financial products will result. When national regulators restrict the entry of foreign owned
banks, there is a positive impact on banks’ net interest income and more rationing of credit
within that jurisdiction. It is argued that the presence of state-owned banking institutions
within marketplaces makes the financial system more volatile whilst limiting the availability
of credit (Berger, Demirgüç-Kunt, et al., 2004; Levine, 2003).

2.5 Literature Gaps

To date, much of the literature has specifically focused on bank funding, liquidity and
procyclicality individually. Given the interrelationship of these factors to effective balance
sheet management and understanding liquidity stress, value may be derived by a study that
incorporates each into its objectives. These components have great importance to regulators,
from a supervisory and financial stability perspective; and to bank management, who are
concerned with not only compliance but in optimal management of their organisation’s
strategy, funding profile and liquidity

Many empirical studies appraised within the literature review have used the United States or
European marketplaces and organisations within their sample. Both Australia and Canada
are early adopters of new international regulation, implementing new rules in full when
recommended by supranational regulatory institutions. The inclusion of these two nations
would not only add to existing research that has been focused towards the United States and
Europe but provide a new perspective.

While there have been broad discussions on the various types of bank deposits, their use as a
funding mechanism and the appropriate valuation techniques, it is apparent that further
research is required to provide new perspectives in an evolved economic and regulatory
environment. Existing literature examined within the literature review covering core deposits is too high level and theoretical for practical implementation and is void of a clear international qualifying criteria of core deposits. Further differentiation and analysis is required.

Much of the existing literature groups together transactional and demand deposits. Although both of these deposits are at-call from an interest rate risk perspective, they are significantly different in their product design and behave very differently from a quantitative standpoint. Segregation of these two deposit types will help the industry develop an accepted methodology for their valuation. Analysis of new banking rules is required to understand whether new regulatory rules, and domestic institutions, are prescribing correct values towards these deposit types from a bank funding perspective. It is not clear whether banks then adopt the prescribed regulatory values for these deposits or maintain their own internal valuation techniques. The literature has not yet covered the ‘natural rate’ of interest for deposit funding but focuses on ‘market’ interest rates. Inspection must be made to understand whether banking regulation has distorted interest rates on bank funding pools. Finally, new regulation may change the competitive behaviour of market participants for certain types of funding that carry high runoff factors from a liquidity standpoint. Exploration has not yet been made into the potential for banks to accept these deposits and manage the duration risk associated with reinvesting the high runoff liabilities into liquid assets.

The literature on procyclicality is quite focused on bank capital regulation in addition to wholesale and interbank markets covering secured funding markets and liquidity. Procyclicality may also extend to the other components of bank funding including transactional and core deposits in addition to wholesale funding. Furthermore, it is not yet clear whether the management of high quality liquid asset portfolios may be subject to procyclicality. Historically banks have been shown to either compete for assets or liabilities at different times of the economic cycle (Reserve Bank of Australia, 2014f). In times of economic volatility, the margins associated with assets and liabilities can rapidly adjust and converge, potentially providing the opportunistic customers with arbitrage opportunities. The literature would benefit from understanding more about banking book arbitrages.
Evidence exists of unwind risk in both asset lending and collateral swap trading. Progressing the recent work of Stein (2013) may extend awareness around the unknown counterparty exposures parties face where rehypothecation is permissible.

Intraday liquidity management is a relatively under researched subject area, where the literature is in its infancy. The research and debate into how intraday exposures can be best measured has not yet developed. As more markets move to real-time payments, the costs associated with intraday liquidity must be better understood, including the resultant impact to the cash market. Some domestic central banks have started to provide ‘open-repo’ facilities for exchange participants. Empirical studies are yet to consider the direct impact to repo markets, and their liquidity, caused by the existence of these facilities.

With a lack of supply of qualifying high quality liquid asset securities, banks will need to hold a portion of their liquid assets in instruments that aren’t ‘risk-free’ but qualify for inclusion within committed liquidity facilities. Further, banks now need to hold liquid assets in all currencies where they have significant exposures. Enquiry can be made to better understand the resultant credit and foreign exchange risk exposures that banks directly face, including the new predisposition towards national government debt. There is the potential for a bank to have executed credit or foreign exchange derivatives to attempt to hedge arising exposures, which may require collateral to be pledged against the trades.

As banks face varying weighted average cost of capital, they too incur a ‘weighted average cost of liquidity’. This is a new concept that must be both defined and have a methodology developed for it.

Despite major banking regulatory changes being announced in late 2010 (Basel Committee on Banking Supervision, 2010a, 2010b) there are a lack of identified solutions in the literature for banks to transform their balance sheets to strengthen their capital and liquidity
resilience and comply with the new regulation. Particularly, the Liquidity Coverage Ratio (LCR) introduced significant liquid asset costs of carry for banks from 1 January 2015 (See Appendix Three), creating an opportunity for balance sheet innovation that complies with the LCR, assisting banks in improving their resilience to liquidity deficiencies like those that were experienced by many global deposit-taking institutions in the recent financial crisis that commenced in late-2007 (Ramirez, 2011).

Future research can develop assessments of the impacts to banking and financial market structure, including potential changes to short-term reference rates, such as the Bank Bill Swap Rates; short-dated bank paper issuance; the foreign exchange forward markets; and matched funding principles. Further analysis is required to better understand the impacts of the LCR and Net Stable Funding Ratio (NSFR) including: the costs borne by individual banks; banking product implications and changes to associated pricing; and the impact to customers, customer types and industry sectors within the economy.

2.6 Conclusion

Banking organisations, and the government institutions that regulate them, are some of the oldest bodies in the world. Supervisory bodies and central banks offer prudential frameworks and regulations, informal controls, in addition to oversight and enforcement to influence and constrain bank behaviour. Throughout recent history there have been significant pieces of literature devoted to the analysis of certain specific types of banking regulation, in addition to empirical studies that have been conducted on bank balance sheets, funding strategies and liquidity stress and management.

The current schemes and rules that exist within banking markets are a function of their history; therefore, understanding the institutional evolution of regulation is paramount to holding an appreciation for the intricacies of today’s prudential frameworks. Constant learning throughout time allows domestic and global banking regulators to make gradual alterations to prudential frameworks and their supervisory practices. Individual banking
organisations will attempt to adapt and change to their prevailing environments and, through their historical experiences, will develop capabilities and routines. These organisations depict their history, groups and vested interests and how they have managed their own environments. Banks only become legitimised by society once their objectives are broadly aligned with those of society.

The recent global financial crisis has presented numerous questions that the literature must now consider. The banking market is currently facing significant change as a consequence of new prudential regulation. Regulatory institutions and banking firms are now modifying behaviours to meet new requirements. Identification of the consequences of regulation can both address any supervisory or financial market concerns in addition to providing banking organisations with findings to evolve their firms and reposition balance sheets.
Chapter Three: Research Design

Government mandated institutions in Australia and Canada have continuously progressed banking regulation throughout time by making measured and ongoing amendments to their prudential frameworks and supervisory practices. In recent times, these two nations have been international pioneers in the adaptation of new prudential accords. Better understanding of the history and evolution of both bank regulation and markets in Australia and Canada allows institutions, organisations and individuals to develop their capabilities, routines and manage their own environments. Empirical and theoretical studies that use these jurisdictions in their scope could reveal findings for international regulatory institutions and prepare banking organisations for their adjustment to the changes. The chief jurisdiction of interest of this study is Australia where Canada is used for comparison and cross-reference.

This dissertation has employed qualitative content analysis to reveal how their schemes and rules have evolved throughout time. Quantitative trend analysis is used when comparing the components of individual bank balance sheets that provide insights into their funding preference and liquidity holdings, which also illustrate the early indicators for procyclicality within the banking sector. There is the further objective of developing existing research and knowledge of liquidity stresses within bank balance sheets.

This research endeavours to extend balance sheet innovation, through action research that has been carried out over a five year period, to provide banking organisations with options to alter their balance sheets in order to both meet the Basel III package of reforms and better deal with liquidity pressures, such as those that were evident in many countries throughout the most recent financial crisis. Consequently, following a review of the literature, the key research question that is put forward in this dissertation is:

How does regulation impact the way banks fund their balance sheets and hold liquid assets in Australia and Canada?

To address this problem statement, the dissertation investigates five sub-questions:
1. How has regulation evolved in Australia? Have there been similarities and differences in the evolution of banking regulation in Canada?
2. If similarities in the evolution of banking regulation exist, has the way that Australian and Canadian banks have funded their balance sheets and held liquid assets been analogous?
3. What new asset and liability products or balance sheet exposures could be developed under evolved prudential frameworks to promote capital and liquidity efficiencies?
4. Have the implementation of the Basel accords led to fundamental shifts in the balance sheet structures and liquidity management strategies in Australia and Canada?
5. Are there any significant risks associated with the current regulatory framework in how it is influencing bank funding and liquid asset holdings?

Table 1: A summary of the research design that has been employed to address these five research sub-questions:

<table>
<thead>
<tr>
<th>Topic</th>
<th>Method</th>
<th>Sample Source</th>
<th>Sampling Method</th>
<th>Data Collection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regulation</td>
<td>Historical Research; Comparative Research; Qualitative Content Analysis</td>
<td>Australian, Canadian &amp; International Regulatory Institutions</td>
<td>Regulation pertaining to liquidity, bank funding and procyclicality</td>
<td>Government Registers; Statutes; Prudential Accords; Industry Associations</td>
</tr>
<tr>
<td>Individual Bank Balance Sheet Analysis</td>
<td>Trend Analysis; Comparative Analysis</td>
<td>Australian Banks; Canadian Banks</td>
<td>Stratified Sampling</td>
<td>Capital IQ; Bloomberg; Banks’ official public disclosures</td>
</tr>
<tr>
<td>Deposit Pricing</td>
<td>Trend Analysis; Comparative Analysis</td>
<td>Retail term deposits and demand deposit</td>
<td>Judgment sampling</td>
<td>Reserve Bank of Australia; Bloomberg;</td>
</tr>
</tbody>
</table>
This chapter commences with an explanation of the research design and methods employed to answer the research questions before outlining the limitations and ethical implications.

### 3.1 Qualitative Research Design

Qualitative research studies attempt to carry out a narrative record of a cultural phenomenon with investigations taking place in natural settings, where variables are not manipulated and all data accumulated is participant-led and not coded or a précis. Researchers can employ one or a combination of research design strategies including case study, ethnography, phenomenology, grounded theory, focus groups and historical research. The main methods for collecting data in a qualitative study include interviews, oral histories, observations, specimen records and artefacts (Mayring, 2000; Willig, 2008).

This dissertation utilises historical, comparative and action research methods with qualitative content analysis being employed on existing prudential regulation in order to understand the regulatory environment in each jurisdiction. Within this dissertation systematic, controlled text examination of the applicable prudential standards and relevant statutory legislation in each jurisdiction is carried out. The prudential standards of both Australia and Canada have
been collected from the respective regulatory authorities’ public registers. The main focus of
the research questions covers the key periods leading up to the introduction of the three Basel
Accords, in addition to the periods following the introduction of federal government
sponsored banking and financial system inquiries or major regulatory reviews. A much more
detailed enquiry is made into the Australian marketplace as it forms the chief jurisdiction of
interest in this study, with the key Canadian developments being detailed.

An extensive review of the significant changes made to the prudential regulation governing
deposit-taking institutions Australia and Canada was conducted during the research process,
where a historical overview can be found in Appendix One and Appendix Two respectively.

3.1.1 Historical Research

Historical research entails an investigation of previous experiences or occurrences through
time (Griffin & Isaac, 1992). The emphasis of this methodology is on the discovery of how
events came to be, making it suitable for comparing past happenings with contemporary
circumstances (Marriott, 2010). There is an association between past events and the present,
however, history does not provide a forecast or instructions for the future (Fleischman &
Tyson, 1997). Historical research has the potential to provide a better appreciation for
existing structures, including schemes, rules, norms, routines and institutions (Previts &
Bricker, 1994). Ultimately the principle aim of historical research is to expand views of
contemporary issues, offering experience to describe the status quo of the present (Avi-
Yonah, 2003). Banking history has been expressed as a subdivision of business history as it
applies a similar methodology. However, economic notions guide hypotheses recognition;
statistical methods are typically employed more frequently when conducting the analysis; and
for banking historians, the use of both qualitative and quantitative methodologies is common
(Baker & Collins, 2007; Rammal & Parker, 2013).

Within this dissertation, political history will contextualise the prudential regulation
introduced by the relevant Australian and Canadian governmental bodies whilst economic
history will examine the setting from within which regulations are designed. In portraying a historical description of the transformation and progression, reason and acumen are inescapable devices in deciphering and rebuilding the political, financial, economic and social environment where these prudential structures were founded. Under this method, reliable descriptions and justifications can be produced. Rather than generating broad enquiries, this dissertation uses statistical analysis of Australian and Canadian banks’ historical balance sheets, deposit pricing and wholesale funding to demonstrate how these firms fund their balance sheets and hold liquid assets.

3.1.1.1 Benefits of Historical Research

Historical research encompasses an investigation of the past, whilst coalescing the past, present and future. Contemporary practices, when analysed whilst considering history, do not seem perpetual or temporary, but are founded in their history (Carnegie & Napier, 2012). Historical research provides researchers with the ability to simultaneously evaluate the future and any manifestations and products of the past (Gomes, Carnegie, Napier, Parker, & West, 2011). Focus on the past allows for the recognition of incidents, or alternatively, the discovery of the failure of expected occurrences (Merino, 1998). Any unintended consequences of historical happenings can be subsequently identified and explained (Merino & Mayper, 1993). Erroneous standpoints, flawed arguments and inaccurate beliefs can be challenged through historical research (Parker, 1997).

The evolution of Australian and Canadian banking regulation, and the institutions that prescribe it, is quite gradual. This research focuses on the noteworthy historical occurrences, placing greater emphasis on recent history. Past events, which impact both financial markets and the banking sector, help to shape institutions’ future policies, governance and prudential standards.
3.1.1.2 Limitations of Historical Research

It has been contended that historical research can pose challenges for researchers given the vast array of data that is required to be analysed, making this method of research time consuming, and also potentially problematic for others to reproduce findings (du Plooy, 1995). Historical data may often be imperfect or incomplete, thereby requiring inferences, triangulation or estimations to complete it (Fleischman & Tyson, 1997). It is not possible for researchers to amass and characterise all available data on a specific historical study and its related happenings, stakeholders, and situations. Acumen must be used when choosing applicable and noteworthy components and organising them into descriptions, accounts, clarifications and elucidations. Researchers cannot make the assertion that they have detected the reasons behind the occurrence of incidents, however, they must attempt to provide and validate conditional reasons for the most apparent and credible influences (Rammal & Parker, 2013). Historical research can potentially be subjective, with the previous perspectives of the researcher influencing their objectivity (Fleischman & Tyson, 1997). It has been argued that over time researchers will interpret historical artefacts and events in different ways as they are motivated by different problems, issues and predispositions (Gadamer, 2004).

Appreciation of the discussed limitations of historical research can help constrain their effect on the findings of this dissertation. Furthermore triangulation, where two or more methods are employed, assists in improving validity of this research project (Modell, 2015).

3.1.2 Comparative Research

The main aim of comparative research is to discover and describe correspondences and disparities between happenings in different countries or cultures. The core assumption made by researchers using comparative research methods is that a specific set of explanatory occurrences can be found to be responsible for the happening of similar events, whilst dissimilar phenomena can be connected with separate explanatory factors (Carnegie & Napier, 2002). Comparative design necessitates the use alike methods in two or more
contrasting cases, such as individuals, groups, organisations, societies or nations (Bryman & Bell, 2011).

Whilst Australia is the main nation of interest to this comparative study, Canada’s inclusion is used to provide verification for the domestic interpretation of global banking regulation, in addition to better understanding the similarities and differences in the way that Australian and Canadian banks have funded their balance sheets and held liquid assets. The use of comparative research in this study overcomes the risks of omitting associations, parallels and disparities that may not be present if Australia was solely explored. The comparative framework across both Australian and Canadian national boundaries, and through history, will enrich the perspectives of both banking historians and present-day commentators. Comparison in this dissertation augments knowledge of procyclicality and the balance sheet components or exposures that could trigger liquidity stress.

3.1.2.1 Benefits of Comparative Research

Comparison of the manifestation of a subject area or phenomena over two or more jurisdictions can lead to better knowledge of social reality in different socio-cultural settings or national contexts (Hantrais, 1996). Researchers can identify variations in national systems and examine the accepted explanations for experiences or happenings that have previously occurred. Comparative research at a country level can help states learn from one another and develop their public knowledge (Carnegie & Napier, 2002). The increasing level of globalisation and dependence amongst nations means that countries are confronted with comparable issues; however, there is not always similarity in the way by which they address these matters. This strengthens the worth of comparative research between nations, and their evolution through time, as institutions and organisations can study how issues were addressed (Grew, 1980). Conversely, the insight into variances can be uncovered through comparative analysis. Varying positions in both nations allows better chance for erudition through the use of two states within the comparative analysis (Marriott, 2008).
3.1.2.2 Limitations of Comparative Research

A comparative study that includes more than one case study can be more generalisable (Marriott, 2008). It has been argued that comparative design, involving two or more separate states, results in a greater number of issues and differences that must be addressed (Berger, 2007). There is sizeable information requisites associated with comparative research over multiple jurisdictions making it harder to meticulously examine premises within a population (Marriott, 2008). However, studies that analyse nations that display comparable economic, legal and social conditions will require fewer controls (Berger, 2007). In an increasingly globalised banking environment, difficulties can potentially arise when attempting to ascertain the precise factors that are specific to a jurisdiction (Rogowski, 1993). Consideration must be given to the international determinants for behaviour, and the creation of regulation, that are independent to the control of the regulator of the jurisdiction (Mair, 1996). Moreover, there is the potential for cross-temporal variation as nations can evolve throughout time (Lijphart, 1994). There is difficulty when conducting comparative research on historical situations and events as it can be challenging to comprehend enough information to conduct profound comparisons with conviction (Carnegie & Napier, 2002).

The goal of this dissertation is to offer a general account of happenings, which is viable under the selected methodology. Attempt has been made to control for variances in certain regulations, legal systems, financial market development, institutions, payment systems, competitive conditions, culture and demographics. Although the complexity of this dissertation is greater as a consequence of its boundaries encompassing both Australia and Canada, any limitations are overshadowed by the anticipated benefits. The scope of the research topic is specific to permit consequential comparison. Attempt is made to overcome these issues through the contemplation of economic, political and social influencing factors; disbanding variables within Australia and Canada into a number of subcategories; and using a research period that is greater than twenty years. Whilst it is possible that any similarities or disparities could be the result of other variables, this dissertation is a comparative study within recent history thereby removing any question of invalidity.
3.1.2.3 Culture

Cultural factors add an additional dimension to cross-border comparative research studies. Along with political, economic and social circumstances, culture can frame regulatory outcomes and explain the behaviour of institutions and organisations within jurisdictions (Carnegie & Napier, 2002; Gray, 1988). According to Hofstede (1984), “culture is the collective programming of the mind which distinguishes the members of one group or society from those of another”. Culture is made up of the philosophies, ideas and beliefs that are transferred amongst societal members and the significance that is placed upon them. Organisations are created in line with the values of their founders, with societies being comprised of institutions and organisations who display the prevailing principles of their respective culture. Consequently, as a material item of a society, it becomes instilled within institutions and any organisations and their management will be constricted by the cultural framework when dealing with stakeholders, business issues and objectives (Usunier, Furrer, & Furrer-Perrinjaquet, 2011).

All banks within the sample are domestic Australian and Canadian owned deposit-taking institutions, sharing a ‘high-level Anglo-Saxon’ heritage in their operations, structure and regulation (Xiang, Shamsuddin, & Worthington, 2011). Furthermore, both nations have highly liquid interest rate markets, floating exchange rates and comparable monetary policy systems (Kearns & Manners, 2005).

3.1.3 Action Research

Action research is a research inquiry or a reflective process conducted by or with insiders to an organisation to address issues, solve problems or innovate. The methodology is oriented to an action or, a cycle of actions, that organisational members have taken or wish to take to address a particular problematic situation (Herr & Anderson, 2005). Lewin (1946, p. 35) was the first to describe ‘action research’ labelling it as “comparative research on the conditions and effects of various forms of social action, and research leading to social action”
composed of “a spiral of steps each of which is composed of a circle of planning, action, and fact-finding about the result of the action”.

Action research is often described as participatory as the researcher is actively involved within a change situation via the existing organisation while conducting the research (Herr & Anderson, 2005). The participatory nature of the methodology is highlighted by the involvement of insiders and the researcher in the self-reflective spiral of planning a change, observing the process and consequences of change, reflecting on these consequences and replanning, acting and observing, reflecting, with the same process repeated again. Action research is also practical type of research as it deals with the practices of people and its main goal is to improve insider practices or the effectiveness of an organisation (Koshy, 2005).

This doctoral dissertation has employed action research methods to pursue balance sheet innovation to provide banking organisations with options to alter their balance sheets in order to meet the Basel III package of reforms, acquire liquidity savings, generate stable balance sheet growth and better deal with liquidity pressures, such as those that were evident in many countries throughout the most recent financial crisis. An understanding of banking regulation was gathered through this research in order to lead to reformulation and innovation, with the research effort being centred on the new possibilities that are available under evolved prudential frameworks.

The researcher’s dual role, where a position is held at Westpac Banking Corporation, provided an avenue for the commercialisation of a new ‘evergreen’ balance sheet deposit product. Although evergreen is a methodology that can be applied to the asset and liability side of the balance sheet in addition to being structured as a balance sheet exposure, focus was given to developing evergreen for the liability side of Westpac’s balance sheet. The

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3 Westpac Banking Corporation now has evergreen deposit offerings in Australia (branded as the “Corporate Evergreen Account” and “Westpac Notice Saver”), Hong Kong and Singapore (both branded as “Corporate Evergreen Account”).

4 The Westpac evergreen deposit product subsequently won the 2013 Australian Business Award for Product Innovation (Westpac Banking Corporation, 2013).
reasons for the initial application of evergreen on the liability side was that: the banking market was experiencing procyclical competition for deposits from early 2008; Westpac, like other Australian banks, had a large amount of liabilities that required transformation to meet the Liquidity Coverage Ratio’s (LCR) 30-day residual maturity threshold; Westpac required strategic solutions for lessening their liquid asset carrying costs; internal funding was being made available for liability product development; the Australian banking market had experienced scarce balance sheet product innovation where banks mainly marketed vanilla deposit products across all customer segments. Vanilla deposit products were likely to exhibit lessened customer returns from 1 January 2015 if banks passed on their liquidity costs under the LCR through reduced interest rates.

In order to build the evergreen deposit within the bank, Westpac assigned over 150 staff members in building, project managing, testing, researching and marketing the product. The project was run under the bank’s formal project framework and was subject to being directed by a steering committee and working group, which reported to the steering committee. All impacted departments and areas of the bank were represented on these committees.

In the development stages of the evergreen deposit, the banks customers across the institutional, business and consumer segments were engaged to understand product features that they valued within the product offering. This research revealed that they regarded:

1. Less administrative tasks, less forms;
2. Good interest rates without having to constantly negotiate;
3. An easy way to manage a diverse portfolio of deposits;
4. No account keeping fees; and
5. No minimum or maximum volume restrictions.

There were 59 complex software systems that required configuration and testing to be completed. Formal workshops and training modules were put into place and the bank now has over 1000 distribution staff that are trained and accredited to support the product, whilst service and support teams also received instruction. This evergreen deposit was tested in a
‘test’ and ‘production’ technology environment. Following these tests, two separate customer pilots were conducted prior to the product’s ‘soft’ launch to a small sub-set of customers within the institutional and commercial segments of the bank. This was done to ensure an optimum end-to-end solution was delivered once the evergreen deposit was made more widely available.

The key obstacle faced during the course of the evergreen deposit project was the uncertainty of the final particulars of Basel III liquidity regulation as its draft went through many iterations by both the Basel Committee on Banking Supervision (BCBS) and the Australian Prudential Regulatory Authority (APRA). The initial draft standard was made public in late-2010, with the LCR becoming applicable from 1 January 2015. The evergreen product therefore required flexibility in all aspects to ensure any future changes to the legislation could still be accommodated. Many features were built into the background of the product technological infrastructure to deal with a number of potential future regulatory scenarios that may unfold. This included early withdrawal, flexible amounts and unlimited durations.

3.1.3.1 Benefits of Action Research

Action research leverages all relevant social sciences methodologies, incorporating them into a broader research strategy, involving local participants in the acquisition of new knowledge, testing validity in action. Research problems are selected based on issues within the current environment and efforts are focused to concretely solve these problems and to assess the adequacy of results and analytical findings. Action research differentiates itself from conventional social sciences by rejecting the superiority of professional researcher knowledge over the practical knowledge of the organisation’s insiders. The method highlights the value of both types of knowledge and recommends these are brought together. From this perspective, it can be argued that action research is the closest of all of the social sciences approaches to a scientific research method. Action research incorporates “problem formulation, operationalisation, hypothesis formulation, data gathering, data analysis, action design, action, evaluation of the action and redesign of the hypotheses, interpretations, and actions in an ongoing cycle” (Greenwood & Levin, 2007, p. 54). Therefore, the method
meets scientific method standards more effectively than social science research conducted in libraries, based on databases or led by researchers entirely detached from the issue context and situation. In addition, there are greater opportunities for a new innovative theory to emerge through action research rather than follow and iterate already existing theories (Koshy, 2005).

3.1.3.2 Limitations of Action Research

As action research depends on reflection, action and the accumulation of new knowledge in a specific context, demonstrating credibility may be challenging and the method could be mistaken for mere ‘story telling’ when compared to the elaborate methodological tool set of conventional social science. Credibility is created through generalising propositions of universal hypothetical type with only trained research professionals possessing the competency to decide on issues of credibility. Action research takes a different approach and states that only knowledge generated and tested in practice is credible. Action researchers place greater emphasis on stakeholders’ willingness to act on the outcomes that are collectively arrived at, with altered patterns of social action constituting a clear test of credibility (Greenwood & Levin, 2007).

3.1.4 Qualitative Research Design Issues & Validity

Any qualitative study needs to be designed and reported in enough detail so that other researchers can attempt to repeat the study. Some certain qualitative studies can never be exactly reproduced as naturalistic conditions will never be exactly the same when collecting data (Fade & Swift, 2011). It is possible for researchers to encounter issues when attempting to determine the sample size for a dissertation as it could regularly be influenced by expediency. This can be overcome by continuing to gather data until this additional information is no longer adding new value (Glaser & Strauss, 1967; Lincoln & Guba, 1985). Research must be designed, with data to be collected and later stored, to meet ethical and legal obligations (Willig, 2008).
It is vital that when any qualitative research is carried out the study is adaptable and not rigid as some studies could encounter the potential issue of needing to alter the design of their research due to length of time that is spent by the researcher when undertaking fieldwork. Comprehensive reports and detailed records can provide evidence and show changes to the initial design of the qualitative study or its research questions or hypotheses.

There is an inherent issue that the researcher themselves could be considered a source of bias. The researcher must confirm a piece of qualitative research’s validity. Influencing or manipulating variables in qualitative research is not possible so maintaining detailed records of events, the phenomenon and the way data is collected can demonstrate internal validity. A case can be made for internal validity by way of interpretive validity, where the significance of the partaker’s reality is accurately contrasted to the qualitative study. The usefulness, contextual breadth, research stance and reporting technique are each part of the interpretative validity process (Cho & Trent, 2006). Trustworthiness is another way to show internal validity in dissertations involving qualitative research methods. Trustworthiness can be ascertained through triangulation of data and findings (Jonsen & Jehn, 2009), member checking or otherwise the corroboration of participant’s opinions and proving that there is a correlation relating to the questions, methods, data and finally showing that the outcome is similar to that with which another researcher could arrive at (Creswell & Miller, 2000; Golafshani, 2003). Thick and rich descriptions allows colleagues and others to question divergent data or any outliers, match patterns, check that the data represents the actual events, analyse any long-term trends and ascertain whether a coding check has been carried out (Denzin & Lincoln, 2011). An audit trail may reveal the plausibility of qualitative research, depicting how final outcomes have been arrived at and therefore making the comments or claims of the dissertation justifiable (Horsburgh, 2003). Each of these aspects strengthens the case for internal validity within this study.

When reported, there is an issue that research findings of qualitative research can be portrayed under categories or premises which materialised during the study. This dissertation presents its findings in this manner in an attempt to facilitate clearness and transparency to
the reader; however, there is an acknowledged risk that this may distort the actual findings and explanation of the phenomenon. Exactness can be replaced with arrangement and a logical consistency or order may be assigned to a complex experience (Anderson, 2010). Qualitative research findings must be generalisable, representing “situational, rather than demographic, representativeness” (Horsburgh, 2003, p. 311) so that any identified theory can be used to elucidate for a phenomenon in similar circumstances.

Most of the qualitative design issues and validity concerns associated with qualitative research are not a consideration within this dissertation. This study has a clearly defined sample and research boundaries that were set at the outset of the research. The majority of qualitative data that has been used has been collected from the official Australian and Canadian government registers. However, where official government statutes or reports have not been available, the study has been designed so that data is collected in at least two or more ways so validity can be established through triangulation. As a piece of individual research, there is no potential for inconsistency in data organisation and coding, nor a need for a method for settling incongruity or a having standardised measurement or rating practice. Furthermore, the colleagues of the researcher of this dissertation are used, in a peer debriefing fashion, to provide an independent analysis of the results of the study and the processes undertaken throughout the doctoral research task. When colleagues can find that they too can arrive at similar outcomes then it can be said that there is a chain of evidence supporting this research study.

When coming to an expected outcome for the data within this dissertation, self-disclosure of actions, assumptions, decisions and biases will take place as these have some degree of bearing upon the study. This process, known as researcher reflexivity, allows acknowledgement that neutrality in the gathering, investigation and explanation of the data is not possible but provides information on how this dissertation’s conclusions have been drawn, divulging the events as a process (Dowling, 2006; Watt, 2007). Further detail on this matter can be found below under ‘Ethical Implications’.
3.2 Quantitative Research Design

Under positivism, with which the quantitative methodology is based (Patton, 1978), there is a “positivistic hypothetico-deductive, particularistic, objective, outcome-orientated and natural science world view” (Cook & Reichardt, 1979, pp. 9-10). The quantitative approach is objective, follows firm laws around how it is operated, utilises statistics and “promotes value-free inquiry. Furthermore, generalisations are inductive, and are comprised of nomothetic statements” (Lee & Song, 2014, p. 108; Sarantakos, 2005, p. 47).

Time series analysis is used in this dissertation to examine how banks’ balance sheets have evolved throughout time as a consequence of bank regulation in both Australia and Canada. Quantitative tests are also used to understand trends, momentum, volatility and correlations.

Extraction has been made from databases containing bank balance sheet information, interest rate figures, deposits and wholesale funding records. Traditional commercial banks and deposit-taking institutions from both Australia and Canada form the sample.

3.2.1 Sample

When analysing banking institutions for either country specific or cross-country studies, Bhattacharya (2003) argues the entire population should be utilised or researchers should employ a representative sample that is as close to the population as possible to avoid results being statistically insignificant. This strategy will ensure that any significant effects or associations amongst variables can be revealed, even if these may just be minor. The sample should always detect the relationship or effect at least 80 per cent of the time and, should the sample size be too small the results can be deemed as being ‘statistically insignificant’ (Hopkins, 2000).
This study uses the individual data of the deposit-taking institutions from Australia and Canada. The dissertation’s sample includes 4 large Australian commercial banks and 3 regional banks, 5 large Canadian commercial banks and 4 smaller banks, where allowances have been made for minor consolidation (merger activity) that has taken place within the industries over time. These organisations represent the majority of the domestic banking system’s assets within their respective countries. The smaller firms that make up the mutual or Credit Union and Building Society (CUBS) industries of both Australia and Canada are not included in the sample due to: data availability; and a higher rate of firm consolidation over time; and the fact that these institutions comparatively make up small parts of the total financial markets in both jurisdictions.

