# Determinants of bank credit growth in Australia: Effects of securitisation and the Global Financial Crisis

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# DECLARATION

I certify that the substance of this thesis has not already been submitted for any degree and is not currently being submitted for any other degree or qualification.

I certify that any help received in preparing this thesis, and all sources used, have been acknowledged in this thesis.

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**Mustafa Alrutbi**

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# ABSTRACT

Global financial markets have changed dramatically over recent decades. One of the most substantial changes is the now widespread use of securitisation in the financial system. Banking institutions are turning from interest-dependent returns or interest-based spread to fee-based activities, including lines of credit and many different forms of credit guarantees, adjusting to the altered financial environment in which they operate. Given the recent Global Financial Crisis (GFC), this study focuses on the benefits and costs of asset securitisation as a funding tool for modern financial institutions. The study addresses the important issue of the financial excesses that resulted in recession and high unemployment rates, not seen for decades in most of the Western world.

This study evaluates the effect of using asset securitisation and other lending determinants on bank credit growth of banking institutions operating in Australia, both local and foreign. The study classifies the determinants into supply-side determinants, which are internal or bank-specific characteristics, and demand-side determinants, which are external or macroeconomic determinants. Credit growth is used as a proxy for operational performance, represented by two key indicators (dependent variables): business credit activity and housing credit activity. Each of these indicators has different measures. Data from a sample of 35 banking institutions was collected over three distinct periods between 2004 and 2012. Of the banks, 10 are domestic banks, of which six securitise assets. None of the 25 foreign banks, a mix of subsidiary and branches, securitise assets. Panel data methods are employed to conduct the analysis.

A random effects regression model is used to analyse the effect of the independent variables on the dependent variables. The business credit activity indicator is measured by credit growth, business loans growth and credit card loans growth. Housing credit activity is measured by housing loans growth, housing loans owned growth, housing loans investment growth and housing loans others growth. The explanatory variables used in this study's regression models are financial and economic indicators; that is, supply-side determinants (bank size, total deposits, liquid ratio and asset securitisation) and demand-side determinants (growth of Gross Domestic Product [GDP], inflation rate, interest rate and unemployment rate).

When examining the determinants on the supply side, the results of the analysis are mixed regarding the effect of securitisation on bank credit growth; but, as expected, most of the empirical results confirm that securitising assets does not have a significant positive effect on credit growth in any of the three GFC periods considered (crisis or no-crisis periods). The proposition was that large banks are likely to be more efficient and able to acquire funds at a lower cost due to the amount of collateral they can provide. However, the empirical results inconsistently support this proposition. Total deposits have a significant effect from the perspective of securitising assets as an alternative and additional funding source that can be used to cover credit demand. Neither the asset securitisation nor liquidity ratio had a significant effect on bank credit growth. In contrast, the results for demand-side determinants show that interest rate and unemployment rate have a significant negative effect on credit growth. The inflation rate has a positive significant effect on credit growth. There is no effect of GDP.

Securitisation activities enable the banking sector to better diversity their financial resources base as well as add flexibility to their financial resources and loan portfolio, enabling them to better cope with challenges arising in their operational environment. However, the random effects estimates in the study show that banking institutions do not, in fact, gain benefits from securitising assets.

Asset securitisation contributes to creating a more integrated market by providing new categories of financial assets that suit investors' preferred investment risk profile by increasing their capacity. If banking institutions know which factors are most likely to enhance their credit growth this could lead to increased competition in the marketplace, assisting in keeping prices low on the supply side of credit and thus encouraging growth in the business sector, which will drive job creation, resulting in a decrease in the unemployment rate.

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# ABBREVIATIONS

| | |
|---|---|
| ABCP | Asset-backed commercial paper |
| ABS | Asset-backed securities |
| APRA | Australian Prudential Regulation Authority |
| BHC | Bank holding companies |
| BIS | Bank for International Settlements |
| BLG | Business loans growth |
| C & I | Commercial and industrial |
| CAGR | Composite average growth rate |
| CCLG | Credit card loans growth |
| CDO | Collateralised debt obligation |
| CDS | Credit default swaps |
| CG | Credit growth |
| CIA | Collateral invested amount |
| EST | Efficient structure theory |
| GDP | Gross Domestic Product |
| GFC | Global Financial Crisis |
| HHI | Herfindahl-Hirchman Index |
| HLG | Housing loans growth |
| HLIG | Housing loans investment growth |
| HLOG | Housing loans owned growth |
| HLOTG | Housing loans others growth |
| INF | Inflation rate |
| IR | Interest rate |
| LQ | Liquidity ratio |
| OLS | Ordinary least squares |
| RBA | Reserve Bank of Australia |
| RE | Random effects |
| RMBS | Residential mortgage-backed securities |
| ROA | Return on assets |
| ROE | Return on equity |
| S & P | Standard & Poor |
| SCP | Structure-conduct performance |

| | |
|---|---|
| SECTA | Asset securitisation |
| SME | Small and medium enterprises |
| SPV | Special purpose vehicle |
| TD | Total deposits |
| UAE | United Arab Emirates |
| UNEMP | Unemployment rate |
| US | United States |
| VECM | Vector error correction model |
| VIF | Variance inflation factors |

# Chapter 1: Thesis Introduction

## 1.1 Introduction

The economic literature reflects an interest in examining and comparing the relationships between the growth of the local economy and the growth of the financial and banking sectors. A financial sector capable of mobilising and privatising financial resources efficiently to serve productive purposes and development can reduce the credit risk of the main capital requirements to strengthen financial institutions while they seek to reduce their probability of facing financial and external shocks. In recent years, several countries have taken important steps in the direction of market reforms towards this end. The reforms have differed among countries in terms of the extent of their depth and the area of their focus, but the aims in all cases were the same: increase reliance on market forces; provide private incentives in the field of financial intermediation and risk management; emphasise the safety of the financial sector; strengthen legislative and regulatory frameworks; and improve the ability of financial institutions to mobilise domestic savings to increase competition between these institutions (Demetriades & Luintel, 1996).

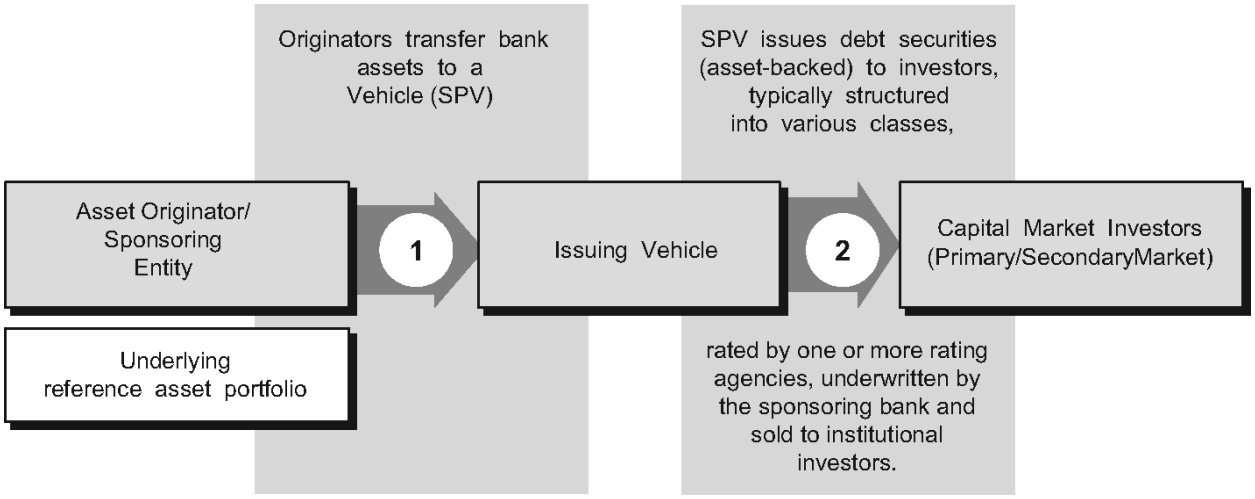
The modern era of the new financial innovation began in the 1970s when the first securitisation transaction took place. By late in the 20th century, asset securitisation for financial systems had become one of the most important financial innovations, allowing both financial and non-financial institutions to gain liquidity from assets that otherwise could not be sold in exchange markets (Frame & White, 2004; Sellon, 1992). For example, instead of holding these assets in the balance sheet for their whole maturity, banks and other financial institutions can issue a covered bond related to a mortgage or to a portfolio of mortgages and convert them into liquid assets (Strahan, 2008).

In this context, this chapter discusses the topic of the current study and is divided into three sections. The first presents factors related to non-traditional activities or off-balance sheet (OBS) activities through concentrating on asset securitisation transactions as one instrument of OBS activities. The second section focuses on the motivation behind securitising assets and examines whether bank performance is affected by using non-traditional activities, followed by an investigation of non-traditional activities. The third section concentrates on theories that explain

the determinants of asset securitisation, such as the Trade-off Theory and Pecking Order Theory, concentrating on hypotheses and related studies on costs of securitisation and benefits of asset securitisation. The final section sheds light on the development of the Australian asset securitisation market and outlines the research problem and the structure of the thesis.

## 1.2 Securitisation—the Process and its Possible Influence

A financial institution that holds debt secured by a mortgage or similar instrument sells its debts, or some of them, at a lower price to the issuer, a bank or institution, or another company known as a special purpose vehicle (SPV). The process (illustrated in Figure 1.1) requires a transfer of financial disclosure foundation for the seller to be immune to these assets for other claims, or bankruptcy of the institution or the vendor, which involves: (i) the vehicle (SPV) begins to issue bonds at an issued premium, and a value equal to the value of debt subject to securitisation, to obtain liquidity by selling these to investors, and the benefits of these bonds are compatible with the benefits of those debts, (ii) in the next stage the vehicle (SPV) pays the debt purchased from the proceeds of the sale of these bonds to the company or financial institution (bank) vendor, (iii) the initiator bank of the securitisation should agree with the issuer institution (SPV) on the compatibility between the maturity dates of proceeds from the debtors and the maturity dates of investors of the benefits of their debts, and between the values of interest assessed on the original debt, and the values of the benefits of bonds held by existing buyers from the other side (Jobst, 2006).




Source: Jobst (2006, p. 42)

**Figure 1.1: The Basic Process of Securitisation**

## 1.3 Development of the Australian Assets Securitisation Market

The process of converting non-liquid assets (asset securitisation) into tradable securities (liquid assets) in Australia has grown and developed rapidly over the past 10 years. In mid-2004 there was an increase in outstanding assets and liabilities of securitisation vehicles in Australia to AU$160 billion compared with just AU$10 billion in the first quarter of 1995, which represents an increase of 16 times, in approximately one decade.

Asset-backed securities were issued by Australian institutions in both national and international markets for AU$63 billion of domestic bonds; offshore bonds were AU$59 billion in addition to AU$22 billion of asset-backed commercial paper outstanding. Since 2000, over 50% of bonds issued nationally by Australian institutions were asset-backed bonds whereas more than 25% of them were offshore issuance.

During the past decade, securitisation of residential mortgages were the main reason behind the rapid growth in the asset-backed securities market, which has grown massively to AU$116 billion compared with AU$5 billion, 10 years ago (more than 25 times), and so far account for 70% of the assets of Australian securitisation vehicles (Bailey, Davies & Smith, 2004). Most of this was originally driven by the non-bank sector.

Since 2000, the market has grown rapidly—more than most other bond market elements: the percentage of growth of the market has been ~30% per year. Before the 2008 Global Financial Crisis (GFC), in June 2007, asset-backed securities represented ~30% per year of the total bond market of Australia, which accounted for around AU$280 billion of total securities (Black, Brassil & Hack, 2010).

Table 1.1 shows that residential mortgage-backed securities (RMBS) make up the majority the Australian asset-backed securities (ABS), at ~66% of the outstanding stock. In both 2007 and 2009, before and after the GFC, collateralised debt obligations (CDOs) were at the same level, ~6%. Similarly, there was no change in commercial mortgage-backed securities (CMBS) (~4%) in the years 2007 and 2009. The market share of asset-backed commercial paper (ABCP) with less

than one year of maturity was 24% in 2007, or ~AU$68 billion; the majority of this type was backed by both RMBS and residential mortgages.

**Table 1.1: Australian Asset-backed Securities (ABS) by Type from June 2000 to June 2009**

| Australian ABS by type | | | | | | |
|---|---|---|---|---|---|---|
| | **Outstanding (AU$ billion)** | | **Share (%)** | | **Annual growth (%)** | |
| | Jun00–Jun 07 | Jun07–Jun 09 | Jun 00–Jun 07 | Jun07–Jun 09 | Jun00–Jun 07 | Jun 07–Jun 09 |
| **MBS** | 176 | 102 | 63 | 66 | 27 | –21 |
| **CMBS** | 12 | 7 | 4 | 4 | 78 | –23 |
| **CDOs** | 18 | 10 | 6 | 6 | 44 | –22 |
| **ABCP** | 68 | 30* | 24 | 19 | 91 | –29 |
| **Amount in residential mortgages**** | 42 | 22 | | | | |
| **Other ABS***** | 9 | 8 | 3 | 5 | 17 | –3 |
| **Total** | 283 | 157 | 100 | 100 | 29 | –22 |

*Share and growth rate are calculated using the most recent available data, for August 2009 ; **includes RMBS; ***mainly bonds backed by leases, receivables and motor vehicle loans

Source: Reserve Bank of Australia (RBA) 2010

## 1.4 The Global Financial Crisis and its Impacts

The GFC, which has been called the crisis in sub-prime lending, was evident from 2007. It resulted from nothing but an overgrowth of risk, especially in the United States (US) financial system, with its contagious effects on international markets not being accompanied by a growing capital base sufficient to ensure, in many cases, the solvency of some intermediaries. A set of structural and cyclical factors explain the configuration of this scenario (Banu, 2013; Jones, 2009).

Structural factors may include the liberalisation of financial systems in recent decades; the interplay of international financial flows in the context of large external imbalances; strong technological innovation allowing a significant and relevant improvement in cash management techniques; both financial and non-financial intermediaries; the emergence of new products tailored to the needs of investors and/or claimants of funds (so-called structured credit products) whose valuation is complex given its lack of standardisation and lack of organised trading

markets; and the emergence of new non-bank financial intermediaries and therefore reduced opportunities for arbitrage between markets.

This situation has not been reflected in the capital base maintained by banks depending on internal control systems of existing risk entities and regulations on capital requirements on a consolidated basis in force in each country. The sub-prime lending crisis has become a crisis of confidence in international financial markets but it remains difficult to determine the magnitude of the potential adverse effects on economic developments, especially in countries that have simultaneously experienced an acceleration of real estate credit and real estate prices by unsustainable macroeconomic fundamentals (Crotty, 2009).

The role of balance sheets of banking institutions in determining the evolution of credit growth must have been an area for discussion for the duration of the 2008 depression. On one hand, there is evidence to suggest that contaminated assets somewhat influenced the ability of banking institutions to grant more loans (Puri, Rocholl & Steffen, 2011). On the other hand, even banking sectors without structured OBS products but with high exposure to real estate declines in prices of the housing sector, have depreciated capital positions of their financial intermediaries and the possibility to affect the overall credit supply.

Thus, things become more serious and strained if they reduce the confidence in, or weaken the financial system, which is based on individuals′ confidence. The issue becomes more complicated as a result of overlap between the financial institutions in different countries. All financial institutions deal with each other and any crisis experienced by one of these institutions must be reflected in the rest of the global financial system (that is, the crisis is globalised) (Claessens & Van Horen, 2014). Thus, the economy tends towards a downturn and may enter a recession. It is clear from the foregoing that the cause of economic instability and resulting economic crises often comes back to the monetary or financial side, and to monetary and financial institutions. This is evident when considering most of the crises that have occurred in economic systems, particularly the US in 1929, Mexico in 1994, Southeast Asia in 1997, Russia in 1999, Brazil in 2007, and 2008 in the US and most other countries of the world, when financial assets exceeded the actual maturity, which is the exchange value of goods produced (Banu, 2013; Claessens & Van Horen, 2014).

The expansion of credit can be a symptom of increased investment opportunity to promote growth. However, it has been noted through many studies that abnormally large jumps in bank credit to the private sector is one of the phenomena that precedes the occurrence of a financial crisis. Perhaps the financial crisis of 2007–09 is a good example of this, indicating that credit growth is not necessarily useful to the economy (Hume & Sentance, 2009; Jorda, Schularick & Taylor, 2011; Reinhart & Rogoff, 2010).

The question regarding the conditions that policy should be directed towards in moderating high credit growth is not a simple one. This is due to the uncertainty regarding what is undue credit growth under particular conditions. For instance, risks associated with increasing and excessive lending such as price bubbles of the asset are usually not identified as risks until growth turns to decline.

Not all credit mutations ultimately lead to banking crises (Gourinchas, Valdes & Landerretche, 2001). Research conducted by Tornell and Westermann (2005) concluded that emerging markets that showed the fastest economic growth are those that undertake trade and financial liberalisation, followed by lending booms and busts. Although the relationship between credit growth and banking crises has been studied on a large scale, there is no general agreement on the significance of the role that credit plays in a banking crisis. There have been many attempts to interpret and clarify why and under which conditions high credit growth precedes banking crises.