For each of the two jurisdictions, stratified sampling techniques are employed to split the population of banking institutions into common subsets, depending upon the class of firm they constitute. This is necessary to make the data more reliable by grouping similar, non-overlapping banking organisations, aligning the sample with the study (Clarke & Courchane, 2005). ADIs are broken up into subsets based upon the type of ADI they represent, being whether can be categorised as a major or regional banking organisation.

Table 2: Summary of the stratified sampling employed within the dissertation:

<table>
<thead>
<tr>
<th>Subset</th>
<th>Australia</th>
<th>Canada</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major Banks</td>
<td>Australia &amp; New Zealand Banking Group Limited (ASX:ANZ);</td>
<td>Bank of Montreal (TSX:BMO);</td>
</tr>
<tr>
<td></td>
<td>Commonwealth Bank Of Australia Limited (ASX:CBA);</td>
<td>Canadian Imperial Bank of Commerce (TSX:CM);</td>
</tr>
<tr>
<td></td>
<td>National Australia Bank Limited (ASX:NAB);</td>
<td>Royal Bank of Canada (TSX:RY);</td>
</tr>
<tr>
<td></td>
<td>Westpac Banking Corporation Limited (ASX:WBC)</td>
<td>The Bank of Nova Scotia (TSX:BNS);</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The Toronto-Dominion Bank (TSX:TD)</td>
</tr>
</tbody>
</table>
Regional Banks
Bendigo & Adelaide Bank Limited (ASX:BEN);
Bank Of Queensland Limited (ASX:BOQ);
Macquarie Group Limited (ASX:MQG)
Canadian Western Bank (TSX:CWB);
Laurentian Bank of Canada (TSX:LB);
National Bank of Canada (TSX:NA);
Pacific & Western Credit Corporation (TSX:PWC)

The above organisations are firms that carry out the business activities of traditional commercial banking enterprises, that is, they offer a range of deposit and lending products to retail and/or institutional customers. These firms can also have advisory and funds management business, however, must always hold a deposit-taking licence. Examples of the organisations that are not relevant to the study comprise of mutual societies, including the Credit Union and Building Society industry; the securitisation sector; managed funds; general insurance; and the shadow banking sectors. All of these firms are excluded from the probability based sample.

3.2.2 Data Analysis and Collection

The sampling frame in this study has been formed by the McGraw Hill Financial S&P Capital IQ database; Bloomberg; the Australian Financial Markets Association (AFMA), the Reserve Bank of Australia (RBA), CANSTAR; Australian and Canadian government registers; international regulatory bodies; and the official public disclosures made by individual deposit-taking institutions. These sources have allowed the extraction of balance sheets, which depict the liability and liquidity profiles of each deposit-taking institution, in addition to interest rate and volume data.

---

5 The shadow banking sector includes organisations that participate in credit intermediation activities but are not prudentially regulated nor accept customer deposits. Examples of firms within this sector include structured finance vehicles, other investment funds, finance companies, money market corporations and cash management trusts.
Before undertaking the statistical analysis, collected data was checked to ensure validity. This process was undertaken to confirm that all data was extracted from the relevant databases correctly with no omissions that could lead to potentially misleading conclusions. Within subsets, the sample’s ADIs are weighted with an even level of importance within their common subsets. With regard to lack of fit, non-systematic causal factors are treated as error (Mahoney & Goertz, 2006).

Table 3: Illustration and summary of the data set, sample period and data collection used across each main section of analysis within the dissertation:

<table>
<thead>
<tr>
<th>Deposit Analysis</th>
<th>Data Set</th>
<th>Sample Period</th>
<th>Data Collection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Core (Stable) &amp; Less Stable Deposits</td>
<td>Bank Regulation</td>
<td>Present</td>
<td>APRA, OSFI, BIS</td>
</tr>
<tr>
<td></td>
<td>Deposit insurance schemes</td>
<td>Present</td>
<td>Commonwealth Government of Australia; Canada Deposit Insurance Corporation</td>
</tr>
<tr>
<td></td>
<td>Non-Interest Bearing Deposits; Total Deposits</td>
<td>Australia: 1992 to 2014 Canada: 1995 to 2014</td>
<td>Capital IQ, Bloomberg, Company Registers</td>
</tr>
<tr>
<td>Time Deposits</td>
<td>Total Time Deposits; Total Deposits</td>
<td>Australia: 2000 to 2014 Canada: 2003 to 2014</td>
<td>Capital IQ, Bloomberg, Company Registers</td>
</tr>
<tr>
<td>Australian Retail Deposit Pricing</td>
<td>At-Call: 1) Savings &amp; Investment Accounts; 2) Bonus Saver Accounts</td>
<td>July 2010 to April 2015; Time Deposits (TD): November 1987 to May</td>
<td>CANSTAR Reserve Bank of</td>
</tr>
<tr>
<td><strong>Transaction (Operational) Deposits</strong></td>
<td>Bank Regulation</td>
<td>Present</td>
<td>APRA, OSFI, BIS</td>
</tr>
<tr>
<td>---------------------------------------</td>
<td>-----------------</td>
<td>---------</td>
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</tr>
<tr>
<td><strong>Foreign Deposits</strong></td>
<td>Foreign Deposits; Total Deposits</td>
<td>Australia: 2001 to 2011 Canada: 2001 to 2009</td>
<td>Capital IQ, Bloomberg, Company Registers</td>
</tr>
<tr>
<td><strong>Unsecured Wholesale Funding</strong></td>
<td>Bank Regulation</td>
<td>Present</td>
<td>APRA, OSFI, BIS</td>
</tr>
<tr>
<td><strong>Wholesale Funding Regulatory Environment</strong></td>
<td>Short-term Wholesale Funding; Total Liabilities</td>
<td>Australia: 1992 to 2014 Canada: 1994 to 2014</td>
<td>Capital IQ, Bloomberg, Company Registers</td>
</tr>
<tr>
<td><strong>Short-term Wholesale Funding Usage</strong></td>
<td>Total Wholesale Funding; Total Liabilities</td>
<td>Australia: 1992 to 2014 Canada: 1994 to 2014</td>
<td>Capital IQ, Bloomberg, Company Registers</td>
</tr>
<tr>
<td><strong>Overall Wholesale Funding</strong></td>
<td>Total Wholesale Funding; Total Liabilities</td>
<td>Australia: 1992 to 2014 Canada: 1994 to 2014</td>
<td>Capital IQ, Bloomberg, Company Registers</td>
</tr>
<tr>
<td><strong>Australian Outstanding Debt Securities</strong></td>
<td>Onshore &amp; Offshore issuance</td>
<td>September 1992 to January 2015</td>
<td>Reserve Bank of Australia</td>
</tr>
<tr>
<td><strong>Australian Prime Bank Issuance</strong></td>
<td>Prime Bank paper volumes</td>
<td>September 2013 to June 2015</td>
<td>Australian Financial Markets Association</td>
</tr>
<tr>
<td><strong>Cost of Funds</strong></td>
<td>AUD Bank Bill Swap Rates (BBSW); Canadian Dollar Offered Rates</td>
<td>January 2011 to June 2015</td>
<td>Bloomberg</td>
</tr>
<tr>
<td>(CDOR); AUD &amp; CAD Quarterly Interest Rate Swap Curves</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td></td>
</tr>
</tbody>
</table>

### Customer Lending and Liquidity Facilities

<table>
<thead>
<tr>
<th>Contingent Lending Regulatory Environment</th>
<th>Bank Regulation</th>
<th>Present</th>
<th>APRA, OSFI, BIS</th>
</tr>
</thead>
</table>

### Liquidity

<table>
<thead>
<tr>
<th>Liquid Asset Holding Requirement</th>
<th>Bank Regulation</th>
<th>Present</th>
<th>APRA, OSFI, BIS</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Reserves (Cash Assets)</th>
<th>Cash; Total Investments</th>
<th>Australia: 1997 to 2013 Canada: 1996 to 2014</th>
<th>Capital IQ, Bloomberg, Company Registers</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Investment Assets</th>
<th>Cash; Investments; Total Investments</th>
<th>Australia: 2000 to 2014 Canada: 2003 to 2014</th>
<th>Capital IQ, Bloomberg, Company Registers</th>
</tr>
</thead>
</table>

### Procyclicality

<table>
<thead>
<tr>
<th>Regulatory Environment: Procyclicality, Bank Capital,</th>
<th>Bank Regulation</th>
<th>Present</th>
<th>APRA, OSFI, BIS</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Bank Capital</th>
<th>Total Capital Ratio;</th>
<th>Australia: 2001 to 2013 Canada: 2001 to 2014</th>
<th>Capital IQ, Bloomberg, Company Registers</th>
</tr>
</thead>
</table>

| Tier 1 Capital Ratio | Australia: 2001 to 2014 Canada: 2002 to 2014 | Capital IQ, Bloomberg, Company Registers |
|---|---|---|---|

<p>| Tier 2 Capital Ratio | Australia: 2001 to 2012 Canada: 2003 to 2012 | Capital IQ, Bloomberg, Company Registers |
|---|---|---|---|</p>
<table>
<thead>
<tr>
<th><strong>Asset/Loan Funding</strong></th>
<th>Earning Assets; Interest Bearing Liabilities</th>
<th>Australia: 1994 to 2014 Canada: 1994 to 2014</th>
<th>Capital IQ, Bloomberg, Company Registers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Gross Loans; Total Deposits</td>
<td>Australia: 1996 to 2014 Canada: 1996 to 2014</td>
<td>Capital IQ, Bloomberg, Company Registers</td>
</tr>
<tr>
<td><strong>Bank Margins</strong></td>
<td>Net Interest Margin</td>
<td>Australia: 2000 to 2013 Canada: 2002 to 2014</td>
<td>Capital IQ, Bloomberg, Company Registers</td>
</tr>
<tr>
<td></td>
<td>Cost of Total Borrowings</td>
<td>Australia: 2000 to 2012 Canada: 2002 to 2014</td>
<td>Capital IQ, Bloomberg, Company Registers</td>
</tr>
</tbody>
</table>

### 3.2.3 Quantitative Tests

Time series analysis is used in this dissertation to examine how banks’ balance sheets have evolved throughout time as a consequence of bank regulation in both Australia and Canada.

In order to better identify and understand the trends and volatility within price movements, Bollinger Bands are used within this dissertation. Bollinger Bands position two ‘volatility bands’ or ‘envelopes’ over (Upper Band) and under (Lower Band) a moving average (Middle Band) in order to ascertain whether the spread of two interest rate curves diverges away from its dynamic average value. Volatility is expressed as a multiple of the standard deviation of historical interest rates within the respective test (Fang, 2014; Murphy, 1999). Within this dissertation the Bollinger Bands are stated as:

\[
MB_n(t) = MA_n(t);
\]

\[
UB_n(t) = MB_n(t) + (\sigma_n(t) \times w)
\]

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\[ LB_n(t) = MB_n(t) - (\sigma_n(t) \times w) \]

Where, \( \sigma_n(t) \) is the standard deviation of the interest rate yields, at time \( t \), over \( n \) historical time periods, where \( w \) is the parameter to control the width of outer bands to the moving average. The upper and lower bands have been set two standard deviations over and under the middle band in each test within this dissertation.

The Bollinger per cent B (\( %B \)) represents the situation of the latest price in relation to the Bollinger Bands, in addition to the degree that it is over or under any of the Bollinger Bands. When the \( %B \) is 100, the price of a security will exactly equal the upper band. Conversely, when the \( %B \) is 0, the price of a security will exactly equal the lower band. A result of 50 will correspond with the price being equal to the middle band. Furthermore, it is possible for prices to have a \( %B \) result that is greater or less than the outer Bollinger Bands (Bollinger, 2002; Fang, 2014). Where \( P = \text{price} \), the Bollinger \( %B \) was computed in this dissertation by using the following equation:

\[
%B = \left[ \frac{(P - LB_n(t))}{(UB_n(t) - LB_n(t))} \right] \times 100
\]

The width of the Bollinger Bands can be articulated as a percentage of the moving average. If there is a sudden contraction in the width of the Bollinger Bands, it is likely that volatility will increase acutely in the near term (Bollinger, 2002). Bollinger BandWidth has been computed with the subsequent algorithm:

\[
Bollinger BandWidth = \left[ \frac{(UB_n(t) - LB_n(t))}{MB_n(t)} \right] \times 100
\]

Simple moving averages (SMA) are used within this dissertation and have been estimated by calculating the average price of an instrument, security or interest rate curve over a certain number of periods. Exponential Moving Averages (EMA) are calculated and used to provide a result that relies more on the most recent prices of an instrument. Where available, closing
prices of a security have been used. Within this dissertation, the SMA and EMA have been computed using the following equations:

\[ SMA_n = \frac{\sum_{i=1}^{n} P}{n} \]

\[ EMA_n = (P \times \alpha) + [(EMA_{n-1} \times (1 - \alpha)] \]

Where \( n \) = the number of periods in the moving average; \( P \) is the price of an \( i \) day; and \( \alpha \) represents the smoothing factor \( \frac{2}{1+n} \).

The Relative Strength Index (RSI) quantifies the velocity and change of movements in price of a security or interest rate curve, which oscillates between the values of 0 and 100. On average, a security, index or curve can be deemed ‘oversold’ when it returns a result that is below 30. Conversely, when the RSI displays a calculation that is above 70 it may be deemed ‘overbought’. Furthermore, the RSI also indicates the general direction of a trend (Rudik, 2013; Suchomel, Bailey, Sole, Grazer, & Beckham, 2015). Within this dissertation, a 14-period RSI has been calculated where the following algorithms were used for the RS and RSI:

\[ RS = \frac{Average \ Gain}{Average \ Loss} \]

\[ RSI = 100 - \frac{100}{1 + RS} \]

Correlation coefficients are also calculated to understand the relationship between a dependent and an independent variable and whether one security, index or interest rate curve leads or predicts another variable (Pring, 2002). Correlation is calculated using the CORREL() function within Microsoft Excel.
Standard Deviation is calculated using the STDEVP() function within Microsoft Excel in order to estimate the degree of dispersion around an average.

The Know Sure Thing (KST) is a momentum indicator that considers four distinct time period in order to compute a smoothed rate of change. It affords insights into a trends momentum and supplies signals when it goes over or under its moving average. It is also useful in identifying price divergences. For example, the KST may signal a price divergence when prices make a new low or high but the KST doesn’t confirm this with a corresponding new low or high (Lloyd, 2013). Within this dissertation, the following algorithms were used to calculate the KST and corresponding signal line:

\[
RCMA1 = 10 \text{ period SMA of 10 period RoC}
\]
\[
RCMA2 = 10 \text{ period SMA of 15 period RoC}
\]
\[
RCMA3 = 10 \text{ period SMA of 20 period RoC}
\]
\[
RCMA4 = 15 \text{ period SMA of 30 period RoC}
\]

\[
KST = (RCMA1 \times 1) + (RCMA2 \times 2) + (RCMA3 \times 3) + (RCMA4 \times 4)
\]

\[
\text{Signal Line} = 9 \text{ period SMA of the KST}
\]

The price relative indicator is used to demonstrate how two securities, instruments, indices or interest rate curves are behaving relative to one another, allowing one to understand whether a particular security is under performing or over performing (Levy, 1968). The price relative indicator is determined through the following formula:

\[
PR(t) = \frac{S1(t)}{S2(t)}
\]

\[
\Delta PR(t) = \left[ \frac{(PR(t) - PR(t-1))}{PR(t-1)} \right]
\]
\[ \Delta S_{1(t)} = \left( \frac{(S_{1(t)} - S_{1(t-1)})}{S_{1(t-1)}} \right) \]

\[ \Delta S_{2(t)} = \left( \frac{(S_{2(t)} - S_{2(t-1)})}{S_{2(t-1)}} \right) \]

\[ \text{Differential} = \Delta S_{1(t)} - \Delta S_{2(t)} \]

Where \( PR(t) \) is the price relative at time \( t \); the price of securities 1 and 2 are represented by \( S_{1(t)} \) and \( S_{2(t)} \) respectively; and where \( \Delta = \text{change} \).

The Price Momentum Oscillator (PMO) is an oscillator that is constructed by twice exponentially smoothing a Rate of Change computation, where the present price is contrasted against a prior price in order to ascertain the degree of price change over certain period of time. The tool is normalised and may also be employed as an instrument for understanding relative strength. Different securities or interest rate curves may be ranked by their PMO result, representing their relative strength (Hegazy, Soliman, & Salam, 2015; Lam, 2004).

Within this dissertation, the following algorithms were used to deduct the PMO and corresponding signal line:

\[ SM_n(t) = \left( \frac{2}{p} \right); \]

\[ CSF_n(t) = [\text{Close} - CSF_n(t - 1)] \times SM_n(t) + CSF_n(t - 1); \]

\[ \text{PMO Line} = 20 \text{ period custom smoothing of } (10 \times 35 \text{ period customer smoothing of } \left\{ \left( \frac{P_t}{P_{(t-1)}} \times 100 \right) - 100 \right\}; \]

\[ \text{PMO Signal Line} = 10 \text{ period EMA of the PMO} \]
Where $SM_{n}(t)$ is the smoothing multiplier and $p$ is the time period; $CSF_{n}(t)$ is the custom smoothing function; $P_t$ represents price; and $EMA$ represents the exponential moving average.

### 3.3 Limitations

There are important and critical issues associated with the qualitative and quantitative research paradigms. Any form of published research must be exposed to a degree of enquiry so that its qualifications can be examined and tested. This dissertation should be examined on the value of the methods employed where effort has been taken for the research to symbolise actuality instead of obtaining truth. As Mays and Pope (2000) offer, the qualitative and quantitative research paradigms can be both assessed by shared quality criteria being both validity and relevance. Within this dissertation validity is defined as the accuracy or credibility of conclusions, accounts or data with methods being the way by which the researcher substantiates validity (Maxwell, 1992).

Many perceive the qualitative research paradigm to have a significant issue in that it is deficient of the scientific exactitude used in quantitative research, therefore lacking credibility and validity. According to (Horsburgh, 2003, p. 308), quantitative research relies upon the “measurement and analysis of causal relationships between variables”. This dissertation adopts the view that in the context of qualitative inquiry, validity can be understood to purport how precise the research embodies the researcher’s actualities of the social phenomena (Schwandt, 1997). Creswell and Miller (2000) state that there is a perceived need for qualitative researchers to prove that research is valid, with Johnson (1997, p. 282) arguing that qualitative studies will maximise validity when they have been shown to be “plausible, credible, trustworthy, and, therefore, defensible”. Denzin and Lincoln (2011) and Guba and Lincoln (1989) each demonstrated the value of the qualitative method of research with Morse (1999) and Strauss and Corbin (1990) showing that quantitative criteria is not relevant to show the validity of qualitative research. The qualitative paradigm focuses on dissimilar epistemological and ontological suppositions when contrasted to the quantitative paradigm and thus, the criteria used to demonstrate validity varies between the
two standpoints (Hammersley, 1992). Within this dissertation, ontology is inferred to mean the matter of existence with epistemology being defined as wisdom and knowing.

Although it would be optimal to carry out this proposed research using data that contains the complete population of banking firms in each jurisdiction, to include all credit unions and building societies, this information is not readily available. The McGraw Hill Financial S&P Capital IQ database, Bloomberg and the official public disclosures made by individual deposit-taking institutions are relied upon to build a sample that covers the majority of banking assets within the two jurisdictions included in this dissertation. The balance sheet data that Australian and Canadian banks have reported throughout time have varying levels of granularity, where it has proved difficult in some circumstances to obtain consistent reporting of information. Furthermore, there is limited reliable historical balance sheet data prior to 1990, with banks reporting in different levels of detail and under different accounting standards to the present; and merger and consolidation activity through the industry making it difficult to aggregate organisations.

3.4 Ethical Implications

Business researchers potentially face ethical problems when they collect, analyse, store and report data and their study’s findings. There are no potential ethical implications associated with this research study as all data is publically available. Therefore, care is not required to be taken when examining, warehousing and reporting data and research findings.

As a business researcher, one may face ethical problems if they hold connections or relationships with the area of the study, especially when funding is involved if, as Bell and Bryman (2007) write, these connections have had any bearing on the conclusions drawn or the way findings are presented. Often business researchers can face power inequality if they are investigating areas where senior, powerful or influential executives have a stake in the outcome of the research in some way (Gurney, 1985). Many business researchers can often be employees within a research situation and could find it difficult to distinguish between
their dual roles (Coghian, 2001). Due to the researcher’s position Westpac Banking Corporation, which have provided funding for this doctoral research, and the researcher’s previous affiliation with the Australian small and mutual ADI industry, care is taken when drawing research conclusions and presenting findings. The issue of dual roles is noted and is controlled.

3.5 Conclusion

Both Australia and Canada are early adopters of the latest Basel Capital Accord and other banking markets have the opportunity to learn from the methods that banks, operating in these markets, have employed when dealing with the significant change. Correspondences and disparities can be described through the comparison of Australia and Canada, highlighting the evolution of funding preference and liquidity holdings in banks in both nations, elucidating the early indicators for procyclicality within the banking industry.

Qualitative and quantitative research methods are employed within this dissertation where traditional commercial banking deposit-taking institutions from both Australia and Canada form the sample. Through a comparison of the data, the mutual influences of Australian and Canadian regulators and banks within their respective jurisdictions can be distinguished. It is advocated in this dissertation that a comparative framework across both national boundaries, and through history, will enrich the perspectives of both banking historians and present-day commentators.
Chapter Four: Results

Australia and Canada have relatively competitive, albeit concentrated banking systems. Their marketplaces are similarly comprised of commercial banks, credit unions (caisses populaires) and building societies in addition to non-bank financial institutions. Over time the functions of banking organisations have changed where many have attempted to diversify by providing a wide-range of financial services throughout multiple jurisdictions. Australian and Canadian banks control a significant part of the total financial system assets in their respective jurisdictions, with larger banks acting as financial conglomerates.

As banking organisations have evolved and advanced their sophistication, domestic institutional regulators have continuously progressed banking regulation. The gradual adjustment to rules and schemes over time has had the goal of strengthening the resilience of banks, by impacting the way that they fund their balance sheets and hold liquidity. Interestingly the interpretation of global regulation by both the Australian and Canadian banking supervisors has not always been consistent. Banks’ funding preferences, liquidity profiles and balance sheet compositions are seen to differ in a number of ways throughout the business cycle. Trend analysis of key balance sheet measures can demonstrate procyclicality, whilst providing bank management and regulators with critical insights into the areas of balance sheets that may contain enlarged liquidity and capital risks.

An extensive review of how regulation has evolved in Australia and Canada is detailed in both Appendix One and Appendix Two respectively. An overview of the three main components of Basel III that influence bank funding and liquidity can be found in Appendix Three. This chapter has been divided into three parts. It commences with an examination of the components of bank funding before progressing to sections covering liquidity and procyclicality with the results to the analysis being exhibited.
4.1 Bank Funding and Lending Facilities

4.1.1 Deposits

Deposit funding is, and has historically been, the main source of funding for Australian and Canadian banks. The composition of deposits on banks’ balance sheets is a factor in the outcome for net interest margins, funding profiles, liquid asset holding requirements and ongoing financial stability. The length of time that deposits remain with banks is generally at the customer’s discretion. It is this discretion which creates liquidity risk as the customer may choose to withdraw their deposits, particularly in a crisis. Any customer deposit funding that falls outside of the LCR’s 30 calendar day window will not enter banks’ LCR calculations.

4.1.1.1 Core (Stable) Deposits

Following the Basel III accord on liquidity, both APRA and the OSFI assigned runoff factors to deposit products across the spectrum of customer segments. These runoff factors are determined by the type of deposit, the time until maturity and the category or class of depositor. Both APRA and the OSFI consistently define retail deposits as those placed by natural persons. Retail deposits are divided between ‘stable’ and ‘less stable’ categories and can be captured through both demand and time deposits product offerings.

Much of the existing literature on core deposits to date incorporates all deposit products that banks hold from retail investors that are typically covered by deposit insurance schemes. In Australia, the federal government guarantees depositors for up to AUD 250,000 per ADI through its Financial Claims Scheme. This scheme covers all types deposit product offered by locally incorporated Australian ADIs. The Canada Deposit Insurance Corporation provides deposit insurance on CAD deposits in Canada for amounts up to CAD 100,000. In Canada, deposits must have contractual maturities that are less than five years. These
domestic scheme arrangements form the limits for the level of volume that can be considered ‘stable’ or ‘less stable’ in the respective jurisdictions.

Both APRA and the OSFI make provisions for small and medium-sized enterprises to be treated in a similar fashion to retail customers where the total aggregated funding is less than AUD 2 million or CAD 1.5 million.

4.1.1.1.2 Non-Interest Bearing Deposits

The non-interest bearing deposits to total deposits ratio provides insight into the amount of funding that individual banks in Australia and Canada hold on their balance sheets where they do not pay any interest. Non-interest bearing deposits are typically a by-product of an alternative service that the bank is providing to a customer. Examples of non-interest bearing deposits could include operational or security deposits.

Figure 1.0: Australian banks’ proportion of non-interest bearing deposits to total deposits between 1992 and 2014:
Figure 1.1: Canadian banks’ proportion of non-interest bearing deposits to total deposits between 1994 and 2014:

Interestingly, the two charts above illustrate:

- Some of the above data appears to have been incorrectly disclosed for both the CBA and the NAB at certain historical points in time. Reported data is displayed in the above charts, however if interpolations are made, the major Australian banks seem to display a degree of positive correlation in the proportion of non-interest bearing deposits held on their balance sheets;
- Canadian banks seem to be increasing the proportion of non-interest bearing deposits on their balance sheet. The loosening of Canadian Dollar monetary policy that commenced in late-2007, in addition to the low USD overnight target rate, may have contributed to this.
4.1.1.2 Less Stable Deposits

Simply put, less stable deposits are deposits that do not qualify as being stable under Australian and Canadian liquidity rules and are more likely to leave the bank in periods of volatility. Less stable deposits include: deposits that are not covered by deposit insurance schemes; all retail deposits that are originated by a third-party that isn’t associated with the ADI; and onshore foreign currency deposits. Australian prudential standards go further by specifying deposits from customers where the bank lacks an established relationship; where the bank has used online channels to attract the deposit; or where the deposit product provides interest rate incentives to attract volume.

APRA stipulates that where retail depositors invest with an ADI via an intermediary, the deposit must be reported as a deposit from a financial institution unless the retail depositor maintains all of its rights regarding the deposits investment, rollover and maturity. The OSFI allows a 10 per cent runoff factor to be applied if the intermediary does not hold decision rights and the ADI can identify the underlying depositor.

Where the OSFI provides allowance for Canadian banks to use a 10 per cent runoff factor for all less stable deposits, APRA has taken a more conservative approach introducing a ‘scorecard’ that creates two categories of less stable deposits. The bank is required to make an assessment on the deposits stability and assign either a 10 or 25 per cent runoff factor to the funds.

4.1.1.3 Term (Time) Deposits

Should banks’ in Australia or Canada permit early termination or withdrawal of time or term deposits by their customers, the entire pool of funding will be classified as being at-call and
included in a bank’s LCR estimate. Under liquidity regulation that took effect from 1 January 2015 in both countries, early termination would need to be at the bank’s discretion and if it was permitted, the customer would still need to wait at least 31 days before being able to access their funds.

The total time deposits to total deposits ratio provides some indication into the preference, or ability, for banks in these jurisdictions to fund their balance sheet with time (term) deposit funding.

Figure 2.0: Australian banks’ total time deposits to total deposits ratios between 1994 and 2014:

Both countries allow for termination or time deposit buyback when the customer is experiencing ‘hardship’.
As is apparent in the two charts above:

- Australian banks demonstrate a much greater tolerance for at-call deposit raising in comparison to the Canadian banks by raising significantly larger quantities of this type of funding:
  - This may also indicate contrasting investor preference or norms between the two banking sectors;
- Despite LCR being announced in December 2010, the proportion of time deposits has been in decline:
  - This mix may change once LCR costs are transmitted through banks’ internal departments through internal transfer pricing;
- From this data alone, the proportion of demand deposits that are ‘core deposits’ cannot be ascertained to understand the rollover, or runoff, risk that banks face from a liquidity risk perspective:
  - This knowledge would provide the result into whether Australian banks are taking on a greater amount of liquidity risk;
If so, higher HQLA requirements, compared to Canadian peers, would be the result;

- The Royal Bank of Canada is an outlier in comparison to all other Canadian banks;

### 4.1.1.4 Transactional (Operational) Deposits

In both Australia and Canada, operational deposits are broadly described as those where the ADI is providing a service to the customer that involves either clearing, custody or cash management services, and where the account is central to the ongoing business activities of the customer. For an operational account, the customer will have a substantive dependency on its continued operation and will have practical impediments to its immediate closure. As such, the regulator applies lower outflow assumptions to operational deposits as there is a greater likelihood that the deposits will materially remain during a crisis.

There are some common exclusion clauses in both APRA and the OSFI’s regulation. The 25 per cent outflow rate does not apply: where a bank’s customer is split or multi-banked or has a backup banking provider enabling the customer to arrange to have an alternative bank fulfil its operational services; if there is no documented legal arrangement in place for the bank to provide its services or there is a lack of impediments preventing the customer moving away from the bank within a 30 day period; and on excess balances that could be withdrawn by the customer.

For any operational account, the portion in excess of operational requirements must be identified by the bank and reclassified as ‘Wholesale Non-Operational Funding’, as in a crisis, the assumption is that customers will reduce operational balances to those required to maintain their normal business.
4.1.1.5 Foreign Deposits

Under the prudential liquidity standards of both APRA and the OSFI’s, Australian and Canadian banks will be required to hold liquid assets in those currencies where more than five per cent of the bank’s liabilities are denominated in that currency. The Reserve Bank of Australia and the Bank of Canada do not provide lender of last resort support in foreign currencies.

The foreign deposits to total deposits ratio provides insight into the global dependency and diversity that individual banks in Australia and Canada have on foreign deposits.

Figure 3.0: Australian banks’ foreign deposits to total deposits ratios between 1994 and 2014:
The two charts above reveal that:

- It is clear that most of the banks that are included within the above charts have more than one significant currency, therefore requiring it to hold liquid assets in those currencies;
- Only the National Bank of Australia and the Australia and New Zealand Banking Group have had levels of foreign deposits that are similar to the large Canadian banks;
- The Canadian banks have historically had larger global operations, attracting a greater amount of foreign deposits;
- All four Australian major banks have significant exposures to New Zealand.
4.1.1.6 The Price of Australian Deposit Funding

4.1.1.6.1 At-Call Savings Account Products (Retail/Consumer Segment)

Figure 4.0: Australian retail (consumer) at-call savings accounts observable headline interest rates between July 2010 and April 2015:

Source: Reserve Bank of Australia, CANSTAR
Figure 4.1: Australian retail (consumer) at-call savings accounts market average headline rates between July 2010 and April 2015:

![Graph showing Australian retail (consumer) at-call savings accounts market average headline rates between July 2010 and April 2015.]

Figure 4.2: Australian retail (consumer) at-call savings accounts average headline rate differential to the Reserve Bank of Australia’s official cash rate between July 2010 and April 2015:

![Graph showing Australian retail (consumer) at-call savings accounts average headline rate differential to the Reserve Bank of Australia’s official cash rate between July 2010 and April 2015.]

Source: Reserve Bank of Australia, CANSTAR
Figure 4.3: Australian retail (consumer) at-call savings accounts observable base interest rates between July 2010 and April 2015:

Source: Reserve Bank of Australia, CANSTAR
Figure 4.4: Australian retail (consumer) at-call savings accounts market average base rate between July 2010 and April 2015:

Figure 4.5: Australian retail (consumer) at-call savings accounts average base rate differential to the Reserve Bank of Australia’s official cash rate between July 2010 and April 2015:
4.1.1.6.2 At-Call ‘Bonus Saver’ Account Products (Retail/Consumer Segment)

Figure 5.0: Australian retail (consumer) at-call ‘bonus-saver’ accounts observable base interest rates between July 2010 and April 2015:

Source: Reserve Bank of Australia, CANSTAR
Figure 5.1: Australian retail (consumer) at-call bonus savings accounts market average rates between July 2010 and April 2015:

![Graph showing average rates from July 2010 to April 2015]

**Source:** Reserve Bank of Australia, CANSTAR

Figure 5.2: Australian retail (consumer) at-call bonus savings accounts average interest rate differential to the Reserve Bank of Australia’s official cash rate between July 2010 and April 2015:

![Graph showing interest rate differential from July 2010 to April 2015]

**Source:** Reserve Bank of Australia, CANSTAR
Review of the customer pricing on at-call Australian retail investment products reveals that:

- After peaking in 2012, interest rates across the Australian sample banks’ at-call retail demand deposit investment products have since slowly trended down towards the Reserve Bank’s overnight cash rate target;
- The headline margin over the Reserve Bank’s overnight cash rate paid to customers on at-call savings accounts is at its lowest level since 2010;
- Three major Australian banks use their subsidiary banking brands or business units to compete on price with regional and non-bank deposit-taking institutions;
- Banks often do not adjust interest rates immediately after an official change in the monetary policy setting and can take a number of weeks to pass on new interest rates to customers.

4.1.1.6.3 Australian Dollar Retail Term Deposits

Figure 6.0: The onshore Australian Dollar retail term deposit yield differentials to the respective Australian Dollar interest rate swap curves covering the period from 1987 to 2015:

Source: Reserve Bank of Australia, Bloomberg

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7 Subsidiary banking units include St George, the Bank of South Australia and the Bank of Melbourne (all Westpac), BankWest (Commonwealth Bank), and uBank (National Australia Bank)
4.1.1.6.3.1 Analysis of Three Month Retail Term Deposits

Figure 7.0: The onshore Australian Dollar 3 month retail term deposit yield and respective the respective 3 month Bank Bill swap rate from 1989 to 2015:

![Graph of Retail Term Deposit and BBSW 3M Index from 1989 to 2015](image)

Source: Bloomberg, RBA

Figure 7.1: The onshore Australian Dollar 3 month retail term deposit decision point price momentum oscillator from 1993 to 2015:

![Graph of Decision Point Price Momentum Oscillator (PMO) from 1993 to 2015](image)
Figure 7.2: The onshore Australian Dollar 3 month retail term deposit relative strength index from 1990 to 2015:

![Relative Strength Index (RSI)](image1)

Figure 7.3: The onshore Australian Dollar 3 month retail term deposit 10-period standard deviation from 1990 to 2015:

![10-period Standard Deviation](image2)
Figure 7.4: The onshore Australian Dollar 3 month retail term deposit 20-period standard deviation from 1990 to 2015:

Figure 7.5: The onshore Australian Dollar 3 month retail term deposit Bollinger Bands from 1990 to 2015:

The outer bands have been set 2 standard deviations over and under the middle band.
Figure 7.6: The onshore Australian Dollar 3 month retail term deposit %B indicator from 1990 to 2015:

![Bollinger Bands (%B Indicator)](image)

Figure 7.7: The onshore Australian Dollar 3 month retail term deposit Bollinger Bandwidth from 1990 to 2015:

![Bollinger BandWidth](image)
Figure 7.8: The onshore Australian Dollar 3 month retail term deposit Know Sure Thing from 1992 to 2015:

![Graph of KST and Signal Line](image)

Figure 7.9: The onshore Australian Dollar 3 month retail term deposit simple and exponential moving averages from 1990 to 2015:

![Graph of Moving Averages](image)
Figure 7.10: The correlation coefficient between the onshore Australian Dollar 3 month retail term deposit yield and respective the respective 3 month Bank Bill swap rate from 1990 to 2015:

Figure 7.11: Analysis of the ‘price relative / relative strength’ between the onshore Australian Dollar 3 month retail term deposit yield and respective the respective 3 month Bank Bill swap rate from 1989 to 2015:
4.1.1.6.3.2 Analysis of Six Month Retail Term Deposits

Six month retail deposit pricing will be impacted by the ‘6s3s’ phenomena, which is discussed in Section 4.1.2.5 Cost of Funds. The following analysis has been conducted to assess this relationship.

Figure 8.0: The onshore Australian Dollar 6 month retail term deposit yield and respective the respective 6 month Bank Bill swap rate from 1987 to 2015:

Figure 8.1: The onshore Australian Dollar 6 month retail term deposit decision point price momentum oscillator from 1992 to 2015:
Figure 8.2: The onshore Australian Dollar 6 month retail term deposit relative strength index from 1989 to 2015:

![Relative Strength Index (RSI)](image1)

Figure 8.3: The onshore Australian Dollar 6 month retail term deposit 10-period standard deviation from 1988 to 2015:

![10-period Standard Deviation](image2)
Figure 8.4: The onshore Australian Dollar 6 month retail term deposit 20-period standard deviation from 1989 to 2015:

![Standard Deviation Graph](image)

Figure 8.5: The onshore Australian Dollar 6 month retail term deposit Bollinger Bands\(^9\) from 1989 to 2015:

![Bollinger Bands Graph](image)

\(^9\) The outer bands have been set 2 standard deviations over and under the middle band.
Figure 8.6: The onshore Australian Dollar 6 month retail term deposit %B indicator from 1989 to 2015:

![Bollinger Bands (%B Indicator)](image)

Figure 8.7: The onshore Australian Dollar 6 month retail term deposit Bollinger Bandwidth from 1989 to 2015:

![Bollinger BandWidth](image)
Figure 8.8: The onshore Australian Dollar 6 month retail term deposit Know Sure Thing from 1991 to 2015:

![Graph showing Know Sure Thing (KST)](image)

Figure 8.9: The onshore Australian Dollar 6 month retail term deposit simple and exponential moving averages from 1989 to 2015:

![Graph showing Moving Averages - Simple and Exponential](image)
Figure 8.10: The correlation coefficient between the onshore Australian Dollar 6 month retail term deposit yield and respective the respective 6 month Bank Bill swap rate from 1989 to 2015:

![Correlation Coefficient Graph](image)

Figure 8.11: Analysis of the ‘price relative / relative strength’ between the onshore Australian Dollar 6 month retail term deposit yield and respective the respective 6 month Bank Bill swap rate from 1989 to 2015:

![Price Relative Graph](image)
As depicted in the series of charts above:

- After sharply increasing in the late-1980s, deposit pricing experienced a long period of decline that commenced in the early-1990s, lasting until early-2008;
  - Specifically, between 1997 and 2007 there was a gradual widening between the 3 and 6 month BBSW rate and equivalent duration term deposit;
- During the latest financial crisis, time deposit markets were not immune to the financial market’s sharp linear repricing of risk;
- Deposit rates repriced to reflect credit and liquidity spreads in 2008, where yields moved from below to above their equivalent BBSW settings;
  - On average, pricing shifted from approximately three per cent below the swap rate to nearly two per cent above it in a matter of approximately 2 years;
  - This represents nearly a 500 basis point revaluation;
  - New Basel regulation was announced that incentives deposit raising;
  - Credit rating agencies and equity analysts stating that customer deposits were more ‘stable’ or ‘core’ at this time;
- Since deposit pricing peaked in 2012, rates have been steadily declining;
- There have been several periods over the last 15 years where retail term deposit funding margins has experienced large amounts of dispersion, or volatility;
- The ‘price relative / relative strength’ between term deposit rates has shown new, much greater deviations of under and outperformance against the respective BBSW rates from late-2007. This has been widening until the end of the sample period in 2015;
- Although both the 3 and 6 month retail term deposit interest rates mainly display positive correlations with their equivalent BBSW settings, there have been period throughout the sample period where interest rates have been negatively correlated.

### 4.1.2 Unsecured Wholesale Funding

Unsecured wholesale funding includes funding, including deposits and tradable securities, which is obtained from legal entities, sole proprietorships or partnerships and is not collateralised by legal rights. To be included within the LCR’s 30 day residual maturity threshold, unsecured wholesale funding must expire or be callable within a 30 day period.
Wholesale non-operational funding comprises of deposits and other funding sources that are surplus to operational funds or where the key purpose is to earn a yield on the customer’s excess funds. This funding is by definition dispensable and therefore carries a higher risk of leaving the bank in a crisis. Any funds sourced from non-financial corporations, central banks, public sector enterprises or sovereigns that fall into the LCR’s 30 day residual maturity threshold must be assigned a 40 per cent runoff factor. For financial institutional customers the runoff factor is 100 per cent. On the banking book of Australian and Canadian banks, non-operational deposits products can include saving and investment products, where one main motivation is for the customer to generate a return on their excess funds.

Global short and long dated wholesale debt issuance usually is undertaken from banks’ trading books and forms a critical component to the diversification of Australian and Canadian bank liabilities. Australian and Canadian banks use this funding to: lengthen the duration of their liabilities, as few banking book deposits are written beyond 3 years; access funding from a range of jurisdictions; issue in a basket of currencies; access different investor types and categories; and broaden their liability product set. All of these factors assist Australian and Canadian banks to achieve sound liquidity management practices and optimise their borrowing costs.

4.1.2.1 Short-term Wholesale Funding to Total Liabilities

The proportion of short-term wholesale funding to total liabilities provides insight into the amount of short-term wholesale funding that individual banks in Australia and Canada have on their balance sheets. This includes both short-dated issuance, where the initial duration is less than one year, in addition to any longer-term debt that has scrolled in.
Figure 9.0: Australian banks’ proportion of short-term wholesale funding to total liabilities between 1992 and 2014:

![Australian banks' proportion of short-term wholesale funding](image)

Figure 9.1: Canadian banks’ proportion of short-term wholesale funding to total liabilities between 1994 and 2014:

![Canadian banks' proportion of short-term wholesale funding](image)
After inspecting the above charts, it appears as though Australian and Canadian banks have, on average, maintained equivalent proportions of short-term wholesale funding on their balance sheets;

4.1.2.2 Total Wholesale Funding to Total Liabilities

The proportion of total wholesale funding to total liabilities exhibits the aggregate volume of wholesale funding that banks in Australia and Canada have outstanding over time. This includes both short-dated issuance, where the initial duration is less than one year, longer-term debt that has scrolled into consideration, in addition to the bank’s long-term debt.

Figure 10.0: Australian banks’ proportion of total wholesale funding to total liabilities between 1992 and 2014:
As illustrated by the above charts:

- Between 1992 and late-2007, the proportion of wholesale funding on the balance sheets of Australian banks was gradually increasing. Subsequently all Australian banks reduced this ratio, particularly the regional banks;
- Where the Australian banks displayed a clear upward trend, Canadian bank proportions of wholesale funding have largely trended sideways over the 20-year period;
- The smaller banking organisations within the sample in both Australia and Canada have historically held lower proportions of wholesale funding than the larger banks.
4.1.2.3 Australian Outstanding Debt Securities

Figure 11.0: The outstanding debt securities issued by Australian banks & financial institutions (AUD millions) \(^{10}\)^\(^{11}\)^\(^{12}\)

The figure above illustrates that:

- The outstanding debt securities of Australian banks and financial corporations experienced significant year-on-year growth from 1992 until late-2007;
- The total volume of stock outstanding is greater than it was in late-2007, however, banks have transformed their debt issuance profiles following the start of the financial crisis:
  - There is a lessened their dependence upon all forms of issuance, particularly short-term domestic wholesale funding, where focus has diverted towards deposit funding;

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\(^{10}\) Between September 1992 and June 1998, the RBA produced quarterly data on the outstanding volumes of short-term non-government securities issued in Australia by banks and other financial corporations. To complete this data set, interpolation was carried out on a straight line basis;

\(^{11}\) Short-term securities includes commercial paper and bonds with an initial term to maturity of one year or less;

\(^{12}\) Data for short-term securities issued by banks within the ‘banks and other financial corporations’ series also include bank bills and certificates of deposit sourced from APRA. Data prior to July 2000 are averages of weekly figures for the month.
• Domestically issued long-term funding has slightly declined, after steadily growing until 2012:
  o It appears that capacity has been absorbed by both deposits and offshore issuance;
• Despite slightly declining after August 2010, offshore bank debt issuance started to increase in early 2013 as offshore conditions began to improve:
  o The relevance of offshore funding to Australian banks overall funding strategies is as significant as ever.

4.1.2.4 Australian Prime Bank Issuance

Australia’s prime banks are the four major banks and, combined, are responsible for the majority of short-dated domestic non-government issuance. The interest rates that prime bank issuance trades at in the interbank market for selected durations are used in the daily calculation of the Australian Bank Bill Swap (BBSW) rates. Importantly, these interest rates do not reflect bank to client transactions as these are more heterogeneous where customer margins can be included.
Figure 12.0: The monthly average issuance volumes (AUD millions) of prime bank paper executed through approved venues (9:55am - 10:05am inclusive), for the purposes of setting BBSW. This covers the period October 2013 to June 2015:

![Bar chart showing monthly issuance volumes](image)

Source: Australian Financial Markets Association

Figure 12.1: The monthly average issuance proportions of the aggregate daily volume in prime bank paper executed through approved venues (9:55am - 10:05am inclusive), for the purposes of setting BBSW. This covers the period October 2013 to June 2015:

![Bar chart showing issuance proportions](image)

Source: Australian Financial Markets Association
Inspection of the data reveals that:

- Short-term prime bank domestic issuance has been declining since October 2013;
- Australian banks habitually conduct most of their issuance in certain parts of the month;
- The most popular maturity bucket has been in three months;
- The only durations where banks are regularly active are the one, three and six month buckets;
- The volume of six month issuance spiked in November 2014 to a level representing 43 per cent of total prime bank issuance;
- Six month issuance then dropped to a level representing six per cent of the total proportion in December 2014; and
- AFMA is carrying out the BBSW setting process using prices where, more often than not, there is a lack of prime bank issuance being conducted.

### 4.1.2.5 Cost of Funds: Interest Rate Curves

The quarterly swap curve reflects the cost of funds for Australian and Canadian banks. Many banks set customer prices on deposit and loan banking book products by offering customers a margin over the Australian Financial Market Association’s (AFMA) published BBSW/BBSY rates or the Canadian Dollar Offered Rates (CDOR). Within global financial markets this spread or differential is known as the ‘6s3s’ (‘six/threes’).
4.1.2.5.1 Australian Dollar 6s3s

Figure 13.0: The Australian Dollar 6 month Bank Bill swap rate and respective AUD quarterly interest rate swap curves from 2011 to 2015:

![Graph showing Australian Dollar 6 month Bank Bill swap rate and respective AUD quarterly interest rate swap curves from 2011 to 2015.](image)

Source: Bloomberg

Figure 13.1: The correlation coefficient between the Australian Dollar 6 month Bank Bill swap rate and respective AUD quarterly interest rate swap curves from 2011 to 2015:

![Graph showing the correlation coefficient between the Australian Dollar 6 month Bank Bill swap rate and respective AUD quarterly interest rate swap curves from 2011 to 2015.](image)
Figure 13.2: Analysis of the ‘price relative / relative strength’ between the Australian Dollar 6 month Bank Bill swap rate and respective AUD quarterly interest rate swap curves from 2011 to 2015:

![Price Relative / Relative Strength Graph](image)

Figure 13.3: The differential between the 4, 5 and 6 month semi/quarterly AUD interest rate swap curves (Monthly Average) between January 2011 and June 2015:

![Interest Rate Swap Graph](image)

Source: Bloomberg
4.1.2.5.1 Canadian Dollar 6s3s

Figure 14.0: The 6 month Canadian Dollar Offered Rates (CDOR) and respective CAD quarterly interest rate swap curves from 2011 to 2015:

Source: Bloomberg

Figure 14.1: The correlation coefficient between the 6 month Canadian Dollar Offered Rates (CDOR) and respective CAD quarterly interest rate swap curves from 2011 to 2015:
Figure 14.2: Analysis of the ‘price relative / relative strength’ between the 6 month Canadian Dollar Offered Rates (CDOR) and respective CAD quarterly interest rate swap curves from 2011 to 2015:

4.1.2.5.3 Comparison between the AUD & CAD 6s3s

Figure 15.0: The Australian and Canadian Dollar quarterly interest rate swap curves from 2011 to 2015:
Figure 15.1: The correlation coefficient between the Australian and Canadian Dollar quarterly interest rate swap curves from 2011 to 2015:

![Correlation Coefficient](image)

Figure 15.2: Analysis of the ‘price relative / relative strength’ between the Australian and Canadian Dollar quarterly interest rate swap curves from 2011 to 2015:

![Price Relative / Relative Strength](image)
Figure 15.3: The differential between the AUD and CAD semi/quarterly interest rate swap Curves (Monthly Average) between January 2011 and June 2015:

Figure 15.4: The correlation coefficient between the AUD and CAD semi/quarterly interest rate swap Curves (Monthly Average) as it relates to Figure 15.3:
Inspection of the Australian and Canadian 6s3s data reveals:

- During the recent global financial crisis, the 6s3s in both currencies was elevated, going above 20 basis points;
- This spread has been in decline from December 2011 until November 2014 in both currencies, although the CAD 6s3s differential remained higher than the AUD equivalent throughout this time:
  - Since October 2014 these curves have displayed a negative correlation;
- Since November 2014, there has been a widening in the spread between AFMA’s published four, five and six month BBSW/BBSY settings and the quarterly equivalent interest rates in each of these durations;\(^\text{13}\)
- Without customer margin adjustment, there is a large differential in the effective interest rate between 3 & 6 month client transactions.
- Australian banks are facing larger costs associated with issuing prime bank paper in the months of December 2014 and January 2015, when these funds are converted back to banks’ cost of funds;
- The higher ‘implied’ prices banks are paying and charging for deposits and loans over the quarterly equivalent interest rate when customer margins are not adjusted;
- Over the sample period, this daily differential has ranged between:
  - AUD 4 months: -1.41 and +12.68 basis points;
  - AUD 5 months: -1 and 25.55 basis points;
  - AUD 6 months: -0.75 and 37.9 basis points;
  - CAD 6 months: -11.43 and 96.42 basis points.

\(^{13}\) This phenomenon is not evident in the one, two and three month part of the curve.
4.1.2.6 Wholesale Issuance Margins

Figure 16.0: Generic AUD AA curves spread to the Commonwealth Government Generic Bond Contracts between 1999 and 2014:

Source: Bloomberg

Figure 16.1: The correlation coefficient between the Australian Dollar 3-year AUD AA curve and the respective Australian Government generic bond contract from 1999 to 2015:
Figure 16.2: Analysis of the ‘price relative / relative strength’ between the Australian Dollar 3-year AUD AA curve and the respective Australian Government generic bond contract from 2000 to 2015:

![Price Relative / Relative Strength](image)

Figure 16.3: The Australian Dollar 3-year AUD AA curve decision point price momentum oscillator from 2000 to 2015:

![Decision Point Price Momentum Oscillator (PMO)](image)
Figure 16.4: The Australian Dollar 3-year AUD AA curve relative strength index from 1999 to 2015:

![Relative Strength Index (RSI)](image)

Figure 16.5: The Australian Dollar 3-year AUD AA curve 10-period standard deviation from 1999 to 2015:

![10-period Standard Deviation](image)
Figure 16.6: The Australian Dollar 3-year AUD AA curve 20-period standard deviation from 1999 to 2015:

![Graph showing 20-period standard deviation from 1999 to 2015.]

Figure 16.7: The Australian Dollar 3-year AUD AA curve Bollinger Bands\(^{14}\) from 1999 to 2015:

![Graph showing Bollinger Bands (20,2) for AUD AA curves.]

\(^{14}\) The outer bands have been set 2 standard deviations over and under the middle band.
Figure 16.8: The Australian Dollar 3-year AUD AA curve %B indicator from 1999 to 2015:

![Bollinger Bands (%B Indicator)](image1)

Figure 16.9: The Australian Dollar 3-year AUD AA curve Bollinger Bandwidth from 1999 to 2015:

![Bollinger BandWidth](image2)
Figure 16.10: The Australian Dollar 3-year AUD AA curve Know Sure Thing from 2000 to 2015:

![Know Sure Thing (KST)](image)

Figure 16.11: The Australian Dollar 3-year AUD AA curve simple and exponential moving averages from 2000 to 2015:

![Moving Averages - Simple and Exponential](image)
Analysis of the data reveals:

- In late-2007, the Australian Dollar 3-year AUD AA curve experienced a sharp linear repricing of risk;
- On average, wholesale margins have been contracting since the end of 2007;
- There have been several periods over the last 15 years where bank wholesale funding margins have experienced large amounts of dispersion, or volatility;
- The ‘price relative / relative strength’ between the Australian Dollar 3-year AUD AA curve has shown larger deviations of under and outperformance against the respective Australian Government generic bond contract from late-2007 to 2015;
- The Australian Dollar 3-year AUD AA curve has maintained a high degree of positive correlation to the respective Australian Government generic bond contract throughout the sample period.

4.1.3 Customer Lending and Liquidity Facilities

Banks’ customers establish lending or liquidity facilities in order to draw funds or gain access to liquidity when they require it. Customers use these facilities for various reasons including funding working capital shortfalls, when making asset purchases, or to provide liquidity coverage for their commercial paper programmes. The allocation of lending limits to customers creates contingent balance sheet exposures for banks as provisions need to be allocated against facilities in the event of customer requests to drawdown. It is the expectation of both APRA and the OSFI that both the customer type and the product type will influence a customers’ propensity to drawdown on a loan commitment. For the purposes of this dissertation, the outflow assumptions are divided into two distinct groups of committed and other contingent funding obligations.
4.1.3.1 Committed Lending Facilities

These are facilities that are contractually irrevocable ("committed") or conditionally revocable agreements to extend funds in the future. Before applying the Basel III customer segmentations, the facilities are broken into product types with all facilities defaulting to credit facilities unless they are proven to satisfy the definition of liquidity facilities.

A "liquidity facility" is a commitment to extend funds for the express purpose of refinancing financial market debt obligations that will mature within the next 30 days. The amount of any commitment to be treated as a liquidity facility is the amount of outstanding debt maturing within a 30-day period that is backstopped by the facility (or proportionate share of a syndicated facility). Bank customers in Australia and Canada may use these facility types as liquidity support for their commercial paper programmes. In contrast to liquidity facilities, a "credit facility" is provided for general corporate or working capital purposes.

4.1.3.2 Uncommitted Lending Facilities

Uncommitted revocable facilities exhibit similar criteria to that of committed facilities; however they are provided by a bank on an uncommitted basis. This means that where the facility can be unconditionally cancelled by a bank, such as in circumstances where there is no precondition of a material change in the credit condition of the borrower, a lower outflow rate of 5 per cent will apply.

4.1.3.3 Contingent Funding Obligations

Contingent funding obligations can include trade finance facilities, guarantees, and merchant prepayments facilities and can be explicitly contingent upon a credit or other event that is generally unrelated to the ADI’s liquidity position. Basel III has provided both APRA and the OSFI discretion to determine the outflow factors to apply to these exposures. APRA has
therefore prescribed that for contingent exposures the deposit-taking institution analyse the ‘average outflow’ approach, which recognises that the liquidity risk is linked to the underlying credit worthiness of the portfolio in question. For guarantees and other letters of credit, APRA has stated that this calculated average outflow receives a 50 per cent haircut.

Figure 17.0: Australian run-off factors by product type:

4.2 Liquidity

4.2.1 Liquid Assets and Counterbalancing Capacity

The highest quality liquid assets can be instantaneously switched into cash with small or no loss of their value. These assets are of a low risk, simple and transparent in their valuation, have a low correlation with risky assets and may be listed on a developed exchange. The characteristics of liquid assets are that they have low volatility, active large buyers and sellers, and in times of stress market participants often move into these assets. Liquid assets can provide owners with cash via outright sale or the repo market, without the need to sell holdings at a discount. The liquidity characteristics of assets are tested in times of economic or financial market stress and holders need to be cognisant of the timeframes with which they
may need to liquefy the asset or the volume that may be required to be sold and the consequential impacts that these factors can have on the asset’s value.

Basel III identifies two categories or ‘tiers’ of assets that can be included in banks’ HQLA portfolios. Tier 1 HQLA refers to assets that can be easily and immediately converted into cash with little or no loss of value under stressed market conditions, and can be included in the LCR without limitation or the application of haircuts. Tier 2 HQLA have a proven record as a reliable source of liquidity even during stressed market conditions, but do not have as deep liquidity characteristics as Tier 1 HQLA, and often cannot be considered ‘risk-free’ from a credit risk perspective. In both Australia and Canada there is a lack of supply of qualifying HQLA securities, meaning banks will need to hold a portion of their liquid assets in instruments that are considered Tier 2 HQLA and can qualify for inclusion within banks’ committed liquidity facilities. Under their prudential accords on liquidity, both APRA and the OSFI allow deposit-taking institutions to hold Tier 2 HQLA of up to 40 per cent of their total HQLA portfolio.

As at January 2015, following a review of a range of marketable instruments denominated in Australian dollars (AUD) against the Basel III criteria for HQLA, APRA advised that the only assets that qualify for Tier 1 HQLA are cash, balances held with the Reserve Bank of Australia (RBA), and Commonwealth Government and semi-government securities. Further, there are no AUD assets that qualify as Tier 2. The supply of Tier 1 HQLA securities is not sufficient to meet the liquidity needs of the Australian banking system. Australian banks may seek a contractual liquidity commitment from the RBA towards meeting their LCR, known as the Committed Liquidity Facility (CLF). Each deposit-taking institution will be granted an approved CLF facility limit, which they can access for a fee of 15 basis points. Eligible securities will be held as collateral against the facility limit, and in the case of a crisis will be used to enter into repurchase agreements with the RBA. APRA requires ADIs to demonstrate that they have taken all reasonable steps towards meeting their LCR requirements through their own balance sheet management, before relying on the CLF. The CLF can only be accessed by a deposit-taking institution for any shortfall in their onshore AUD liquidity needs. Consequently material foreign currency LCR requirements will need to be satisfied by holding liquid assets any currency where a bank has significant exposures.
4.2.1.1 Reserves (Cash Assets)

Figure 18.0: Australian banks’ proportion of cash within their total investments between 1992 and 2014:

Figure 18.1: Canadian banks’ proportion of cash within their total investments between 1992 and 2014:
Figure 18.2: Australian banks’ cash reserves as a proportion of their total assets between 1992 and 2014:

![Australian Banks' Cash Reserves](image1)

Figure 18.3: Canadian banks’ cash reserves as a proportion of their total assets between 1993 and 2014:

![Canadian Banks' Cash Reserves](image2)
Historically, as the above four charts indicate, Canadian banks have held significantly different proportions of cash assets as a proportion of their total investments on their balance sheets. With the exception of the comparatively smaller Pacific & Western Credit Corporation, all Canadian organisations within the sample had lowered cash assets to less than 5 per cent by 2008. Of the remaining banks, only the Bank of Montreal has increased its proportion of at-call reserves following the most recent global financial crisis to a level of 10 per cent. These post-2008 Canadian bank results represent lower levels of cash balances than their Australian counterparts as a proportion of their total investments. In summary, cash reserves represent a small proportion of total assets of Australian and Canadian banks.

4.2.1.2 Investment Assets

The investments to total assets ratios provide some indication into the proportion of investable assets and liquidity (not HQLA) that Australian and Canadian banks have historically purchased and held. The first two charts include only the banks total investments as a fraction of total assets, with the second two charts including both total investments in addition to their cash and cash equivalents in an attempt to demonstrate liquidity of the banks over time. The trends of Australian and Canadian banks are displayed below, covering the period between 2000 and 2014 for Australia and between 2003 and 2014 for Canada:
4.2.1.2.1 Total Investments

Figure 19.0: Australian banks’ total investments as a proportion of total assets between 1992 and 2014:

Figure 19.1: Canadian banks’ total investments as a proportion of total assets between 1992 and 2014:
4.2.1.2.2 Total Liquid Assets

Figure 20.0: Estimate of Australian banks’ proportion of total liquid assets, which includes their cash assets and total investments between 1992 and 2014:

Figure 20.1: Estimate of Canadian banks’ proportion of total liquid assets, which includes their cash assets and total investments between 1993 and 2014:
The above figures indicate:

- Australian banks have consistently invested between 10 to 20 per cent of total assets over the last 22-year period;
- Canadian banks have historically had a greater appetite for investment assets, however, since 2010 this has been, on average, slightly trending downwards:
  - The larger Canadian banks have historically held a greater proportion of investment assets.

### 4.3 Procyclicality

Through the implementation of Basel III, both APRA and the OSFI introduced a new countercyclical buffer of up to 2.5 per cent, which could be introduced when either APRA or the OSFI feels as though the allocation of credit within the financial system is excessive and there is widespread evidence of risks within the marketplace.

When banks enlarge their balance sheets, the price for assuming credit risk falls. This makes it critical for both regulators and banks to monitor the size of bank balance sheets, how they are being funded and the margins that assets and liabilities are being written at.

Changes have also been made to rehypothecation regulation to tighten the list of eligible securities that could be pledged as collateral and reduce the churn of securities that resulted in lower levels of financial market liquidity during the last financial crisis. This is an example of where regulation has indirectly instituted a predisposition to government securities. Australian and Canadian banks both allow mark-to-market accounting treatment for the valuation of securities that sit within the trading book.
4.3.1 Bank Capital

With APRA and the OSFI adopting the BIS’ Basel II capital accord they provided banks with allowances for assessing risk weights for the credit risk of banking book assets. Pillar I of the accord described three approaches, including: the standardised approach; the foundation internal ratings-based approach; and the advanced internal ratings-based approach. These allowances have implications for procyclicality. Whilst a granular review of bank capital regulation has not the primary focus of this dissertation, there are some important differences discovered between the BIS’ Basel III capital accords and what has been enacted locally by the respective regulators.

Both APRA and the OSFI enacted Basel III capital regulation in their domestic jurisdictions from 1 January 2013, which is ahead of the international implementation schedule. The Basel Committee on Banking Supervision carried out an assessment on both jurisdictions. APRA’s prudential framework was found to be compliant in twelve of the fourteen components, with the remaining two components being largely compliant. Differences related to the definition of bank capital that has been adopted by APRA and the Internal Ratings-based (IRB) approach for credit risk (Basel Committee on Banking Supervision, 2014a). Conversely, the OSFI’s prudential framework was found to be compliant in thirteen of the fourteen components, with the remaining component being largely compliant. Differences related to the definition of bank capital that has been adopted by the OSFI (Basel Committee on Banking Supervision, 2014b). Without context and knowledge of the differences, comparison of the individual bank balance sheet data becomes difficult.

Both APRA and the OSFI announced that domestic systemically important banks (D-SIBs) would have a higher loss absorbency (HLA) capital requirement of 1 per cent from 1 January 2016. This requirement captures the four major banks in Australia and Canada’s six largest banks.
As can be seen in the charts below, it appears as though Canadian banks have been better capitalised since the start of the century. However, if Australian banks reported based upon the OSFI’s standards their actual capital ratios would be significantly higher than the below balance sheet data reveals. Consequently, for the purposes of analysing bank capital within this dissertation comparison at a domestic level is made.