## 1.5 Statement of the Research Problem

Studies have identified a wide range of vulnerabilities and points of weakness provided as reasons for the emergence, and then the spread of the GFC—with its unprecedented impact across all financial and banking systems. In general, studies and analyses have identified the points of weakness, which included a broad range of infrastructure, activities and banking practices. For example, high-risk investments, and also the practices of securitisation and complex re-securitisation (leverage). The previous studies also found weaknesses in risk management practices, including corporate governance risks; determination of investment accumulations; stress tests; practices of asset valuation, disclosure and transparency; liquidity management; and last but not least, in the cycle of capital requirements.

As indicated by the occurrence of the GFC, many banks had insufficient liquid capital to support the position taken and carried risk that turned out to be far in excess of what was expected before the crisis. This is undoubtedly contrary to the fundamental principles of Basel II relating to capital adequacy.

Perhaps most affected by the types of assets during the GFC was the operation of complex securitisation. That is because the managers of many banks eased capital requirements through securitising or re-securitising assets and transferred them from inside to outside sources, showing a capital adequacy ratio higher than it actually was. This was one of the main factors that led to the GFC spreading quickly to a large number of financial systems and institutions across the world and the huge impact that it had globally.

Add to this one of the other essential causes that worsened the crisis: a large number of banks with global spread built excessive debt within and outside the sources and the level and quality of the capital base eroded gradually. At the same time, many of those banks had an insufficient liquidity. This coincided with huge credit losses as a result of concentration of investments and poor management of these concentrations, and the counter-parties risks, especially those resulting from investing in derivatives and credit derivatives. The crisis then escalated more broadly because of the debt reduction (de-leveraging) process to link formal institutions with each other through a complex set of transactions. In the end, the deficit in the banking sector spread to the rest of the

financial system and to the other real economy, which led to a massive reduction in liquidity and availability of credit.

Over a period of ~10 years, as securitised products became extremely complex, concerns started to emerge, with the foreword of CDOs, and of CDOs of CDOs, or double CDOs. Lending began to seem random, with concerns about the evaluations of housing, and about the lack of sufficient documented ability of repayment and prices of real estate appeared to disregard historical trends. As US house prices declined, reflecting the negative direction of the economy, and as delinquencies and foreclosures on mortgage debts increased, the value of securities backed by mortgage receivables decreased.

The complexity and ambiguity overstated in the structures formed through securitisation made it practically impossible to place a reliable value on these securities. This led to a confidence crisis that paralysed trade in some of these securities. The market began to decline, including the value of such securities, which in turn was reflected in the haemorrhaging balance sheets of security holders—especially some hedge funds. The turmoil then became widespread on as it impacted on Wall Street, including the demise of large investment banks such as Bears Stearns and Lehman Brothers, in 2008.

The current study therefore investigates the effect of asset securitisation and other credit growth determinants on credit growth of banking institutions and how this financial tool can improve the operational performance of banking institutions.

Although some effort has gone into empirical analysis of the securitisation process, a number of key issues remain a matter of debate or are ambiguous. This research focuses on addressing the following question:

> *To what extent do asset securitisation and other credit growth determinants affect the credit growth of banking institutions in terms of credit growth during crisis and non-crisis periods (pre- and post-GFC) ?*

The following sub-questions were designed to answer the main question:

- What is the nature of the relationship between asset securitisation and other credit growth determinants, and growth in business loan activity during crisis and non-crisis periods?

- What is the nature of the relationship between asset securitisation and other credit growth determinants, and growth in housing loan activity during crisis and non-crisis periods?

## 1.6 Brief Theoretical Framework and Hypotheses

### 1.6.1 General Theories on Bank Credit Growth

***Trade-off Theory.*** The trade-off theory means or refers to the idea of firm options with respect to how much debt could be used to finance operations, as well the amount of equity (capital) that could be used to ensure a balance between costs and returns (Hovakimian, Hovakimian & Tehranian, 2004). This theory also holds that the costs of insolvency are impacted. Therefore, it confirms that on one hand there are some advantages to using debt as a method to finance operations (i.e. tax advantages) and on the other, there are some costs associated with using such a instrument for funding (namely, the insolvency costs and debt costs of financial distress) (Frank & Goyal, 2005). The marginal advantages of additional increases in debt are coupled with decreases in the growth of debt. For an institution that seeks to improve overall value, the trade-off theory—when it has the possibility to choose how much equity and debt can be used to finance its operations. This then suggests an optimal debt equity ratio that will maximise profitability while minimising the costs to improve the overall value to shareholders. In practice, the trade-off theory could describe the differences in the debt to equity percentages (D/E) among industries sectors; however, on the other hand, this theory does not describe the differences in the same industry (Tong & Green, 2005).

***Pecking Order Theory.*** The perspective of this theory is based on an assumption that institutions fund their operations depending on a hierarchy of sources: retained income as the first source with debt coming after; the last source would be capital increase through issuing shares (DeAngelo & DeAngelo, 2007).

In the capital structure theory of the corporation and decisions of funding, Donaldson (1961) advanced the pecking order theory in 1961, and it was adapted by Myers and Majluf (1984). This theory indicates that firms determine their priorities or the order of their funding sources (between internal funding, debt or equity) depending on the consequence of the least effort or of the lowest resistance, in preference to increasing equity as a last-

resort funding instrument for the institution. Therefore, internal financial sources are employed first, and when there are no more funds in that source, the institution could begin issuing debt, and when it is not able to issue any more debt, the institution could begin issuing more equities. Pecking order theory attempts to determent the asymmetric information costs. This theory maintains that firms stick to their hierarchy of funding sources, and internal funding is the first order whenever available; if not, debt will be preferred over equity when the institution is going to use external funding (using equity will extend the external ownership for an institution through issuing shares). Hence, the debt choices of an institution are not a sign of that institution's need for external funding. In this sense, the pecking order theory is favoured by Myers (1984), who discusses how equity will not be the preferred tool to increase a firm's capital because when a manager—who is expected to be more aware and knowledgeable than investors about the true form of the situation—is going to issue new equity instead of using other tools, investors trust the manager's decision that the firm is over-valued and that the manager is going to take advantage of this over-valuation; therefore, investors will place a lower value on the new equity issued.

### 1.6.2 Hypotheses and Related Literature

In recent decades, according to Dionne and Harchaoui (2008), banking institutions have dramatically increased their use of asset-securitised techniques, which has pushed through improvements in the quality of viewing and observing the development of technologies used. Even though securitisation markets were influenced by the GFC, which caused a near collapse of those markets, decision makers and commentators agreed that credit risk transfer is still a fundamental aspect of banking institution activities. Whereas the phenomenon of credit risk transfer from the balance sheets of banking institutions is not novel, the new methods or the new wave of asset securitisation transactions have differed from the previous ones. This allows removal of credit risk with more flexibility to include a wider and different group of assets than was possible with previous transactions, ranging from small, ambiguous mortgages to the receivables of credit cards (Dionne & Harchaoui, 2008).

The availability of these new methods or financial techniques has raised key questions about the effect of credit risk transfer on the performance of bank and financial institution conditions. On the other hand, in boom periods and before a financial crisis, some analysts have recommended that a new model of banking systems be appropriated in which institutions' intermediaries improve their capability to manage credit risk through restructuring debt to external investors.

In fact, the underlying principle of hedging credit risk from the theoretical perspective is well known and understood. Diamond (1984) showed that banking institutions should use hedging credit risk and hedge whole banking risks, especially those with no comparative benefits—the set that possibly involves, for instance, debt such as credit card receivables. DeMarzo (2005) demonstrated that collecting sets of loans and issuing them as securities with different levels of risk is likely to include the 'lemon discount' requested by investors, especially on informational ambiguous assets of banking institution.

Bannier and Hansel (2006) suggested that current analyses of banking institutions' have a tendency to remove credit risk from their balance sheets are influenced by two weaknesses. First, the literature has assumed a correlation between credit risk transfer use and the characteristics of the banking institution. Obviously, as mentioned above it will not be possible to differentiate between the motivations that encourage banking institutions to consider the use of credit risk transfer, and the influences of using this strategy on the performance of banks. The second weakness is that the literature concentrates on particular features of securitisation impacts, which may possibly prevent a deep understanding or knowledge about the motivations behind why banks tend to securitise their assets. For instance, the general findings of previous studies are that banking institutions are at a higher-than-average risk before using asset securitisation transactions. This may reflect the fact that banking institutions utilise the tools of credit risk transfer to re-balance their portfolio of loans to meet a particular level of risk (the lowest risk). However, an alternative explanation is that banks that securitise their assets will be at a higher-than-average risk due to following the strategy of high risk–high return. The implications of this policy for these two alternative interpretations (perspectives) are completely different. However, without a broad analysis of securitising bank characteristics—such as profitability or risks

after securitisation transactions—it would not be possible to distinguish between them (Cebenoyan & Strahan, 2004; Hirtle, 2009; Minton, Stulz & Williamson, 2009).

The theoretical literature has examined and provided different hypotheses related to the influences of financial innovation. Banking institutions will remove some of the credit risk from their balance sheets if ex-ante risk offset the advantages (e.g. by reduction of banking risks or reducing the expenses of interest rates or financial resources available to take advantage of new investment opportunities) exceed the changeable and fixed costs of the transactions or operations. Therefore, this section will review the key costs and advantages of credit risk removal from the balance sheet of banking institutions and will identify testable effects on the ex-ante feature of securitising banking institutions and ex-post influences of transactions or financial operations.

***The fixed costs hypothesis.*** A securitisation transaction takes on high one-time costs, considering the costs of consultation and organising the instrument, as well as those associated with collecting and classifying the debt or the loans in different portfolios. Also taking into account paying rating costs to the agencies responsible for classifying multiple, different tranches, and the underwriting of legal expenses. For instance, Davidson, Sanders, Wolff and Ching (2004) considered that the principle costs for a typical asset securitisation can exceed US$1 million, especially legal expenses. Due to the operation's structure and organisation, most of the related costs are somewhat fixed and will therefore will be borne disproportionately by small banks, and this will affect the use of securitisation or credit risk removal techniques.

***The lemon discount hypothesis.*** As banking institutions already have their own private information on the quality of their debt portfolios, exterior investors will ask for a lemon discount on the asset prices that are sold (Gorton & Pennacchi, 1995). The securitised assets therefore may be undervalued compared to the book value of the loans.

Due to this phenomenon, banking institutions paying a lower lemon discount may be more likely to use securitisation techniques (i.e. to securitise their assets). The discount may be lower only when (i) the banking institution can realistically confirm the quality of the asset they are going to sell (Focarelli, Pozzolo & Casolaro, 2008); (ii) their own private

information is less applicable because the loans are less ambiguous or more consistent; or (iii) the loss due to the failure to pay is less than expected. For instance, this may occur if the debt is collateralised. Therefore, in previous years, banking institutions faced fewer difficulties with debt, so that they may enjoy the advantages of a good reputation and therefore in practice can support a good capability to monitor and observe their borrowers, which will be necessary to enter into securitisation operations. Utilising such techniques (removing risks from the balance sheet of the institution) should provide more elasticity for banking institutions with larger ratios of receivables, which include auto loans, credit card and mortgages that are less affected by asymmetric information (because of a higher degree of standardisation) and have less loss given default (due to higher collateralisation). Thus the payment of a lemon discount for the listed banking institutions may also be less than unlisted, once the balance sheets of those banking institutions are under the strong scrutiny by external analysts.

***The hypothesis of financial costs.*** According to Carlstrom and Samolyk (1995), and Pennacchi (1988), banking institutions that securitise their assets are more likely to be motivated to retain a large share of their credit risk for reason relating to the asset's quality. However, given that much of the information available to investors about the retained risks will be harder to get and more costly, this will lead to imprecise estimates for the overall risk of the bank. Further, uncertainty about the exact level of the risks of assets of a banking institution can also lead to enormous financial troubles. These issues would be more likely for banks with a greater share of short-term liabilities and with all liabilities subject to regular overturn on markets, which might be more likely to become more sensitive to the terms of issuing institutions. Therefore, with respect to the hypothesis of financial costs, the probability of employing techniques for credit risk transfer should be negatively associated with how much of the share relates to two factors: short-term liabilities and liabilities between banks (use of these tools largely means higher costs of transparency for that bank due to asset securitisation ) (Chiesa & Bhattacharya, 2007).

Retroactively, assets of banks with lower transparency because of asset securitisation are more likely to raise the costs of these types of financial resources, thereby encouraging banks that employ asset securitisation techniques to lower the weight of their total liabilities.

***The hypothesis of liquidity.*** The ability to securitise some assets from the balance sheet allows banks to use other methods as a financial channel whenever there are issues related to liquidity. Obviously, this cannot be done in the event of normal (systemic) shocks, but can be done in abnormal (idiosyncratic) shocks. For example, the GFC dried out the interbank and asset securitisation markets.

The chance for intermediaries to benefit from this advantage will be greater if banks have a larger amount of non-liquid assets in their balance sheet. Therefore, banks with more debt should be more able to reduce non-liquid assets through use of the securitisation method. Further, if the issue of securitising assets is a subject of concern for banks that are going to use this method of funding because of the likely influence of a liquidity shock, these institutions should keep a larger level of liquid assets compared with others in the same industry (regardless of increases in the opportunity cost of the bank's assets).

Some banks are usually thought to be more likely to face shocks of liquidity, particularly those whose balance sheets include deposits as a higher percentage of total liabilities (Diamond & Dybvig, 1983).Such banks will be more vulnerable to reducing their assets by using asset securitisation techniques. Bank deposits are likely to be withdrawn at a short notice when customers perceive weakness in the banking sector and this may lead to in extreme circumstance to bank runs. However, in recent decades, fundamental changes in the investing activities in the banking sector, the plans of banking deposit insurance and other traditional factors have been relegated to the past or are nearly obsolete (Brunnermeier, 2008), creating instead other resources to reduce liquidity shortages (shocks). Banks and financial institutions that still operate with some core financial institutional and traditional activities (e.g. retail deposits) found this to be a highly stable resource of finance in most cases, essentially lowering their exposure to the shocks of liquidity; thus, the correlation between the tendency to securitise assets and demand deposits share is still unclear.

However, the possibility of increasing financial sources by using the asset securitisation market encourages banking institutions to raise the ratio of assets such as non-liquid loans, to liquid assets.

***The hypothesis of risk removal.*** Securitising their assets could help banking institutions to re-organise their balance sheets, particularly their credit portfolios, and achieve the main purpose of increasing returns and lowering risks facing the banking industry.

Some banks plan to transfer undesirable risks out of balance sheets, which can be easier through securitising higher risk loans and re-employing the returns in less risky assets. This approach is attractive for banks that have a higher-than-normal risk and that will face huge losses in case of failure to payback; for instance, some banks have a large value in franchise (Gorton & Souleles, 2007; Jiangli & Pritsker, 2008).

Therefore, with respect to the risk removal hypothesis, banks that have a large number of loans and lower than expected Z-score (common factors of failure to pay) also have a high profit (factor for franchise value). Banks with these features should be more likely to securitise their assets; therefore, failure to payback should decline.

***The hypothesis of risk taking.*** Benveniste and Berger (1987) suggested that asset securitisation sometimes could tend to increase risks instead of reducing them. If the debt is securitised at low risk and banks re-employ this money in the form of new loans granted to high-risk borrowers, then the asset securitisation technique should be utilised essentially by banks with lower risks (less volume of debit trouble or with a high Z-score); the Z-score is a proxy for distance to default.

Berger and Udell (1991), and Salah and Fedhila (2012) discuss that banking institutions tend to be strongly motivated to take on risk when they have a greater probability of failure to payback, with the aim of explaining the reality that deposit insurance costs do not completely reflect, or are independent of, the approach to a bank's risks. With respect to the risk taking hypothesis, banks with high risks are more likely to use asset securitisation in countries that have a system of banking deposit insurance, to enhance their overall risk. Demirguc-Kunt & Detragiache (2002) examined the risk taking hypothesis through an interrelating default risk proxy with a level of moral hazard index that depends on the particular features of each state's system of banking deposit insurance. Obviously, with this hypothesis the subsequent asset securitisation influences should increase risk, in contrast

with what is suggested by the risk removal hypothesis (Berger, Bouwman, Kick & Schaeck, 2014).

***The hypothesis of capital ratio.*** Banking institutions with a ratio of capital to total assets close to the compulsory minimum requirements could use asset securitisation transactions as a way to improve the capital ratio, or on the other hand, to take the opportunity of an additional margin to use other approaches to lending opportunities. Thus, such banks should be more likely to securitise their debt.

The balance sheet development of securitisation issuers after securitising assets should help distinguish between those alternative hypotheses when using asset securitisation to select the best way to exploit beneficial lending opportunities, and then the transaction debt should be increased, meanwhile reducing the capital ratio. Instead, the main aim of a bank is to improve the financial ratios in which case the ratio of capital to total assets should increase, as should loans in line with or even less than the level in the measurement period. Obviously, intermediate results are also possible, particularly with banks that increase their loans and their capital ratios at the same time, albeit to a less extreme level than they were with the possibility of non-growth of loans.

***The hypothesis of diversification.*** Securitising assets provide banks the flexibility to lower their exposure to particular sectors or specific areas, thus aiming to diversify their loan portfolios, as broadly studied and explained in the theory and in previous studies. Pennacchi (1988), for instance, debates that the securitisation contracts improve the efficiency of banks by unequal contribution of credit risk of loans, especially with respect to what would be most favourable from the perspective of optimal management of risks. However, such extreme risk taking with respect to credit could be diversified (removed) out of a bank's balance sheet by using assets (loans) sales (Morrison, 2005).

If diversification is a factor driving asset securitisation, banking institutions with loan portfolio concentration should be more likely to use securitisation techniques. To the extent that both industrial and commercial loan size is on average larger than that for mortgages and consumers, banks with smaller consumer loans, and particularly mortgage loans, would be more likely to securitise assets.

Under the hypothesis of diversification, this would mean that after securitising assets, banks tend to lower their loan portfolio concentration (which could be measured through the decline in the size or share of commercial and industrial [C & I] loans) and likelihood of credit risk (measured, for instance, through loan–loss provisions or the Z-score).

### 1.6.3 The Effect of Non-traditional Activities on Bank Performance

The influence of the environment on the banking sector has changed and the game has become more competitive while profitability has declined, not only for new banking institutions but old commercial banks as well. They must pay attention to recent developments at the financial system level as well as other economic sectors, and must concentrate on improving the quality and efficiency of the financial services they offer. However, the decline in income from traditional activities, represented by interest income, cannot be avoided because of lowering interest rates.

Lozano-Vivas and Pasiouras (2010) mentioned that banking institutions, in order to stay in the industry, should search for other income resources to achieve profitability. As is known, interest and non-interest income recently became the main sources of operational income for banking institutions. However, because of interest rate declines and spread, bank experts will concentrate on other sources of income—that is, non-interest income—as the most important source for banking institutions to stay profitable and remain more capable of competing. In addition, these authors illustrated that non-traditional activities could be developed via three existing methods: (i) innovation of financial products, (ii) deregulation and (iii) improving the technology used. However, since the 1980s, due to these factors, non-traditional income (non-interest income) has become a more important source of operating income, especially since the decline of interest rates, as interest was the main source of banks' operating income. Banking institutions depend not only on traditional operating income (lending) but also on different income (fees) that could be obtained through the use of non-traditional activities as another source of income. Thus, over the years, the ratio of non-interest income to operating income has increased to play a more important role in banks' operating income.

Feldman and Schmidt (1999) showed that in 1984 the ratio of non-interest to operating income was 15% for small banks and 27% large banks. By 1999, these percentages had increased to 28% and 46%. Overall, the percentage of non-interest income for the banking sector increased to 27% in 2003 from 16% in 1993.

Although undertaking non-traditional activities is a way of diversifying banking institutions' income, this method could lead to an increase in bank and inputs' risks. The elements of banks' outputs compared to inputs might be changed in the case of banks'non-traditional activities. Therefore, bank operating efficiency could be influenced in terms of using non-traditional activities as a method of diversifying the source of banks' income (Lozano-Vivas & Pasiouras, 2010).

## 1.7 The Importance of the Study

Despite the increase in pursuit of non-traditional activities, their influence on efficiency of banking institutions in the literature is ambiguous. Many banking experts believe that the growth in non-traditional activities helps improve the profitability of banking institutions and bank efficiency.

On the positive side, the studies of Robert DeYoung (1994) and Rogers (1998) in the 1980s and 1990s illustrated that having large amounts of income based on fees or non-traditional activities, or on banks' services, improved the efficiency of banking institutions. This was true not only for commercial banks. But also bank holding companies (BHCs) will be involved and will be affected in the same way. On the side of income evaluation created by payment for services, Radecki (1999) considered that the importance of payment income to the banking sector was mainly for the BHCs, which also created an income increase of ~7% to the firms.

However, some issues were critiqued from an objective perspective. DeYoung and Rice (2004) confirmed that non-interest income was obtained from both traditional and non-traditional operating activities. The outcome of their research illustrated that the profitability of banking institutions increases by using non-traditional activities. Further, they found that non-traditional

activities increase banks profitability mainly due to operational performance, and that there were higher risks associated with the increase in income instability. Income volatility and risks associated with that income do not affect non-interest income (in non-traditional activities). Using a panel smooth threshold model to investigate the scale economies of the part of the global banking sector that mixed fee income and interest income in the banking system of Taiwan, revealed there was no scale economies, but the fixed asset size was ~NT$10 billion (e.g. DeYoung & Roland, 2001; Shen, 2005; Smith, Staikouras & Wood, 2003; Stiroh, 2004; 2006; 2012; Stiroh & Rumble, 2006).

In the case of diversifying assets, banking institutions should not concentrate only on a higher return resource. Even though interest income gained from operating in traditional activities such as granting different type of banking loans—which represent the main income generator for banking institutions—the diversification of income sources from traditional activities to non-traditional activities could be a better strategy for banks to increase their returns. However, banking institutions should use caution when considering and applying this approach. Focusing on non-traditional activities and moving attention away from traditional activities may not be a good approach for all banking institutions. DeYoung & Rice (2004) pointed out several non-traditional activities of banking institutions that are associated with traditional activities. Therefore, in various situations some banking institutions may not be profitable or improve their profitability through increasing the use of non-traditional activities to the exclusion of traditional activities from their operating income. Stiroh (2004; 2006), and Stiroh and Rumble (2006) examined the performance of banking institutions with respect to diversifying their type of income sources, and the findings included that diversification of income in terms of non-traditional activities will improve the financial performance of a bank. However, the performance of adjusted risk was not the issue. The findings also supported the idea that non-interest income generated by engaging in non-traditional activities will be profitable, but will include risks.

## 1.8 Organisation of the Thesis

The thesis is organised into seven chapters. The first outlines the background to the study and gives an overview consisting of the introduction to the research. The second chapter deals with financial innovation and the role of securitisation in credit growth, and describes the recent GFC.

The third chapter consists of a review of the theoretical and empirical literature relating to bank performance and credit growth determinants, as the theoretical framework for the thesis. The fourth chapter covers the research methodology and design of the models, including the data collection, measured variables and analytical techniques applied in the study. Data analysis, presentation and research findings are also discussed in this chapter. Chapter 5 analyses and discusses the effect of asset securitisation and other lending determinants of bank credit growth on domestic Australian banking institutions between 2004 and 2012. Chapter 6 presents the results of the analyses and discusses the impact of bank credit determinants on foreign banking institutions operating in Australia between 2004 and 2012. The last chapter concludes the thesis with a summary of the overall findings and discussion of the contributions of the research to the finance literature, its recommendations and limitations, and some directions for future research.

# Chapter 2: Financial Innovation, Securitisation and the Global Financial Crisis

## 2.1 Introduction

This study investigates the effect of asset securitisation and other credit growth determinants on credit growth of banking institutions and how this financial tool can improve the operational performance of banking institutions.

In developed countries, the banking sector is facing ongoing changes and questions about the most important factors of such a change give rise to the following factors; trends in demand for financial services, competition, economic volatility, subsequent regulation and deregulation, technological innovation, mergers, supply diversification, globalisation, strategic agreements and acquisitions. These are the main change factors expected within the last three decades, since the beginning of deregulation of global financial systems (Freeman, 1981). These stages have been followed with a range of commitment levels according to the different perspectives of institution.

In business practice, compliance with this development is a substantial evolution. The financial system in an international sense has developed an array of new financial tools and techniques to take into account the ever-changing global environment. Through their different abilities to encourage the products of innovation, domestic financial systems have exercised different levels of influence on economic performance. In the meantime, in modern economies, the increasing importance of the financial sector and the rapid rate of financial innovation in this sector have encouraged research into this phenomenon (financial innovation) and this subject has attracted more attention from both the banking sector and researchers.

It is clear that a well-developed financial sector has strong sector relationships that can support economic growth. It allows economic institutions to diversify their portfolios and achieve the main purpose of liquidity requirements. Sinha and Macri (2001) suggested that in a modern financial system, financial resources are distributed in a more efficient way and with the availability of risk management solutions. The existence of all these financial instruments can push the possibility of economic production frontiers outwards; therefore, in the long-term, higher

growth is likely. From the same perspective, if the operational efficiency of the financial sector increases due to innovation, this will have a positive influence on long-term economic growth.

The definition of the innovation idiom may suggest reasons for applying new developments. Further, there are two methods to analyse the source of innovation. One method was illustrated by the theory of demand and the other, by the supply theory of financial innovation. According to the first theory, financial innovation is a consequence of development of a business nature, and is built on a competitive basis and as a reaction to growth of business firms to achieve their main purpose and attain competitive advantage in their business surroundings, the so-called demand-driven financial innovations. These are seen as external factors arising from imperfections of the market, such as changes in the business environment and recent economic challenges. Demand-side determinants are related to industry-specific and macroeconomic scenarios that reflect the economic and legal environment within which the banking institutions operate. Some factors are beyond the control of bank management, such as the economic environment, Gross Domestic Product (GDP) growth, inflation rate and unemployment rate (Ionescu, 2012; Mina, Lahr & Hughes, 2013). On the other hand, this type of demand can be affected by two factors: the internal requirements of institutions seeking to develop their activities, and the instability of their environment driving appropriate changes in their business strategies (Saunders, 2009).

The second theory regarding the source of innovation relates to the function of the supply side, as innovations first appear as a result of financial market development and are created by innovation suppliers and then applied in institutions (the end-users of financial innovation) (Mina et al., 2013). Therefore, these sorts of solution, known as supply-driven financial innovations, can be achieved as a consequence of processes in three stages: internal factors relating to aims and needs; supply-side determinants under the control of banking institutions and often influenced by policies and decisions and the approach of bank management of financial sector participants (both banking institutions and other entities) with regard to sources and uses of funds, capital, liquidity and expense management (Mina et al., 2013); and the final, innovation stage, which is the diffusion of innovation by trading of innovation tools or through mutation. As mentioned above, technological innovations theory can be modified to financial innovations theory by taking into account the specific characteristics of the latter. However, in spite of their differences, the processes and applications in the financial innovation sources are quite similar. In the current financial system, many observed financial innovations somewhat result from the protection procedures of the rate

patent, in contrast to technological financial innovations, because at this point financial innovations can diffuse rapidly (Awrey, 2013).

In contrast, unsuccessful financial innovations will be withdrawn from the market, and after a while they will be developed or modified to suit the requirements of financial markets; as a consequence, competitors of the institution in the market are always trying to imitate sound financial innovations. Thus, all new financial developments in the current market that were introduced by other financial organisations are somewhat similar to previous ones. Therefore, the processes of creating and applying financial innovation will be faster, cheaper and less complex than in the case of technological innovation (Awrey, 2013).

In the global financial system, the diffusion rate of financial innovations is supported by dynamic growth of new technologies and communications. Another issue broadly discussed in the literature is the consequences of financial innovations, which may not be clear. Modern financial systems can by assisted by sustainable innovations to meet their main purpose of lower costs and simultaneous higher efficiency. However, not all new developments in the financial market will have such a positive effect on the financial system. Some will have unexpected and undesirable side effects that influence financial system stability, which in the main will increase financial risk. Therefore, regulatory institutions should take appropriate action to control and deal with risky financial innovations. Further, a temporal perspective must be considered when analysing the impacts of financial innovations on financial systems. Financial innovations affect the financial system in both the short and long-term: in the short term, users will obtain temporary benefits of such innovations but at the same time, other participants in the market will be influenced in the negative way. However, in general the effects of financial innovations in the long term will improve financial system efficiency. Clearly, there are likely efficiency benefits to be obtained from financial innovations in terms of supporting underlying financial system functions. Nevertheless, regardless of the efficiency and welfare advantages of financial innovations, these may not be enjoyed in all cases and the possible efficiency advantages may be compromised if, for any reason, they threaten the stability of the financial system. All of these issues need to be taken into account with respect to the systemic stability implications of financial innovations in general, and credit risk transfer tools in particular (Turner, 2009).As a background to this study, the role and importance of financial innovation is considered in section 2, followed by a description of the securitization process in section 3. The last section considers the GFC in more detail.

## 2.2 The Importance of Financial Innovation for Banking Credit Growth

Recently, in light of development experiences over the final decade of the 20th century, the Bank for International Settlements (BIS) highlighted two important factors for financial system transformation—ongoing deregulation and technological innovation—and studied their effects (risks and benefits). The deregulation of banking systems in particular enhances economic growth through improved allocation efficiency and decreased costs of financial services. In other words, increasing attention has been dedicated to instability as a consequence of stronger competitive pressures and the subsequent erosion of return margins; however, it has been mainly left to incentives for the banking sector to restore these margins through bad policies, or even bad banking systems (Goodfriend & King, 1988).

It is clear that liberalised financial systems are also more prone to costly misadventure, mainly if supported by macroeconomic instability of the environment. In the majority of industrial and emerging market economies, taxpayers have paid a large share of GDP to encourage and recapitalise failed banking systems. More often, the follow on consequences of macroeconomics in terms of lost output and increasing unemployment have been significantly more costly. However, the banking sector has not quantified the economic losses associated with failures in payment systems, which regularly process trillion of dollars daily (BIS, 1997). Under constant pressure from those change factors mentioned above, the banking sector has practised improved strategies intended to achieve a competitive advantage, to generate more value than other banks at the sector level. According to the size of the company and features of the market, such policies combine diversification of activities with cost control in multiple ways related to the essential role of new financial tools and process innovations.

Miller (1986) and Merton (1992) provide examples of research on the importance of new services and tools in the financial field. Financial innovation might occur in different forms and through various financial institutions, and may be disseminated to any institution or sector through the national economy. Many new types of financial assets and liabilities have been introduced in recent times. Several of these developments come into view in what might be banking are main financial services providers in many economies.

On the other hand, there are concerns about financial innovation. In particular, new financial tools directly influence monetary policy set by the central bank, and affect the structure of financial markets, the financial behaviour of economic institutions and the sorts of financial products that are traded. In turn, this affects the mechanism of the entire monetary transmission and introduces ambiguity to the environment of the financial systems in which monetary authorities administer monetary functions. To deal with such issues, the central bank usually reacts by applying greater pragmatism to the implementation of banking policies through increasing their observation of banking activities.

This factor has differentiated the evolution of financial activities to different levels; however, since the beginning of the 21st century this has become more obvious principally as a result of technological innovation and deregulation. Acceleration of speed and of shapes of these financial innovations can be envisaged with effects on the procedures and organisational systems of financial corporations, with the creation of more complex secondary markets for trading and of financial tools, as well as the improvement of engineering intended through the relocation and subsequent allocation of particular risk categories (Arnaboldi & Rossignoli, 2009).

Financial innovation has attracted substantial attention for research in the social sciences with a particular focus on the relationship between competition and innovation. In unstable environments, the innovation that provides the most competitive benefit to the corporation also leads to higher performance (Roberts & Amit, 2003).

Although the importance of financial innovation in banking performance is debated, it appears that there is a lack of understanding about the drivers of innovation and innovation's effect on performance. In fact, most previous research adopted a simplistic approach to the innovation–performance relationship, which does not take into account the antecedents to internal and external innovations of banking institutions, all of which could affect this relationship. In particular, several earlier studies ignored the possibility of overturn causality between innovation and performance. DeYoung, Lang and Nolle (2007) attempted to resolve this issue by taking into account the effect of externalities of financial innovation as an explanatory variable in performance.

In addition, despite widespread research on financial innovation there is still a lack of empirical literature on financial innovation (asset securitisation ) and most studies have highlighted asset

securitisation as one tool in financial innovation (Frame & White, 2004). Allen and Santomero (2001) reiterate that regardless of increasing literature focused on financial innovation these are essentially innovations of securities in financial markets.

Modern financial systems are distinguished by their rapid pace of innovations, which can happen in any of its fundamental operations; regulations, tools, organisations and markets. The financial innovations monitored in the financial system can be categorised according to different criteria representing heterogeneity of financial innovations. Regardless of the differences in practical categorisations, financial innovations theory essentially considers the influence of financial innovations on the entire financial system. For many reasons, sustainability of financial innovations is required because they improve financial system efficiency through enhancing economic growth, which can improve social wealth. On the other hand, some financial innovations can have negative side effects on the financial system by providing advantages to one party, and at the same time being risky to others; therefore, the efficient usage of particular financial innovation requires broad skills and knowledge about the way of functioning and a comprehensive analysis of financial innovation consequences.

## 2.3 Off-balance Sheet Activities in the Banking Sector

Over the last two decades, financial institutions have faced dramatic changes. The sharp acceleration in the pace of innovation has considerably changed traditional features of global financial systems. These improvements and developments have been essentially due to the interaction of a group of factors. The revolution in information technology associated with an increase in competition at both local and global levels has led to many complex processes because the main intermediaries have been international in their geographical coverage and widespread in their financial functions—encompassing banking, securities market activities and, increasingly, insurance (Ghosh & Nachane, 2002).

Nowadays, due to the latest developments in the banking, the banking sector has become more competitive and meanwhile the profitability factor has decreased. All banks, whether old or new, must improve both the quality and efficiency of their financial services. There has been a decline in the income from traditional activities (interest income) because of the decline in interest rates; therefore, to remain competitive, all banking institutions must look for alternative sources of

revenue to achieve the main purpose of any institution, which is to maintain profitability. However, due to the issues discussed above, banks depend not only on interest income as a source of profit but also on non-traditional income or non-traditional activities (non-interest income) because of the latest developments in financial services; banks have become more dependent on non-traditional activities as their main source of operating income .