4.3.1.1 Total Capital Ratios

Figure 21.0: Australian banks’ total capital ratios between 1994 and 2014:
Figure 21.1: Canadian banks’ total capital ratios between 1995 and 2014:

4.3.1.2 Tier 1 Capital Ratios

Figure 21.2: Australian banks’ Tier 1 capital ratios between 1994 and 2014:
Figure 21.3: Canadian banks’ Tier 1 capital ratios between 1995 and 2014:

![Canadian banks' Tier 1 capital ratios between 1995 and 2014](image)

4.3.1.3 Tier 2 Capital Ratios

Figure 21.4: Australian banks’ Tier 2 capital ratios between 1994 and 2014:

![Australian banks' Tier 2 capital ratios between 1994 and 2014](image)
Figure 21.5: Canadian banks’ Tier 2 capital ratios between 1995 and 2014:

Interestingly, as can be seen in the series of charts above:

- There has been a trend by both Australian and Canadian banks to hold greater amounts of capital;
- Capital ratios can be seen to be increasing leading up to the introduction of Basel II, throughout the years of the recent financial crisis, and then before and after the introduction of Basel III;
- The Tier 1 capital ratios of the major Canadian banks have all declined from 2012 to 2013, which is the period covering the implementation of Basel III. Conversely the Tier 1 capital ratios of all Australian banks, with the exception of the ANZ, increase over this period;
- Since 2010, the Tier 1 capital ratios of Australian major banks have been higher than the Australian regional banks;
- Australian usage of Tier 2 capital has, on average, been in decline since 2003.
4.3.2 Asset/Loan Funding

4.3.2.1 Earning Assets

The earning assets as a proportion of interest bearing liabilities shows the year-on-year growth of either earning assets or interest bearing liabilities.

Figure 22.0: Australian banks’ earning assets as a proportion of interest bearing liabilities between 1994 and 2014:
Figure 22.1: Canadian banks’ earning assets as a proportion of interest bearing liabilities between 1994 and 2014:

The above charts depict that:

- On average, Australian banks seem to be adding a greater proportion of interest bearing liabilities compared to earning assets over the sample period, with their ratios displaying down trends;
- Within Canada, banks’ results display a greater degree of volatility and are not as correlated as the Australian banks;
- Following a dip during the years of the financial crisis, Canadian banks ratios have largely reverted back within their upward sloping channel.

4.3.2.2 Gross Loans

The gross loans to total deposits ratios provide some indication into the preference, or ability, for banks in these jurisdictions to fund their lending with deposits.
Figure 23.0: The proportion of gross loans to total deposits of Australian banks between 1992 and 2014:

Figure 23.1: The proportion of gross loans to total deposits of Canadian banks between 1993 and 2014:
As displayed above:

- The Gross loans to total deposits ratios of the Canadian banks have been significantly lower than their Australian counterparts over the entire sample period between 1996 and 2014;
- This ratio provides some indication of the preference, or ability, for banks in these jurisdictions to fund lending with deposits;
  - However, a lower gross loans to total deposits ratio can also indicate that the bank may be utilising deposits to fund assets outside of lending;
- Interestingly, following the onset of the most recent financial crisis, the Gross loans to total deposits ratios of Australian and Canadian banks have moved in opposing directions, with Australian banks declining and the Canadian banks increasing, with the exception of the Bank of Nova Scotia;
- Australian banks greatly increased this ratio in the late 1990s and early 2000s, with many banks naturally ‘peaking’ in 2006/7, before reversing a long trend over the remainder of the sample period:
  - This reversal is a consequence of a combination of both lower levels of credit growth in Australia and competition moving from the asset side of the bank to deposit raising;
- The results of Canadian banks reveal that deposits have been historically used to fund other balance sheet assets.

4.3.3 Bank Margins

4.3.3.1 Net Interest Margins

The Net Interest Margin (NIM) is the differential between a bank’s interest income and its overall interest expense.
Figure 24.0: Australian banks’ NIM between 1994 and 2014:

Figure 24.1: Canadian banks’ NIM between 1995 and 2014:
4.3.3.2 Earning Asset Yields

Figure 25.0: Australian banks’ earning asset yield between 1994 and 2014:

Figure 25.1: Canadian banks’ earning asset yield between 1994 and 2014:
4.3.3.3 Cost of Total Borrowings

Figure 26.0: Australian banks’ cost of total borrowings between 1994 and 2014:

![Australian banks' cost of total borrowings](image)

Figure 26.1: Canadian banks’ cost of total borrowings between 1994 and 2014:

![Canadian banks' cost of total borrowings](image)
As is evident in the series of charts above:

- Earnings asset yields and the cost of total of borrowings varied greatly over the course of the sample period’s business cycle, however, the Net Interest Margins (NIM) of both Australian and Canadian banks have, on average, been in decline since the start of this century:
  - This indicates that asset yields are falling faster than the banks’ total cost of borrowings;
- Australian NIM margins have been significantly higher than their Canadian peers throughout this period;
- In Australia, the NIM turned positive immediately after the onset of most recent the global financial crisis for most sample banks, before remaining constant or declining thereafter;
- Net interest margins increased significantly between 2006 and 2009 before starting to slightly decline again for the Royal Bank of Canada, the Bank of Nova Scotia and the National Bank of Canada. It appears that the driver of this has been its overall interest expense falling at a faster rate than interest income. The Bank of Montreal and the Canadian Imperial Bank of Commerce both experienced a similar trend; however, it commenced a year later.

4.4 Conclusion

The banking systems of Australia and Canada are quite similar as there is a high positive correlation between the institutions that set prudential frameworks and also in the types of banking organisations that make up their industries. Despite these parallels, the compositions of banks’ balance sheets reveal some differing structures. The results show that the funding mix diverges between Australian and Canadian banks, with varying margins, capital holdings and asset funding profiles have been reported over time. These components to banks’ balance sheets can provide insight into procyclicality and the ongoing financial stability of the broader marketplace.
Recent regulatory change has driven a revaluation in bank liabilities and the LCR’s residual maturity threshold provides new opportunity for balance sheet innovation. Banks that strengthen their funding profile will lessen their need for liquidity, which can carry a high regulatory cost and credit exposure towards the national governments of Australia and Canada.
Chapter Five: Findings

This chapter presents a discussion of the findings of the dissertation that relate to the analysis conducted in the preceding chapter. It is divided into three sections, representing the areas of bank funding, liquidity and procyclicality. Within the first section on bank funding, the findings relating to both deposits and wholesale funding are detailed.

The second section concerning liquidity, reports on liquidity risk management, liquidity costs and liquid assets and counterbalancing capacity. It is postulated that Australian and Canadian banks must go much further in their approach to measuring liquidity risk, calculating liquid asset requirements and the subsequent management of their High Quality Liquid Asset (HQLA) portfolios. Efficient pricing of liquidity risk may assist banks in strengthening resilience to liquidity stress events and in the valuation of balance sheet products.

The third and final section provides the findings into procyclicality. The analysis of Australian and Canadian balance sheet aggregates provides evidence of procyclicality and reinforces the importance for regulators to monitor bank assets, deposits and overall leverage when conducting macroeconomic enquiry. Bank management must consider that its tactical balance sheet measures can sway the ‘booms’ and ‘busts’ within business cycles. The variables examined within the prior chapter can provide useful signals for governmental institutions in their application of monetary policy as banking organisations thrust economies through the stages of the business cycle.
5.1 Bank Funding

5.1.1 Deposits

5.1.1.1 Insured Deposits

In Australia there is the presence of an explicit government guarantee, and the Canada Deposit Insurance Corporation (CDIC) provides a deposit insurance scheme in Canada. These arrangements are unique in that they are not complemented by any privately run deposit insurance schemes. In both Australia and Canada the government guarantee is far reaching and therefore has a greater the impact to banking stability, particularly as the guarantees are run and funded by the government instead of the private sector. Under this structure all ADIs effectively assume the credit rating of the national government when issuing covered deposits. It is argued in this dissertation that ADIs can come to rely on a government guarantee of deposits when it is in place. This reliance enhances the possibility of a banking or financial market crisis developing as, although it enhances domestic competition for retail deposit funding, it makes price the main differentiating factor for deposit gathering. Effectively safer ADIs are disadvantaged under the current model.

Although it is likely that lower runoff rates will be attached to insured deposits, the presence of a government guarantee does not wholly remove the motivation for the customer to withdraw their insured deposit from distressed ADIs.

As at March 2015, the Australian Government is proposing the introduction of a 5 basis point tax on guaranteed deposits to cover the cost of deposit insurance. This dissertation argues that there is no welfare gain derived from taxing the existing scheme and it is more than likely that this fee will be borne by the investor. Under the current structure, Australian investors or ADIs cannot opt-in or out of the scheme or elect their desired level of coverage. In view of this, the insurance scheme should be privately run where retail investors or ADIs can seek out coverage if it is desired.
It is reasonable that investors and the market has the opportunity demand a greater yield premium from ADIs where no government guarantee or insurance scheme exists, reflecting investors’ degree of risk intolerance. Where investors and ADIs can opt-in or out of the scheme, or nominate their level of coverage, the competitive landscape for retail deposits will become about more than just price.

5.1.1.2 Transactional Deposits

The Australian and Canadian banks in the study’s sample offer a range of transactional banking accounts which provide access to working capital and chequing facilities. The wide range of accounts payables and receivables settlement functionality available in both of these marketplaces make transactional deposits highly liquid, where bank customers can draw down at any time. Historically these products have provided low, or zero, returns to bank customers as interest returns are secondary to gaining access to the payments system. Non-interest bearing deposits will be more profitable for banks when interest rates are higher, however, in these times it is likely that banks’ portfolio volumes will be smaller as customers have a greater incentive to actively manage their working capital.

APRA’s regulation in the area of operational deposits is found to be lighter than its Canadian peer with the OSFI providing much more granular regulation. The OSFI, but not APRA, has postulated that it may not allow Canadian ADIs to classify portfolios of operational deposits with a 25 per cent outflow rate if there is the presence of concentration risk, or a large part of the portfolio comes from a small number of customers. Furthermore, the 25 per cent runoff factor is permitted for the level of deposits that are used for this purpose and approval must be sought from the OSFI for this treatment so that there is oversight that the bank is only applying this runoff factor to the correct level of operational deposits.

This research has found that the OSFI is also stricter when it comes to interest rates being an exclusion factor when meeting the operational definition. It states that when interest rates
within a jurisdiction are close to zero, the operational account should be non-interest bearing and there is the risk that customers could leave excess funds in operational accounts during these periods. If the interest rate on the bank account is set at a level that is close to, or above, the rate that could be achieved on an investment account it can be expected that customers may hold surplus funds within these bank accounts. Additionally, if the bank’s customer has access to capital markets, or can access bank lending at rates lower than what they can earn from a bank on a transactional bank account, it is likely that the customer will leave surplus funds within the operating account. Once rate on a transactional account hits a certain level, the bank will find it harder to assess the deposit as being ‘operational’. There needs to be ‘significant’ economic incentives, or interest rate differentials, between operational and surplus deposit products so that customers to go to the effort of forecasting their cash flows, or working capital needs, and move non-operational balances out of their operating accounts.

Like other deposit types, there is the potential for procyclical competition for transactional deposits as, when searching for liabilities, banks seek out deposit pools with low regulatory runoff factors that also come with low capital intensive payable and receivable revenue streams. Competition could lead to credit interest rates being used to incentivise customers to move banks.

In summary, the OSFI is much more granular in the regulation of operational deposits. The findings stress the need for APRA to look to provide further guidance to Australian ADIs in relation to the treatment of operational deposits, adopting similar methodologies to the OSFI. Regulators and bank management must be aware that operational deposits are not immune from procyclicality in times of strong competition, where higher credit interest rates may provide an incentive for customers to leave additional surplus balances within their transactional bank accounts.
5.1.1.3 Demand and Term (Time) Deposits

Much of the existing literature groups together operational deposits with other demand deposits. Although both of these deposits are at-call from an interest rate risk perspective, they are significantly different in their product design and behave very differently from a quantitative standpoint. Regulatory segregation of these two demand deposit types will help the industry develop an accepted methodology for uncoupled valuation.

Should banks’ in Australia or Canada permit early termination or withdrawal of time or term deposits by their customers, the entire pool of funding will be classified as being at-call and included in a bank’s LCR estimate. In the Australian market the big-4 banking institutions, with the exception of the Australian and New Zealand Banking Group (ANZ), updated their terms and conditions prior to the implementation of the LCR to stipulate to investors that early termination would be at the bank’s discretion and if it was permitted, the customer would still need to wait at least 31 days before being able to access their funds. Time will reveal whether this regulatory change will alter investor preference for at-call over term investing, thereby changing the funding mix of banks.

The comparison of the mix of term deposit funding on the balance sheets of Australian and Canadian banks reveals that Australian banks have a much greater appetite and tolerance for at-call deposit raising. Only the Royal Bank of Canada has recently displayed proportions of demand deposits similar to those of the Australian banks within the sample. Interestingly, despite the LCR being announced by the BIS in December 2010, the proportion of time deposits to total deposits has been in decline in Australian banks. This could drive higher HQLA requirements for Australian banks when compared to their Canadian peers.

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15 Many deposit-taking institutions issued customers with letters in late 2014 advising them of these changes, with the ANZ launching a new term deposit product (the ANZ Advance Notice Term Deposit) with a 31 day early termination notice requirement alongside its old term deposit product (the ANZ Term Deposit), which carried lower rates than the new regulatory friendly product carrying the notice requirement. The ANZ would be required to hold HQLA against its ‘ANZ Term Deposit’ product from 1 January 2015, until customers migrate to its new ‘ANZ Advance Notice Term Deposit’ product.
A larger amount of demand deposits means that Australian banks are undertaking a greater amount of maturity transformation. If these deposits are core demand deposits, the bank will not be greatly exposed to rollover risk. The Australian banking landscape is categorised by a large volume of variable rate home loans and the desire of Australian banks to hold large proportions of demand deposits on their balance sheets could not only potentially reflect investor preference, but the fact that at-call deposits can provide banks with a natural interest rate risk hedge against floating rate home loan portfolios. Now that the costs associated with the LCR are being completely transmitted through banks in Australia, the desire to hold such large quantities of demand deposits may diminish. Banks will need to weigh up higher LCR costs and greater degrees of liquidity risk with any interest rate risk benefits.

5.1.1.4 Foreign Deposits

Foreign deposits volumes provide insight into the deposit dependency and diversity that banks have outside of their reporting currency. Australian and Canadian banks have substantial offshore operations and foreign deposits are typically raised to provide funding for foreign assets.

For banks as large as the Australian and Canadian banks included within the sample of this dissertation, currency mismatches may be sizeable and prove both difficult and expensive to hedge. This may lead to banks running unhedged positions or developing a larger reliance towards United States Dollars (USD) via forward foreign exchange markets. Forward foreign exchange markets may only be cost effective or deep enough in certain currencies for banks to continuously convert these exposures back to USD. Banks and regulators need to monitor their foreign deposits and understand and manage the risks associated with this type of deposit taking.
5.1.1.5 The Price of Australian Deposit Funding

Analysing Australian retail term deposit pricing over the last 28-year period clearly demonstrates the degree of procyclicality in the onshore Australian deposit market. After sharply increasing in the late-1980s, deposit pricing experienced a long period of decline that commenced in the early-1990s, lasting until early-2008. At this time, deposit pricing sharply repriced as Australian banks scrambled to attract funding following diminished available liquidity in global financial markets. The price of credit and liquidity sharply repriced and there was revaluation across all Australian bank liabilities.

Since deposit pricing peaked in 2012, rates have been steadily declining. This also extends to the Australian retail at-call deposit products. The lower levels of pricing that can be observed after the 2012 highs can be attributed to procyclicality and declining credit and liquidity margins. Consequently as of early 2015, competition within the Australian deposit market is significantly lower than it was in 2012, with banks turning back their attention towards the asset side of their balance sheets. Following the dramatic increase of deposit volumes on the balance sheets of Australian banks, it is evident that banks are currently in a position whereby they can comfortably fund new lending. Any sharp increase in the demand for credit could be initially covered by the issuance of wholesale funding.

These Australian liabilities demonstrate slower repricing characteristics and prove to be largely insensitive to the daily volatility that may be evident within wholesale money markets. Australian at-call liabilities also display a high positive correlation to the Reserve Bank of Australia’s overnight cash rate target.

APRA’s introduction of Basel III package of reforms on liquidity has created a permanent structural shift in deposit pricing. Regulation provides banks with incentives to hold greater proportions of core deposit funding on their balance sheets through liquidity saving incentives. Where deposit portfolios provide intrinsic utility to the bank from a funding and liquidity perspective, customer pricing is likely to be higher than other liability pools that
incur greater liquid asset costs of carry. This dissertation reasons that APRA’s liquidity regulation has permanently shifted the ‘market rate’ for deposit funding above its ‘natural rate’. Basel III has distorted the market interest rates for deposit funding above their natural interest rates through the introduction of runoff factors, resulting in higher deposit rates. It is contended that deposit prices in Australia would be lower than the rates being observed within the market without prudential regulation that favoured deposit funding.

5.1.2 Unsecured Wholesale Funding

5.1.2.1 Short-term Wholesale Funding to Total Liabilities

Short-term wholesale funding is a useful lever for banks in administering their short-dated liquidity needs. These liabilities can help banks match fund; manage liquidity buckets; facilitate settlements; and make customer payments. Borrowing via short-term wholesale funding can be cheaper than sourcing other liabilities as it is obtained from large sophisticated investors where interest rates do not reflect bank-to-client transactions. Bank-to-client transactions can be described as being more heterogeneous as customer margins are included. Furthermore, the larger Australian and Canadian banks within this sample all carry good short and long-term public credit ratings enabling them to attract volumes at competitive interest rates.

The benefit in using short-term wholesale funding over other liabilities is that additional volumes can be raised quite quickly. The bank does not need to risk repricing customer deposits and other liabilities to meet short-dated funding needs. Banking book liabilities, including customer and franchise deposits, can take much longer for Australian and Canadian banks to raise and their treasury departments will have less control over total volume that makes its way onto the balance sheet. Further, distribution teams may need to be engaged; marketing campaigns run; or margin incentives may need to be provided. Short-term wholesale funding is a channel for Australian and Canadian banks that does not leave the bank at risk of cannibalising any of its other liability pools over the short-term.
There are liquidity risks associated with institutions and organisations that have too much short-term borrowings and long-term debt that is close to expiry. Banks that place too much reliance on short-dated borrowings are likely to experience a steeper yield curve and pay more for obtaining loans. Furthermore, it may also indicate that the bank may be engaging in lower amounts of maturity transformation. Australian and Canadian banks have historically utilised international wholesale markets to source short-term wholesale funding. Due to both APRA and the OSFI’s liquidity regulation the costs associated with short-dated offshore borrowings have increased. This places greater reliance on domestic financial markets to fulfil the banking sector’s short-term needs.

5.1.2.2 Total Wholesale Funding to Total Liabilities

Wholesale funding forms a critical component to the funding strategies of Australian and Canadian banks. Banking firms within these two jurisdictions have concentration towards their home markets, which structurally permit very small proportions of longer-term deposit raising. Consequently wholesale issuance provides Australian and Canadian banks with an opportunity to broaden their liability base by geography, product, currency and duration.

After increasing for approximately 15-years until late-2007, the proportion of wholesale funding on the balance sheets of Australian banks is seen to be in decline until 2014. This is in part a consequence of volatility in global markets in addition to a preference of Australian bank management towards deposit raising throughout this time. With Australian banks now holding enough deposits to fund current levels of credit growth, wholesale funding is likely to be used to diversify the banks’ funding base and lengthen the liability profile of the bank.
5.1.2.3 Australian Outstanding Debt Securities

Australian bank and financial corporation issuance of wholesale debt securities has experienced a gradual increase in volumes outstanding since 1992. Despite the recent financial crisis disrupting fixed income markets from late-2007, the aggregate volume of stock outstanding is greater than it was in late-2007. Credit and liquidity turmoil has led to Australian banks altering their overall funding strategies and the profile of their debt issuance. There is now a lessoned dependency upon all forms of issuance, particularly short-term domestic wholesale funding, where bank management have diverted their focus towards securing deposit funding. The relevance of offshore funding to Australian banks overall funding strategies is as significant as ever, however with high levels of deposit funding, future issuance into global markets will be selective and dependent upon prevailing conditions.

5.1.2.4 Australian Prime Bank Issuance

Australian prime bank paper refers to the issuance of Australian Dollar denominated Negotiable Certificates of Deposit (NCD) within Australian money markets. The Australian Financial Markets Association uses the observable prices on prime bank paper to set the daily Bank Bill Swap Rates (BBSW). It is apparent that Australian banks habitually conduct most of their issuance in certain parts of the month as there is a tendency for BBSW to set higher towards the middle and end of the month. Short-term prime bank domestic issuance has been declining since October 2013, where it is found that there is significant market illiquidity. The most popular maturity bucket has been in the three month part of the yield curve. Many buyers of prime bank paper are benchmarked off the three month BBSW rate, whilst quarterly BBSY rates reflect the cost of funds for Australian banks.

Interestingly, the volume of six month issuance spiked in November 2014 to a level representing 43 per cent of total prime bank issuance. This was the first month where banks’ three month issues had a liquidity tail, experiencing the full effect of a 100 per cent runoff factor under the LCR. In other words, three month prime bank paper would have 30 days or
less until maturity by January 2015, meaning where banks would be required to set aside liquidity against a cash outflow. At this point six month issuance becomes a more attractive option for banks under the LCR given that liquids would only need to be set aside for one fifth of the securities duration in comparison to three month issuance where liquids are required to be set aside for one third of the securities duration. After November 2014, six month issuance then dropped to a level representing six per cent of the total proportion in December 2014. A potential reason for this, in that AFMA’s six month BBSW reference rate represents a semi-annual interest rate, is discussed in the succeeding section.

In summary, there has been a significant decline in the quantities of prime bank paper being issued onshore in Australian Dollars. The only durations across the maturity curve where banks are regularly active are in the one, three and six month buckets. Analysis of aggregated daily volume data reveals that AFMA is carrying out the BBSW setting process using prices where, more often than not, there is a lack of prime bank issuance being conducted. This dissertation finds that a market deviation, sooner rather than later, away from the BBSW interest rate benchmark towards a more vigorous risk-free benchmark that is constructed off the Overnight Indexed Swap (OIS) would be beneficial.

5.1.2.5 Cost of Funds

The quarterly swap curve represents the costs of funds for Australian and Canadian banks\(^{16}\). Many banks set customer prices on deposit and loan banking book products by offering customers a margin over the Australian Financial Market Association’s (AFMA) published BBSW/BBSY rates or the Canadian Dollar Offered Rates (CDOR). Within global financial markets this spread or differential between the semi-annual and quarterly swap curves is known as the ‘6s3s’ (‘six/threes’), and a component of single currency basis. The wider the differential between semi-annual and quarterly interest rates, the greater the cost for banks to issue liabilities in the four, five and six month durations. Moreover, banking book deposit

\(^{16}\) Regardless of the issuing currency, all Australian and Canadian major banks conduct significant term debt issuance where the official three month floating rate is used as the base rate for the transaction.
and loan profitability is also impacted where interest rates are set as a function above or below the Australian or Canadian interest rate benchmarks (BBSW/CDOR).

A common reason behind a widening in the spread between the Overnight Indexed Swap (OIS) and AFMA’s BBSY rates (‘Bills/OIS’ or ‘BOB’ spread) is when there is the presence of volatility within financial markets. During the sample period volatility was not apparent as credit spreads remained somewhat unchanged and it is more likely that that the spread widening has been driven by a combination of banks’ LCR requirements and the costs of Australian Dollars in the foreign exchange forwards market (Debelle, 2014b). The motivation to borrow for longer periods, due to the liquidity costs faced by banks under the LCR, was described in the preceding section.

Where the higher cost to issue in the four, five and six months relates to the differential in the semi/quarterly spread alone, the profitability of banking book products, where interest rates are set as a margin above or below AFMA’s interest rate benchmarks, is also impacted by the margin component to the all-up interest rate. As described in the fictitious examples below, there is a large differential in the effective interest rate between 3 months and 6 months transactions where the bank does not adjust the customer margin.

**Examples**

ABC Australia Bank advertises the following customer pricing on three and six month retail time deposits:

\[
r_{3m} = BBSW_{3m} + 0.5\% \\
r_{6m} = BBSW_{6m} + 1.0\%
\]

Where \(r_{3m}\) represents the 3 and 6 months deposit rates respectively and BBSW refers to the AFMA’s official Bank Bill Swap rate settings for the corresponding durations.
• In the above, the bank is providing an incentive in the form of a 50 bps (0.5%) margin premium to incentivise the customer to invest in the 6 months over the 3 months durations;
• Using the 14 January 2015 as a random date for this example, there was a difference of 15 bps between AFMA’s 6 month BBSY and the quarterly BBSY rates (i.e. the ‘6s3s = 0.15%).

Example 1:  A customer invests in a 3 month term deposit. In this example the customer can expect a return of $r_{3m}$

Example 2:  A customer invests in a 6 month term deposit. In this example the customer can expect a return of $r_{6m}$

For an Australian or Canadian bank to compare and express the 6 deposit against the 3 month deposit, we need to add the semi/quarterly of 15 bps in addition to any difference in margin between the two durations. Furthermore, the bank must also include the 50 bps margin differential that it is offering to incentivise the customer to invest for a longer duration.

Therefore, to express the ‘implied cost’ of the 6 month deposit over the quarterly cost of funds (ADSQF) we may derive the banks cost of funds for this deposit as follows:

$$r_{6m} = ADSWQF_{6m} + 0.15\% + 0.15\% + 0.5\% + 0.5\%$$

$$r_{6m} = ADSWQF_{6m} + 1.3\%$$

The above illustrates the potential for banks to face a significantly higher cost for the 6 month deposit funding over the 3 month deposit when ignoring the 6s3s and paying a margin to encourage duration in this part of the interest rate curve. The above example ignores both liquidity costs and rollover risk and is an attempt to explain how customer margins also contribute to the profitability of customer transactions. Depending upon its final construct, a
market deviation away from the BBSW interest rate benchmark towards a more vigorous risk-free benchmark, such as one that is constructed off the Overnight Indexed Swap (OIS), may be able to eliminate some of the above issues.

5.2 Liquidity

5.2.1 Liquidity Risk Management

Whilst Basel III provides a framework stipulating broad runoff factors for certain assets and liabilities, the regulation was developed as a common international framework and it makes broad assumptions on customer behaviour and product characteristics. Australian and Canadian banks are mandated to hold a specific proportion of liquid assets, which is a function of their exposures and the regulator’s runoff factor. Each bank within the study has calculated the amount of required regulatory holdings of HQLA to meet its obligations under the Basel III Accord, however, this figure may not equal the actual liquidity that banks believe that they must hold in reality to achieve sound liquidity management practices and effectively price liquidity risk.

Under the Liquidity Coverage Ratio (LCR) prerequisites, bank holdings of liquid assets are greater than what has been historically required. Given the smaller return generated on liquid asset portfolios, when compared to other banking book assets with less liquidity and greater credit risk, holding liquid assets can be viewed as a tax on the deposit-taking institution. Additional liquid asset holding requirements may provide incentives for banks to engage in excess risk taking elsewhere in their balance sheets in order to maintain shareholder returns.

The deposit-taking institutions within this study are large, accounting for a significant proportion of the domestic financial assets within their respective jurisdictions. Liquidity risk assessment within these firms needs to be made at both a portfolio and customer level to understand how their bank’s balance sheet behaves in both normal and stressed operating environments. Independent liquidity risk management business units should understand
balance sheet product terms and conditions including any embedded optionality; what the bank’s technology infrastructure permits both staff and customers to execute; the portfolio characteristics of asset and liability portfolios within the balance sheet, such as volatility, customer concentration and historical behavioural data; and how products are sold and distributed so that customer commitments are appreciated. As is the case for other streams of risk management, independent units or bank treasury teams, must be able to challenge business decisions to adequately provide lines of defence for banks.

The process of modelling the credit risk posed by customers is both advanced and well established within most of the Australian and Canadian banking organisations in this study’s sample. Many of these firms qualify for BIS’ Internal Ratings-Based approach for measuring credit risk, having widely understood internal processes of modelling credit risk, holding capital and allocating it efficiently throughout the organisation. The results of the dissertation reveal that bank approaches towards liquidity risk management and the pricing of liquidity need to be at a level that matches the sophistication of the bank’s wider banking operations. At a customer level, banks can develop better understanding of their customers’ activity and behaviours by conducting liquidity risk assessments. For customers with transactional banking relationships, it is critical to gain an appreciation of the true operating balance of each customer and their working capital cycle, in addition to the investment mandates of individuals and organisations depositing funds with the bank. The assignment of liquidity risk scores to each customer, and better capturing and reporting of customer liquidity information, may be a method to help banks to optimise liquid assets and better manage cash flow commitments. Further, this process may have secondary application in that it could assist sales and distribution teams identify products and services to better meet their customer’s working capital and investment needs.

On its own, the Basel III liquidity regulation is not granular enough for banks to truly manage the liquidity risk positions they face. The regulation can be seen as a good first step in establishing guiding liquidity risk management principles, focusing bank management, domestic regulators and the public on the importance of strong liquidity risk management and the pricing of liquidity risk. In order for banks to be comfortable that they can withstand liquidity stress, this dissertation finds that banks must go much further in their approach to
measuring liquidity risk than what is specified within the prudential frameworks of both APRA and the OSFI. This need to go deeper will become even more critical once APRA and the OSFI introduce the Net Stable Funding Ratio (NSFR) into Australia and Canada from 1 January 2018 as banks will be required to estimate the degree to which investor behaviour is “core” (stable) or “non-core” (volatile) in a crisis situation.

With Australia and Canada being early adopters of liquidity regulation in full, the approach the large Australian and Canadian banks in this study implement will guide the future direction of liquidity regulation and lead to ongoing refinement of liquidity principles. The large sophisticated banking organisations within this study have started moulding the way with which they fund their balance sheets and hold liquid assets to initially comply with regulatory ratios and prudential requirements.

The domestic implementation of the Basel III package of reforms on liquidity in both Australian and Canada has, in many ways, imitated the historical approach taken towards bank capital regulation, where assets and liabilities are categorised, assigned risk runoff factors that have led to the establishment of constrictive regulatory ratios. Therefore this dissertation deducts that, as there is for capital, there is now a divergence between regulatory liquidity requirements (‘regulatory liquidity’) and the actual liquid asset holdings of banks that ensure sound liquidity management practices (‘economic liquidity’). Both of these terms are constructed and described further in the succeeding section.

5.2.2 Liquidity Costs: Regulatory v’s Economic Liquidity

The term ‘regulatory liquidity’ is used within this dissertation to describe the minimum amount of liquidity that banks must set aside to meet their prudential obligations, whereas the term ‘economic liquidity’ is a term applied here to designate the process where banks attribute liquidity to cover the economic effects of liquidity risk-taking activities. This terminology is adapted here from the established capital management philosophy to describe liquidity phenomena. Although regulatory liquidity can be defined as being conceptually
akin to economic liquidity, it is argued that recent regulation has now created a distinction between the prudential accord’s suggested methodology for the measurement of liquidity and banks’ liquidity risk profiles.

Ultimately economic liquidity is a function of an individual bank’s internal methodology for quantifying its liquidity requirements. The parameters that the bank utilises within its internal modelling may not align to the runoff factors prescribed within the Bank for International Settlements’ (BIS) Basel III package of reforms on liquidity. Certain asset and liability portfolios may require a lesser or additional amount of liquidity to be set aside, when compared to the regulatory liquidity requirement, due to the bank’s unique product design, customer concentration risks, known customer behaviour, portfolio balance volatility, embedded optionality, rates of interest and interest rate sensitivity.

It is clear that banks have allocated resources to meeting regulatory requirements and understanding their regulatory liquidity costs, however, banks must now become more advanced and work to develop their knowledge of economic liquidity. Banks must now analyse their balance sheet components in order to optimise liquidity usage and ensure that liquidity costs are efficiently allocated throughout their organisations.

To achieve sound liquidity management practices within a banking institution, liquid asset carrying costs need to be transmitted to bank’s individual business units through internal transfer pricing mechanisms. The complete liquidity cost must be transferred at a granular level to ensure that both divisional balance sheet owners and their distribution and sales staff understand their liquidity usage and can incorporate this cost into customer pricing. Failure to implement an adequate liquidity transfer pricing system can lead to internal business units having a ‘free rent’ of the consolidated balance sheet’s liquidity and/or ineffective product and customer pricing that fails to appropriately value liquidity.