Since banking institutions began using non-interest income as a source of operating income along with traditional sources (interest income), they have become more dependent on non-interest income and less dependent on traditional sources. This is due to fluctuating and declining interest rates. However, bankers reviewing policies and strategies are rethinking their available resources (both traditional and non-traditional activities) and considering profitable and competitive sources that should be increased, including non-interest income.

To increase the use of non-traditional activities, three methods are employed: the products of financial innovation, deregulation and technical developments. Thus, from the 1980s on, all returns achieved from using non-traditional activities were classified as non-interest income, which has an important influence on the operating income of banks. The current returns for banking institutions are obtained from traditional functions but are also in the form of multiple fees for non-traditional activities. Several studies consider the increase in non-traditional activities as illustrated in Table 2.1.

In a 1999 study, Feldman and Schmidt reported that the ratios of non-interest to total operating income in small and large banking institutions in 1984 were 27% and 15%, respectively; these ratios almost doubled, to 46% and 28% in 1998. The ratios of non-interest income in those banks increased to 27% in 2003 compared with just 16% in 1993. The increase in the use of non-interest income as an alternative income source for financial institutions meant that the growth might increase input risks. Shen (2005) suggested that in the case of non-traditional banking activities, the outputs per inputs for operating activities of financial institutions may change through this process. Therefore, the operating efficiency of financial institutions may be affected by using non-interest income as a strategy for increasing operating income.

In the same way, rapid growth of technology of organisations that cannot be expected in short-term income imposed hard limitations on the research and development budgets of banks that supplied services and products intended to hedge foreign return and plans over the longer term.

This implied that banks had to gradually diversify away from their conventional banking functions and supply expense-based services, with higher returns despite greater risks. The growth of off-balance sheet activities was a natural consequence for banking institutions applying such risk management approaches (Ghosh & Nachane, 2002).

**Table 2.1: The Impact of Non-traditional Activities on Banking Efficiency (Empirical Studies)**

| Author (year) | The topic of study | Country (sample period) | Major findings |
|---|---|---|---|
| Stiroh (2000) | How did BHCs prosper in the 1990s? | US (1991–97) | The efficiency estimates of US BHCs are sensitive to output specification, and failure to account for the instruments of OBS minimises the degree of the efficiency of return. |
| Isik & Kabir Hassan (2003) | Financial deregulation and total factor productivity change: an empirical study of Turkish commercial banks. | Turkey (1981–90) | Excluding the instruments of OBS dramatically deteriorates the average efficiency and productivity scores of the Turkish banking industry. |
| Tortosa-Ausina (2003) | Non-traditional activities and bank efficiency revisited: a distributional analysis for Spanish financial institutions. | Spain (1986–97) | Average cost efficiency of Spanish banks has improved when fee-generating income as an indicator of non-traditional activities is used in the output vector. |
| Rime & Stiroh (2003) | The performance of universal banks: evidence from Switzerland. | Switzerland (1996–99) | Failure to account for the instruments of OBS leads cost and profit efficiency to be significantly minimised. |
| Casu & Girardone (2005) | An analysis of the relevance of off-balance sheet items in explaining productivity change in European banking. Applied financial economics. | European Banks (1994–2000) | Including the instruments of OBS results in an increase in the estimated productivity levels of the European countries in the study sample. Additionally, the effect seems to be greater on technological than efficiency change. |
| Lieu, Yeh & Chiu (2005) | Off-balance sheet activities and cost inefficiency in Taiwan's Banks. | Taiwan (1998–2001) | Exclusion of OBS instruments as output led to underestimation of cost efficiency of Taiwanese banks by 5%. The banks with higher OBS output gain higher cost efficiency. |
| Sufian & Ibrahim (2005) | An analysis of the relevance of OBS items in explaining productivity change in post-merger bank performance. | Malaysia (2001–03) | Including the instruments of OBS results in an increase in productivity of Malaysian banks. Moreover, it has a greater effect on technological than efficiency change. |
| Huang & Chen (2006) | Does bank performance benefit from non-traditional activities? A case of non-interest income in Taiwan commercial banks. | Taiwan (1992–04) | Inclusion of non-interest income has a positive impact on the cost efficiency of Taiwanese banks. |
| Pasiouras (2008) | Estimating the technical and scale efficiency of Greek commercial banks: the impact of credit risk, OBS activities and international operations. | Greece (2000–04) | Inclusion of OBS instruments in the output vector does not have an impact on the efficiency scores of Greek banks, whereas inclusion of loan–loss provisions in the input vector contribute to highest efficiency scores. |

| | | | |
|---|---|---|---|
| Sufian (2009) | The impact of OBS items on banks' total factor productivity: empirical evidence from the Chinese banking sector. | China (2000–05) | Inclusion of the instruments of OBS has a positive effect on the efficiency change, whereas it has a negative effect on the total factor productivity of China's banking industry. |
| Sufian & Habibullah (2009) | Non-traditional activities and bank efficiency: empirical evidence from the Chinese banking sector during the post-reform period. | China (2000–05) | Inclusion of OBS instruments improves the technical, pure technical and scale efficiencies of Chinese banks. |
| Lozano-Vivas & Pasiouras (2010) | The impact of non-traditional activities on the estimation of bank efficiency: international evidence. | 87 countries (1999–06) | There is an increase in the average cost efficiency of banks when OBS or non-interest income is accounted for in the output vector. However, the inclusion of OBS does not have any significant impact on profit efficiency. |
| Budd (2009) | The consideration of OBS activities on banking efficiency and productivity performances within the United Arab Emirates (UAE). | UAE (2001–05) | The inclusion of the instruments of OBS increases efficiency scores and estimated productivity levels of UAE banks. |
| Chortareas, Garza-Garcia & Girardone (2011) | Banking sector performance in Latin America: market power *v.* efficiency. | 1998–2003 | The inclusion the instruments of OBS has no significant effect on the efficiency and productivity of the Latin American banking system. |

## 2.4 Introduction and Overview of Asset-backed Securities and the Australian Securitisation Market

The ABS market has witnessed massive changes in recent years, with respect to the structure and the main players, which depend on the originator, the type of entities that can be originated and the identity of the investor. One of the main aims of recent financial systems is to bridge the gap between structured finance and corporate finance simultaneously. In some states, some basic rules have been applied for the first time. The main rules relate to the basic legal, regulatory, tax and accounting infrastructure for asset securitisation (Minton, Opler & Stanton, 1997).In other states, some improvements and revision have been made to the current rules to drive the legislation of asset securitisation for better restructuring to the balance sheet. It is evident that there has been rapid growth and development of sophisticated instruments for evaluating and managing credit risk, which has led to an increase and growth liquidity in both swap and hedging markets; as a consequence there is a chance for some sorts of ABS to grow (Legro, 2009).

The word 'securitisation' in the language of the ordinary market has two meanings. The idiom was created to explain the process of disintermediation and replacement security lending issues for the lending functions of banking systems. Nowadays, this idiom has a place in modern financial markets where it is used to refer to structured funding in the case of non-liquid assets

that are pooled and packaged again with security interests, rather than the stream of cash flows and other economic advantages generated by loans collection and sold to third party investors— other financial institutions— in the form of securities. Some of the ABS granted a verity and sometimes in some cases uncertain claims each of them is with its own pay out and characteristics of risk. In general, the term securitisation is applied to transactions in which the underlying assets are either shifted from the balance sheet of the institution or were never included; unless otherwise stated, this is the definition applied in the current research (Carey & Stulz, 2005).

Transferring non-liquid loans into liquid securities is one of the benefits of securitisation, which can lead to an increase in the instability of asset values, although credit enhancements may reduce this impact. In addition, volatility can be reduced by factors other than changes in the creditworthiness of the borrower. The market value of the majority of assets can be readily determined in certain circumstances, and can enhance liquidity. Instead of going from the concept to the valuation of banks' financial institutions, those free from capital requirements were to achieve a competitive advantage through investing in securitised assets. Although securitisation may have the advantage of allowing lending policy to be outside the capital limitations of the banking system, the transaction might lead to a decrease in the total capital employed in the banking system; thereby increasing the fragility of the financial institution. Losses of credit can be absorbed by the banking system. This concern is mainly restricted to countries where banks still have conventionally been the dominant financial intermediaries. However, the infrastructure of institutions will benefit from the advantages of asset securitisation. If institutions are entirely developed and the legal system is quick to react to changing trade rules, this type of process will possibly face difficulties (Kothari, 2006).

Securitisation has played an important role in modern financial systems and to some extent reflects financial innovation in financial markets as the best way of pooling assets from the balance sheet of an institution and utilising cash flows to back securities, which allows originators to make non-liquid asset value more flexible and at the same time, make available low costs of funds for clients. Both ABS and mortgage-based securities (MBS) provide investors with a group of high-quality, fixed income products with attractive returns; this type of market has grown and became more popular. Along with originators and investors, this growth has been significant over the 30 year period that recorded ~US$6.6 trillion in outstanding ABS/MBS (Kothari, 2006).

Recently, asset securitisation has become known as a complex series of financial transactions designed to obtain higher cash flows and lower the risk to the creators of debt. This is achieved when acquiring assets, accounts receivable and financial tools are classified into groups and offered as collateral for third party investment. The following financial tools are sold, and are backed by the cash flow or the value of the underlying assets (Kothari, 2006; Legro, 2009).

The securitisation process can lead to a decline in banks' importance in the process of financial intermediation. This means that asset securitisation may lower the ratio of assets and financial liabilities of banking institution, making it difficult to implement monetary policy in countries where central banks operate on the basis of the minimum reserves (Kothari, 2006). The relationship between lenders and borrowers might also become weaker due to the decrease in banks' importance, especially in countries where banks are the leading sector in the economy (Legro, 2009).

The asset-backed securities system has recorded enormous growth in recent years and current developments suggest that the growth of ABS will remain strong moving forward and achieving the aims for which it was created. More significantly, securitisation is being employed progressively more to meet strategies of portfolio rebalancing. Investment performance criteria have become almost compliant with a global standard, and the importance of performance-based measures such as return on assets (ROA) and return on equity (ROE) has been highlighted (Legro, 2009). In response, both banking institutions and non-financial corporations have moved to utilise securitisation transactions as a tool to improve their financial ratios by removing selected assets from their balance sheets. In Europe for instance, banking institutions have started to use ABS as a tool for improving profitability by loosening capital allocated to low-income assets, a strategy that became more evident in the restructuring of the US market in the second half of 1980. Additionally, in different regions and systems in Asia, the practice principally is used to grant capital when it is needed, at any time. In general, the overall world economies are heading towards the creation of a new wave of combinations and attainments. Asset securitisation tools are utilised in many transactions in combination with the activities of traditional banking institutions. The difference between loans and securities has become indistinct as a consequence of these mixed transactions (Krishnamurthy, 2010).

The growth in the industry of asset securitisation has helped numerous individuals with mortgage credit histories to attain credit; this type of transaction enables them to take out further mortgage loans, providing lenders an efficient way to manage credit risk (Kothari, 2006).

Securitisation financial institutions have a source of long-term funding and therefore can afford to improve their balance sheet management. This will increase the availability of credit and lower the costs on the other side. Also, investors gain the advantage of securitisation transactions through obtaining direct risk exposure to different sectors of the economy, thus leading to diversification benefits (Kothari, 2006).At a deeper level, the key advantage of structured funding securitisation is that it increases the ability to redistribute and disperse credit risk to a wider and more diverse investor base (Krishnamurthy, 2010).

Securitisation is one of the most imperative and notable developments in international finance systems. It can be defined as a process of integrating and re-organising non-liquid financial assets of a similar kind into vendible entities having a profitable market value for investors. The process helps in the development of particular financial tools that hold a certain value of interest for the owner as well as they being secured by means of profitable assets. These assets can also be regarded as collaterals for the security. The security may be offered either in the form of secured real property such as automobiles, real estate or equipment loans, or may be in the form of unsecured assets such as credit card debt or consumer loans (Gaschler, 2008).

The process of securitisation comprises four basic steps: (i) SPV is made to entitle the assets offered as security, (ii) the owner of assets sells the assets to the SPV, (iii) the SPV employs an investment banker and distributes the securities among the investors, and (iv) the SPV pays the owner of the assets with the profit gained from the sale of securities. The touchstones of securitisation (Gaschler, 2008) are that the major criteria for securitising the assets are legally verifiable sales of assets to an SPV with clearly delineated aims and objectives. The offering of securities by the SPV to investors may be collateralised by the holding assets. Repayment of the assets by the investors is completed through the profits gained from sales instead of the credit of their seller. The owner and the issuer are this way separated and thereby the SPV is made less susceptible to bankruptcy.

In addition to the abovementioned factors, the following aspects are considered in the process: handling of the assets along with maintaining relationships with obligors; provision of timely

interest and major repayments through suitable credit boosts; additional facilities to completely take care of the interest rate; asset security etc.; and formal evaluation from one or more rating agencies.

According to Gaschler (2008), some or all of the following entities are involved in a securitisation contract: (i) the original owner of the asset (the originator or sponsor), who has signed a loan agreement with the borrowers (obligors); (ii) the issuer of the loan, who also is the SPV—this structure protects the SPV from the consequences of bankruptcy of the originator, known as 'bankruptcy remote'; (iii) the investment banker, who in exchange for a particular fee, develops the contract; (iv) the valuation agency, who evaluates the credit quality of certain types of financial tools and assigns a credit rating; (v) the credit enhancer, who provides credit support through a letter of credit, guarantee or other assurance that may be a bank, surety company or insurer; (vi) the servicer, usually the owner of the assets, who receives payments upon the offered assets and, after retaining a servicing fee, pays them over to the security holders; (vii) an agent, who deals with the issuer, credit enhancer and servicer as a representative of the security holders; (viii) the legal advisor, who takes part in the development of the contract; and (ix) the alternative third party, who offers an interest rate or currency swap, if required.

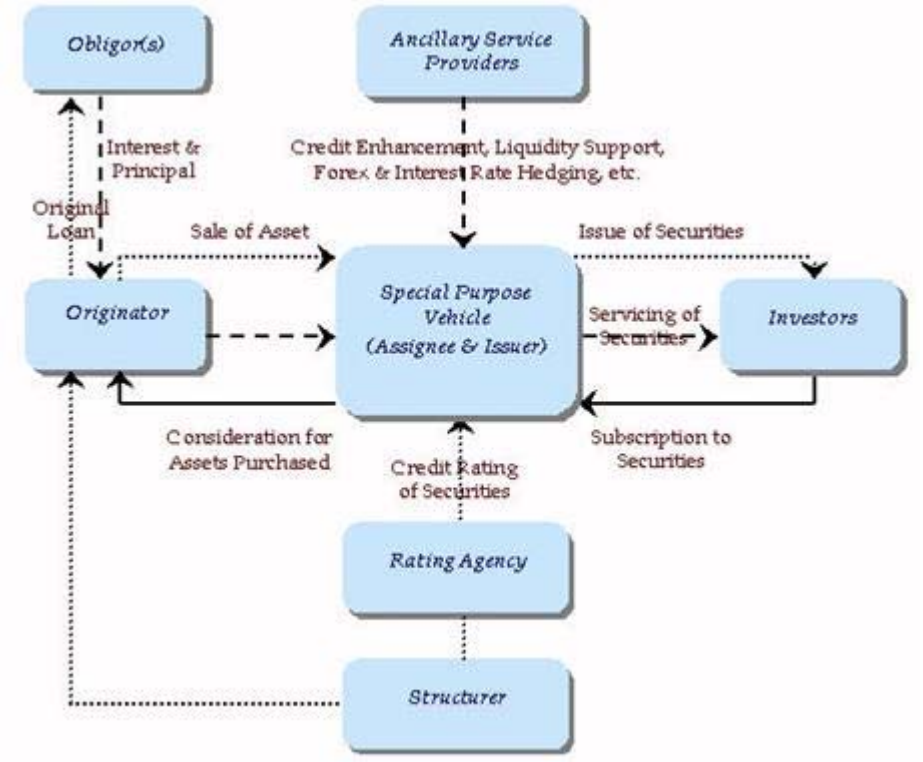



**Figure 2.1: Typical Securitisation Structure**

Source: Dickler & Schalast (2006, p. 35)

**Special Purpose Vehicle/Entity.** Asset securitisation provides to investors a higher quality of assets because financial structures have a method to isolate investors from the impact of the issuer's bankruptcy risk. This ensures that the transformation of bankruptcy risk aim of the transaction can be achieved; it is crucial to transfer the value of the assets out of the issuer's balance sheet to another independent entity. Basically, the main aim of SPV is to take (purchase) the assets from the institution (issuer) and issue them in the form of securities against those assets purchased. A standard securitisation process is described in the following: employment of such a process assures investors that their investments for the assets will be held by the SPV on their behalf and will not ever be subjected to any kind of unprofitable results on the part of the originator. The SPV serves as security that is owned and managed by the originator independently, with the major goal being to identify the financial tools from that of originator's assets (Gorton & Souleles, 2007).If, during the securitisation process, any asset or financial claims are involved that must be included in the contract, the originator may involve an arbitrator agency shown as the source of the asset or claim. For example, in the case of having a secured debenture—that is, a secured loan offered from a number of investors—the originator's assets must be included in the contract and then classified as per market sale ratios. To do this, an arbitrator is involved, which provides security to the assets on the part of the investors and issues profitable interest benefits to them. Hence, in this way the assets become secure to be marketed (Saqib, 2005).A similar process of securitisation is employed for receivables, in which the arbitrator party takes up the ownership of the receivables in exchange for offering profitable interest certificates to investors.

**Rating agency.** Ratings are expert opinions about the creditworthiness of sovereigns, institutions and financial instruments. They are one determinant of investment decisions, but not the only one. For example, in bond markets, other important influences are liquidity or price volatility. They explain why market prices for bonds with the same rating may differ considerably (Katz et al., 2009) among credit rating agencies.

The rating process has two components: quantitative assessments of credit risk and expert judgments of a ratings committee. Fallacies became apparent with the Enron and WorldCom scandals in the early 2000s. Both firms had investment-grade ratings until just before their collapse. However, more recent events indicate that alternative in-house models based on value-

at-risk analyses—which are characterised by high complexity, partly unrealistic assumptions and a crude combination of market valuations and synthetic prices—are also fraught with pitfalls (Packer & Tarashev, 2011).

There is a significant difference in the modelling approaches of the quantitative models employed by different rating agencies (Table 2.2). In Moody's, the ratings are linked with statements of expected loss, although the procedure employed to calculate this figure is highly methodological in nature. On the other hand, both Standard & Poor's (S & P's) and Fitch link their ratings with a statement on the probability of default; that is, their ratings do not provide clear statements regarding the amount of the incurred loss (Dickler & Schalast, 2006; Legro, 2009).Further, these two agencies employ simulations along with intricate suppositions and measures instead of using simpler analytical procedures. The model employed by Fitch specifically considers the range of probable loss along with the default probability in its simulation process, valuates the correlations on the basis of a factor model and uses a multi-step procedure in its Monte Carlo simulations. Owing to the similar extent of difficulty faced by all models in the calculation of parameters, such a high level of complexity does not tend to have any particular risk. For example, the portfolio of receivables can be influenced to a greater extent with respect to tranche formation and the risks associated with each tranche, in case of even minor errors during the calculation of correlations (Dickler & Schalast, 2006; Legro, 2009).

**Table 2.2: Comparison of CDO Rating Approaches in the Major Rating Agencies**

| **Criteria** | **The main rating agencies** | | |
|---|---|---|---|
| | **Moody's** | **Fitch** | **Standard & Poor's** |
| Rating statement | Expected loss | Probability of default | Probability of default |
| Portfolio model | Binomial expansion technique (BET) | VECTOR model | CDO EVALUATOR model |
| Modelling approach | Portfolio level | Individual receivables level | Individual receivables level |
| Assumed distribution | Binomial distribution (defaults) | Monte Carlo simulation (defaults, loss) | Monte Carlo simulation (defaults) |
| Simulation period | N/A | Multi-step | Single-step |
| Correlations | Diversity score, discrete value (static) | Factor model, matrix (dynamic) | Historical estimates, matrix (static) |
| Correlation value | 0.00–0.38 | 0.06–0.55 | 0.00–0.30 |
| Recovery rate (US) | 30–67% | 24–70% | 15–60% |
| Stresstest result | Is the expected loss below the limit required for the desired rating? | Is the default probability below the limit required for the desired rating? | Is the default probability below the limit required for the desired rating? |

Source: Dickler & Schalast (2006, p. 35)

The available public information shows that particular risks prevalent in cash flow modelling are smaller in magnitude and are mostly related to credit risks and structural risks; moreover, legal risks are normally handled in the qualitative analysis.

Every agency employs a different methodology, which results in different ratings. For example, up- or downgrading done by one agency may not be done by the others (see Table 2.3). In this regard, Fitch was the first agency to employ categorical evaluation of systemic risk. However, this practice received considerable criticism because of its use of econometrics and neural networks for limited samples of sovereign nations and sovereign defaults (Dickler & Schalast, 2006). In 2007, a new bank rating methodology was introduced by Moody's before the GFC. This methodology addressed the external support available to banks. S & P is reconsidering its current methodology owing to the GFC. However, this change is also aimed at altering the geographical distribution of probable rating actions; that is, upgrading the Asian banks and downgrading the European ones. This objective is considered to be putting significant pressure on other agencies (Legro, 2009).

**Table 2.3: Rating Methodologies for Bank Ratings**

| The method | The methodology of major rating agencies | | |
|---|---|---|---|
| | **Fitch** | **Moody's** | **Standard & Poor's[1]** |
| **Stand-alone assessments (intrinsic financial strength)** | Focus on OBS commitments, funding and liquidity risk | Emphasis on forward-looking assessments of capital ratios, based on embedded expected losses | Focus on risk-adjusted performance and ability to grow capital from profits |
| **All-in ratings (with external support)** | Distinct ratings of sovereign support provide a floor | Based on a joint default analysis of banks and providers of support | Anticipated support increases with the bank's systemic importance |
| **System-wide assessment Country rating** | Based on:<br>- macro indicators<br>- average bank rating | None | Based on:<br>- macro indicators<br>- industry and regulatory environment |
| **Does systemic risk affect banks' ratings?** | Not explicitly; anticipated support increases with the bank's systemic importance but falls in times of generalised distress | Not explicitly; anticipated support increases with the bank's systemic importance | Yes, through:<br>- macro indicators for countries where the bank operates<br>- assessments of the industry and regulatory environment in the home country |
| **Last major changes** | 2005: systemic risk analysis | 2007: joint default analysis in support assessment | 2011: overhaul of the rating methodology<br>Greater emphasis on:<br>- system-wide risks<br>- link from earnings to capital |

**[1] Refers to the agency's proposed methodology for bank ratings, as outlined in S & P (2011)**

Source: Packer & Tarashev (2011, p. 45)

***Internal credit enhancements*** relate to credit supports that are entwined with the specific design and nature of the security itself. They may therefore vary in form and nature as illustrated by Legro (2009) and Lumpkin (1999).With respect to earlier studies in this regard, multiple credit enhancement methodologies are commonly available and contribute to ensuring credit supports are equal to multiples of the losses to be expected from the asset pool.

***Credit enhancement provided by internal structure.*** Multiple structural features would in turn contribute towards ensuring that the quality of the credit is made available in relation to the asset-backed security. In this regard, higher rated securities would be susceptible higher risk in relation to multiple lower classes of securities, and in conjunction with cash collaterals. Senior and subordinate structures are generally layered against individual positions to ensure credit protection with respect to the available lower positions. Such junior positions are derived in relation to the payments accrued against the principal amount under consideration, and with regard to the securities under consideration.

Normally, general security structures are aligned from junior to senior debt. This is construed to mean that the first to be hit with the losses is placed in front:

(i) Excess spread. Herein, the portfolio yield accrues on a monthly basis against the receivables under consideration with a fall-back amalgamation of ABS, which is normally over and above the value of the coupon, the cost of the service, the losses to be expected from the securities, etc. The remainder of the finance charges after deducting costs associated with funding, services and the related costs are termed excess spread. Correspondingly, the residual amount is channelled back to the seller in terms of additional profit (Lumpkin, 1999).

(ii) Spread account. The monthly finance charges accrued from the underlying pool of the receivable are normally circulated towards recouping unforeseen losses incurred over time per month. Correspondingly, if there are no losses to be covered, the excesses available are routed back to the seller. Multiple trusts have a process wherein as the portfolio yield declines, the losses correspondingly increase. The monthly excess spread is therefore arrested and channelled to a spread account to allow for credit enhancements in the future (Lumpkin, 1999).

(iii) Cash collateral accounts. A cash collateral account refers to an independent trust account that is funded by a trustee as per the deal, aiming to insure the losses in interest, principal or servicing tariff for a particular series if surplus range becomes zero. The account may

also be funded by the issuer, though in most cases a third party bank provides the funds as a loan, subject to payment after all the involved certificate bearers have received their complete payments (Lumpkin, 1999).

(iv) Collateral invested amount (CIA). The CIA refers to an unauthorised share in the trust, which may be consigned to privately subsidise the payment rights of all investor certificates. Similar to the subordination function of a cash collateral account, the CIA also deals with insuring the losses caused bya negative or excess spread. The CIA is covered by a cash collateral account and available monthly excess spread. Any deficits to the CIA are refunded from the future excess spread, if available (Lumpkin, 1999).

(v) Subordinate security classes. Subordinate classes are less important claims than other debts; that is, they are subjected to reimbursement only when other classes of the security having higher claims have been repaid fully. Some securities may include more than one class of subordinate balance. In the same way, one subordinate class may have a higher claim than other corresponding positions (Lumpkin, 1999).

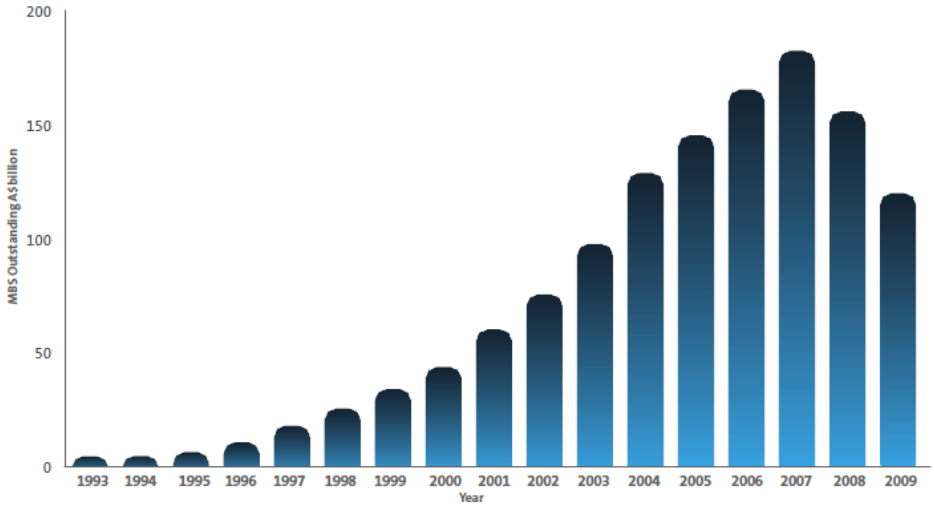
***External forms of credit enhancement,*** like irretrievable letters of credit and financial guaranty insurance, are subject to be made available by third parties with triple-A credit ratings. A third party bank provides the irrevocable letters of credit with intent to indemnify a segment of the pool of assets. The amount provided is usually equal to the evaluated loss profile for the concerned loans and is often less than other reimbursements (Merton & Bodie, 1995).

Non-bank, mono-line insurance firms provide the third party insurance. Warranty is provided in the form of a wrap. The wrap is assured by means of a definite guarantee for the complete and timely payment of the bonds. Usually, this practice is employed to provide coverage for second-dollar loss. It is provided when the first layer of coverage for first-dollar loss has completely covered the probable credit losses along with the unexpected losses. In some contracts, the insurer can ask for the bonds in case of non-payment. While assessing a provided ABS transaction, the evaluating agencies assume that the credit quality of the debit pool may be lower than that of the weakest bond in its enhancement package. Therefore, when dealing with external credit enhancements, the assessment of the high-ranking securities in an ABS case is usually covered as such by keeping it at the rating level of the third party guarantor, regardless of the quality of the relevant security. In most cases, sponsors depend completely upon guarantors with triple-A credit ratings. Previously, reductions in the credit ratings of third party credit have incentivised many sponsors to choose internal forms of credit enhancement (Merton & Bodie, 1995).

***Credit enhancement provided by external parties.*** For issuers having lower credit ratings than required for the provided security, a third party may offer a letter of credit as insurance for a particular amount of loss. The bonds provided in the letter of credit protection are subject to be reimbursed from surplus cash flows obtained from the securitised portfolio (Merton & Bodie, 1995). In terms of recourse to the seller, this method is usually used by non-bank issuers with limited security for the seller and protecting a particular amount of deficits in the pool (Merton & Bodie, 1995).Surety bonds are the securities offered by third parties such as triple-A-rated mono-line insurance companies, who guarantee coverage of the principal and interest payments of a complete transaction (Merton & Bodie, 1995). Regardless of the normally higher ratings of third party credit enhancers, such an occurrence can cause a reduction in the rating of a security. Consequently, issuers tend to depend less on third party enhancements (Krishnamurthy, 2010).

## 2.5 Australian Residential Mortgage-backed Securities

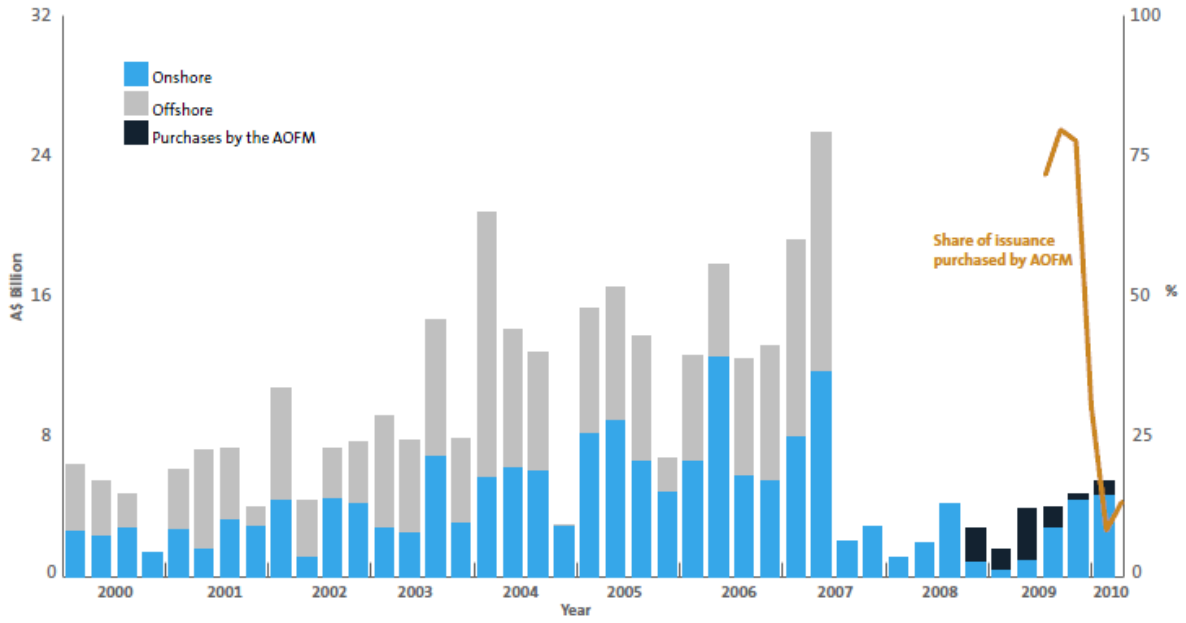
Prior to the US sub-prime mortgage crisis in 2007, Australia's RMBS market experienced remarkable growth, having a composite average growth rate (CAGR) of 31%per annum (p.a.) for the period June 1997 (AU$13.6 billion) to June 2007 (AU$204 billion) (Figure 2.2). This increase was even faster than the growth in Australian residential mortgages during the same period: 15.7% p.a. CAGR to AU$870 billion in June 2007. This growth enhanced the significance of Australian RMBS subsidies for the Australian mortgage market, providing it a 23% market share in 2007 of Australian mortgages outstanding, up from 7% in June 1997.




Source: Australian Bureau of Statistics; Austrade

**Figure 2.2: Australian Residential Mortgage-backed Securities**

The US sub-prime crisis and the following global recession of 2008–09 significantly influenced securitisation markets throughout the world, including Australia's RMBS market (Figure 2.3). In the period June 2007 to December 2009, the Australian RMBS market declined by 41%—from AU$204 billion to AU$120 billion—owing to the release of some primary issues and excess of existing portfolios. The rates of issuance of RMBS were significantly reduced following the GFC because of the lack of availability of external sources of funding. The primary market issuance of Australian RMBS reduced by 70%to AU$14.1 billion in 2009 from AU$49.4 billion in 2007. Similar events occurred in other securitisation markets around the world, reducing the global net issuance of securitisation by 74% (i.e. US$2138 billion in 2007 to US$548 billion in 2009).




Source: Australian Bureau of Statistics; Austrade

**Figure 2.3: Australian RMBS Issuance—Australian Dollar Equivalent, Quarterly**

The reaction of international markets to this issue depended on the asset quality. In the case of the Australian RMBS market, the assets are usually of very high quality owing to a high standard of lending practices and primary mortgage security conditions. High collateral levels of the lender's mortgage insurance, and the existence of a market where lenders have a range of alternatives for borrowers in the case of default, further increases the quality of the Australian RMBS. These features of the Australian RMBS market reflect negligence in observing international standards.

The potential effects of securitising assets on financial systems might be different for other countries depending on the stage of development of their financial systems, or on the ways in

which monetary policies are enacted. Also these influences will differ depending on the developing level of asset securitisation in a particular country. The main effect could be positive or negative; however, still some concerns are mentioned which they might in definite circumstances more than beneficial or harmful issues.

Some of these concerns are not primarily managerial in nature but they are mentioned here because they might affect the policy of monetary authorities, particularly with respect to the impact on the development of securitising assets markets. Meanwhile, assets, transfers and securitisation transactions can increase financial system efficiency and increase the capability of credit by helping borrowers gain direct access to end investors.