Banks may still wish to write balance sheet exposures that have large liquidity costs to support certain customer relationships, or where income can be generated when the full costs
of liquidity holdings are priced into a transaction. By way of example, Australian banks continue to offer at-call investment products to large corporate and financial institutional customers to support longstanding customer relationships despite the high liquidity costs associated with doing so. Furthermore, the practice where Australian banks borrow AUD domestically with short-dated maturities of less than 30 days from large corporate or financial institution customers and, via foreign exchange forward markets, lend these funds in USD has continued after the implementation of the LCR.

On its own, regulation has the potential to divert or focus the attention of bank management towards gathering certain types of liability gathering as the Basel III regulatory runoff factors have introduced a form of ‘ranking’ system. In a marketplace where banks have not discovered their economic liquidity costs, but rely solely on the regulatory cost of liquidity, there is likely to be a differential between the ‘market’ and ‘natural’ rates of interest for balance sheet products. In other words, prudential regulation has the potential to distort the competitive market structure within jurisdictions as the prescribed regulatory liquidity costs may not equal those actually faced by banks. In situations where regulatory liquidity costs are less than economic liquidity costs, banks will underestimate the value of liquidity if they use regulatory liquidity as the hurdle rate within their internal pricing models.

As this chapter of research findings progresses, the impact of regulation on the individual components of bank funding is detailed so as to divulge where regulatory liquidity can differ from economic liquidity. Banks’ cost of economic liquidity, or its weighted average cost of liquidity, is used for pricing liquidity risk. This cost can be expressed as having two components being the Liquid Asset Carrying Cost (LACC) and Liquidity Duration Funding Factor (LDFF).
5.2.2.1 The Weighted Average Cost of Liquidity

As banks incur a weighted average cost of capital, they too experience a weighted average cost of liquidity. The Liquid Asset Carrying Cost (LACC) and Liquidity Duration Funding Factor (LDFF) will be different in each currency that the bank has significant operations\(^7\). The LACC represents the cost that is associated with investing in eligible liquid assets, or HQLA securities. The LDFF denotes the bank’s funding cost over the swap curve, or in other words, the premium that the individual bank faces for raising funds a particular duration\(^8\). The economics of writing assets and liabilities needs to appropriately incorporate the funding they require or provide. If an asset is completely illiquid, it should be funded with longer-term liabilities.

A bank should not accept or write liquidity intensive assets and liabilities where the cost of funding and holding these liquid assets is greater than the return that can be generated from the HQLA portfolio. The activity of writing profitable exposures onto the balance sheet, where there is high liquidity usage, should be limited as the bank is both assuming duration risk and is grossing up its balance sheet. The bank assumes duration risk because for exposures to incur a liquidity cost under the Basel III liquidity accord, they must have a potential outflow within a 30 day period. Although in normal operating environments it is reasonable to assume that liquid assets can be redeemed within 2 business days, the weighted average duration of HQLA portfolios in both Australia and Canada are likely to be a lot longer than 30 days. Further, leverage ratios limit the bank’s ability to gross up their balance sheets indefinitely.

\(^7\) A significant currency is where 5 per cent or more of the bank’s liabilities are denominated in that currency.
\(^8\) It is not the intent of this dissertation to report a methodology for calculating either LACC or LDFF for Australian and Canadian banks as a consequence of regulatory change or describe a process for liquidity transfer pricing. There are a number of appropriate methodologies that banks can utilise and this process should be a component to the bank’s wider internal capital and liquidity framework. The process is crucial to apt pricing of liquidity risk with the profitability of business units and individual transactions being directly influenced by the process.
5.2.3 Liquid Assets and Counterbalancing Capacity

In years gone by, Australian and Canadian banks maintained minimum High Quality Liquid Assets (HQLA) ratios that represented a proportion of their total assets. However as described above, Australian and Canadian banks need to calculate the aggregate volume of HQLA that are required to meet their economic liquidity needs under the recently applied liquidity rules. Liquid asset portfolios need to also include liquidity buffers which provide the bank with a form of insurance against contingent liquidity risk. This risk can arise from products with high degrees of balance volatility, such as wholesale demand deposits, or where the bank has entered into customer agreements to supply committed and uncommitted lending facilities and there are probable cash outflows in times of stress.

Historically, it could be assumed that liquid asset portfolios would grow at a rate equal to or greater than the rate that the bank’s liability base expands. The Basel III liquidity reforms specifically prescribe differing runoff factors to individual components of banks’ balance sheets and, as such, future growth of liquid asset portfolios will be driven by the types of assets and liabilities that are experiencing growth. Australian and Canadian banks must now assess the additional amounts of liquidity that they believe is required to be held against new exposures and accordingly add to their HQLA.

Australian and Canadian banks fund liquid asset portfolios from their broader liability base. Funding that could be assigned to banking book assets, such as retail and business lending, is diverted to the banks trading book and subsequently invested in qualifying HQLA. Liquidity buffers must provide the bank with long-term insurance against contingent liquidity risk. Therefore, it is prudent that funding for the liquid assets that provide this insurance comes from longer-term note or paper issuance in the currency that additional liquids are being sought. The cost of the liquid asset buffer reflects the bank’s marginal cost of funding.

The return that can be generated on the bank’s portfolio of HQLA is also another factor that contributes to the bank’s LACC. The internal treasury department, which is typically tasked
with the responsibility for managing the liquid assets of the bank, will attempt to optimise the returns on its HQLA in order to minimise the LACC. With a lack of supply of qualifying high quality liquid asset securities, banks in Australia and Canada need to hold a portion of their liquid assets in instruments that aren’t ‘risk-free’ but qualify for inclusion within committed liquidity facilities. Risk free securities all trade at a margin below the swap curve\(^{19}\) and eligible non-HQLA securities become subject to a Committed Liquidity Facility (CLF) fee\(^{20}\). Consequently, HQLA portfolios require dynamic management, constant rebalancing of asset composition and duration. Apart from monitoring market factors, consideration must be given to any changes to risks associated with non-sovereign securities, regulatory adjustments or central bank nomination of eligible securities (including relevant haircuts), which are the assets that the central bank is prepared to purchase under reverse repo. Therefore, prudential regulation has been a contributing factor making the portfolio management of a bank’s HQLA a multi-stage decision problem with dynamic management being required at separate intervals in time.

By implementing Basel III, APRA and the OSFI have introduced a predisposition to government bonds. This liquidity ruling may have some unintended consequences. Regulation has forced banks to increase their holdings of the debt issued by federal and state governments within Australia and Canada. Although both the Australian and Canadian national governments are both well rated from a credit risk perspective, this may not always remain the case. In other global jurisdictions sovereign bonds can carry significant credit exposures and may be even subject the bank to default risks, which could create solvency issues for the bank itself. Furthermore, due to the regulatory requirement to buy and hold government issuance over the long-term, Australian and Canadian banks may crowd out other government bond investors leaving the two jurisdictions with investor counterparty concentration. Other investor counterparties who have historically purchased and traded Australian and Canadian bonds may retire their limits towards these counterparties. This could lead to shallowing of the inherent liquidity of these instruments.

\[^{19}\text{Within this dissertation, the short-dated swap curve refers to BBSW (AUD), CDOR (CAD), LIBOR (USD/GBP) and Euribor (EUR). These curves are not risk-free curves and have an attached element of credit risk premia.}\]

\[^{20}\text{As-at April 2015, The Reserve Bank of Australia charges a 15 basis point line fee to access its CLF.}\]
Most of the banks that are included within the sample of this study have more than one significant currency, therefore requiring it to hold liquid assets in those currencies under both APRA and the OSFI’s prudential frameworks. These banks must manage the currency translation back to AUD or CAD when reporting on a consolidated basis and manage any potential credit risks arising from their liquidity holdings. Where banks use credit or foreign exchange derivatives as hedging instruments for managing credit or market risk exposures, collateral may be required to be pledged against the trades, which can in turn have liquidity implications.

The results of the analysis into the proportion of cash assets on Australian and Canadian banks reveal that Australian banks have held larger amounts of cash on their consolidated balance sheets as a proportion of total investments when compared to their Canadian peers. The Reserve Bank of Australia (RBA) does not encourage or facilitate Australian banks leaving reserves within their Exchange Settlement Accounts, which means that Australian banks must be leaving reserves with other central banks or financial institutions. The reasoning behind larger cash balances may be interpreted as being due to the fact that offshore marketplace can offer banks liquidity diversification and access to markets with deeper liquidity, or alternatively, that foreign exchange forward markets offer favourable margins for banks to convert their AUD and deposit it with offshore central banks on an overnight or even longer-term basis. Other less likely reason are to facilitate global payments; support settlement of their offshore issuance programmes; that there is a preference to hold liquid assets in other significant currencies on an at-call basis; or that Australian banks have enough exposure to the Australian Government. When looking at the trends in banks holdings in investment assets as a proportion of their total asset base, Australian banks have consistently maintained between 10 to 20 per cent of total assets in investment assets over the last 22-year period. Their Canadian banking peers have held greater proportions; however since 2007 this has been on average trending down.

In summary, Australian and Canadian banks must go much further in their approach to measuring liquidity risk, than what is specified within the prudential frameworks of both APRA and the OSFI, and reach a level that matches the sophistication of the bank’s wider banking operations. Australian and Canadian deposit-taking institutions are mandated to hold
a specific proportion of liquid assets, which is a function of their exposures and the regulator’s runoff factor. Bank holdings of liquid assets are greater than what has been historically required and Australian and Canadian regulators are emphasising sound liquidity management practices and effectively price liquidity risk more than ever before. The combination of these factors has created the opportunity for balance sheet innovation to strengthen the capital and liquidity resilience of deposit-taking institutions and reduce the liquid asset carrying costs that they face. Balance sheet innovation in the form of ‘evergreen’, is the result of the action research conducted in this dissertation and is detailed within Chapter Six.

5.3 Procyclicality

Bank regulation attempts to strengthen the resilience of banks by ensuring capital and liquidity cushions are held. Whilst these buffers help banks to withstand various types of stress, they have created procyclicality. Each Basel accord has progressively made banks more secure but in turn have produced additional levels of procyclicality.

This dissertation contends that Australian and Canadian banks determine the price of risk, thereby influencing business conditions and the business cycle within their respective jurisdictions. The size of their balance sheets provides insights into credit conditions and bank risk appetite. Regulators have acknowledged the need for macro-prudential supervision where they monitor the size of bank balance sheets. APRA and the OSFI have indicated that they would implement procyclical capital buffers if they believed that credit growth was too fast. This dissertation reasons that procyclical capital buffers are a function of monetary policy and their use should be determined by the Reserve Bank of Australia and the Bank of Canada and not APRA or the OSFI. Incorrect use of procyclical capital measures may impact the respective central bank’s ability to implement monetary policy.

Analysis of Australian and Canadian balance sheet aggregates provides evidence of procyclicality and the importance for regulators to monitor bank assets, deposits and overall
leverage when conducting macroeconomic enquiry. Bank management must consider that its tactical balance sheet measures can sway the ‘booms’ and ‘busts’ within business cycles. It is claimed in this dissertation that the most significant indicators of procyclicality within the banking sector should be trends in the total volume of lending being conducted; overall bank gearing; bank capital holdings; how bank lending is being funded; and bank margins. It is argued that these variables are critical for the implementation of modern monetary policy with banking organisations propelling economies through the business cycle.

5.3.1 Bank Capital

Although bank capital management has not been the main focal area within this dissertation, the evolution of bank capital ratios through the business cycle can provide banks and regulators with greater insight into procyclicality within the banking sector. This has been acknowledged in the international Basel III capital framework and domestic government institutions now have the ability to implement procyclical capital buffers. However, as argued above, the implementation of these tools is a component of monetary policy and should fall under the remit of either the Reserve Bank of Australia or the Bank of Canada.

The historical investigation into bank regulation and individual bank balance sheets in both Australia and Canada has revealed some differences in the allowances for regulatory capital inclusion and the consequential capital holdings of Tier 1 and Tier 2 that gets reported by the banks within this dissertation’s sample. The regulatory capital rules implemented in Australia by APRA can be interpreted as being more conservative than those within Canada. This makes cross-jurisdictional comparison of the capital ratios of Australian banks with their Canadian peers problematic. At face value it seems as though Canadian banks are better capitalised, however, if Australian banks reported based upon the OSFI’s standards their actual capital ratios would be significantly higher that their balance sheet data reveals. This dissertation argues that APRA’s capital regulation is distortive and it should align prudential definitions and requirements to its international peers. Should the Australian regulator then wish to enforce a requirement for Australian banks to carry larger amounts of Tier 1 and Tier 2 capital then it should explicitly state this requirement.
This dissertation finds that the capital rules that APRA have implemented relating to the minority interests in offshore organisations are conservative, requiring Australian banks to allocate a greater degree of their capital towards any holdings. This requirement makes the internal acquisition hurdle greater for Australian banks when evaluating whether to acquire new offshore units. These rules may go some way to explaining the concentration towards the Australian and New Zealand markets.

The differences in capital requirements between the two jurisdictions only serves to make global comparisons more difficult, confusing global counterparts who may wish to deal with Australia’s internationally active banking institutions. Consequently for the purposes of analysing bank capital within this dissertation, comparisons have been made at a domestic level. Following the announcement of Basel II capital regulation, it is evident that both Australian and Canadian banks have accumulated additional capital reserves, bolstering their holdings. Regulation has resulted in capital accumulation leading up to the introduction of Basel II, throughout the years of the recent financial crisis, and then before and after the introduction of Basel III.

Capital regulation, as it stands, contributes to procyclicality as banks’ assessment of risk will fluctuate throughout the business cycle based upon prevailing conditions in the broader marketplace. By way of example, it is likely that banks will deduct that customers have lower levels of inherent risk in business cycle boom phases, consequently setting aside smaller amounts of its equity due to lower levels of perceived risk in these periods. Regulators must look deeper into capital ratios, understanding the amount of equity that a bank is allocating to a loan that has been ‘risk-weighted’. Escalating loan areas rates will eat into the Tier 1 and Tier 2 capital base, triggering the need for auxiliary equity raising activities.
After business cycle capital trends, bank gearing; the total volume of lending being conducted; and how bank lending is being funded form important additional indicators of procyclicality within the banking sector.

5.3.2 Asset/Loan Funding

Whilst credit and savings growth within an economy can greatly influence results, the earning assets as a proportion of interest bearing liabilities measure can be used as a supplementary tool to understand procyclicality and reveal whether banks are competing for assets or liabilities. Long downtrends may provide evidence that the broader market is in a ‘boom’ phase as this can signify a preference for asset growth that is being funded by interest bearing liabilities, or alternatively that banks are in competition for liabilities to address their funding profiles. It can be seen that Australian banks have, on average, used greater amounts of interest bearing liabilities to fund their growth of interest bearing assets over the period from 1994 to 2014. Closer inspection further reveals that following the onset of the financial crisis, banks broadly needed to issue greater amounts of interest bearing liabilities to fund assets. It is found that during periods of slower credit growth, banks will be under lessoned pressure to raise interest bearing liabilities.

Banks’ gross loans to total deposits ratios provide some indication into the preference, or ability, for banks in these jurisdictions to fund their lending with deposits. High ratios of loans to deposits can indicate procyclicality in a boom phase of a business cycle where banks are expanding their lending by rates larger than they can broaden their deposit base. This ratio could prompt analysis into whether: the market rate for writing risk is dwindling; lending standards are deteriorating; or whether banks a developing a greater reliance on wholesale funding.

A consequence of the period of financial market volatility that commenced in late-2007 was to shift the focus of bank management in Australia from lending towards the liability side of their balance sheets, where competition intensified for deposits. The gross loans as a
proportion of total deposits ratios of Australian banks reached highs in 2006/7, before substantially declining thereafter. This reversal is a consequence of a combination of both lower levels of domestic credit growth; tightened standards of lending; and the need for Australian banks to rebalance their funding mix and acquire greater proportions of deposit funding.

As discussed in Appendix One, the insurance and managed fund sector within Australia, which includes superannuation, controls a significant proportion of assets within the nation. The traditional preference of these firms has been to invest with banks by purchasing and holding their tradeable debt securities. For this reason there is a structural reason behind the Australian banks’ gross loans to total deposits ratios being significantly lower than their Canadian banking counterparts over the sample period. In recent years, many institutions within the Australian managed funds sector have started investing a portion of their fixed income portfolios into less liquid banking book deposit instruments. The transition from the banks trading book to its banking book helps the appearance of basic deposit-to-loan style balance sheet ratios but it does not fundamentally change the strength of the bank’s balance sheet from a funding or liquidity standpoint. Whether the funding is issued as a deposit or a tradable instrument the behavioural characteristics will be identical and banks will need to shorten their asset books or naturally conduct maturity transformation activities, thereby exposing themselves to rollover risk. The liquidity implications presented by rollover risks must be balanced in order for banks to be able to continue to operate as a sound going concerns.

5.3.3 Bank Margins

On average, the net interest margins at the majority of Australian and Canadian banks have been experiencing compression since the start of the century. Whilst being lower than their Australian counterparts, the Net Interest Margins (NIM) of Canadian banks have been far more volatile and inconsistent, even when analysed at a domestic level. Canadian banks have structured their balance sheets towards loan and deposit funding and low interest rate benchmarks would have influenced their results.
For many Australian banks within the sample, NIM turned positive immediately following the onset of most recent the global financial crisis. Differing trends can be observed in Canada with some banks improving their NIM whilst others experienced deteriorating margins. Liability repricing tends to lag customer loans and contingent funding facilities in Australia, where many assets are of a variable nature. Furthermore, Australian banks have large portfolios of non-maturity or demand deposits on their balance sheets. These deposits are typically sourced at lower rates than time deposit funding. If the bulk of these deposits are core, then it is likely they will reprice at a much slower rate when compared to time deposit portfolios. Canadian banks that have unvarying core lending portfolios in addition to those who have assertively lowered their cost of funds have commonly experienced better NIM results.

After 2010 it appears as though competition for assets increased. It has been widely reported in recent years that both economies experienced lower overall quantities of bank balance sheet lending, coupled with copious amounts of liquidity within global and domestic financial markets. This has potentially contributed to the declining reported NIM results in the Australian and Canadian banking sectors. Only in recent years have banks attempted to reprice deposits in line with falling funding costs and asset yields. To preserve the current NIM, bank management ought to persist with reducing deposit rates until they see consistent customer lending growth. Their success in their tactical deposit repricing strategies will be evident in future reporting years through their cost of total borrowings and overall NIM. Additionally, the NIMs of both Australian and Canadian commercial banks will benefit once central banks alter monetary policy and interest rate settings and interest rates start to rise.
5.4 Conclusion

This chapter has articulated the findings of the analysis conducted in Chapter Four, where focus has been given to the areas of bank funding, liquidity and procyclicality.

Safer ADIs are disadvantaged under the compulsory deposit insurance schemes in Australia and Canada, making the competitive landscape for retail deposits based largely on price. Prudential guidance on operational deposits is much more lax within Australia and these deposit portfolios may experience procyclicality in times of strong competition. Regulatory detachment of operational deposits from other at-call deposit products can assist in the development of separate valuation techniques. Additionally, the Australian banking marketplace demonstrates a far greater tolerance than Canada for at-call deposit funding, thereby requiring banks to carry out greater maturity transformation. The degree of deposit funding procyclicality has been revealed through the analysis into the onshore Australian deposit market.

Short and long-term wholesale funding remains an important channel for banks in handling their short-dated liquidity requirements and overall funding strategies. Short-dated prime bank paper issuance has been in decline in Australia with the market lacking deep liquidity. The BBSW benchmark setting process is being carried out by AFMA using light, if any, traded volume. Australia requires a more vigorous risk-free benchmark, such as one that is constructed off the Overnight Indexed Swap (OIS). Finally, differentials between the quarterly and semi swap curves will impact banks’ funding costs.

The domestic implementation of the Basel III package of reforms on liquidity in both Australian and Canada has, in many ways, imitated the historical approach taken towards bank capital regulation. There is now a divergence between regulatory liquidity and economic liquidity. The approach taken by banks towards liquidity management should match the sophistication of its wider banking operations.
The major and regional banks within Australia and Canada determine the price of risk and can sway the business cycle and consumer and business conditions within their corresponding territories. Their balance sheets offer insights into credit conditions and risk appetite. Inappropriate application of procyclical capital measures by either APRA or the OSFI could have bearing on the domestic application of monetary policy.

The subsequent chapter details the findings of the dissertations action research, which was carried out over a five year period, to provide banking organisations with options to alter their balance sheets in order to meet the Basel III package of reforms and better deal with liquidity pressures, such as those that were evident in many countries throughout the most recent financial crisis. Regulatory change and the introduction of the Liquidity Coverage Ratio (LCR) has made it clear that there is a gap in banks’ traditional balance sheet product offerings due to the liquid asset carrying costs these products incur under regulatory reform. Banks that can attract funding, make loans or enter into balance sheet exposures with customers by using liquidity saving products will be able to optimise their liquid asset holdings.
Chapter Six: Evergreen - Balance Sheet Innovation

Despite major banking regulatory changes being announced in late 2010 (Basel Committee on Banking Supervision, 2010a, 2010b) there are few identified solutions in both the literature and marketplace for banks to transform their balance sheets to strengthen their capital and liquidity resilience and comply with the new regulation. In Australia and Canada, the Liquidity Coverage Ratio (LCR) became effective in full from 1 January 2015 whilst the Net Stable Funding Ratio (NSFR) will come into practice from 1 January 2018.

This dissertation has reviewed historical bank regulation in both Australia and Canada, cumulating in an extensive review of the latest liquidity regulatory reforms and the market structures within these jurisdictions. Evolved prudential frameworks has created the opportunity for balance sheet innovation and this research has sought to identify new asset and liability products or balance sheet exposures to promote capital and liquidity efficiencies. Under the LCR, balance sheet exposures can be allocated a 0 per cent runoff factor until they fall within the 30-day residual maturity threshold. Once within the 30-day period, exposures must be included within a bank’s outflow considerations with corresponding holdings of unencumbered high quality liquid assets that match the runoff. This new prudential liquidity regulation has created the opportunity for balance sheet innovation. It incentivises banks to structure their balance sheets and develop liquidity risk management practices around the LCR’s constraints in order to attempt to economise on liquid asset holdings.

The researcher’s dual role, where a position is held at Westpac Banking Corporation, provided an avenue for the commercialisation of a new ‘evergreen’ balance sheet deposit product, which stemmed from action research conducted during this dissertation, and is a direct example of where regulation has triggered change to the way banks are looking to

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21 See Appendix One, Two and Three.
22 Westpac Banking Corporation now has evergreen deposit offerings in Australia (branded as the “Corporate Evergreen Account” and “Westpac Notice Saver”), Hong Kong and Singapore (both branded as “Corporate Evergreen Account”).
23 The Westpac evergreen deposit product subsequently won the 2013 Australian Business Award for Product Innovation (Westpac Banking Corporation, 2013).
fund their balance sheets and lessen their liquid asset carrying costs. The understanding of banking regulation gathered through this research not only has helped satisfy Basel III legal obligations and conformity but has led to reformulation and innovation, where this research effort has been centred on the new possibilities that are available under evolved prudential frameworks.

This section provides a detailed description of evergreen and its wider application for financial markets, incorporating the items that market participants, including banks, need to consider when using evergreen instruments. Subsequently, the mechanics of the evergreen deposit, which is now well established at Westpac Banking Corporation, is then explained so that the researcher’s considerations made during this doctoral study and the evergreen deposit product’s commercialisation are empirically documented in order to encourage future research and application of the evergreen concept within society. Finally, evergreen’s use across the spectrum of balance sheet products and financial market instruments is explored.

6.1 Evergreen: The Concept

‘Evergreen’ is a term used to describe a security, financial instrument or balance sheet item where the contractual maturity date or expiry date is replaced by a notice period. Counterparties nominate a minimum notice period that is usually at least 31 days, which must be served before all of part of the principal can be accessed.

6.2 The Regulatory Value of Evergreen

Evergreen has been designed following the review bank regulation conducted in this dissertation, which included the Bank for International Settlements’ (BIS) Basel III package of reforms on liquidity and capital regulation. One component to this regulation includes the Liquidity Coverage Ratio (LCR), which is a regulatory ratio that attempts to measure and demonstrate a bank’s ability to withstand short-term liquidity stress by requiring the
organisation to hold enough liquidity, in the form of High Quality Liquid Assets (HQLA), to meet its outflows over a 30 day period (Australian Prudential Regulation Authority, 2014g).

When the notice period on an evergreen instrument is at least 31 days long, the instrument will always fall outside of the LCR’s residual maturity threshold and be eligible for a 0 per cent runoff factor when the principal is ‘evergreen’. Banks need only include evergreen amounts into their LCR calculation once a notice has 30 days or less remaining. In the case of evergreen deposits, amounts are not callable within the LCR’s horizon of 30 days with only the notice component can have an earliest possible maturity date situated within this horizon. To be compliant with the LCR, there can be no ability to ‘early-break’ prior to serving a notice period of at least 31 days.

Therefore, evergreen provides banks with a solution for transitioning existing balance sheet exposures, which do not meet the LCR’s required ‘residual’ maturity threshold and have high regulatory prescribed runoff factors, into more regulatory ‘friendly’ equivalents. Some traditional banking products can no longer provide liquidity or funding benefits to banks due to new prudential standards. Evergreen products can fill a newly created void in the marketplace, supplementing existing banking product offerings that may have lessened appeal as a consequence of regulatory reform. With the future adoption of the Net Stable Funding Ratio (NSFR), there is the potential to structure evergreen instruments to provide additional regulatory relief.

6.3 Evergreen Duration and Final Expiry

Evergreen instruments maintain a constant pre-defined revolving duration until a counterparty exercises a right, or provides the other counterparty/s with notice that they intend to partially or completely redeem, or mature, the principal of the security. Once this intent has been signalled, a fixed contractual maturity date is set that reflects the duration of the pre-agreed notice period, which must to be served before the transaction can expire or mature. By way of example, an investor in an evergreen deposit that has a pre-defined notice
period of 31 days will need to first provide the issuing bank with notice that they wish to access their funds and then serve out the notice period of 31 days before having access to their principal.

Evergreen securities are bucketed in the time band on the balance sheet that reflects their notice period and will remain in that bucket (i.e. they will not ‘scroll in’) until a notice has been triggered. This means that for an evergreen instrument that has a notice period of 31 days, the bank will assume that, for their liquidity reporting, there are 31 days until maturity. When a notice is triggered the bank can then scroll in the principal until it is eventually at-call.

Evergreen arrangements are flexible in that they can be for a fixed sum of principal or make allowance for capital increases and decreases throughout time. At any given time, a single evergreen instrument can be configured to have multiple notices active to provide staggered maturities, redemptions or withdrawals. Evergreen instruments can be established to continue perpetually, even when the principal has been reduced to a zero balance, or to terminate once the principal is at zero. Under perpetual evergreen arrangements, counterparties need only execute legal agreements or forms a single time to allow continuous usage. For banks, long behavioural maturities can potentially develop.

6.4 Market (Interest Rate) Risk

Evergreen products can be used to build up and maintain ‘permanent’ exposures to specific parts of the yield curve. Should a bank be either consistently ‘long’ or ‘short’ in a particular maturity band, natural hedges can be developed by writing opposing evergreen exposures. When funds are evergreen the exposure will not scroll in, thereby providing the bank with an effective hedge.
Regardless of the length of the notice period, evergreen instruments can be referenced to numerous interest rate benchmarks, such as the Overnight Indexed Swap (OIS), the London Interbank Offered Rates (LIBOR) or even ‘outright’ or ‘all-up’ yields.24 By way of example, Westpac Banking Corporation’s Australian-domiciled, Australian Dollar evergreen deposit can track the Reserve Bank of Australia’s overnight cash rate target or rates derived from the Bank Bill Swap Rate (BBSW). This flexibility allows banks to tailor the evergreen instruments to counterparty or market preference or to suit their existing balance sheet exposures.

The final expiry of an instrument with a contractual maturity date typically prompts counterparties to renegotiate terms for an extended period should both parties be in a position to roll or extend the deal. At this point, there is a high likelihood that the instrument will reprice. Evergreen instruments do not have a contractual maturity date meaning this repricing trigger is removed. Banks therefore have greater control over the frequency that their evergreen instruments reprice, holding the ability to reprice at more or less frequent intervals. With asset and liability writing competition amongst banks being procyclical, evergreen products can reduce customers’ ability to reprice the bank’s margins in times of high competition. In the case of the deposits, customers often tender their term deposits to the market upon maturity, with banks sometimes being required to pay higher prices to keep hold of price-sensitive, less stable deposits. If these funds were captured through the issuance of evergreen deposits, the bank is likely to face less customer tendering. Conversely, more frequent repricing frequencies can be set by the bank if they believe that their borrowing costs, credit risk premia or the liquidity spreads they face are likely to change over the short-to-medium term. Evergreen margins could be linked to counterparty’s credit default swap premia to closely track any movement.

The evergreen deposit was designed with a pre-determined notice period requirement. Before the transaction commences, counterparties agree to a specific number of days that forms the notice period and this cannot be altered under any circumstances. This requirement

24 An ‘outright’ or ‘all-up’ interest rate is simply when the yield on a fixed income product is expressed as a numerical interest rate (eg. 3.55%) rather than a margin above or below an interest rate benchmark.
removes optionality by negating the potential for maturity transformation or yield curve plays by either of the counterparties, whilst removing any option for a counterparty negotiating to serve a lessoned notice period. This feature not only strengthens the product from a liquidity risk perspective but allows banks to confidently bucket the product in the appropriate part of the yield curve. Evergreen instruments without the requirement for pre-defined notice periods would contain a form of embedded optionality.

6.5 Liquidity Risk

Evergreen exposures are static, maintaining a consistent profile in banks’ balance sheets and daily liquidity risk reports until a notice period is served. Bank can better prepare for inflows and outflows as customers provide banks with prior notification of a future event. For the purposes of liquidity planning, rollover assumptions need to be made by banks’ treasury departments around the likelihood that certain contractual maturity instruments will be extended or rolled over. Given the structure of evergreen products, there is a greater probability that the principal will move away from evergreen into another banking product, or alternatively leave the bank completely once a notice has been placed.

Evergreen products are of great benefit to banks when they are used in dealing with industry sectors and customer types that have higher prescribed regulatory runoff factors under the Basel III package of reforms on liquidity and capital regulation. Evergreen operates as a liquidity saving mechanism, reducing a bank’s liquid asset cost of carry as HQLA is required to be held against large portions of the balance sheet items from these customers that have less than 30 days until maturity.

In the event that a bank is distressed, or there is widespread financial market volatility, there is the potential that evergreen exposures can create a ‘liquidity cliff’ on the balance sheet of a bank. This would happen if all customers provided the bank with notice at, or around, the same time. Liquidity cliffs can be overcome by the bank employing measures to safeguard itself against this event where it believes that there could be a cause for concern. Outside of
portfolio diversification, banks can place conditions into an evergreen product’s legal agreement, or embed optionality, to stagger a customer’s ability to provide notice. Banks may choose to follow the exercisable right structures of the various types of non-vanilla options, such as Bermudan, Verde or Canary styles. By restricting the dates where the customer can provide notice, banks can effectively manage the risk of liquidity cliffs.

6.6 Pricing and Valuation

The pricing on traditional instruments with contractual maturities can be used in the formulation of pricing an evergreen instrument. Instruments initially carrying similar durations can provide useful relativities, especially as the evergreen notion is in its infancy. Evergreen instruments can be structured in a way that there is different pricing when funds are in an evergreen state compared to when they are on notice. Banks can offer better pricing on components that are evergreen as they obtain liquidity savings. Once notice has been provided, banks can alter the price for any amounts on notice in order to reflect any liquidity costs that are to be borne by the bank.