To the extent that rating agencies maintain their pre-crisis role in the financial landscape, they will influence the effectiveness of prudential authorities' communication with financial markets. More transparent ratings will convey more explicit assessments of the external support available to banks. As has been demonstrated in the case of several developed financial markets, asset securitisation is an important building block in creating an efficient and broad-based financial system.

The concept is highly relevant to emerging economies, given their capital constraints. An enabling policy framework and affirmative actions in this regard from the government can immensely facilitate the development of the ABS market in developing countries. From an originator viewpoint, longer term advantages of securitisation are that, if used strategically, it will enable them both to grow and to create a sustainable competitive advantage.

The flexibility of funding banking institutions will enhance growth and the bank balance sheet will be less affected by the requirements of capital regulation. From the development side, it is very important to improve the local debt capital market, to assemble savings with long terms whereas insurance and superannuation corporations, etc., may function as agencies of such resource mobilisation. It is also important to create a range of high-quality financial assets in which they can invest. These assets can in turn direct the mobilised resources to their appropriate destinations in the larger interests of the nation. Securitised debt backed by receivables from infrastructure financing may well be one category of such assets, which could satisfy this requirement.

## 2.6 The Global Financial Crisis

In terms of economic and financial volatility, the 2007 GFC was the biggest crisis since the Great Depression of the 1930s. The overall impact of this turmoil amounted to more than US$13 trillion in terms of lost wealth and US$6 million in terms of jobs layoff in the US (Krugman, 2011).Examples in history that resemble the current situation of crisis include the failure of various institutions, increasing unemployment rates, volatile financial markets and deflation of asset prices.

The very basis of macroeconomics theory has been negated by the recent GFC, which is the main reason for the losses of confidence in macroeconomic theory since 2009. Economists have been criticised for this lack of confidence in macroeconomics, because they missed the signs of the crisis: the situation was not recognised as a worst indicator and no single resolution was agreed among them. A typical economic theory based on a financial market was the focal point in the mind of the critics. According to conventional economic theory, the efficient use of resources by intermediaries and financial markets is the main reason for an increased rate of economic growth (King & Levine, 1993). The efficient market hypothesis is based on the assumption that all information is known to the market and therefore reflected in the prices of assets. Further, these have been supported by various tests that have revealed that markets do this quiet well (Patrick, 1966).

September 2008 saw the point of inception of a new era in the GFC, when the downfall of Lehman Brothers was witnessed. The downfall of the stock and housing markets resulted in various financial institutions going bankrupt, which made for a tough time for governments all over the world (Reinhart & Rogoff, 2008).Fear took over the banks and other financial markets, which experienced an acute liquidity crisis and a lack of confidence in exchanging money with each other. As a result of this shaky environment, the risk premium shot up to 5% from almost zero previously (Prasad, Rogoff, Kose & Wei, 2009).

On the corporate front, the risk premium rocketed up to 6% on corporate bonds. Governments acted too late to inject lifeblood (i.e. money) into the economic system. The situation was further aggravated by the stoppage of huge CAPEX projects, a discontinuation of corporate borrowing, non-availability of trade credit due to low trade volumes and decreasing demand for capital goods

and durable consumer goods such as cars and so on. To deal with the crisis, central banks all over the globe tried greasing their financial system by increasing the money supply to the tune of billions of dollars and decreasing interest rates. When the crisis worsened, the G-20 governments introduced tax benefits of around US$1.65 trillion for those who were willing to invest (Prasad et al., 2009). To develop future policies to deal with crises of this nature, it is of utmost importance that the reasons behind the GFC are understood and analysed. The example of the Great Depression should be kept in mind when major changes like restructuring of economies and the re-regulation of financing and banking laws are taking place (Prasad et al., 2009). However, if the intention behind the introduction of reforms is to ease the impact of financial crises, it is of vital importance that the gravity of the crisis is understood clearly.

The GFC was the result of many sequential events that ignited a financial crisis in a range of world economies with similar characteristics. The crisis struck various international markets at different times.

Numerous examples of intensified financial crisis pertaining to financial institutions like banks, and other crises pertaining to exchange rate parity can be found throughout economic history. The examples from the pages of history include the crisis of Mexico in 1994–95, the 1980 crisis of Bank Berendz (which bears some resemblance to the GFC), and the US crisis of exchange rate parities in 1894–96 (Reinhart & Rogoff, 2008).In addition to the 1960s crisis of the French Franc and the Pound Sterling, the 1970s crisis of the Bretton Woods system and the 1980s crisis of external debts, the period between the two world wars in the 20th century experienced various financial setbacks in different parts of the world.

Many crises had an international effect: the Asian crisis commonly known as the Asian Tiger crisis-affected countries like Thailand, Korea, Malaysia, the Philippines and Indonesia in 1997–98. The currency and exchange rate crisis of 1990 and 1992–95, respectively, occurred in the European monetary system. The cost to financial sectors in terms of expenses and mobilisation of public finances, along with the techniques used to deal with each of these crises, were different in nature. In most of the above examples, due to the pervasive nature of the crisis, it was imperative that international help was solicited to reduce the financial effect and to counter its contagious effects on many countries.

The financial crisis that began showing up in the US in August 2007 took a worse turn after June 2008, and because of various EU and other countries having a stake in the US in terms of investments, the crisis spread globally.

Financial crisis is not considered a recent phenomenon in any way. In many cases, it is subject to the same forces that have long exercised influence in various crises, but the financial innovation and greater integration in global financial markets during the last two decades of the 20th century appear to have added new factors and concerns. Recent crises have differed from what preceded them, in important respects. The spread of the GFC and its effects seemed clearer and more far-reaching than ever before (Reinhart & Rogoff, 2008). The international market passed through a series of financial crises—the GFC—that spread in a series of complementary events witnessed in similar economies in different regions of the world in recent years.

The costs of these crises differed in terms of the output and expenditure of public finances and financial techniques addressed to support weak financial sectors. As the effects of the crises spread significantly at an international level, in a number of cases they required international financial assistance to mitigate and reduce costs, reduce the spread of infections and contain their negative effects on other countries.

Economic history is replete with a great number of crises from banking crises to exchange rates, and it has seen periods that exacerbated financial crises, particularly banking crises. Two prominent examples are those of Bank Berendz in 1890, which had similarities to the recent GFC, and the obvious crisis of Mexico, which took place in the period between 1994 and 1995; an exchange rate crisis occurred in the US in the period 1894–96.

In the 20th century, many financial crises occurred in the period between world wars, in addition to the crises of the Pound Sterling and French Franc in the 1960s, the collapse of the Bretton Woods system in the early 1970s and the external debt crisis in the 1980s.In the European monetary system in the 1990s, currency crises occurred; in particular, the crisis of the mechanism of exchange rates in the period 1992–95. A financial crisis occurred in East Asia, known as the Asian Tiger crisis or Asian financial crisis, which primarily affected Indonesia, Korea, Malaysia, the Philippines, and Thailand in the period 1997– 98.

By the second half of 2008, a financial crisis increased aggressively, beginning in US financial institutions, moving separately through other economic sectors and extending into holding assets, interlocking and overlapping investments to Euro countries, and the rest of the world.

## 2.7 The Australian Financial Sector during the GFC: an Overview

Among advanced countries globally, Australia has been least affected by the GFC, as suggested by its growth of GDP in the first quarter of 2009, which was 0.4% (albeit with minor negative growth in the subsequent quarter).Australia's banking sector was also less affected compared to those of other countries as it did not show any failures and its profits soared, though declining marginally compared with the past and with slightly more bad debts (Brown & Davis, 2010).

However, concerns have been prompted about financial market practices and investor protection, as there have been visible failures of investment/financial companies and big investor losses from structured products and investment schemes. However, based on education, disclosure and advice, the Australian approach to regulation of securities and investment markets did not avoid the marketing of high-risk financial products and controlled retail investment structure (in retrospect).Other 'unsophisticated' wholesale investors (e.g. local players) did not completely favour the market and other stakeholders' risk being present. From a high in November 2007, the stock market fell in June 2009 by almost 41%, causing major losses for investors and the pension fund sector at large; this highlighted the need for proper regulation of the securities market structure (Brown & Davis, 2010).

Australia's comparative lag, as suggested by (Brown & Davis, 2010), the effect of the GFC and responses to it, shows both better economic control and regulation and some good luck, although a few long-term issues remain.

The recent GFC potentially reminds the financial sector of the global economic interdependence of countries. Beginning in 2007, the GFC occurred at a time of serious challenge for borrowers in the US sub-primal mortgage sector, which caused a failure in credit market confidence globally, by default. Although the US sub-prime collapse did not directly affect the Australian banking sector, investor suspicion regarding the banking sector and slow global growth in trade did result in sluggishness in Australia. Although the Australian dollar came down alongside the crash of its

share markets, net aggregate wealth also came to the floor, resulting in country-side uncertainty and unemployment (Brown & Davis, 2010).

The recent GFC has its foundation in the 1980s economic deregulations—a time when global economies wished to sweep out financial system regulations to increase market competition and invite more efficient players into the market, which would result in more innovation. The result of this was cheaper credit and various credit products, and easing of lending regulations with stronger rates of lending; however, the increasing innovation caused great difficulties for regulators and planners attempting to assess the asset position and creditworthiness of the banking sector (Chesters, 2010).

Quite a few large US mortgage lenders during 2007–08 failed and the American Bank took them over to manage the disaster; nonetheless, many European countries also suffered from this problem as many European banks that had invested in the US were bailed out by their countries' governments. Lehman Brothers' September 2008 collapse in the US caused a wide-ranging loss of confidence that swiftly worsened the situation (Chesters, 2010; Rötheli, 2010). Thus, an end to stable inflation and growth was brought about by this GFC (Hume & Sentance, 2009) at a time when many countries were experiencing a dramatic increase in nominal GDP, including the US (120%), Australia (156%) and the UK (150%) (Pomfret, 2009). The major reason for this exponential growth was property investment that pushed prices higher and caused an asset bubble in the real estate sector. To keep inflation under control, central banks kept interest rates low and neglected the role of interest rates as the capital price, hence adding to the asset bubble (Pomfret, 2009b). Investors were encouraged by low interest rates and sought high-income securities (Debelle, 2008), which created a market with fresh investment products such as CDOs and credit default swaps (CDSs) by investment banks.

Australia enjoyed a 15-year steady economic growth between 1993 and 2008. The aggregate household income and the indebtedness percentage for the average household increased as well. In 1990, household debt was AU$190 billion, increasing to AU$1.1 trillion in 2008. Average debt, at the household level, which had remained at around 66% of household disposable wealth in the middle of the 1990s, increased to approximately 150% of the same income in 2009. During the two decades before the GFC, the massive increase in household debt was mainly caused by increasing housing credit for own occupation, and buying rental houses for investment. As a result, between 2001 and 2008, housing prices increased by almost 10% per year. This growth

was fuelled by the deregulation of the banking sector, and house owners ably took benefit of new financial products like making use of equity in their own home, to safeguard their mortgage for investment purposes (Chesters, 2010).

Although much of the regulation hindering banking sector growth was eliminated by successive Australian governments, the Australian Prudential Regulation Authority (APRA) still monitors Australian banks and relevant financial bodies. This institution has followed a moderate strategy on capital competence by offering credit evaluations by third party originators and higher investment rates for non-abiding loans (Chesters, 2010). These measures mean it is no longer easy to transfer less creditworthy clients (with mortgage) to other institutions—a factor from which the US sub-prime mortgage suffered (Chesters, 2010).

The GFC's most rapid impact in Australia came in the shape of its dollar collapsing from US$0.98 to US$0.60 from July 2008 to October 2008. It also caused a rapid decrease in average value of household properties—14%—followed by a decrease in house purchases, increasing unemployment and a dramatic increase in the household savings rate from 1.2% in March 2008 to 8.5% in December 2008. From February 2008, the unemployment rate was 4.1%, which increased to 5.8% in August 2009, and then decreased in February 2010 to 5.3% (Chesters, 2010).

## 2.8 The Impact of the Global Financial Crisis on the Australian Banking Sector

Australia was affected least by the GFC worldwide. This raises the question of what factors saved Australia from the GFC's disastrous effects. Chesters (2010) suggested that many factors played a part, including fate, sound management and adjustments. In the early 1990s, when two Australian government banks collapsed, risk taking may have been controlled, reflecting the banking system in Australia. However, the formation of cumulative monetary drifts was also responsible for shaping bank performance. To rectify the country's existing credit shortfall, Australia's banks were a chief debtor in global wholesale financial markets and consequently were more determined to obtain aid globally for loaning inside the country than to obtain complicated guarantees like CDOs, either for financial statements or instruments. The elevated productivity may have decreased incentives due to local loan behaviours for participating in a diverse, more dangerous game, and considered in a lesser support on trading profits than foreign correspondents.

Australia's main banks rigorously acted to form a risk management system that met the requirements for Advanced IRB (internal ratings-based) status for the initiation of the Basel II practical instruction outline in January 2008. The formation of risk requirements and organisations may have helped the banks to prevent the unnecessary risk taking seen in other countries (though a similar aspect may have been applicable globally). The role of practical instructor was significant in controlling bank risk taking. APRA had suffered immense shame and consequent administrative reform in 2001 after a big insurance firm under its management collapsed, was subject to a government resolution to deliver around AU$600 million reimbursement to customers levying a noteworthy charge on citizens. The Australian Securities and Investments Commission was assigned the role of practical instructor with securities market systems, which was APRA's sole function (Chesters, 2010).

The increase in retirement funds aiming for fixed interest style investment, the dearth of a considerable internal bond market and a small government securities market had stimulated the development of a considerable securitisation segment in the wider financial segment. On the source side, this may have reduced risk to lenders and inventors from unacceptable behaviour and increased regulatory resource obligations for non-typical loans that did not change by substituting a major way of lending. On the other hand, the information on debtors regarding the chance of failure or from lapsing on repayments on mortgage loan contributed positively to the process of securitisation (Chesters, 2010).

While the global financial and economic crisis was affecting almost all countries of the world, the Australian government, took some immediate calculated and well-considered steps to reduce the global crisis effect in the second half of 2008 to save its economy. The first action was guaranteed deposits. The deposit-taking institutions in the country retained up to AU$1 million to encourage deposits to secure their reserves, and a guaranteed bank approach to capital markets was provided (Edey, 2009; Lim, Chua, Claus & Tsiaplias, 2009; Valentine, 2009). The government initiated a preliminary incentive of AU$10.4 billion in October 2008 and another of AU$42 billion in February 2009 to encourage private sector spending in the country (Lim, Chua, Claus & Tsiaplias, 2010; Valentine, 2009). Householdswere given aid in the form of hard cash (Eslake, 2009). To increase development schemes in the country, the government allocated AU$29.4 billion and AU$1.5 billion for residential projects (Lim et al., 2010). To increase demand, the RBA considerably lowered interest rates (Eslake, 2009; Lim et al., 2010). The effect of these calculated actions can be seen in the form of a reduction in the cash rate target from 7.00% in September

2008 to 3.25% in the first three months of 2009 (Bloxham & Kent, 2009; Lim et al., 2009; 2010). The jobs of almost five million workers hired by small business owners were also protected through actions taken by the government.

Further actions were taken to protect 100,000 businesses on a small scale by providing a year of interest-free deferrals on their Goods and Services Tax duties. Moreover, income tax payments were also delayed during 2008–09 (Australian Taxation Office [ATO], 2009).The number (27,503) of businesses announced as liquidated during the year 2008–09 was up from 25,970 in 2007–08; and 9,908 businesses terminated their operations, up from 8,575 in 2007—08 (ATO, 2009).

## 2.9 Summary

Countries have improvised their financial models in the last few decades; much of this can be attributed to the awareness created by globalisation. However, this carries a set of risks or drawbacks: following improvisations in the financial systems of many countries, the crises of the 1990s stress the benefits of globalisation.

The globalised financial system has been questioned after the recent financial crisis that affected many counties across the globe. Cross-border connections that were implemented a decade prior are considered the main reason for the success of this system, and are now regarded as the main reason for the beginning of the GFC. In addition to this, globalisation altered the pattern of cross-country credit growth and the external positions of the financial systems of one economy relative to another, which resulted in an acceleration of the crisis because one affected system influenced the global financial system.

Crises were more likely to affect the countries where key financial factors were not as strong as other countries, thus they are more exposed to risks in both the domestic and international markets. Countries are more exposed to risks associated with capital flow, even if they have strong financial factors, because of the irregularities in international financial markets. Exposure to cross-country financial crisis is one of the negative aspects of the global economic system. This can only be avoided in a country that has no connection with economic systems of other countries.

The moment an economy connects with the global economic system, it is prone to be affected by it one way or another.

Although globalisation secured some countries from the risk of financial crisis, for others it served as the perfect catalyst for accelerating the effect of the crisis on their economy. On the whole, emerging markets were less vulnerable to the crisis than were developed markets because the long-equity, short-debt structures of these financial systems were modelled/developed on the assumption of continuous growth of equity markets and stable credit market. Interestingly, in this scenario, some advanced economies were able to benefit from currency depreciation.

Overall, the substantive effect of globalisation is positive, because after the crisis situation eases up, risk aspects are more established. On the other hand, countries that integrate with the international financial system must face global crisis corruptions. Decision makers should follow the rule of thumb that they have optimum benefit from the advantages, and take measures to minimise risks. Countries should keep in mind that when they are enforcing their financial system, it should be more absorbent to external shocks and should be constructed with foreign capital flows in mind. Risk management policies should be stringent to form the basis of a powerful economy. This should be monitored with great emphasis by regulatory authorities. The global financial system stresses the need for a global monitoring system for policy monitoring and coordination to strengthen the countries incorporated in it.

Weakness or irregularities lead to collapse of international financial systems, resulting in an increased loss to the economies because this makes prevention or management of the crisis challenging. Although many policies have been developed and reforms have been made, there is a considerable amount of improvisation that can be done, such as developing the global framework of national and even local financial systems so that they are in line with the international financial system.

The global financial system can greatly assist in the development of risk management systems, consumption levelling and proficient allocation of capital if national and international institutions are established. In fact, in the presence of a sound institutional framework, when ‘smart’ asset trade is enhanced, and ‘distorting’ international asset trade is eliminated or minimised, even a small volume of trade would result in higher levels of real income.

Subsequently, one factor that can be considered as a gain from the recent crisis is that it helped in development of securitisation, OBS items and hedging transactions that led to or misled matters of adequate capital requirements after important prudent regulatory measures in the US and global markets, with strong measures being implemented to ensure supervision of these measures in an effective manner. Most of these developments were driven by and were in tandem with globalisation of the financial system. Systematic risk increased consequently. In comparison with earlier financial systems, virtually all the financial systems are more strongly interlinked and connected with each other, including stock and bond markets. As a result, systematic risks have been reorganised after implementation of these measures; still, it cannot be said that full control or authority have been achieved. The same is true as far as measures for capital control are concerned: this is a grey area as far as the result of effectiveness of eliminating these practices is concerned.

In conclusion, it can be said that with the help and experience of previous financial crises, the GFC was less damaging than previous financial crises. Aggressive monetary and fiscal policies were pursued, in contrast to the situation before the Second World War.

# Chapter 3: Literature Review

## 3.1 Introduction

The recent GFC prompted a comprehensive review of financial and banking regulations and legislation at the domestic level in each country, as well as at the international level, for international banking standards and rules. Many official organisations and private or domestic and international organisations conducted studies and comprehensive analyses to determine the factors affecting the performance of banking institutions using credit growth indicators. However, to date, little has been done using asset securitisation to propose reforms required to enhance the resilience of financial systems and make them less vulnerable to crises.

In recent years, bank performance of banking institutions has become an important subject and has attracted much attention from researchers and institution managers or shareholders, and current and future investors. Some research has examined the role of resource management in determining operational performance of banking institutions. In general, the main factor contributing to operational performance is the quality of resource management. As previously mentioned, to the best of the current researcher's knowledge, there has been no investigation on the effect of using asset securitisation on the operational performance of banking institutions in Australia. Thus, the empirical literature presented here represents studies conducted in other countries or markets that are relevant to this study; the following section discusses the context of previous studies.

Bank performance determinants affected by external factors are the official and economic environment, which affect operational performance of banking institutions. Based on the objectives and nature of each study, different variables are used in the approach selected for each study. Internal determinants, or bank-specific factors, such as bank size, liquidity ratio, total deposits, management efficiency, liquidity management and asset securitisation are mostly used. However, economic growth, inflation, interest rates and unemployment rates are commonly used as external determinants, or macroeconomic factors, that influence bank performance.

In this context, this chapter presents the topic of this study and summarises the relevant literature on the effects of asset securitisation and other lending determinants on the operational performance—credit growth—of the banking sector (excluding non-banks).Little has been written on this subject although the literature is expanding quickly. The following sub-sections briefly summarise the main findings of theoretical and empirical studies regarding the effects of securitisation on operational performance of banking institutions, which can be measured through use of the credit growth indicator considered in this study. Therefore, the literature on determinants of bank performance will be reviewed in the first section. The second section focuses on hypotheses and related studies on the determinants of bank credit growth, divided into three parts; asset securitisation and credit growth; financial crises and effects on bank credit growth; and empirical studies that explain the determinants of bank credit growth.

## 3.2 Determinants of Banking Performance

The profitability of banks is considered a significant indicator of financial crises in economies. Thus, studying banks' profitability determinants can assist bank managers to make the right decisions and help foster policies to help develop the banking sector. There is already a vast literature on bank performance. Overall, findings propose that the determinants of bank profitability differ depending on location (nation) as well as global region (Said & Tumin, 2011).

Studies generally concentrate on two types of factors that affect bank profitability. One is internal or bank-specific determinants connected to bank management. In the literature, capital adequacy, income source, credit risk, efficient management and bank size are the major variables considered responsible for changes in bank operating performance. The second type is external or microeconomic factors that relate to the economic and legal environment of the bank: inflation, industry size, ownership status, competition and concentration are the most significant components of these factors.

By using data from US commercial banks over the period 2001–08 Sarkisyan, Casu, Clare and Thomas (2009) used the matching method propensity score in an attempt to evaluate whether banks can improve their financial performance by using the asset securitisation market. They constructed a hypothetical group of banking institutions to evaluate the changes that could occur to banks' situation if they are not securitised. They first examined the study hypothesis through

using univariate analysis and discovered that on average, securitising banks are more profitable institutions with greater credit risk exposure and higher financial costs. Moreover, the score matching of tendency analysis did not provide strong evidence for a strong contributory influence of asset securitisation on bank performance.

With respect to changing wealth, Thomas (1999) investigated 236 securitisation transactions in the US during the period 1991–2006 as an example. The study examined abnormal returns and showed that asset securitisation was generating wealth for shareholders, whereas for bondholders it was not the destruction of wealth. These wealth influences were exposed to be greater for manufacturing companies than for banking and financial institutions.

Martinez-Solano, Yagüe-Guirao and Lopez-Martinez (2009) analysed the reactions of the Spanish exchange market to securitisation announcements by listed banking institutions between 1993 and 2004. The findings illustrate the existence of strong revenue from the day following notice of the securitisation deal; the pattern is strong for different analyses carried out on different periods around the date of the event. These results are consistent with the idea that investors predict the possible advantages of securitisation transaction conditions of release equity, which offers banking institutions a chance to improve their profitability factor.

Using different methods to examine the same issue in pre-GFC data (2002–07), Sarkisyan et al. (2009) analysed the influences of asset securitisation on US BHCs using the tendency matching method to compare the ex-post securitisation of originators' banking institutions to the counterfactual group performance of equivalent, but non-originator banking institutions. As a bank performance indicator this study used the financial cost, measured as 'interest expense to total liabilities', of several risks including the ratio of non-performing loans or the ratio of loan–loss provision, and a number of measures of operating performance. The study found no evidence that securitisation transactions have a positive influence on performance of banking institutions.

Using a sample of 174 US commercial banks over the period 2001–08, Salah & Fedhila (2012) analysed the effect of asset securitisation on risk behaviour and stability of the banking sector. They found that a good alternative asset securitisation is related to the deterioration in the quality of the loan portfolios of US banks and the credit risk will increase in the balance sheets of banks. Conversely, the results point to a strong positive influence of asset securitisation on bank stability, which could be due to the different classes of securitised assets that give rise to a variety of

influences on the stability of US banks. In particular, the results illustrate that the effect of mortgage securitisation on bank stability was positive and significant, supporting the alternative hypothesis. Moreover, non-mortgage securitisation has a negative effect on the stability of banks due to reduced monitoring incentives of banks related to this particular form of securitisation.

Bhattacharyya and Purnanandam (2010) conducted an analysis of US commercial bank risk profiles immediately prior to the 2007 crisis. A significant rise in the banking sector's systematic risk profile was inferred between 2000 and 2006; the major driving force behind the profile was the idiosyncratic effect of residential mortgage loans and the levels of systematic risk. It was identified by the US stock market that improvement in the systematic risk of asset portfolios of banks occurs through high mortgage lending activity (and also securitising of mortgages).

Integrating bank-specific variables with country-specific variables, Angkinand and Wihlborg (2010) and Laeven and Levine (2009) investigated bank governance spanning several nations. Size, credit, quality, capital buffer and liquidity ratio were the bank-specific variables; the country-specific variables included per capita income, rights, capital requirements, capital stringency, restrict, deposit insurance, enforcement of contracts, merger and acquisition, GDP growth, inflation and interest rates. They conclude that there is a significant relationship between size, credit quality, capital buffer, liquidity ratio, GDP growth, inflation, and interest rate and credit and insolvency risk exposures.

By using three empirical models—fixed, random, and random as coefficient—Ben Naceur and Goaied (2005) examined the determinants of bank interest margin, performance and profitability in Tunisia between 1980 and 2000. They found that macroeconomic variables had no effect on Tunisian banks' performance and profitability through GDP per capita growth variables taken into account in the study; on the other hand, the results confirm that inflation has a positive effect on net interest margins.

Between 1995 and 2001 data from 584 local and foreign commercial banks from 15 EU nations were used by Pasiouras and Kosmidou (2007) in an attempt to identify the most important variables that significantly affect bank profitability. The sample consisted o 4,088 observations, which were analysed using the fixed effect regression model. The findings suggest that, whatever the ownership, European commercial banks' profitability is affected by bank-specific and macroeconomic variables; for all situations, in terms of macroeconomic determinants, inflation

and GDP growth have an effect in all three categories, but with the opposite sign for local (positive effect) and foreign banks (negative effect). The authors suggested that the cause of these mixed results may be the varying knowledge about each country's macroeconomic situation and the different segments of customer, which may under the same conditions give a different response.

Sufian (2011) used a set of balanced panel data for 11 Korea banks for the period 1993–2003 (including the pre- and post-Asian financial crisis) to examine the major elements of bank-specific and macroeconomic variables affecting bank profitability by employing fixed and random effect models. Regarding the effect of internal variables, the author concluded that there is a positive relationship between inflation and profitability of banks (ROA).This means that inflation was anticipated to a large extent by the Korean banks during the study period, which enabled them to adjust interest rates and earn higher profits during that period. Another key determinant is stock market development: the results confirmed that this has a positive influence on bank profitability at a significant level of 5%, which means that the Korean stock market is sophisticated and provides indirect opportunities for banks to curb credit default, and increase borrowing capacity and capitals to finance their equity capital. Added to that, the results showed that during the pre-Asian financial crisis period, Korean banks were mainly profitable, unlike in the period after the crisis.

Kosmidou (2008) attempted to investigate determinants of the performance of Greek banks using unbalanced time series data from 23 banks over the period 1990–2002. Several internal and external determinants were regressed against the banks 'ROA. The study revealed that ROA was positively associated with high capital and a lower cost to the return rate, as well as the size and GDP growth. Additionally, the inflation rate had a strong negative effect on performance.

Using data from five banks in Macau for the period 1993–2007, a study by Vong and Chan (2009) investigated the influence of characteristics of bank and macroeconomic indicators, and structure of financial entity on the banking institutions' performance. The findings illustrated that the bank's capital strength is the principal factor affecting profitability. Any bank that highly capitalises is supposed to be less risky and such a benefit will be converted into higher profitability. In contrast, assets quality (loan–loss provision) affects negatively the banks' performance. Moreover, banking institutions with a large retail deposit-taking relationship do not reach higher levels of yield than smaller banking institutions. In addition, with respect to

macroeconomic factors, only inflation rate showed a significant correlation with performance of banking institutions. In contrast, other macroeconomic variables such as interest rates and economic growth showed no correlation with ROA of banks.

## 3.3 Determinants of Bank Credit Growth

Financial intermediaries were considered highly significant in the pre-crisis era as they were engaged in the function of liquidity transformation, but a remarkable change occurred in the securitisation operation that enabled credit markets to perform this function. With the passage of time, the banking industry has diversified: it now performs the function of 'originate, repackage and sell' rather than 'originate and hold' as it has gained the opportunity to access credit along with gaining the efficacy of the bank lending channel of monetary policy. Securitisation activity has proved to be a plus for banks as it protects the supply of banks' loans from the influences of monetary policy. This is evident in the great number of banks of Europe that were investigated by Altunbas, Gambacorta and Marqués-ibáñez (2009).Securitisation activity was shown to be a crucial element for enhancing the banks' capacity to supply more loans but it is still reliant on business cycle phases and most importantly, risk positions of banks. The current experience of the sub-prime mortgage loans crisis seems quite enlightening on this issue (Altunbas et al., 2009).

The literature shows a positive relationship between the use of securitisation and other credit derivatives on the supply of credit (Cebenoyan & Strahan, 2004; Franke & Krahnen, 2005; Goderis, Marsh, Castello & Wagner, 2006). However, it is not clear if all customers benefit from the effects of securitisation (Hirtle, 2008). By removing assets from a bank's balance sheet, securitisation provides funds and regulatory capital to increase lending activity. Further, due to the increased options of risk management through securitisation, lending options increase. Goderis, et al. (2006) suggested that banks that had issued at least one collateralised loan obligation experienced a growth in their purposes of loan levels of ~50%. Franke and Krahnen (2005) provide evidence that banks that use loan sales increase their loan portfolio and thereby also increase the systematic risk of the issuing bank. Instefjord (2003) found that securitisation increases credit growth and thus enhances the competitiveness of the underlying credit market.

Hirtle (2008) provides a micro-level analysis of securitisation of bank lending and shows that credit derivatives increase the supply of credit in newly negotiated loans only to large corporate

borrowers and not to smaller borrowers. Further, using detailed datasets, the study shows that use of credit derivatives primarily affects the terms of lending, such as maturity and spreads, rather than the loan volume. Altunbas, Gambacorta and Marques (2007) using a large sample of European banks from 1999–2005provide evidence that securitisation has made the bank lending channel less sensitive to monetary policy. This is a worrying effect of securitisation, because monetary policy becomes ineffective if securitisation becomes widely used across the financial system. It has also strengthened the capacity of banks to issue more new loans, and this effect increases when the economy is booming.

In 2009, a study by Shin (2009) was done to determine the factors that influenced commercial banks' profitability in Swaziland between 1997 and 2005, using a sample of banks relating to the use of securitisation prior to the sub-prime crisis. He argues that the crisis originated in the increased supply of loans. This was caused by the usage of securitisation and the search for new assets to fill the banks' balance sheets. The higher risk-taking capacity of the shadow banking system led to expanding balance sheets and also an increase in leverage. After all the good-quality borrowers had been serviced, they continued to search for more opportunities, even among sub-prime borrowers, who ultimately defaulted on their obligations.

By using a sample of loan applications for the period 1992–2004, Loutskina and Strahan (2009) examined the relationship between securitising assets and the declining effect of bank finance on loan supply. They found that the low cost of deposits and increased liquidity ratio of balance sheets will increase the motivation of banking institutions to provide non-liquid loans rather than loans that simply could be sold or securitised, to take advantage of the failure of Fannie Mae and Freddie Mac to buy the originations of large mortgages to recognise the external change in the liquidity of mortgage. The mortgage originations volume of bank institutions relative to non-large mortgage originations is greater than holdings of liquid assets, and declines with the cost of increasing deposits. This result indicates that the growing secondary mortgage securitisation market sponsored by these institutions has reduced the effect of the lender's financial situation on the supply of credit.

Jimenez, Mian, Peydro and Saurina (2010) used comprehensive data on loan-level information for all loans granted in Spain quarterly from1999Q4 to 2009Q4. By merging the information with the balance sheet for both borrowers and lenders (firms and banks) this study estimated the effect of asset securitisation on the credit supply of banking institutions in Spain. At the level of the bank,

any increase in the ability of securitising real estate assets will lead to an increase in the quantity of credit extended to non-real estate companies. However, the results showed that the effect is very close to zero for the majority of the companies in the study, because of the competing recent bank credit; even so, securitising assets does not lead to an increase in credit for first-time clients, who are dramatically more likely to increase failure to payback. Also, securitising assists lead to more flexibility in conditions of credit, most likely because of hard competition. As a final point, the 2008 turmoil of the asset securitisation market contracted credit from more securitising assets subject to banking institutions; the total level of institutional influence on securitising asset-driven credit crisis has close to no effect.

The banking industry and the effects of the financial crises that took place in 2007–10 affected a great number of countries disproportionately, but Spain suffered most as it endured a pronounced housing bubble partially funded through impressive developments in the securitisation markets of the country, further heading towards looser credit standards along with consecutive financial stability intricacies. Rating changes in individual securitised deals and their effect on balance sheet bank conditions were taken into account to get to the root of consecutive deterioration of credit in Spain. This analysis was performed by Carbó-Valverde, Marqués-Ibáñez and Rodriguez-Fernandez (2011) on a sample of 20,286 observations linked to securities and rating changes between 2000Q1 and 2010Q1 in which they structured a model approximating the loan growth on balance sheet credit quality, and sequential rating changes. When the outcomes were analysed, they concluded that on-balance sheet loan performance has a high effect on loan growth with an interval of a minimum of two years. Moreover, rating changes had optimistic effects over loan performance with an interval of four quarters. The ratings were influenced greatly by certain bank features including cash flow generation, cost efficiency and solvency, and other features of banks influence the rating changes of securities released by savings banks more than that of securities released by commercial banks.