Differential pricing in evergreen transactions negates the ability for a counterparty to arbitrage the bank against its contractual maturity products. It also provides an incentive to a counterparty to maintain their evergreen status, rewarding long behavioural maturities. The longer that the funds are kept evergreen, the closer the weighted average interest rate of the transaction will be to the interest rate offered on the evergreen component.

Where there is a lack of a contractual maturity date, banks hold more control over how frequently they alter the pricing on evergreen instruments. When taking this decision, consideration must be given to the counterparty type and how sticky they wish the evergreen exposure to be on the balance sheet.
From a liquidity saving standpoint, evergreen instruments provide a mechanism for banks to reduce their liquid asset carrying costs and the pricing of these instruments can be tailored to reflect liquidity savings. The longer the duration of an transaction, the smaller the LCR liquidity benefit will be to a bank by entering into an evergreen over a contractual maturity instrument. For example, a vanilla term deposit is not considered within a bank’s LCR calculation until there are 30 days or less to maturity. A 12 month term deposit thus has 11 months of value, where a 60 day term deposit only has 30 days of value, before the bank applies a prescribed regulatory runoff factor against it once it has 30 days or less left to run. From a liquidity cost standpoint, the 12 month deposit does not come into the LCR calculation 91.6 per cent of the time, whereas the 60 day term deposit is included 50 per cent of the time. Therefore, the liquid asset carrying costs saving is greater in short-dated evergreen products and there should be a pricing differential to reflect this difference. As the evergreen notice period becomes longer, the liquidity benefit provided by evergreen dissipates and in turn banks should lessen the yield premium over instruments with contractual maturities.

The valuation of financial assets with contractual maturity dates is relatively straightforward. For many fixed income instruments, a common measurement technique is the present value of the instrument’s future cash flows, where the discount rate reflects a market interest rate. Where an option-free instrument carries credit risk as a consequence of the credit rating of the issuer, the discount factor will include a credit risk premia in addition to a spread for liquidity. Most approaches to determining the behavioural maturities of securities with contractual maturities are primarily quantitative, with maturity measured at an individual transaction level as the time elapsed from initial exchange of principal to the final repayment of this principal. This approach is not appropriate for evergreen instruments.

The revolving nature of evergreen instruments makes deriving appropriate behavioural maturities for valuation purposes challenging. From a quantitative standpoint, the point at which the principal is committed and withdrawn is only loosely tied to the instrument’s origination and ultimate termination, if this takes place. Principal increases and decreases can typically occur throughout the life of an evergreen product with amounts fluctuating over time. Furthermore, there is a further complication that results from the fact that pricing can
be altered throughout time. Consequently this makes maturity comparisons to a wholesale funding instrument using quantitative approaches problematic.

It is recommended that banks adopt quantitative methodologies for evergreen instruments that are similar to those employed in the valuation of demand deposits such as: replicating portfolio models (Frauendorfer & Schürle, 2006); the no-arbitrage discounted cash flow approach (Dewachter et al., 2006); or by using the Kaplan–Meier estimator to conduct survival analysis to find the survival function of evergreen principal (Okechukwu et al., 2013).

Different evergreen product portfolios will exhibit divergent quantitative characteristics depending on the type of instrument (e.g. loan, deposit or tradeable security), the category of counterparties engaging in the evergreen transaction (e.g. retail, business, institutional) the method and channel chosen for distribution (e.g. via branch networks, relationship managers or online), the product’s pricing and repricing characteristics, the product’s features and how it is marketed or positioned. These factors will influence the ‘core’ portfolio proportion, or the amount of funds that are always ‘evergreen’, where notice is not being served. Banks can measure the core or the stable portion of an evergreen portfolio by using historical data to analyse the portfolio’s balance volatility. In the case of evergreen deposits, the core proportion of the portfolio can provide an indicator of the volume of funds that the bank can utilise for funding assets.

6.7 The Evergreen Deposit: ‘Notice of Withdrawal’ Deposit Products

As a component to the action research, Gooley (2013) previously published the details on the mechanics of evergreen, including the advantages and application for both banks and investors immediately after the public launch of the product. Given the advantageous treatment applied to evergreen under the Basel III liquidity rules (Australian Prudential Regulation Authority, 2014g) other deposit-taking institutions, including each of the major banks within the Australian marketplace, have emulated this product. To date widespread
use within the Australian banking industry has yet to occur as the evergreen maturity concept with banks mainly using the concept on the liability side of their balance sheets (Debelle, 2014b).

Evergreen deposit products are at least 31 days in duration, meaning that any customer balances that are ‘evergreen’ are not considered within a bank’s Liquidity Coverage Ratio calculation as they are eligible for a 0 per cent runoff factor. Evergreen has allowed early adopters to prepare for APRA’s new liquidity regulation by transitioning funds that do not meet the Liquidity Coverage Ratio’s 30 day residual maturity threshold. As these deposits provide the bank with direct liquidity relief, stock holding requirements of unencumbered high quality liquid asset are much lower when compared to the liquidity usage of other more traditional deposit products under the new liquidity regulation.

Although the evergreen deposit is revolving in nature it should be treated, or ‘bucketed’, at its contractual maturity from an interest rate risk perspective. Whilst funds are ‘evergreen’ (i.e. sitting outside of the Liquidity Coverage Ratio’s 30 day residual maturity threshold), banks must bucket evergreen deposits at their first call date, which reflects the number of days that the investor must provide as notice before redeeming their funds. By way of example, a 90 day evergreen deposit would be included in a bank’s 3 month bucket. When called, funds receive an interest rate risk treatment that is akin to those deposits carrying contractual maturities.

Evergreen deposits are a new concept and there are no published empirical studies that help banks in their internal valuation of evergreen deposit portfolios. Banks undertake internal valuation of their assets and liabilities so that they can understand the duration that funding will either remain with the bank or be required to be set aside. Internal valuation also guides management in determining the appropriate interest rates that should be paid to investors and how various products can be compared against each other from a relativity perspective.
From a quantitative standpoint, the point at which deposit funding is committed and withdrawn by investors in evergreen deposit products is only loosely tied to account originations and closures. Like demand deposits, evergreen deposits are revolving in nature and cash inflows and outflows can occur throughout the life of an account, meaning that the principal amount of funding supplied to the bank will fluctuate over time. Banks need to estimate the behavioural maturity of the pool of funds that are ‘evergreen’ and may, for this component of the product, use a valuation methodology that is similar to one with which they would apply when determining the value of their demand deposit. The value of funds that have been called resembles a similar instrument with a finite contractual maturity.

Once an investor’s notice of withdrawal has less than 30 days remaining, APRA has ruled that a bank must assume a 100 per cent runoff factor for this amount in its Liquidity Coverage Ratio calculation, regardless of any other customer characteristics that may usually change the runoff factors (Australian Prudential Regulation Authority, 2014e).

The evergreen deposit products that are currently available within the Australian market each allow for the issuing bank to apply different interest rates to the distinct components of an evergreen deposit, depending on the stage of the product cycle that it is in. This pricing framework allows the bank to reward its investors through higher yields for the time their deposit balances are ‘evergreen’, lowering the interest rate, to pass on the liquidity costs they face, only when the investor has placed a withdrawal notice. Any deposits, where a notice period has been served, are treated as being at call. There is no current evidence of banks offering yields on the at call components.

6.7.1 The Product Design

1. Once a customer deposits funds to their evergreen account, they are instantly considered as being ‘on hold’. This portion of the account will always fall outside the Liquidity Coverage Ratio (LCR) 30-day rule, being eligible for a 0% run-off factor. The bank offers the customer a high rate of interest, with interest calculated daily and
paid monthly. There is no expiry/maturity date and the product can continue to accept deposits at all times, albeit to the ‘evergreen’ or ‘on hold’ portion of the account;

2. When the customer wants to redeem their funds (all or a partial amount) they need to provide the bank with notice. This can be applied on the same day or for a future date, however once the notice period commences the amount of funds cannot be altered. The funds will remain ‘on notice’ until the notification period has expired, e.g. 31 days after notice was applied. Once they have completed this process they will then be allocated to a portion of the account as ‘at call’;

3. The ‘at call’ portion will operate as a normal chequing account. Standard electronic and branch access is available and normal transactional banking fees and charges applies to the account.

6.7.1.1 Bank Benefits:

- No contractual maturity date - Core balances will always fall outside the Liquidity Coverage Ratio (LCR) 30-day rule and will be eligible for a 0% run-off factor;
- The customer has no ability to redeem balances or ‘early-break’ prior to serving the agreed notice period;
- Removes the ability for Customers to reprice the bank’s margins - There is no contractual maturity so the customer cannot ‘tender’ their deposit to the market upon maturity. The bank would not be forced to ‘pay-up’ to keep hold of price-sensitive, less stable deposits;
- Stable balance sheet solution for short-term term deposits, which provide little liquidity value to the bank;
- No interest is paid on ‘at-call’ working capital portion of the account;
6.7.1.2 Customer Benefits:

- Competitive variable interest rate;
- The flexibility to have interest paid every month with the option of funds paid as annuity or reinvested to ‘compound’ interest yield;
- The flexibility to top up an evergreen deposit account at any time;
- The ability to apply notice to withdraw funds online or via their relationship manager;

6.8 Other Evergreen Instruments

6.8.1 Evergreen Loan Commitments

Evergreen has application for banks’ asset side of the balance sheet. Committed and uncommitted lending facilities have liquidity implications for banks as they need to set aside in the event that customers draw on their arranged lending lines. Lending facilities with evergreen conditions provide banks with a pre-defined period that can be utilised to prepare their balance sheets for the funding of a customer loan. In the same way that evergreen deposits do not come into the LCR’s 30 day residual maturity threshold, lending commitments that require customers to provide the bank with at least 31 days of notice of their intent to draw will be considered in a bank’s LCR calculation.

6.8.2 Evergreen Options

An evergreen option is an option where the buyer has the right to exercise by providing a pre-determined period of notice. This option could be either American or European in nature or alternatively it could be combined with option styles that have non-vanilla exercise rights. For example, an ‘Evergreen-Bermudan’ option provides the buyer of the option with the right to exercise at set specific points in time after providing the other counterparty with a pre-determined period of notice of their intent to exercise the option. Evergreen options provide sellers with a period of time to prepare for settlement once the buyer has exercised their rights
under the option. Embedding evergreen optionality within products can enable counterparties to lengthen their inflow or outflow obligations.

Within the Bank for International Settlements’ (BIS) Basel III package of reforms on liquidity and capital regulation, there are rules which prevent customers from breaking or terminating their term deposits within a 30 day period. Consequently many Australian deposit-taking institutions have inserted evergreen option structures within their term deposit products to overcome this regulation and provide term deposit customers with a ‘right to break’. Customers can now break their deposits by providing the bank with 31 days’ notice of their intentions.

**6.9 Other Customer Uses and Application**

For evergreen loans and deposits, bank customers receive increased flexibility, especially in shorter durations, as they can utilise their evergreen product over the course of their working capital or business cycles to borrow or invest depending on their cash flows. The need to continuously enter into new arrangements is negated, with the customer receiving greater control over when they borrow or invest. The interest rates on evergreen instruments should be more attractive relative to products with contractual expiry dates that carry similar initial durations. This is because when the instrument is in an evergreen state the bank will not be incurring a liquid asset carrying cost. Once a notice has been initiated the interest rate may revert to a rate that is worse than products with contractual expiry dates as a known end date becomes known for the principal of the notice.

Counterparties can use evergreen instruments to maintain stable weighted-average portfolio durations. This can be useful to asset managers who are consistently long and track particular reference rates, benchmarks or indexes, such as the bank bill index. Returns can be generated that perfectly correlate to these benchmarks whilst ensuring asset portfolios maintain adequate liquidity levels. Counterparties may also use evergreen to remain within any prescribed duration limits.
The financial institution industry sector has been significantly impacted by the Bank for International Settlements’ (BIS) Basel III package of reforms on liquidity and capital regulation. Firms within this sector face higher costs, penalties or less favourable pricing when dealing with banks due to the liquidity and capital costs that banks incur when traditional balance sheet products fall within a 30 day period. Financial institutions that make use of evergreen instruments, where it is possible to do so, can obtain a much better pricing outcome than if traditional contractual instruments are utilised.

### 6.10 Conclusion

Evergreen has been designed to be supplementary to existing balance sheet products and exposures to provide banks with new and useful diversification. Replacing the contractual maturity date or expiry date with a notice period stops exposures from ‘scrolling in’ towards the at-call time band on the balance sheet, until a notice has been triggered. Evergreen operates as a liquidity saving mechanism. When counterparties nominate a minimum notice period that is usually at least 31 days, the balance sheet exposure will sit outside of the LCR’s 30 day residual maturity threshold. This enables institutions and organisations to use evergreen to transform assets and liabilities that have a high liquidity usage, into exposures that alleviate liquidity costs faced under Basel III liquidity regulation.

Constant pre-defined revolving durations allows organisations to build up and maintain ‘permanent’ exposures to specific parts of the yield curve. These exposures can be referenced to numerous interest rate benchmarks. The lack of a contractual maturity date means the repricing triggers at expiry are removed. Pricing differentials can be set on the distinct components of evergreen to reflect the bank’s liquidity savings or the costs when evergreen exposures enter the LCR’s calculation. Quantitative methodologies may be applied for the internal valuation and deduction of behavioural maturities of evergreen instruments.
Now that evergreen deposits are a part of the banking landscape there is the opportunity for banks to extend the usage of evergreen to other parts of their balance sheets, including all deposit products. All variations can provide both banks and their customers with new types of flexibility, overcoming the liquidity constraints introduced by the LCR.
Chapter Seven: Conclusion and Further Research

This dissertation has had the aim of developing new research and methods to assist in making banking organisations more resilient to stresses that impact their capital and liquidity adequacy. Specifically the research has had the goal of representing the evolution of the liquidity risk profiles of Australian and Canadian banks, developing the existing research and knowledge of their funding preferences and liquidity holdings, whilst attempting to better understand procyclicality within both jurisdictions.

A primary objective of the research has been to postulate a substantive methodology for banks to transform their balance sheets and funding profiles to not only strengthen and transform their balance sheets but to curb heightened liquidity costs that have been brought on by Basel III regulatory reform.

This dissertation has demonstrated the degree of procyclicality within deposit markets, particularly where there is the presence of far reaching deposit insurance schemes that are run and funded by the federal government. National programmes enhance domestic competition for retail deposit funding in Australia and Canada, however, disadvantage safer banking firms by making price the main differentiating factor for deposit gathering. Banks may come to rely on these schemes, which may have consequences for the stability within the wider banking system.

The investigation into time and demand deposits has revealed that Australian banks have a much greater appetite and tolerance for at-call deposit raising. Australian banks therefore conduct larger amounts of maturity transformation, which also drives higher costs under the Liquidity Coverage Ratio (LCR). Procyclical competition for transactional deposits is possible as banks seek out deposit pools with low regulatory runoff factors that also come with low capital intensive payable and receivable revenue streams. Higher credit interest rates may provide an incentive for customers to leave additional surplus balances within operational bank accounts, or switch banks. This dissertation finds that liquidity regulation
has led to a permanent structural change in deposit pricing, shifting the market rate for deposit funding above its natural rate. Further, forward foreign exchange markets may only be cost effective or deep enough in certain currencies for banks to continuously convert any balance sheet exposures back to United States Dollars (USD).

Liquidity regulation has increased the costs associated with short-dated offshore borrowings placing greater reliance on domestic financial markets to fulfil the banking sector’s financing needs. Despite this short-term prime bank domestic issuance has been declining in Australia since October 2013, where this dissertation has shown that there is significant market illiquidity. The large differentials in the semi/quarterly spread will substantially impact the profitability of banking book products. A market deviation, sooner rather than later, away from the BBSW interest rate benchmark towards a more vigorous risk-free benchmark that is constructed off the Overnight Indexed Swap (OIS) would be beneficial for the Australian financial system.

Basel III liquidity has, in many ways, imitated the historical approach taken towards bank capital regulation, where assets and liabilities are categorised, assigned risk runoff factors that have led to the establishment of constrictive regulatory ratios. It has been found that bank approaches towards liquidity risk management and the pricing of liquidity need to be at a level that matches the sophistication of the bank’s wider banking operations. Prescribed regulatory liquidity costs may not equal those actually faced by banks, creating the divergent concepts of regulatory and economic liquidity. It has been found that the cost of the liquid asset buffer reflects the bank’s marginal cost of funding.

The implementation of Basel III has introduced a predisposition to government bonds, which may have unintended consequences. Should state and federal governments pose credit or default risk, banks may become subject to solvency issues of their own through regulatory requirements to buy and hold government issuance. Furthermore banks, through their large HQLA needs, may crowd out other government bond investors.
Each Basel accord has progressively made banks more secure but have created additional levels of procyclicality. Australian and Canadian banks determine the price of risk. The review of bank balance sheets shows that banks increase and decrease the size of their balance sheets with the economic cycle. Procyclical buffers are regulatory tools that are aligned with the implementation of monetary policy and should be managed by the government sponsored institution tasked with the role of implementing monetary policy, rather than institutions that implement and enforce prudential regulation.

‘Evergreen’ is a term used to describe a security, financial instrument or balance sheet item where the contractual maturity date or expiry date is replaced by a notice period. Counterparties nominate a minimum notice period that is usually at least 31 days, which must be served before all of part of the principal can be accessed.

Evergreen was designed following the review bank regulation conducted in this dissertation to provide banks with a solution for transitioning existing balance sheet exposures, which do not meet the LCR’s required ‘residual’ maturity threshold and have high regulatory prescribed runoff factors into more regulatory ‘friendly’ equivalents. It is a supplementary method that offers banks new and useful diversification and has use across the spectrum of balance sheet products and financial market instruments.

7.2 Further Research

Although not covered by the scope of the research within this study, there are additional literature gaps which been identified that require further exploration.

To date, empirical studies on dual banking have all focused upon the regulation of banking institutions that are subject to one charter, be that one of a state or federal authority (Blair & Kushmeider, 2006; Smith, 2003). Analysis has not been undertaken where consideration is given to the fact that many banking institutions are now global multinational deposit-takers
who operate throughout many different jurisdictions with different market structures, and have funding and liquidity requirements at both a national and parent-entity level. The literature is void of studies analysing whether banks with a global presence can be found operating in a dual banking environment where they need to decide how to adhere to regulation. If bank management are offered regulatory options, if they are not headquartered in a jurisdiction, the respective regulator may find it difficult to enforce their version of best banking practice, particularly if the government or society benefits from the institution’s market presence. Research is required to understand whether a bank’s approach to funding and liquidity does vary if management are able to carry out regulatory arbitrage (Houston, Lin and Ma, 2009).

The literature could further scrutinise the customer relationship where transactional accounts are present, looking for linkages with other bank products such as payables and receivables, lending, foreign exchange, wealth management and so on. Rather simply analysing the relationship tenor in years lapsed or the presence of a lending linkage; these additional product linkages could better reveal how ‘sticky’ customer balances are and how entrenched their relationships are with the bank. Earlier studies have made conclusions that in times of liquidity stress, customer loan and deposit commitments can ‘net off’ (Gatev et al., 2009; Gatev & Strahan, 2006; Kashyap et al., 2002), however, it is not clear whether this premise holds true for all customer types and under what conditions.

As interbank deposits can qualify for inclusion in banks’ liquid assets, further inspection is needed to understand the volume of claims that financial institutions have against each other that count as liquidity, which could simply ‘net-off’. Society would benefit from an evaluation of the credit exposures that it could face should they be pledged when banks draw on their committed liquidity facilities.

New regulation may change the competitive behaviour of market participants for certain types of funding that carry high runoff factors from a liquidity standpoint. Exploration has not yet been made into the potential for banks to accept these deposits and manage the duration risk associated with reinvesting the high runoff liabilities into liquid assets.
Intraday liquidity management is a relatively under researched subject area, where the literature is in its infancy. The research and debate into how intraday exposures can be best measured has not yet developed. As more markets move to real-time payments, the costs associated with intraday liquidity must be better understood, including the resultant impact to the cash market. Some domestic central banks have started to provide ‘open-repo’ facilities for exchange participants. Empirical studies are yet to consider the direct impact to repo markets, and their liquidity, caused by the existence of these facilities.

There is much room for further work to be conducted into the methods that central banks can employ when intervening into financial markets. Historically, academic literature has focused on a central bank’s role as the lender of last resort, however, the recent financial crisis has shown that government sponsored institutions must contemplate a range of interventional policies that may not just include the supply of liquidity and low interest rates. Furthermore, how financial markets fund property, infrastructure and non-mortgage assets can benefit from further attention.

The reliance upon individual jurisdictions for funding and liquid assets is currently unknown in existing literature and research is required to understand whether banks are operating in silo structures or reliant upon cross-border capital flows. Studies are yet to be carried out where a comparison is made between a bank’s geographically segmented balance sheet and the consolidated parent-level balance sheet, thereby gaining an understanding whether different approaches are taken across jurisdictions and in different parts of the banking group.

As determined within this dissertation, APRA and the OSFI have introduced a predisposition to government bonds by implementing Basel III, which may have unintended consequences. Investigation is worthwhile to understand whether Australian and Canadian banks have started to crowd out other government bond investors leaving the two jurisdictions with investor counterparty concentration. It would be of public interest to understand whether there are investors that may have historically purchased and traded Australian and Canadian
government bonds have started or are planning to retire their limits towards the state and federal government issuers. Future research could reveal any shallowing of the inherent liquidity of these instruments.
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Appendix One: Australian Banking System

Current structure of the Australian Financial Sector

Australia has a competitive, albeit concentrated banking system when compared with many other jurisdictions. The market is comprised of commercial banks, credit unions and building societies in addition to non-bank financial institutions.

Banks, credit unions and building societies currently account for 55 per cent of all assets within the Australian financial sector as at December 2013 (Reserve Bank of Australia, 2014c). Although there were 168 individual Authorised Deposit-taking Institutions (ADIs) listed and regulated by the Australian Prudential Regulatory Authority (APRA) as at 15 August 2014, four Australian commercial banks held 78.5 per cent of total ADI assets at March 2014, up from 65.4 per cent at September 2007\(^{25}\) (Australian Prudential Regulation Authority, 2014h). Total assets within the Australian financial system have risen from approximately two years of nominal GDP in 1997 to a level corresponding to roughly three years of nominal GDP in 2014, with the financial sector now contributing eight per cent of Australian GDP (Australian Financial System Inquiry, 2014b). Australia’s largest four commercial banks have significantly grown their wealth management and life insurance divisions since the 1997 Wallis Inquiry. Due to their size and breath of their operations, the four largest Australian banks are systemically important to the stability of the banking system and the performance of the Australian economy (Australian Prudential Regulation Authority, 2013b).

Despite the reduction in market share held by the credit union, building society and non-bank financial institution sector, the Australian banking market remains competitive for basic deposit and lending products with most ADIs contesting for consumer banking business

\(^{25}\) In 2008, Westpac Banking Corporation and the Commonwealth Bank of Australia acquired the St George Bank and The Bank of Western Australia respectively.
(Australian Financial System Inquiry, 2014b). The Australian Financial System Inquiry (2014b) acknowledges that less institutions service the business and corporate segments where there are only 20 organisations marketing small business loans.

The largest Australian commercial banks maintain significant competitive advantages over smaller deposit-taking institutions within Australia due to their coverage; product and service offering; payments processing; research and development capabilities; ability to attract specialist personnel; brand strength; and individual credit quality, which assists the accessing domestic and international wholesale funding markets at relatively attractive margins. It has been argued that larger deposit-taking institutions gain domestic regulatory advantages, with APRA requiring organisations that qualify for using APRA’s internal ratings-based approach to hold lower levels of capital and liquidity than smaller organisations who adhere to qualitative requirements, such as the Minimum Liquidity Holdings (MLH) ratio (Customer Owned Banking Association, 2014a).

Australian banking institutions operated 5,483 bank branches at June 2014, which is made up of 2,055 branches in New South Wales, 1,466 in Victoria, 1,354 in Queensland, 628 in Western Australia, 508 in South Australia, 150 in Tasmania 100 in the Australian Capital Territory, and 71 branches in the Northern Territory (Australian Prudential Regulation Authority, 2014a).

**Commercial Banks**

Australian commercial banks are the largest participants in the Australian financial system, offering a large assortment of financial products and services to all parts of the Australian economy. Many Australian commercial banks have funds management and insurance subsidiaries. Foreign banks are constricted by APRA to wholesale deposit-taking within Australia. As at 15 August 2014, there were 23 Australian-owned banks, 7 foreign subsidiary banks and 40 branches of foreign banks (Australian Prudential Regulation Authority, 2014c).
As at March 2014, banks’ global consolidated group assets were AUD 3,884 billion\(^{26}\) (Reserve Bank of Australia, 2014e). Australian banks’ risk-weighted assets were AUD 1,644 billion as at June 2014\(^{27}\), where the aggregate common tier 1 capital and total regulatory capital ratios were 9 per cent and 12.3 per cent of this figure respectively (Reserve Bank of Australia, 2014c).

Of the 23 Australian-owned banks there are four major banks (Westpac Banking Corporation, Commonwealth Bank of Australia, National Australia Bank and Australia and New Zealand Banking Group) and three regional banks (Suncorp, Bank of Queensland, and Bendigo and Adelaide Bank) which account for the bulk of the assets within the Australian banking system. The major banks generated an average return on equity of approximately 15 per cent over the 2010-2014 period, which is well above international banking peers operating in other advanced economies.

Australian banks have a significant number of points of presence across Australia with the four major banks also operating in international jurisdictions. As at March 2014, overseas exposures accounted for less than 25 per cent of Australian domiciled banks’ assets with the largest exposure being to New Zealand where each of the Australian major banks have operations that are similar to those run in Australia (Reserve Bank of Australia, 2014c). The United Kingdom is the next significant region to Australian banks, where the National Australia Bank maintains the largest operation. Each Australian major bank has its own growth and expansion strategy for the Asian region due to the significant investment and trade flows between Australia, New Zealand and greater Asia. Asia accounts for approximately 20 per cent of the total international exposures of Australian-owned banks as at March 2014 (Reserve Bank of Australia, 2014c).

\(^{26}\) This figure includes the assets of all locally incorporated banks and foreign bank branches.

\(^{27}\) This is made up of: Credit risk of AUD 1,416; Operational risk of AUD 152 billion; Market risk of AUD 76 billion.
The Australian Financial System Inquiry (2014b) finds that commercial banks’ exposures to residential lending represents approximately 66 per cent of the loan book, which increased from 47 per cent in 1997 when the Wallis Inquiry was published. Specifically, advances to household customers for property investment accounted for circa 20 per cent of total bank loans as at September 2014. Commercial property advances represent approximately 30 per cent of banks’ domestic non-financial business financing. Foreign bank lending accounts for circa 15 per cent of outstanding business credit within Australia where lending volumes demonstrate procyclical characteristics (Reserve Bank of Australia, 2014c).

**Credit Unions and Building Societies**

The Australian Credit Union and Building Society (CUBS) industry is categorised by a large number of smaller deposit-taking institutions that predominately offer consumer and, to a lesser degree, small business banking products. Traditionally these firms have serviced a particular community group, company, industry or geographical region. These organisations can attribute much of their early growth to being lightly regulated until the 1980s. The majority of credit unions, co-operatives and building societies within Australia are mutual Authorised Deposit-taking Institutions where the customers of the organisation are also shareholders. Like commercial banks, regulatory oversight is provided by APRA and the Australian Securities and Investment Commission (ASIC). Following the federal governments banking reform package for the mutual sector in December 2010, there have been eleven of the larger credit unions or building societies that have obtained banking licences at September 2014 (Canstar Research, 2013).

The Customer Owned Banking Association, a national industry body, represents 10 mutual banks, as they have maintained their customer owned equity structures, in addition to 81 credit unions, 7 building societies and 1 other where these organisations control a total of AUD 86.4 billion in assets at August 2014 (Customer Owned Banking Association, 2014b). There are 244 building society branches and 604 credit union branches across Australia at June 2014 (Australian Prudential Regulation Authority, 2014a).
Australia has the third largest mutual banking sector (credit unions, building societies and mutual banks) after the United States of America and Canada. Due to the ownership structure of mutual societies, where each member is an equal shareholder, there are constraints in raising equity. Expansion of the capital base can only occur through new member acquisition, retention of earnings, merger activity or the issuance of hybrid debt instruments.

There has been a recent trend for the larger mutual deposit-taking institutions to seek out published risk ratings from global ratings agencies in order for these institutions to be in a position to be able to issue their tradeable securities into debt markets to wholesale investors and other ADIs. There are a number of mutual ADIs that obtained an official credit rating receiving a short and long-term score that can be considered as being ‘investment grade’ (Standard & Poor’s, 2013). Small and mutual ADIs are not large enough to be able to obtain funding from international wholesale marketplaces through commercial paper issuance, given that each wholesale funding debt issue needs to be of at least AUD 300m to satisfy investors’ liquidity prerequisites (Association of Building Societies and Credit Unions, 2010). Therefore, this minimum volume requirement limits these institutions to only accessing funding from the domestic Australian financial market.

Despite the collective culture within this part of the banking sector it is not clear whether mutual banking societies are homogeneous or heterogeneous and consider other Mutual ADIs as competitors or collective alternatives to major Australian banks. It would be valuable to know whether small and mutual ADIs act individually in a structure of perfect competition or in a monopolistic competition framework where there are forms of collectivism. Given the apparent concentration of assets and liabilities of Australian small and mutual ADIs, there is the potential problem that these firms could potentially create systemic risk or cause a systemic event within the Australian mutual banking industry if they are seen by financial markets and the Australian public as being homogeneous.
Securitisation

Prior to 2007, securitisation provided a well-priced avenue for smaller Australian deposit-taking institutions and non-bank lenders to fund the provision of lending to Australian consumer and business customers. The asset and residential mortgage backed securities issuance conducted by these institutions amounted to around 70 per cent of the 2007 total (Australian Financial System Inquiry, 2014b). This asset class was one of the most affected during the financial crisis as traditional purchases of these fixed income securities changed their investment mandates following a loss of confidence, despite Australian structured products continuing to perform well throughout the crisis with no investors experiencing losses. Between June 2007 and December 2013, the volume of outstanding asset backed securities nearly halved in nominal terms, from AUD 225 billion at June 2007 to AUD 122 billion at December 2013, and deteriorated three-fold relative to Australian GDP (Debelle, 2014a). Consequently, the organisations that relied upon this funding channel had to adjust their business models.

As of October 2014, Australian securitisation transactions are dominated by Australian dollar issuance. Some of the smaller deposit-taking institutions have now returned to the market after an absence of a number of years. Issuances, especially for the major Australian banks’ RMBS issuance, have become larger with an average deal volume of $2.5 billion. The margins, or spreads of the swap rate, have reduced to the lowest levels since June 2007. Greater private investment in this asset class from mid-2012 allowed the federally sponsored Australian Office of Financial Management (AOFM) to formally close its purchase programme of Australian residential mortgage backed securities in April 2013. The AOFM has sold AUD 1 billion of its holdings since the start of 2013. Securitisation in Australia is likely to be able to provide a viable funding mechanism for the Australian financial system due to the fundamental quality of Australian collateral, however despite issuance volumes being at the highest levels since 2007, it is not forecasted that the local market will increase its reliance to pre-financial crisis proportions (Australian Financial System Inquiry, 2014b; Debelle, 2014a; Reserve Bank of Australia, 2014d).
Managed Funds

The managed funds sector within Australia mainly consists of the superannuation industry, the life insurance sector, public unit trusts in addition to cash management trusts, common funds and friendly societies. The superannuation segment accounts for approximately 75 per cent of the assets held by the managed funds sector as at June 2014 (Reserve Bank of Australia, 2013b). Regulatory changes made within the superannuation industry over 2012 and 2013 could have repercussions on the investment mandates of fund managers and their asset allocations (Reserve Bank of Australia, 2014c). For the twelve month period to March 2014, the weights assigned to cash and deposits was relatively constant, however, this proportion remains double to what it was in 2004 (Reserve Bank of Australia, 2014b). With an aging population within Australia, the RBA accentuates the potential for Australian banks to develop concentration risks to the superannuation sector within their liability portfolios if deposit holdings increase (Reserve Bank of Australia, 2014b).

Life insurance organisations in Australia typically offer risk-based insurance products including life and disability in addition to investment, annuity and superannuation products and services. As at June 2014, life insurance organisations held approximately 12 per cent of the total funds under management within the managed funds sector, where recent growth can be attributed to solid investment returns from debt and equity securities (Reserve Bank of Australia, 2013a, 2014c). Over recent years, life firms have experienced certain risk-based insurance products displaying slighter profitability, leading to higher premiums, in addition to a trend where consumers are retiring their insurance policies (Reserve Bank of Australia, 2013b).

Australian public unit trusts are amalgamations of investors’ funds, typically grouped into asset classes, being predominately managed by investment banks, commercial bank subsidiaries or insurance firms. As at June 2014, public unit trusts accounted for AUD 294 billion of assets, or 12 per cent of total managed funds asset volumes (Reserve Bank of Australia, 2014c). Cash management trusts, common funds and friendly societies are a relatively small part of Australian financial markets with assets under management of
approximately AUD 36 billion as at June 2014 (Reserve Bank of Australia, 2014c). Cash management trusts are administered by a trust deed and usually invest in securities that are accessible within short-dated money markets. Common funds money can be accepted from the public, or held on behalf estates, and is consolidated by trustee firms which in turn invest in particular asset classes including fixed interest, equities or mortgages. Friendly societies, like credit unions, are owned by members and offer a range of investment and insurance products including education bonds, funeral, sickness or accident insurance amongst other product and services.

**General Insurance**

Australia’s general insurance industry consists of two main business product lines. Property insurance covers motor vehicle insurance, home and contents insurance and travel insurance whilst liability insurance includes professional indemnity and public liability insurance, business insurance, workers compensation insurance and compulsory third party motor vehicle insurance. At March 2014, there were AUD 178.9 billion of assets held by 117 organisations in the sector (Reserve Bank of Australia, 2014e). APRA is responsible for the provision of regulatory oversight and governance of general insurance firms within Australia.

As a proportion of total revenues, Australian insurance firms generate significant revenues from ‘short-tail’ insurance products, which cover events incurred within a year of the premium being paid by policy holders. In recent years there have been new entrants to the general insurance market which have provided strong price competition for profitable short tail premiums. Despite heightened competition, the industry reported a 17 per cent return on equity over the first half of 2014, where low levels of claims contributed to this strong result (Reserve Bank of Australia, 2014c).

Lenders mortgage insurance is specialist insurance provided to lenders against losses that may be incurred on mortgages that default. As a consequence of its linkages with the Australian banking system and property market, this part of the sector plays a role in the
credit creation process and the overall stability of the Australian financial system. Firms generated an approximate return on equity of 14 per cent over the first half of 2014, which is greater than the average return of roughly 10 per cent that was generated over preceding years (Reserve Bank of Australia, 2014c). As at November 2014 the largest organisation within Australia, Genworth Australia, is majority owned by its American parent, despite 33 per cent of its total equity being listed on the Australian Stock Exchange in 2014 (Tracer & Foley, 2014).

**Shadow Banking Sector (Non-ADI Financial Institutions)**

The Australian shadow banking sector includes organisations that participate in credit intermediation activities but are not prudentially regulated by APRA nor accept customer deposits (C. Schwartz & Carr, 2013). This sector comprises of structured finance vehicles, other investment funds, finance companies, money market corporations and cash management trusts. Shadow banking occupies a small component of the Australian financial system, accounting for approximately five per cent of as at December 2013, which is down from ten per cent as at December 2007 (Reserve Bank of Australia, 2014c). Total assets held within the sector amounted to AUD 275.8 billion at March 2014, which includes AUD 109 billion of assets held by 63 registered finance companies (Reserve Bank of Australia, 2014e).

The components to this sector that have an interconnectedness with the Australian banking sector are firms who engage in collateral transformation, including collateral lending, in addition to non-bank securitisation activity. As ADIs’ High Quality Liquid Asset (HQLA) holding requirements increase with the implementation of Basel III in Australia (Australian Prudential Regulation Authority, 2014g), high quality collateral within the Australian financial system is likely to become scarce leading to the potential for multifaceted collateral lending transactions.

Non-bank securitisation represents two per cent of the Australian home loan market and accounts for AUD 127.5 billion of assets at March 2014 (Reserve Bank of Australia, 2014e). Home loan originators are the only suppliers of non-conforming home loans within Australia and consequently have higher arrears rates within their portfolios (Reserve Bank of Australia,
Australian commercial banks, with institutional banking divisions, play a role in providing funding and liquidity support facilities to, in addition to arranging issuance of, Residential Mortgage-backed Security (RMBS) programmes.

**Historical Evolution of Regulation and Market Structure in Australia**

**Pre-1930**

Until 1893, the prevailing banking system that existed throughout each of the Australian colonies could be described as being an example of free banking, where deposit-taking institutions were not subject to any form of stringent regulation with banking institutions dictating market structure (Cashin, 1995; Dowd & Hutchinson, 2010). Australian banks could accept any amount of deposits regardless of their capital holdings; determine appropriate amounts of liquid assets; and the proportion of riskier assets that they wrote onto their balance sheets (Dow, 1996). This was in contrast to other jurisdictions, such as Canada, Russia and some states of the USA who, in the nineteenth century, enforced restrictions on the amount of liabilities a bank could raise (Hickson & Turner, 2002, 2004).

In the years preceding 1893, there had been a sharp increase in commodity and property prices whilst, at the height of the market in 1888, Australian listed equities experienced high volume turnover and price rises and banks were engaging in behaviour that was excessively risky (Australian Financial System Inquiry, 2014a; Maddock, 2014; Merrett, 1997). Australian banks would fund their balance sheets as they pleased, with the only liability restrictions being that outstanding notes on issue were required to be less than the amount of paid up capital. However, due to the high proportion of deposits that made up the liability base of banks at the time, regulatory constraints on note issuance did not impact their liability management practices.
The Australian banking crisis that took place in 1893 is an example of where a free banking regime experienced widespread collapse of 41 deposit-taking institutions within the Australian colonies, with real per capita GDP falling 20 per cent, demonstrating that banks can behave opportunistically when they are unregulated. A lack of general regulation in Australia in the late nineteenth century was a factor that contributed to the financial market instability that prevailed in the late 1880s and resulted in the banking crisis of 1893.

Australian banks had poor liquidity management standards, raising deposits from British investors and failing to treat them in a different manner to those deposits that they raised domestically within the Australian colonies. This is despite representing the deposits making up 27.1 per cent of total banks’ deposits in 1891. The Australian banking system had accepted the role of an intermediary for funding sourced by both private and public organisations. Rapid branch expansion strategies pursued by the colonial banks was another contributing factor to the banking crisis.

Agreements between deposit-taking institutions in the form of mutual assistance schemes, to support each other in the event of a crisis were not successful due to the fact that participating institutions did not hold enough capital to do so (Selgin & White, 1994). Privately held banks cannot fulfil the role of a central bank as they stand to gain from a competitor’s collapse. The intervention of the various colonial governments in taking corrective action had mixed success and, in certain instances, assisted in mitigating the gravity and duration of the banking crisis (Hickson & Turner, 2002, 2004).

**1930-1960**

- Royal Commission, chaired by J. M. Napier, released its report on its inquiry into the monetary and banking systems at present in operation in Australia (1937);
- Australia’s first credit union was established in NSW in 1937;
In 1941, banks became licensed and were required to keep reserves with the Commonwealth Bank, which acted as a central bank. Interest was paid on reserves but at rates that prevented banks from making profits that exceed pre-war levels\(^{28}\); the Commonwealth Bank imposed interest rates ceilings in 1942 under new powers it received from the federal government; the Banking Act 1945 ratified much of the prudential regulation put into place during the Second World War, except for the restrictions placed on bank profits; the Life Insurance Act 1945 specified regulatory oversight of life insurance companies; an attempt made by the Commonwealth Government to nationalise banks (1947); Australia’s first body to represent mutual banking societies, the NSW Savings & Loans Co-operative Associations Ltd, was established in 1956;

1960s

- The Reserve Bank Act 1959 established the Reserve Bank of Australia (RBA) in 1960, which would be accountable for the stability of the currency, the maintenance of full unemployment and the economic prosperity and welfare of Australians in addition to assuming the role of a central bank\(^{29}\);
- The Sydney Greasy Wool Futures Exchange was established in 1960;
- A prerequisite was introduced in 1961 for life companies and superannuation funds to hold minimum levels of government securities (the ‘30/20’ rule);
- Savings banks became permitted to engage in personal lending in 1963;
- Lending restrictions were lifted by the RBA in 1965, removing bank impediments relating to lending to certain borrower groups;
- The balance between the Statutory Reserve Deposits (SRD) and the Liquid Assets and Government Securities (LGS) was changed to allow banks to own greater amounts of LGSs, which provided holders with market yields;

\(^{28}\) The Commonwealth Bank was able to manipulate the supply of credit to the private sector through reserve requirements. The Liquid Assets and Government Securities (LGS) convention that existed during this period obliged commercial banks to keep a minimum share of assets in the form of liquid assets and government securities.

\(^{29}\) At this time the Commonwealth Bank of Australia became a commercial banking organisation.
• The bank accepted commercial bill market developed in the mid-1960s, providing an additional avenue for commercial banks to supply finance;
• The decimal currency was introduced on 14 February 1966;

1970s
• Restrictions were introduced through the Banks (Shareholdings) Act 1972, which applied from 1970, capped individual shareholdings at no more than 10 per cent of a bank’s total equity;
• In 1970, deposit interest rates were permitted to be changed, however, remained subject to a maximum rate that was dictated by the Reserve Bank;
• Volume caps on interest bearing amounts within bank investment accounts were increased in 1970 from AUD 10,000 to AUD 20,000;
• Fixed term deposit durations were permitted to be lengthened from two to four years in 1970;
• The Australian and New Zealand dollars were linked to the United States dollar rather than the British pound sterling in 1971;
• In 1971, banks were allowed to trade in foreign exchange markets as principals rather than as agents for the Reserve Bank, however, they were required to clear their long or short positions each day with the Reserve Bank;
• Investment account minimum balance requirements were lowered from AUD 500 to AUD 100 with minimum transaction requirements being simultaneously removed in 1971;
• In 1972, banks became able to negotiate interest rates, up to a maximum rate, on the deposits they issued for durations between 30 days and four years, where the principal was greater than AUD 50,000;\(^{30}\)
• The ceiling on the interest rate that banks could charge on overdraft facilities and residential mortgages was removed in 1972;
• South Australia became the first state to institute a state based credit act in 1972;

\(^{30}\) Until this reform was implemented, commercial banks could not offer market yields on deposit products due to interest rate restrictions. At this point in time, Australia faced high levels of inflation and the nominal interest rates on customer deposits did not preserve the real value of investments;
• The Insurance Act 1973 was introduced which outlined the regulation and oversight of general insurance companies;
• In 1973, volume caps on interest bearing amounts within bank investment accounts were increased again, from AUD 20,000 to AUD 50,000;
• Durations on certificates of deposit were permitted to be lengthened from two to four years in 1973, with interest rate ceiling also being abolished;
• Volume caps on interest bearing amounts within bank investment accounts were completely abolished in 1974;
• In 1974, the liquid asset ratio requirement was reduced to 7.5 per cent;
• Uniform fee structure agreements between commercial banks were ended as they infringed the Trade Practices Act 1974;
• Options market trading started in 1976;
• In 1976, the Statutory Reserve Deposit (SRD) interest rate was increased to a rate of 2.5 per cent;
• Interest rates ceilings were extended in 1976 to include overdraft facilities and residential mortgages with volumes below AUD 100,000;
• The price for Treasury Notes (T-Notes) became market driven in 1979 following the establishment of the tender system for the issuance of government securities.  

1980s

• Australia’s first Cash Management Trust (CMT) came into existence in 1980;
• Banks became eligible in 1980 to raise their ownership proportions in money market corporations to 60 per cent following approval of an application to the Reserve Bank;
• Interest rate ceilings, and other regulatory restrictions on bank deposits, started to be removed from December 1980;
• The Campbell Report 1981 published its inquiry into the Australian Financial System, which was later endorsed by the Martin Committee of Review in 1984;
• In 1981 the shortest permitted duration on certificates of deposit was cut to 30 days;

31 Previously the Government would set the interest rates on each issuance of Treasury Notes and Bonds, allowing buyers to acquire as much, or as little, volume as they desired. Consequently, the Government faced the problem of not issuing a desired level of stock to meet their financing needs if they set interest rates too low;
• From 1982, banks could accept deposits from trading or profit generating firms, for principals of up to $100,000;

• The shortest permitted duration on fixed deposits was cut to 14 days from 30 days for amounts greater than AUD 50,000 and to 30 days from 90 days for amounts under AUD 50,000. The shortest permitted duration on certificates of deposit was also again lowered to 14 days;

• The obligation to provide notice of one month to withdraw balances within investment accounts was removed in 1982;

• In 1982, commercial banks were permitted to accept fixed rate customer deposits for terms between 30 days and 4 years;

• The Statutory Reserve Deposit (SRD) interest rate was increased in 1982 to a rate of 5 per cent;

• The prescribed asset ratio and liquid asset ratio requirements were removed and replaced with the Reserve Assets Ratio, which required commercial banks to hold the equivalent of 15 per cent of depositors’ balances in cash, Commonwealth Government Securities (CGS) and deposits held at the Reserve Bank;

• Following Commonwealth Government approval, Westpac Banking Corporation was formed in 1982 by the acquisition of the Commercial Bank of Australia by the Bank of New South Wales. The Commercial Banking Company of Sydney also merged with the National Bank of Australasia;

• In 1983, ten banks, that included foreign banks, would be permitted to establish themselves in Australia;

• The Australian dollar was floated in December 1983 with many exchange controls being eradicated including the ability for banks to hold open foreign exchange positions and onshore and offshore domiciled multi-currency deposits;

• Maturity and volume constraints, such as the minimum and maximum durations and sizes that banks could accept on deposits from customers, were completely abolished in 1984.\(^{32}\)

• Savings banks were permitted to provide chequeing products and services;

• Interest on cheque accounts was allowed to be paid from 1984;

\(^{32}\) In 1982, the shortest duration on fixed bank deposits, above $50,000, had been tapered from 30 days to 14 days. For principals smaller than $50,000 the maturity requirement was reduced from 3 months to 30 days.
- The prerequisite, that had been established in 1961, for life companies and superannuation funds to hold minimum levels of government securities (the ‘30/20’ rule) was removed in 1984;
- In 1984, the rules surrounding the foreign ownership of investment banks were loosened;
- Deregulation of the securities industry and the Australian stock exchanges took place in 1984;
- In 1984, the Australian Payments System Council (APSC) is set up;
- Credit unions obtain the ability in 1984 to issue cheques on an agency basis;
- The restrictions on banks’ maximum ownership proportions in money market corporations of 60 per cent were completely revoked in 1984;
- The government offers sixteen foreign banks the opportunity to establish operations within Australia, where Chase-AMP bank established itself by the end of 1985;
- In 1985, the Reserve Bank released its general approach towards the supervision of banks in addition to approach to the regulation of banks’ capital adequacy;
- The federal government introduces capital gains tax in 1985;
- All regulations covering interest rate ceilings on bank interest rates that remained in 1985, except for owner-occupied residential mortgages below AUD 100,000, were abolished;
- The liquid government securities ratio was replaced with the prime assets ratio in 1985 requiring banks to hold 12 per cent of their total Australian denominated liabilities, that were domiciled within Australia, in addition to loans to money market dealers in ‘prime assets’;¹³³;
- The Australian Council of Trade Unions (ACTU) 1986 National Wage Case claim with the Conciliation and Arbitration Commission gave rise to a three per cent employer superannuation contribution. Award-based superannuation schemes were founded;
- In 1986, a code of conduct for electronic funds transfer was created;

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¹³³ ‘Prime assets’ were defined as cash, central bank reserves and Commonwealth Government Securities. Further, banks could count up to 3 per cent of their total assets held in the form of statutory reserve deposits as ‘prime assets’.
¹³⁴ Superannuation coverage swiftly grew from approximately 40 per cent of employees to 79 per cent in the succeeding four years.
• Non-Bank Financial Institutions (NBFIs) able to issue payment orders and ratify agency measures to issue cheques following the amendment of the Cheques and Payments Order Act 1983;

• The interest rate ceiling restrictions on new owner-occupied residential mortgages below AUD 100,000 were abolished with all existing loans being subject to a maximum interest rate of 13.5 per cent;

• The Reserve Bank outlined its approach towards large credit exposures in 1986, requiring individual banks to report details surrounding any customers or related parties whose exposures were larger than 10 per cent of the bank’s shareholders’ equity. In early 1987, the Reserve Bank went further by dictating that banks provide prior notification should it intend to take on a large exposure;

• Standards for the measurement of banks’ capital adequacy were released by the Reserve Bank where a capital ratio of 6 per cent of assets was required to be met by all banks operating before 1981. The Reserve Bank obliged newer banks, that had established operations after 1981, to hold a ratio of 6.5 per cent of assets;

• In 1987, the reserve assets ratio requirement was reduced from 15 per cent to 13 per cent;

• The double taxation on company dividends was stopped, with the dividend imputation system taking effect in mid-1987;

• The unification of state exchanges into Australian Stock Exchange (ASX) took place in 1987, providing the electronic trading of securities;

• The Insurance and Superannuation Commission (ISC) became inaugurated in 1987;

• The Occupational Superannuation Standards Act 1987 began;

• The 1988 Basel Capital Accord (Basel I) was followed by the RBA. The capital adequacy measurement system specified simple risk-weighted capital requirements for banking institutions to better align risk and regulatory capital;

• In 1988, the statutory reserve deposit ratio was lowered to zero with deposits held within statutory reserve account being moved to ‘non-callable deposits’. The Reserve Bank stipulated a requirement for banks to hold 1 percent of total liabilities in ‘non-callable deposits’, which would be placed within Australian dollar denominated assets within Australia;

• The prime assets ratio was reduced from 12 per cent to 10 per cent in 1988;
Prudential obligations could be established through regulation following the amendment of the Banking Act 1945 in December 1989; Large credit exposures reporting guidelines were amended in 1989 for banks to report large exposures at a consolidated group level rather than at an individual banking basis (Australian Prudential Regulation Authority, 1998f); The setting of the interest rates on non-callable deposits was, from 1989, calculated monthly at a rate equivalent to 5 percentage points under the average yield achieved on 13-week Treasury notes issued over the prior month via the tender process; The Australian Banking Industry Ombudsman scheme was introduced in 1989;

1990s

The Hawke Labor Government rejected a merger on competition grounds between the ANZ and National Mutual in 1990, subsequently adopting the ‘six pillars’ policy; The State Bank of Victoria, which had been owned by the State of Victoria, was taken over by the Commonwealth Bank of Australia in 1991 for total consideration of AUD $2 billion after a failed bid from Westpac at the same time. The State Bank had incurred losses from its investment banking arm earlier that year, Tricontinental, of AUD $1.5 billion. The federal government offered Commonwealth Bank shares to the public for the first time in order to fund the purchase (Reuters, 1990); Non-callable deposits held with the Reserve Bank were removed as being a qualifying ‘prime assets’ in 1990. Further, the prime asset ratio was also reduced to 6 per cent by May 1990; The Reserve Bank altered the method of assessing capital adequacy:

- Any equity or capital investments in non-consolidated subsidiaries were to be deducted from the total capital base; and
- Banks’ holdings of another bank’s issued capital instruments would be subtracted from the investing bank’s aggregate capital base.

Corporations (Unlisted Property Trusts) Amendment Bill 1991 prohibited redemptions in unlisted property trusts, except in cases of financial hardship, for 12 months by requiring unit holders to give 12 months’ notice;
• The Australian Securities Commission (ASC) is established in 1991 to replace the National Companies and Securities Commission and amalgamate the states and territories’ Corporate Affairs departments;

• A Superannuation Guarantee Charge was introduced from 1 July 1992 to ensure employers made the required superannuation contributions to employees;

• Foreign banks became permitted to conduct branch activities within Australia in 1992 but they could not accept retail deposits. Restrictions on the quantity of new banks that may be setup were abolished by the Commonwealth Government;

• Credit Union Services Corporation (Australia) Limited (CUSCAL) was established in 1992 to service mutual banking societies, act as a national trade federation, and to provide treasury and related business services to credit unions including holding emergency liquidity support funds (lender of last resort function);

• Aussie Home Loans, a mortgage originator, was setup by John Symond in 1992 to compete with commercial banks and other retail banking organisations;

• The Australian Financial Institutions Commission (AFIC) came into operation in 1992 to oversee the Non-Bank Financial Institutions, including Credit Unions and Building Societies;

• The Australian Payments Clearing Association came into existence (1992);

• The setting of interest rates on non-callable deposits was increased by 5 percentage points to reflect the actual average yield achieved on 13-week Treasury notes issued over the prior month via the tender process;

• Superannuation Industry (Supervision) Act 1993 became a statute;

• In 1994, the State Bank of NSW was acquired by the Colonial Mutual Life Association;

• Challenge Bank and the State Bank of South Australia are taken over by Westpac and Advance Bank respectively in 1995;

• National Mutual is demutualised in 1995 with AXA SA purchasing a majority interest in the new holding company;

• The June 1993 amendment to the setting of interest rates on non-callable deposits was rescinded in 1995 and a margin of 5 percentage points under the average yield achieved on 13-week Treasury notes issued over the prior month via the tender process was included once again;
• Between 1994-1995, the government released a series of Prudential Statements for deposit-taking institutions:
  o Framework for deposit-taking institutions engaging in securitisation, replacing original rules that were introduced in 1992 (Australian Prudential Regulation Authority, 1998c). These later formed the basis of Prudential Standard (APS 120): Funds Management & Securitisation;
  o General guidance to banks in respect of their equity associations (Australian Prudential Regulation Authority, 1998g);
  o Guidance surrounding the ownership and control of banks (Australian Prudential Regulation Authority, 1998b);
  o Parameters covering a number of aspects of banks’ asset quality (Australian Prudential Regulation Authority, 1998i)
• In 1996, the Commonwealth Bank of Australia conducts a second public equity raising;
• Suncorp is merged into Metway Bank by the Queensland Government in 1996, which plans to divest itself within a 5-year period;
• From the middle of 1997, banks, credit unions, building societies and life companies became able to offer a retirement savings account product for superannuation without the need for a trust structure;
• In 1997, St. George Bank merged with Advance Bank;
• The prime asset ratio was lowered by 3 percentage points from 6 per cent to 3 per cent in June 1997;
• On the advice of the 1997 Financial System Enquiry:
  o Australian Prudential Regulation Authority (APRA) was established to regulate and provide prudential supervision of banks, building societies, credit unions, superannuation and general and life insurance firms;
  o The Australian Securities Commission became the Australian Securities & Investments Commission (ASIC) assuming accountability for consumer protection in deposit-taking, superannuation and insurance.
• APRA qualified the relationship between banks, their auditors and their obligations to the regulator by releasing Prudential Statement H1 in May 1997 (Australian Prudential Regulation Authority, 1998h)
• APRA released its approach to determine the level of capital to be held by a bank against its market risk in August 1998 (Australian Prudential Regulation Authority, 1998d);

• Amendments to the capital adequacy requirements for ADIs were made to align risk weights to changes made by the Basel Committee on Banking Supervision, requiring Australian ADIs to hold less regulatory capital (Australian Prudential Regulation Authority, 1998a):
  o Residential mortgages, that are covered by sufficient lenders mortgage insurance, can qualify for a 50 per cent risk weight if their loan-to-valuation ratio is greater than 80 per cent;
  o The risk weights assigned to ADIs’ government debt holdings were lowered from 10 per cent to zero;
  o A 20 per cent risk weight was to be applied to any banks' claims on a building society or credit union. This risk weight was reduced to align to existing risk weights that applied to a bank’s claim on another bank and was made effective once all ADIs became required to adhere to the Banking Act and fell under the prudential supervision of APRA;
  o Derivative contracts inclusion in the calculation of the credit component of risk-weighted capital continued to be permitted via the matrix of credit conversion factors.

• APRA detailed its minimum criteria for banking licence provisions relating to both locally and foreign owned firms (Australian Prudential Regulation Authority, 1999b, 1999c)

• In 1999, APRA commenced a consultation period following its release of a Policy Discussion Paper on the supervision of conglomerates

• APRA made amendments to the capital adequacy standards applying to banks surrounding innovative tier 1 capital;

• Effective 16 August 1999, the prime asset ratio was abolished and APRA’s Prudential Statement D1: Liquidity Management became the regulator’s new approach to liquidity management with banks’ managing liquidity under individual policies that were agreed with APRA (Australian Prudential Regulation Authority, 1998e);

• ASIC and APRA announced an interim policy for mutual banking organisations under the Banking Act and Corporations Law in December 1999;
2000s

- APRA released a series of draft prudential standards on liquidity (Australian Prudential Regulation Authority, 1999a); credit quality (Australian Prudential Regulation Authority, 2000e); capital adequacy (Australian Prudential Regulation Authority, 2000b, 2000c, 2000d); funds management and securitisation (Australian Prudential Regulation Authority, 2000g); audit arrangements (Australian Prudential Regulation Authority, 2000a); large exposures (Australian Prudential Regulation Authority, 2000h); equity associations (Australian Prudential Regulation Authority, 2000f); and market risk (Australian Prudential Regulation Authority, 2001c), with the goal of harmonising regulation across all types of deposit-taking institutions. All final standards were released in October 2000, with the exception of market risk.
- In January 2001, the Basel Committee on Banking Supervision released its proposal to evolve the 1988 Basel Capital Accord;
- Guidance surrounding the capital adequacy treatment of credit derivatives was issued by APRA in 2001 in order to align regulatory policy to current market practice and expand the types of assets that an ADI can hedge with credit derivatives (Australian Prudential Regulation Authority, 2001a, 2001b);
- Following proposals in March 1999, November 1999 and April 2001, APRA released a policy information paper in October 2001 that described a structure for the oversight of conglomerate groups that hold an ADI within its structure;
- Guidelines for ADI authorisation were released by APRA in 2001 detailing minimum criteria expected to be covered by applicants in establishing an Australian domiciled banking operation;
- In June 2001, APRA makes its second round submission to the Basel Committee on Banking Supervision in relation to their proposed changes to the 1988 Basel Capital Accord;
- Prudential standard on ADI outsourcing is released in 2002 by APRA;
- Concerns are expressed by APRA around the lending standards of credit unions and building societies (Australian Prudential Regulation Authority, 2002);
- In November 2002, new prudential standards are issued to replace September 2000 editions on Capital Adequacy (APS 110); Capital Adequacy: Measurement of Capital (APS 111); Large Exposures (APS 221); and Equity Associations (APS 222);
• In 2003, ADIs became permitted to use an agent to make Real-Time Gross Settlement (RTGS) payments on their behalf if their aggregate transactions were small, avoiding the need to hold an exchange settlement account with the Reserve Bank;

• In late April 2003, the Basel Committee on Banking Supervision released revised plans for updating the international capital adequacy framework for banks;

• APRA released its transitionary requirements in June 2003 for the Basel II capital accord;

• Certain type of capitalised assets, that were included as intangible assets, were eliminated from the tier 1 regulatory capital base from 1 July 2004;

• On 1 July 2003, prudential regulation came into effect regarding the operation and supervision of conglomerates;

• Specialist Credit Card Institutions (SCCI) become a new category of ADI, being subject to higher capital requirements reflecting the higher degree of risk associated with their business activities;

• In January 2004, the National Australia Bank (NAB) announced approximately AUD 180 million in losses stemming from unauthorised trading in foreign exchange options. The NAB’s internal target capital adequacy ratio was increased to 10 per cent; its currency options desk was closed and APRA withdrew its approval for the NAB to use an internal ratings based approach to determine market risk capital requirements;

• Concessional 50 per cent risk-weighting of banks’ home loans could not be applied to ‘low-doc’ or broker and third-party originated loans from September 2004;

• In 2004, APRA outlines that the Basel II accord would come into effect on 1 January 2008;

• Amendments are made by APRA in 2005 to the capital requirements and regulatory reporting obligations of Lenders Mortgage Insurers (LMIs) in 2005 to increase firms’ capital base in addition to improving the definition of suitable mortgages that an ADI can claim capital relief for when lenders mortgage insurance is in place;

• In April 2005, APRA and the Bank of New Zealand announce that they have executed a terms of engagement regarding to the implementation of Basel II in their respective countries;
• Draft papers describing APRA’s proposal to the ‘standardised’ and ‘internal ratings based’ approaches to credit risk under Basel II are published (Australian Prudential Regulation Authority, 2005a, 2005c);

• Draft regulatory approaches to operational risk under Basel II, both ‘standardised’ and ‘advanced’, are released by APRA (Australian Prudential Regulation Authority, 2005b, 2005d);

• Prudential standards relating to an ADI’s business continuity management are published (Australian Prudential Regulation Authority, 2005e);

• An investigation is carried out into the residential valuation practices by ADIs and LMIs, finding that there had been less emphasis placed upon the need for comprehensive external property valuations, especially by the larger banks (Australian Prudential Regulation Authority, 2005f);

• Providers of purchased payment facilities become a new type of ADI in November 2005;

• New “fit and proper” regulation is released (Australian Prudential Regulation Authority, 2006i);

• New outsourcing regulation is proposed through the issuance of a discussion paper, draft prudential standard and related guides (Australian Prudential Regulation Authority, 2006e, 2006g);

• Draft regulatory approaches to interest rate risk in the banking book (non-traded risk) under Basel II, were distributed by APRA for discussion (Australian Prudential Regulation Authority, 2006a);

• A new prudential standard on capital was released as a consequence of Australia adopting international accounting standards, coming into effect from July 2006 (Australian Prudential Regulation Authority, 2006f)

• Governance arrangements for ADIs are harmonised through the release of a new prudential standard (Australian Prudential Regulation Authority, 2006c, 2006h);

• An updated prudential standard on ADI outsourcing is emitted in October 2006 by APRA (Australian Prudential Regulation Authority, 2006d). The standard is enhanced for general insurers, covering their custody arrangements, and also becomes applicable to life companies;

• Following industry feedback, APRA published a paper on its approach to the advanced management of operational risk under the Basel II capital accord,
particularly focusing on the methodology for calculating regulatory capital in addition to required corporate governance and risk management practices under the internal modelling method (Australian Prudential Regulation Authority, 2006j):

- Draft regulation on securitisation is distributed in November 2006, in line with the Basel II capital accord, which also covers the use of credit derivatives in synthetic securitisations (Australian Prudential Regulation Authority, 2006b);
- Draft regulatory approaches to market disclosure under Basel II are released in June 2007 (Australian Prudential Regulation Authority, 2007a);
- Following industry feedback, APRA published a paper on its approach to the advanced measurement of operational risk, the internal ratings-based approach to credit risk in addition to the treatment of interest rate risk in the banking book (Australian Prudential Regulation Authority, 2007d);
- A draft prudential standard to update capital adequacy regulation (APS 110), to align to the Basel II capital accord, is circulated in July 2007 and impacts both ADIs and general insurers;
- In July 2007, draft regulation on securitisation is further updated following industry feedback, setting out ADIs’ obligations in addition to the methodology for determining its regulatory capital provisions arising from credit risk from securitisation exposures. APRA also announced that it would not require any ADI to seek prior approval before establishing new securitisation configurations (Australian Prudential Regulation Authority, 2007e);
- Draft prudential standards covering the standardised approaches to credit and operational risks are released for industry feedback by APRA in July 2007;
- A draft discussion paper and Prudential Standard APS 116 Capital Adequacy: Market Risk are issued in August 2007 (Australian Prudential Regulation Authority, 2007b);
- In late August 2007, APRA publicised details of its investigation into appropriate capital risk-weights for ADIs’ margin lending activities in addition to ADIs’ reliance of external credit assessment institutions when determining risk-weights on their rated credit exposures. An APRA commissioned external consultant recommended that:
  - Capital of three per cent (equivalent to a 37.5 per cent risk-weight) to be set aside against margin lending exposures, with a tolerable range of between one per cent (12.5 per cent risk-weight) and four per cent (50 per cent risk-weight);
o For outstanding loans secured by listed equity investments, a 20 per cent risk-weight could be applied;

- Draft Basel II reporting requirements are released in September 2007 and finalised in early February 2008;
- Minor amendments are proposed to governance arrangements for ADIs, general insurers and life companies in September 2007 with the updated prudential standard becoming effective in 2008 (Australian Prudential Regulation Authority, 2008);
- APRA publicises its approach to the second pillar of Basel II, the supervisory review process, through the release of a discussion paper in September 2007 (Australian Prudential Regulation Authority, 2007c). This process was finalised with the production of an information paper in December 2007;
- Final prudential standards, which are aligned to Basel II, are released by APRA in late November 2007 to become effective on 1 January 2008. This release follows industry consultation that commenced in 2005;
- On 10 December 2007 it was announced that approvals had been granted for a small number of ADIs to adopt the internal ratings-based (IRB) approach for credit risk, at either the Foundation or Advanced level, and the advanced measurement approaches (AMA) for operational risk from 1 January 2008:
  - Advanced IRB and AMA:
    - Australia and New Zealand Banking Group (ANZ);
    - Commonwealth Bank of Australia (CBA);
    - Westpac Banking Corporation (WBC);
  - Foundation IRB and AMA:
    - Macquarie Bank;
  - AMA:
    - Bank of Western Australia (BankWest);
    - National Australia Bank (NAB);

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35 St George Bank made an application to APRA to transition to the foundation IRB approach during 2008 and requested to remain on the Basel I capital arrangement until that time;
36 Both BankWest and the NAB made applications to APRA to transition to the advanced IRB approach during 2008 and requested to remain on the Basel I capital arrangement until that time.
These accounts could be offered by superannuation licensees, life companies and authorised deposit-taking institutions;

- They are taxed at a rate of 15 per cent;
- The commonwealth government makes a 17 per cent contribution on the first AUD 6,000, however, the account holder must deposit AUD 1,000 each year over at least 4 financial years before they can withdraw the funds;

- The federal government pronounced a temporary deposit guarantee covering large deposits and wholesale funding issued by Australian ADIs on 12 October 2008, which took effect on 28 November 2008. This deposit insurance scheme ended for new liabilities at the end of March 2010 (Commonwealth Government of Australia, 2012):
  - Deposits up to AUD 1 million in eligible ADIs were to be guaranteed by the Australian Government without charge under the Financial Claims Scheme until 1 February 2012;
  - The ADI would be required to compensate the Scheme Administrator a fee (see table below) based on the value of deposits above AUD 1 million that are covered by the guarantee:

### Australian Government Guarantee Scheme for Large Deposits and Wholesale Funding

<table>
<thead>
<tr>
<th>Credit Rating</th>
<th>Fee per annum</th>
</tr>
</thead>
<tbody>
<tr>
<td>AAA to AA-</td>
<td>70 basis points (0.7 per cent)</td>
</tr>
<tr>
<td>A+ to A-</td>
<td>100 basis points (1.0 per cent)</td>
</tr>
<tr>
<td>BBB+ and below and Unrated</td>
<td>150 basis points (1.5 per cent)</td>
</tr>
</tbody>
</table>

*Source: The Commonwealth Government of Australia*

- Enhanced liquidity regulation is proposed on 11 September 2009 via the release of a consultation package:
  - Extending ADI’s going concern cash flow projection modelling to 1-year and making it applicable to all ADIs;
  - Strengthening ADIs’ stress testing:

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37 The scheme is to be abolished on 1 July 2015 and these accounts will be treated like any other account held with a provider.
- Name crisis scenario to be extended from five business days to one month;
- Introduction of an APRA defined three-month market disruption scenario;
  - Reporting framework for APRA’s collection of regular liquidity data from ADIs, including at short notice;
- Propositions are offered by APRA to further reform the Basel II capital accord on 21 December 2009, following July 2009 proposals released by the Basel Committee on Banking Supervision, detailing potential regulation of ADIs’ portfolios relating to trading activities\(^{38}\), securitisations and exposures to off-balance sheet vehicles (Australian Prudential Regulation Authority, 2009);

**2010s**

- The proposed method for implementing the Financial Claims Scheme was detailed in January 2010, with a second round of consultation being conducted from August 2010;
- New prudential regulation covering conglomerate groups was announced that has the objective of ensuring that adequate capital is held to ensure that any APRA-regulated entities aren’t impacted by any possible contagion and other risks from within the group (Australian Prudential Regulation Authority, 2010);
- On 16 December 2010, the Bank for International Settlements via the Basel Committee on Banking Supervision released its intention for liquidity regulation with the Reserve Bank of Australia and APRA announcing the domestic implications on the following day. Mention was made of the liquidity coverage ratio, qualifying High Quality Liquid Assets (HQLA) and the committed liquidity facility;
- Proposal was made by APRA to consolidate the prudential standards on outsourcing, business continuity management, governance and fit and proper in December 2010;
- For the Australian jurisdiction, level 1 HQLA is determined to include commonwealth and state government debt, however, there are no qualifying AUD assets meeting the Basel level 2 HQLA criteria as at 28 February 2011;

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\(^{38}\) The intended regulation attempts to cover the credit risk arising from complex trading activities and the establishment of a stressed value-at-risk (VaR) constraint.
• On 23 May 2011, final regulation surrounding the enhancements to the Basel II Framework in Australia, originally announced on 21 December 2009, were released to come into effect on 1 January 2011;
• The federal government introduced a new law preventing banks from charging home loan exit fees on new home loans in July 2011;
• APRA published for comment its planned application of the Basel III capital reforms in Australia (Australian Prudential Regulation Authority, 2011a) on 6 September 2011, specifically outlining:
  o Its intent to embrace the international definition of capital and how it is measured;
  o Continuation of Australia’s existing treatment of deferred tax assets, investments in non-consolidated financial institutions and investments in commercial institutions;
  o The need to establish the Basel III capital buffer regimes and the leverage ratio;
  o A plan to accelerate aspects of the Basel Committee’s timetable:
    ▪ ADIs must adhere to Basel III minimum capital ratios and regulatory adjustments completely from 1 January 2013;
    ▪ The capital conservation buffer must be from 1 January 2016
  o Transitional arrangements for capital instruments that no longer qualify as additional tier 1 or 2 capital;
• Regulation addressing governance, fitness and propriety, outsourcing and business continuity management was consolidated across the ADI, general insurance and life insurance industries into four common standards in September 2011, becoming effective from 1 July 2012 (Australian Prudential Regulation Authority, 2011d);
• The Treasurer of the Commonwealth Government announced on 11 September 2011 that a permanent cap of AUD 250,000 per person per institution would take effect from 1 February 2012, replacing the previous temporary cap of AUD 1 million under the Financial Claims Scheme;
• Additional industry consultation (third round) was sought in September 2011 regarding the implementation of the Financial Claims Scheme following issues raised by the industry. Regular submission of data to APRA would not be required and ADIs could report on from the perspective of a single customer view. A new final
prudential standard for Financial Claims Scheme was released in December 2011, becoming effective on 1 January 2012 (Australian Prudential Regulation Authority, 2012c);

- In October 2011, the Commonwealth Government made amendments to the Banking Act 1959, via the Banking Amendment (Covered Bonds) Act 2011, to allow ADIs to issue covered bonds, with APRA releasing a draft prudential standard shortly after (Australian Prudential Regulation Authority, 2011c);

- In November 2011, the Reserve Bank of Australia announced details of the Committed Liquidity Facilities (CLF) it would provide to ADIs from 1 January 2015 to ensure they can meet HQLA holding requirements under the Basel III version of APS 210 Liquidity (Reserve Bank of Australia, 2011);

- To accompany the RBA announcement, APRA released an updated consultation package on its Basel III liquidity regulation along with updated draft liquidity standards (Australian Prudential Regulation Authority, 2011b);

- Use of the term ‘merchant bank’ by unregulated financial firms that trade within Australia’s short-term money markets was revoked in February 2012;

- Five draft Basel III prudential standards on capital were released on 30 March 2012 (Australian Prudential Regulation Authority, 2012b);

- Under the Australian federal government’s banking reforms, new rules taking effect from 1 July 2012, were put in place to make it easier for consumers to move their transactional banking relationships between ADIs;

- Final prudential standard to apply to ADIs that issue covered bonds (Prudential Standard APS 121 Covered Bonds) was issued on 12 July 2012;

- Changes to regulation relating to ADIs’ holdings of subordinated tranches of securitisations involving receivables originated by another entity, proposed in October 2011 and July 2012, would compel the ADI to subtract these assets from its Common Equity Tier 1;

- A final set regulation encompassing the main parts of the Basel III capital reforms in Australia was released by APRA on 28 September 2012 (Australian Prudential Regulation Authority, 2012a), where highlights include:
  
  o A revised definition of regulatory capital where the main component of Tier 1 capital is common equity;
o Many capital subtractions, for regulatory adjustments, must be from common equity Tier 1 capital;

o Greater amounts of capital to be set aside, specifically:
  ▪ Minimum Common Equity Tier 1 Capital of 4.5 per cent of risk-weighted assets (increase of 2.5 per cent);
  ▪ Minimum Tier 1 Capital ratio 6 per cent (increase 2.0 per cent);

o New capital conservation buffer of 2.5 per cent. This puts greater restrictions on capital distributions if the bank’s capital level drops into the buffer;

o A new ‘countercyclical buffer’ of up to 2.5 per cent. This is introduced when the government feels as though the allocation of credit within the financial system is excessive and there is widespread evidence of risks within the marketplace; and

o Introduction of a new leverage ratio to control the growth of leverage in the banking market;

• On 7 November 2012, further amendments were proposed to the Financial Claims Scheme regulation;

• A further release of final regulation relating to the Basel III capital reforms in Australia was made by APRA on 13 November 2012 and included counterparty credit risk measures\(^\text{39}\) in addition to those reforms that were not included in the September 2012 release, such as the use of external credit assessment institutions;

• Draft prudential regulation that was announced in March 2010 pertaining to conglomerate groups is revisited in December 2012 and May 2013 through a second consultation package, that involves four parts of draft regulation, covering: group governance, risk exposures, risk management and capital adequacy;

• Guidelines were announced in April 2013 pertaining to the Pillar 3 disclosures under the Basel III capital accord, which require ADIs to report its composition of regulatory capital and capital adequacy in a uniform way: detail information on issued capital instruments; and disclose information to the market about the remuneration of senior management and any material risk takers. Final standards were released on 26 June 2013 (Australian Prudential Regulation Authority, 2013d);

\(^{39}\)APRA stated its intent to embrace the minimum Basel III prerequisites for the definition and measurement of counterparty credit risk capital.
APRA proposed to restrict Registered Financial Corporations (RFCs) from using the word deposit and ‘at-call’ in their retail fund raising activities and require any debenture issuance to have a minimum maturity of at least 31-days. Furthermore any unregistered institutions such as religious or charitable development funds, would not be exempt from being registered under section 66 of the Banking Act 1959 if they were to continue to offer products to retail investors (Australian Prudential Regulation Authority, 2013a);

APRA announced in May 2011 that:
- The definition of HQLA is to remain unchanged from its 2011 draft release; and
- The Liquidity Coverage Ratio will become effective from 1 January 2015 whilst the Net Stable Funding Ratio will come into practice from 1 January 2018.

Final financial claims scheme regulation was released in June 2013, becoming effective from 1 July 2013 for the payment, reporting and communications requirements, and from 1 January 2014 for the single customer view;

Australian Prudential Regulation Authority (2013c) stated that the Committed Liquidity Facility (CLF) will be provided:
- To ADIs on a yearly basis;
- If ADIs show that they have taken ‘all reasonable steps’ to meet their LCR requirement when managing their balance sheet;
- Once a liquidity risk framework is in place which includes liquidity transfer pricing systems, remuneration of key and relevant staff being tied to appropriate liquidity management;
- To only meet ADIs’ AUD requirements; and
- To meet ADIs’ AUD net cash outflow plus a buffer;

Following several rounds of industry consultation, draft prudential standards are released relating to conglomerate groups (Australian Prudential Regulation Authority, 2013e);

On 20 December 2013, APRA released final Basel III liquidity reform regulation and practice guides, with quantitative measures applying to large ADIs (Australian Prudential Regulation Authority, 2014g). This regulation does not define the Net
Stable Funding Ratio requirements, which will become a requirement from 1 January 2018;

- APRA announced that domestic systemically important banks (D-SIBs) would have a higher loss absorbency (HLA) capital requirement of 1 per cent from 1 January 2016. As at 23 December 2013, the following ADIs were classified as Australian D-SIBs:
  - Australia and New Zealand Banking Corporation;
  - Commonwealth Bank of Australia;
  - National Australia Bank;
  - Westpac Banking Corporation;

- In preparation for the implementation of Basel III liquidity regulation, the Reserve Bank determined in January 2014 that:
  - The volume of AUD HQLA that ADIs complying with the LCR could practically hold was approximately equal to 30 per cent of the total outstanding federal, state and territory government securities;
  - The total estimated AUD net cash outflows was circa AUD 418 billion for the 35 ADIs;
  - The total notional CLF would have been AUD282 million if it was offered from 1 January 2014;

- Mutual ADIS were permitted to issue Tier 1 or 2 capital instruments as long as they could be converted into ‘mutual equity interest’ in the ADI and become common equity Tier 1 capital for the ADI’s capital adequacy calculation (Australian Prudential Regulation Authority, 2014d);

- Refinements to securitisation regulation were proposed to create:
  - A two credit class structure to lessen the possibility for opaque risk transfer to occur;
  - Mitigation of agency risks by ensuring that issuers maintain holdings in securitisation transactions;
  - Allowance in the regulation for master trusts or revolving securitisations;
  - A process for matching regulatory capital holdings to the underlying inherent risks for ADIs to achieve capital relief;
  - Improved incorporation of securitisation into ADI liquidity frameworks;
  - Better explanation of the management of warehouses;
• On 5 November 2014, APRA released a prudential practice guide on residential mortgage lending following a draft that was released earlier that year on 26 May 2014 (Australian Prudential Regulation Authority, 2014f);

• The introduction of final regulation pertaining to conglomerates was delayed until after the release of the Australian Financial System Inquiry (Australian Prudential Regulation Authority, 2014i). As at 15 August 2014, APRA classified the following organisations as Australian conglomerates:

  o AMP Limited;
  o Australia and New Zealand Banking Group Limited;
  o Challenger Limited;
  o Commonwealth Bank of Australia;
  o Macquarie Group Limited;
  o National Australia Bank Limited;
  o Suncorp Group Limited; and
  o Westpac Banking Corporation;

• APRA requested that ADIs make disclosure is to be required around their leverage ratio, liquidity coverage ratio (LCR). Australian D-SIBs must also disclose the 12 indicators used in the Basel III global systemically-important banks (G-SIBs) methodology (Australian Prudential Regulation Authority, 2014b);

• On 5 November 2014 APRA issued a renewed version of Prudential Standard APS 210 Liquidity (APS 210), and related reporting:
  o Foreign bank branches will be subject to the LCR, however, will not be eligible for the CLF with the RBA and will only need to hold a minimum of 40% HQLA;
  o All ADIs must produce a daily liquidity risk report;
  o APRA sanctioned 14 locally incorporated ADIs to have access to a CLF, where there was AUD 275m of notional limit approved across the industry;

• Following the consultation period after APRA’s April 2013 announcement, the proposed changes to the exemption orders under section 66 of the Banking Act 1959 affecting registered financial corporations would become effective from 1 July 2015;

• A final prudential standard and prudential practice guide on risk management, applicable to ADIs, general insurers and life companies, authorised non-operating holding companies, was released in December 2014 to take effect on 1 January 2015;
On 9 December 2014, APRA revealed that it was focusing on Australian ADIs’ residential mortgage lending practices, namely:

- ADIs writing home loans with greater risk (loans with high loan-to-valuation and loan-to-income ratios, interest-only loans to owner occupiers and mortgages with long durations);
- The significant uplift in property investment loans;
- Assessments on new home loan borrowers around their loan affordability. Ensuring ADIs check the interest rate sensitivity of borrowers around whether they can sustain a 200 basis point change in interest rates, or a floor lending rate of 7 per cent.
Appendix Two: Canadian Banking System

Structure of the Canadian Financial System

Historically, financial institutions within Canada have been broadly bracketed into five primary categories, based on their main course of dealings, which include: chartered banking institutions, mutual credit societies, trust and loan organisations, life insurance companies and securities dealers (Daniel, Freedman, & Goodlet, 1992). Over time the functions of organisations operating within each category has changed with many attempting to penetrate lines of business held outside their traditional spheres of activity. Distinct government institutions regulate the various types of financial institutions, with regulatory oversight being divided amongst both federal and provincial governments. Monetary policy is administered by the Bank of Canada, which also has responsibility for market stability. Each Canadian province maintains its own securities commission as securities regulation is carried out at a provincial level (Pan, 2011).

Commercial banks operate under charters granted by the federal government and their adherence to regulation is monitored at a national level by the Office of the Superintendent of Financial Institutions (OSFI). The Financial Consumer Agency of Canada (FCAC) administers and enforces consumer protection laws. These institutions have always offered commercial lending and supply large amounts of credit in the form of personal and residential loans. Over time, many Canadian commercial banks have also established significant international operations and networks.

Mutual societies, including credit unions and caisses populaires, have historically functioned under the regulation of provincial authorities. More recently, a category of federal credit unions has been created to allow mutual societies to follow national prudential standards (Canadian Bankers Association, 2010). The Credit Union Central of Canada, which is a national trade federation for credit unions and caisses populaires, providing technical and financial support services, was established under federal legislation under the Cooperative
Credit Associations Act. The main assets that these societies have traditionally held include residential and personal loans; however, many have developed portfolios containing commercial loans (Freedman, 1998).

Trust and loan organisations within Canada can follow national or provincial charters; however, the largest institutions are nationally regulated and control the majority of assets within the sector. Loan firms have historically focused on residential lending and raising term deposits but also offer consumer and commercial loans. Trust companies offer discretionary fiduciary services.

All three of these financial institution categories accept and compete for a range of liabilities, where deposits are raised from the consumer, business and institutional segments.

Most of the larger financial institutions, with the exception of the credit union sector, have national points of presence. Through merger activity in the latter part of the nineteenth century and the early part of the twentieth century, Canada’s commercial banks became concentrated and developed national branch networks. These institutions also extended their operations globally into the Caribbean at an early stage, accepting foreign currency deposits and making loans.

**Historical Evolution of Regulation in Canada**

Canadian financial institutions have historically had widely held ownership structures, where downstream linkages between financial and non-financial organisations were limited until the early 1980s. Regulation surrounding downstream linkages for deposit-taking institutions was slightly amended in 1992 whereby investments in specific fields, such as information services, could be made.

Since 1967 there has been a requirement that equity stakes in Canadian commercial banks be capped at 10 per cent of any class of shares of a bank. The 1980 Bank Act revision
maintained this principle for all existing banks within the sector (Schedule 1 banks) and introduced a new class of banking institutions (Schedule 2 banks) where it was permitted that shares could be closely held. Schedule 2 banks would need to be either subsidiaries of foreign banks or new banks that would become widely held after a period of 10 years (Freedman, 1998).

Given the similarities between regulatory change between Australia and Canada, coupled with the increasing internationalisation of banking regulation, the focus of the following summary is not to provide an exhaustive analysis on regulatory changes made within the Canadian financial system but to highlight those regulatory changes that could impact market structure and the way that the Canadian deposit-taking institutions included within this study fund their balance sheets and hold liquid assets.

**Amendments of 1954**

- Banks obtained the ability to provide mortgages that had government guaranteed insurance supplied by the National Housing Association;
- Provision was made to allow chattel mortgages to be offered; and
- Ratification of procedures around a bank’s requirement to hold reserves with the central bank.

**Amendments of 1967**

- The prescribed interest rate ceiling of 6 per cent on bank lending was abolished – The natural rate (market rate) of interest was greater than 6 percent during the 1960s meaning banks were being crowded out of household residential lending;\(^{40}\)
- Banks were prevented in setting interest rates on wholesale over-the-counter deposit and loan transactions with other banks;

\(^{40}\) Throughout this period, banks continued to offer loan financing to businesses where there could be revenue generated from other products providing a cross-subsidy.
• Banks barred from holding trust companies;
• Requirement that equity stakes in Canadian commercial banks be capped at 10 per cent of any class of shares of a bank; and
• Deposit insurance established for Canadian banks and trust and mortgage organisations.

Amendments of 1980

• Downstream linkages between financial and non-financial organisations became permitted, where banks could hold subsidiaries in mortgage and loan companies and venture capital firms\(^\text{41}\);  
• Foreign banks were permitted to establish wholly owned subsidiaries under a new class of banking institutions (Schedule 2 banks); and  
• Canadian Payments Association formed through the Canadian Payments Association (CPA) Act.

Amendments of 1987

• Reforms were made to the Bank Act and to Ontario legislation, which removed impediments between banking institutions and securities businesses;  
• Banks became able to underwrite and distribute government and corporate issuance;  
• Limitations were removed on the investments that financial institutions, including banks, could make in securities firms;  
• From 1988, non-residents could hold up to 100 per cent ownership interests in existing securities businesses; and  
• The Ontario legislative reforms allowed foreign securities organisations direct entry into the Ontario market without limitations.

\(^{41}\) The mortgage and loan subsidiaries of banks could raise deposits which were free from reserve requirements. This enabled banks to better compete with trust companies who had no reserve requirement for their deposits.
Amendments of 1992

- The Canadian government included sunset clauses in the relevant acts governing financial institutions so that all statutes are to be re-examined at least every five years.\(^\text{42}\)
- Federal financial institutions, including banks, trust, loan and insurance firms are provided with the ability to diversify into new financial services businesses.
  - Banks and life insurance companies can establish, or acquire, trust companies;
  - Banks and trust and loan companies receive the power to hold insurance companies, however, remain restricted in the networking of insurance products through their branches;
  - Widely held regulated non-bank financial institutions are able to possess Schedule II banks, without the requirement to divest ownership within a ten year period.
- Banks permitted to provide new products and services, including portfolio management and investment advice;
- The requirement for banks to hold non-interest bearing central bank reserves was removed;

Effectively these amendments, coupled with those made in 1987, changed domestic market structure, enabling financial institutions to extend their financial product and service offering becoming conglomerates.

Bank statutory legislation released in June 1996 set out clear statutory mandates for the Office of the Superintendent of Financial Institutions (OSFI), the Canada Deposit Insurance Corporation (CDIC) and the Payment Clearing and Settlement Act (PCSA)

\(^{42}\) This includes a review of the Bank Act, the Insurance Companies Act, the Trust and Loan Companies Act, and the Cooperative Credit Associations Act.
Amendments of 1997

- Any banking institutions, not accepting retail deposits, are no longer required to belong to the deposit insurance agency;
- Foreign banks become permitted to establish full service branches, or lending branches, directly in Canada without the need for separately capitalised subsidiaries:
  - Full service branches are not permitted to accept deposits of less than CAD 150,000;
  - Lending branches can only borrow from other financial institutions, not being permitted to accept deposits from the Canadian public.
- Mutually owned life insurance companies became permitted to demutualise;

Amendments of 2001

- Ownership regime is introduced that is based on the equity size of the bank:
  - Large banks, that have greater than $5 billion in equity, must still be widely held;
  - Medium banks, which hold between $1 billion to $5 billion in equity, can be closely held but must have a public listing of at least 35 per cent of their voting shares;
  - Small banks, with less than $1 billion in equity, are not restricted by ownership regime regulation;
- Nationally regulated trust and loan or insurance organisations must obtain Ministerial approval for shareholdings greater than 10 per cent;
- Holding company regime introduced to provide greater flexibility for organisations to structure their operations;
- Merger review guidelines are established;
- Permitted investments that banks can make are broadened, particularly allowing investment or joint-ventures in e-commerce;
• Reform made to the credit union system by introducing the concept of a ‘retail association’.

Amendments of 2007

• Legislative and regulatory efficiency are enhanced through measures such as:
  o Foreign bank entry framework is simplified and streamlined. In particular, ‘near banks’ (foreign entities that are not regulated as banks in home jurisdictions but provide bank-type services) are removed from the framework and entry approval for ‘near banks’ that provide unregulated financial services is eliminated;
  o Flexibility is added to the federal framework for the credit union by reducing the number of credit unions required for the incorporation of an association from ten to two;
  o The cost of mortgages for some borrowers is reduced by raising the loan-to-value threshold requiring mortgage insurance from 75% to 80%;
• The financial services legislative framework is adapted to new developments by adjusting ownership regime threshold to reflect sector growth since 2001:
  o Large institutions equity threshold increased from $5 billion to $8 billion;
  o The equity threshold for small companies, trust and loan companies, and insurance companies increased from $1 billion to $2 billion.

Amendments of 2011

• The subsequent 2011 five-year review of the financial services regulatory framework adopts legislative amendments to the 2007 regulation to respond to developments in the sector including:
  o The widely held ownership threshold for large banks is further increased from $8 billion to $12 billion to reflect sector growth;
Requirements for foreign acquisitions are tightened to ensure sound inorganic sector growth. Acquisitions will require approval of the Minister if the acquiring entity has equity of $2 billion or more (qualifying all publicly listed Canadian banks) and the aggregated consolidated assets of the acquired entity, combined with the assets of other acquired foreign regulated entities in the past 12 months, exceed 10% of the acquiring bank’s assets. Previously, acquisition approval was required only by OSFI;

- A set of legislative provisions are outlined to clarify intent:
  - Clarification of the priorities of multiple securities interests that are taken on the same collateral. A security properly taken under the Bank Act has priority over a Personal Property Security Act security interest that was unperfected at the time the Bank Act security was taken;
  - Clarification that banks can have an asset manager who also acts as a trustee of a mutual fund trust.

**Amendments of 2013**

- OSFI issues final version of the Capital Adequacy Requirements (CAR) Guidelines stipulating Basel III regulation implementation in Canada; OSFI expects Canadian banks to meet or exceed the 2019 Basel III minimum capital requirements already in 2013;
- The United States takes its own approach to regulation that has extraterritorial impacts on Canada. The ‘Volcker Rule’ takes effect as part of the Dodd-Frank Act and intends to restrict banks operating in the United States from making certain types of investments that are considered high risk. The rule is broad and captures domestic operations of Canadian banks with U.S. operations and can potentially restrict Canadian banks from undertaking activities in Canada that are allowed by the Canadian Government.
Appendix Three: Basel III Liquidity Risk Overview

In December 2010, the Bank for International Settlements, via the Basel Committee on Banking Supervision, released its intention for evolving international capital and liquidity regulation through its Basel III package of reforms. Largely these proposals were a regulatory response to the volatility and instability experienced in global financial systems in prior years and the prudential accords had the goal of improving banks’ ability to absorb shocks arising from financial and economic stress, whatever the source. The Basel III accords are to be phased in between 2015 and 2019, although the timing and transitional arrangements for banks differ between jurisdictions. Both Australia and Canada have adopted a more conservative stance in relation to the implementation of and the timetable for the introduction of the Basel III package of reforms. The focus for banks in these two countries over the period leading up to 1 January 2015 has been the application of a series of liquidity adequacy requirements implemented by the both APRA in Australia and the OSFI in Canada.

The Basel III accord on liquidity includes a series of quantitative liquidity measures that each provide a separate evaluation of the liquidity adequacy of a deposit-taking institution in addition to supervisory instruments for intra-day and longer dated liquidity monitoring. The key measures being adopted in Australia and Canada include the Liquidity Coverage Ratio (LCR), the Net Stable Funding Ratio (NSFR) and the Net Cumulative Cash Flow (NCCF), which when combined help to describe the full liquidity position of the banking organisation. The intent of the prudential regulation is to ensure that deposit-taking institutions take steps to monitor and control liquidity risk exposures across its subsidiaries, separate legal entities, international operations and the conglomerate as a whole whilst setting and executing appropriate funding strategies. It is a further objective of the accord that the legal, regulatory and operational boundaries to capital and liquidity allocation be well understood.

The adoption of the Basel III liquidity adequacy requirements by Australian and Canadian regulatory authorities has been fundamentally parallel. This purpose of this section is to provide the results of the regulatory review on recent capital and liquidity regulation, as it
relates to the questions posed within this dissertation, in order to identify potential opportunities for financial market and banking product innovation that promote new capital and liquidity efficiencies. This assessment has also been conducted to understand whether any significant risks associated with this regulation or if it has shifted the banking market structures in Australia and Canada in any way. The subsequent section examines the constrictive regulatory ratios established by the implementation of the Basel III package of reforms on liquidity in both Australian and Canada. The resulting implications for the impacted components of banks’ balance sheets, as it relates to the scope of this dissertation, are discussed and reported, including bank funding, procyclicality, liquid assets and customer lending and liquidity facilities.

**Regulatory Ratios for Liquidity Risk Management**

**The Liquidity Coverage Ratio**

The Liquidity Coverage Ratio (LCR) is a financial ratio that describes a deposit-taking institutions ability to meet its liquidity requirements over a 30 calendar day liquidity stress scenario by holding an adequate portfolio of unencumbered High Quality Liquid Assets (HQLA) that can be transformed into cash in order to meet net cash outflows requirements over this period. The deposit-taking institution must be able to demonstrate that it can continue for at least 30 calendar days providing time for suitable remedial measures to be executed by bank management and domestic banking regulators. The LCR can be depicted as follows:

\[
\text{LCR} = \frac{\text{Stock of HQLA}}{\text{Total net cash outflows over the next 30 calendar days}} \geq 100\%
\]

Total net cash outflows can be found by multiplying the outstanding amounts of certain types of liability products and off-balance sheet exposures by the runoff or drawdown factors...
specified by the domestic regulator. The runoff factors adopted in both Australia and Canada largely reflect those set by the Basel Committee on Banking Supervision.

The Net Stable Funding Ratio

The Net Stable Funding Ratio (NSFR) is a financial ratio that attempts to illustrate the funding stability of a deposit-taking institution by considering both its asset composition and off-balance sheet exposures over a one-year horizon. The objective of this ratio is to encourage banks to fund themselves in a sustainable fashion by limiting the over-dependence on short-dated wholesale issuance whilst ensuring bank management measure their funding requirements across all balance sheet exposures, whether they are held directly on the balance sheet or in off-balance sheet structures. This ratio counterpoises the enticement for banks to fund their HQLA portfolio with funding that expires just outside of the LCR 30 day calendar window. The NSFR can be depicted as follows:

\[
\text{NSFR} = \frac{\text{Available amount of stable funding}}{\text{Required amount of stable funding}} \geq 100\%
\]

This NSFR is due to be implemented from 1 January 2018 and at that point Australian and Canadian banks will need to ensure that the value of the NSFR must not be less than 100 per cent. Both APRA and the OSFI intend to release further detail relating to these requirements closer to the implementation date.

The Net Cumulative Cash Flow

The Net Cumulative Cash Flow (NCCF) is a liquidity horizon metric that is used to assess the asset and liability management practices of deposit-taking institutions by analysing cash flows and asset and liability mismatches, after taking into account both the functioning of assets and the rollover assumption of certain liability products. This measure analyses
beyond 30 calendar days, up to and over a 12 month period, bucketing exposures out along
the yield curve to reveal any potential gaps in liquidity. The NCCF is a feature of the OSFI’s
Canadian liquidity regulation and is conducted on a deposit-taking institution’s consolidated
balance sheet and any significant subsidiaries.