In the past 10 years, remarkable changes have taken place in bank credit among numerous emerging market economies.Guo and Stepanyan (2011) classified demand-side and supply-side causes of credit growth, emphasising the supply side, for 38 developing market economies. The investigation included both pre-crisis and post-crisis periods (2002–10). Credit growth was positively influenced by domestic deposits and non-resident liabilities where they equally contribute as finance for either domestic or foreign sources. Other factors that positively affect credit growth are GDP growth and inflation, whereas higher deposit rates indicative of tighter

monetary conditions and a tighter monetary policy in the US negatively affect credit growth. In a comparable scenario, the authors added more factors such as exchange rate (to gauge the influence of foreign currency credit); initial credit to GDP ratio (the higher the ratio, the lower the subsequent credit growth); and non-performing loans (NPLs) (a higher level of NPLs would reduce credit). The varying bank credit trends observed in a variety of developing nations for the past decade were studied by Guo and Stepanyan (2011). The research was conducted by taking the credit granted to the private sector as the dependent variable, whereas the large number of independent variables comprised the foreign liabilities of banks, volume of domestic deposits, rate of inflation, real GDP, interest rate on deposits, exchange rate, non-performing debt and the money supply. The conclusions were that credit provided by banks rose as a direct result of domestic and foreign financing. Also, a resilient economy augmented by local and global expansionary monetary policies ultimately boosts credit growth, raises inflation rates, multiplies the volume of credit and overall bolsters the banking sector.

Compared to loans that can be readily sold or examined, low-cost deposits and incremented balance sheet liquidity raising bank are more inclined to offer liquidity loans. With its holdings of liquid assets and the reduction in its price of increasing deposits, the volume of jumbo mortgage originations of a bank are related to increments in non-jumbo mortgage originations. According to the outcomes, the effect of a lender's financial conditions on credit supply is minimised by the incremental depth of the secondary mortgage market that is cultivated through securitisation (Loutskina & Strahan, 2009).

Loan applications submitted between 1992 and 2004 were included in the report and Congress passed HMDA into law during 1957. Further, with the intention of providing information to the public and regulators with respect to whether financial departments fulfil the local credit requirements, this law was expanded. Moreover, HMDA data and information are utilised by the regulators (Loutskina & Strahan, 2009).

## 3.4 Financial Crises and Bank Credit Growth

A study by Amri, Prabha and Wihlborg (2012) reported that for both advanced and emerging market economies, rapid credit growth is always followed by a banking crisis—the latest example being the GFC. However, there are exceptions and not all credit growth periods are followed by a

disaster. It is observed that a delicate financial system, resulting from spins or disproportions, also plays its part along with a credit boom in a financial crisis. Amri et al. (2012) identified the following as the most likely causes of a fragile system: high leverage, financial liberalisation, a high rate of capital influxes (e.g. bank loans) from overseas, a rise in asset prices, the presence of explicit or implicit protection of banks' creditors, and weak supervision of banks' risk taking. The study tested the viability of the supposition that interaction of these factors with high credit growth would lead to a banking catastrophe. Results from research on 77 countries during the period 1973–2009 were used as the foundation. Advanced economies provided the most prominent results, showing that continued credit growth combined with high leverage, feeble capital regulation and supervision, and aggregate asset price inflation raises the prospect of a banking disaster. These conclusions also stay true when viewed in light of the latest financial crisis. Although other factors responsible for financial fragility affect the crisis in their own individual manner, their importance varies with specifications, economic type and time period.

There are certain factors that influence the demand and supply side of bank lending concurrently as they are connected to average loan development. The financial crisis commenced in mid- 2007 promoting unfavourable conditions for the cost of funds, balance sheets of banks and profitability, reducing the supply of new loans. Hempell and Kok Sorensen (2010) made an attempt to analyse the credit supply on bank lending by using a sample of 118 banking institutions covering 16 Euro countries. They analysed the effects of the restrictions of supply over bank lending in the Euro area concentrating particularly on this financial period. Empirical evidence showed that the capability and compliance of banks for supplying loans typically has a direct effect on complete bank lending activity but it had a major effect when the financial crisis was at its peak. A disparate confidential dataset was considered for the outcomes when a cross-country panel econometric approach was implemented. The outcomes received from the Euro system's bank lending survey enabled the researchers to extricate the loan supply and its effect on demand. Supply-side restrictions created a negative effect on loan growth even after keeping a check and balance on the effects of demand. This scenario is applicable to households when acquiring loans for non-financial corporations and for purchasing of houses. In addition, Hempell and Kok Sorensen (2010) provided evidence to demonstrate the influence of restrictions over the supply side, particularly when it correlates the wholesale funding to interruptions while accessing banks along with their liquidity positions. These results were highlighted when the financial crisis began and parallel changes were made in the loan portfolios from banks that were made through prices in the beginning, and outright quantity restrictions were avoided for that time.

An empirical study by Aisen and Franken (2010) attempted to understand and evaluate the major elements of credit growth linked with banking institutions by means of acquiring samples from around 83 countries. This data sample was collected through a panel data regression technique covering June 2002–May 2009. When the results were analysed, it was deduced that the major reason for the post-crisis bank credit delay was the boom period of larger bank credit that took place before the crisis, and the lower GDP growth of trading partners. Later on, it was realised that integration and financial depth were also significant elements. Finally, the determinants of liquidity and countercyclical monetary policy were foremost elements for making the bank credit contraction convenient after the GFC. It required countries to act differently in this period and follow suitable structures related to the institution and macroeconomics found favourable for countercyclical monetary policies.

Aisen and Franken (2010) found that before the GFC, there was an escalation in the more substantial bank credit along with lowering of the GDP growth of trading partners, which served as significant elements of the post-crisis bank credit deceleration. Certain structural variables including integration and financial depth were also found in that period. After the GFC, improvement in the bank credit contraction is seen in which liquidity and countercyclical monetary policy played a crucial role. It required the countries to act differently in this time period and follow suitable structures related to institution and macroeconomic those are found favourable for countercyclical monetary policies.

Takats (2010) analysed the key drivers of cross-border bank lending to 21 emerging market economies between 1995 and 2009 and also studied bank lending behaviour of cross-border banks that issued the lowest number of loans during the financial crisis. The findings were based on data from 21developing nations and concluded that supply and demand factors equally contributed to the drop in bank lending activity and supply shock was the major driving force behind the decrease in cross-border lending of the developing economies throughout the crisis.

Another significant factor in the credit growth crisis was identified by Rai and Kamil (2010) to shed light on how the credit crunch cascaded in Latin America. Theirstudy examined the historical determinants of international bank lending to the region from 1999Q4 to 2008Q4 with respect to the source of funding (external *v*. internal). The countries that depended on external financing experienced more decline than others. The effect of internal factors like capital and the

quality of the loan was studied by Barajas et al. (2010) and used to explain the contrasts in the credit growth throughout the Middle East and North Africa regions by studying the effect of lending policies of all banks on the money supply of loans.

Variations in credit flow to the private sector are caused by supply and demand responses to a financial crisis and these reactions should be disaggregated by the policymakers who are concerned with the maintenance and development of viable forms (Mac & Bhaird, 2013).

Using loan-level data, Kwan (2011) provides empirical evidence on the supply-side effects of bank loan pricing. Following the GFC, the re-regulation of the banking industry, the new Basel capital standards, and the unfavourable capital market for banking firms seeking external capital led to an environment in the US banking sector in which a banking firm's own financial conditions were found to have significant effects on its loan supply. In a cross-section of banks, the study found that the bank's loan portfolio quality, profitability and unused lending capacity had significant explanatory power for its loan rates, after controlling for borrowers' credit risk and loan characteristics. Specifically, weaker banks were found to charge higher rates. These supply-side effects manifest into unusually tight lending conditions in the bank loan market. Bank loan spreads over the policy rate were ~20% higher than the long-term average, and about 1 percentage point higher than just before the GFC. The tight lending terms counteract monetary easing and could potentially impede economic recovery. Kwan used the transaction data for 1.6 million C & I loans extended by a panel of 429 commercial banks from 1997 to 2011 to study how the C & I loan rate behaved over time, after controlling for credit risk and loan characteristics. In addition to quantifying the tightness in the credit market, he also identified the channels through which banks tightened loan supply, including reducing the (quantity) discount on large loans and raising the risk premium on less creditworthy borrowers. Further, he delved into the supply-side effects of bank credit by examining how lender characteristics determine loan rates.

Holton, Lawless and McCann (2012) showed that, provided that it is mostly ambiguous whether the alterations are supply or demand driven, the reaction of private sector credit flows to financial and economic shocks can be hard to gauge. It is possible that as a consequence of a crisis, banks will be less eager to lend and firms will be less keen to borrow. Nonetheless, the policy implications of each of these are very different. Directly differentiating between movements in demand and supply, including alterations in credit terms and conditions, can be easily done because the 2009–10 survey of small and medium enterprises (SMEs) in the Euro area were

utilised in the research. Generally, the authors concluded that the possibility of larger and older firms being rejected for bank financing is very low. At the national level, the real economy, private sector debt overhand and financial/sovereign sector are the three elements recognised in the GFC. Accordingly, every element of SME financing is affected by the level of debt overhang. Moreover, there is evidence that the effect on credit rejection works through bank balance sheet and goes against the borrower balance sheet channel. It was found that bank CDSs and sovereign yields have an effect on the supply-side rejection and terms and conditions of credit solely, as expected. The results showed that the demand or want for bank financing is only affected by a declining real economy. In conclusion, the three dilemmas have separate effects and include the real economy that affects credit demand. Moreover, all three types of consumer are affected by debt overhang and sovereign/financial dilemmas influence supply decisions. The vastly weakening effect of the credit expansion is emphasised in this final finding and occurs before a financial crisis across the Euro area.

The period 1997–2009 was used to develop empirical work on the basis of the information related to 77 countries in Amri et al. (2012).That study incorporated the GFC and suggested that rapid credit growth occurred before numerous episodes of banking problems related to every advanced and rising market economy. Nonetheless, no such issues are evident after every episode of high credit growth. If the financial system is characterised by weakness as a result of disparities and disruptions in systems, it is possible that credit growth would cause a banking dilemma. The presence of explicit or implicit security of bank creditors, inadequate management of the risk-taking quality of banks, increased speed of capital inflows from abroad (e.g. bank loans), financial liberalisations and high leverage are the signs of potential fragility mentioned by Amri et al. (2012). The suggestion that these elements connect with high credit growth to increase the chances of a banking crisis augments will be verified in the present study.

According to the outcomes, the possibility of a banking dilemma is augmented by the comparatively high credit growth in advanced economies over periods of many years. Moreover, high leverage, cumulative asset price inflation and fragile capital regulation and supervision exacerbate this effect. Regarding the addition of the earlier crisis period, these outcomes are rather fixed. The possibility of banking issues is affected separately by the additional financial fragility symptoms although the importance of these effects is different for factors like the period, type of country and specifications.

Jimenez Porras, Ongena, Peydro and Saurina (2012) found that episodes of steadily low credit and economic growth play a role in banking crises for non-financial corporate borrowers; the balance sheets of banks are also fragile. Thus, the question was whether supply or demand elements play a role in the decrease of credit growth. Nonetheless, owing to the deficiency of detailed loan application, bank and firm-level data, the act of convincing identification and recognition could not be defined. The identification of bank and firm balance sheet channels was possible due to the availability of a dataset of loan applications in Spain over the period 2002–10 that matched with complete bank and firm balance sheet channels. There was strong evidence that bank balance sheet strength measures the accomplishment of loan applications and the funding of loans in crisis times. The loan funding in both good and crisis times was measured by the heterogeneity in firm balance sheet strength even though the effectiveness of this firm balance sheet channel in the crisis time was at its peak. The results had significant implications for both policy and theory.

Since mid-2008, loans to households have slowed down in Europe. Specifically in the context of the financial upset, the question of whether beyond fragile demands this also shows supply limitations are applicable and although loan demand is cultivated through minimum policy rates, this might not be helpful in solving the issue of latent supply side. A loan demand equation was calculated while utilising a panel of Euro area countries to quantify the significance of supply and demand influences in this paper, and its ability to answer such queries is double. First, while avoiding an important source of bias that normally affects loan data, a sequence of outstanding loans are fine tuned for securitisation. Then, along with income conditions and opportunity prices, house prices and credit standards are also incorporated. The latest empirical papers imply that the utilisation of credit standards to attain supply conditions proved advantageous, so the addition of the latter is in agreement with the paper. The cost of funds, and balance sheet limitations, such as supply condition and prospects related to general economic activity cycles are the two variables that are utilised to calculate the credit standard of a bank. According to the outcomes, loans are negatively related to credit conditions and interest rates and positively related to real GDP and housing prices (Adalid & Gómez-Salvador, 2011).

On the basis of the ex-ante possibility of a covenant violation, Kwan (2011) explored how lender-specific shocks affect the strictness of the loan contract that a borrower achieves, and how the innovative quantity of contract strictness is utilised. In the latest portfolio performance, the study found proof from the manipulation of between-bank differentiation that banks apply tighter checks after enduring defaults to their own loan portfolio, unlike their partners (Kwan, 2011).This

behaviour occurs even when defaulting borrowers are from more diverse industries and geographic areas than the present borrower. After manipulating for bank capitalisation, the influence of recent defaults carries on, even though tighter checks are clearly related to negative bank equity shocks. With lenders gaining more knowledge regarding their own screening technology through defaults and then adjusting contracts as a result, the proof and evidence is filled with it and constant. In the end, for borrowers who rely on a comparatively small circle of lenders, contract tightening is recommended and is available with every increasing default that involves convent tightening equal to that of a ratings downgrade (Kwan, 2011).

Grodzicki, Hałaj and Żochowski (2010) used data from a Polish bank lending survey in SLOS, in which 24 banks were asked whether they were able to identify the prerequisites for establishing a means to convey the risks of the monetary policy in the Polish banking sector. The study based its results on the survey data with modifications to factors related to the demand side. The individual bank lending policies of the banks were found to be more influential than the financial constraints (capital and liquidity) in driving credit growth. The perception of risks by banks greatly transformed the policies of bank lending. The effectiveness of monetary policy diffusion is diminished in the small, open economies such as Poland, in contrast with large, developed economies.

It was shown by Ezirim (2005) that bank lending decisions are associated with huge risks and require professional expertise and skills of the highest calibre in this regard. He indicated that a good analysis of credit, and high quality in the display, organisation and preparation of reports on the part of credit analysts played a pivotal role in the success of all lending decisions.

Bank lending decisions are a combination of many elements, as shown by Chodechai (2004), where the most prominent are the interest rates, the volume of lending and the identification of collateral. The author also cautioned that banks in relation to passing loan pricing judgments; a low interest rate imposed by the bank will not able to generate enough interest income to efficiently meet the costs of deposits and general expenditures, and non-performing debt; and a high interest rate will promote non-payment on behalf of borrowers.

The major objective of Rabab'ah (2015) was to analyse the elements of lending by commercial banks in Jordan. The evaluation was based on data from 10 Jordanian commercial banks over the period 2005–13. The ratio of credit facilitations to total assets was used as the dependent variable

and there were 11 independent variables: capital ratio, lending rate, ratio of deposits, liquidity ratio, window rate, economic growth rate, inflation, asset size, ratio of non-performing loans, and legal reserve ratio. The ratio of credit facilitations (dependent variable) was positively affected by the bank size and the rate of economic growth, whereas the window rate, ratio of non-performing loans and liquidity ratio negatively influenced the dependent variable. These results suggested that excess liquidity should not be practised in Jordanian banks and they should be more concerned with decreasing the rate of non-performing loans.

Imran and Nishat (2013) examined the determinants (identified following analysis of different scenarios) and elucidated the term 'bank credit' in the context of businesses, different fiscal environments and rising intricacies worldwide. Continuous changes in the behaviour of bank credit were analysed and explained through major explanatory variables such as money market rate, real economic growth, exchange rate, growth of liabilities from foreign markets, $M_2$ as a percentage of GDP, and growth in domestic deposits; the dependent variable was the growth in bank credit to the private sector. The ARDL econometric approach was considered suitable for comprehending the supply side and the data were taken from the period 1971–2008 annually for Pakistan. If the authors considered the long-term effects of bank credit on the private sector in Pakistan, they inferred that domestic deposits, economic growth, monetary conditions, foreign liabilities, and exchange rates were highly influential. In contrast, private credit was not influenced by the increase in inflation and money market rates over the long term. Assuming short-term data meant that private credit did not have any effect on domestic deposits. This may have been due to immediate loans never being sanctioned by banks using existing money deposited by account holders. The acquisition of loans represents a significant effect on liquidity and financial health, as indicated by the outcomes. When Pakistanis in a stronger economic condition, as shown by the GDP, the allowance of more private credit to businesses acts as a motivating factor. In this regard, the stability of long-term relationships can be seen by the outcomes, whereas in the short term, there may be instability for some time but it will soon return to its previous position at the rate of 53.5% annually. Imran and Nishat (2013) did not explain their choice of financial reform period (1990–2008) and non-financial period (1971–1989) related to the behaviour of bank credit and demonstrated in Pakistan.

The outcomes of various studies illustrate that credit is defined according to the financial health and liquidity of banks, whereby good economic circumstances compel banks to provide a larger volume of credit to the private sector. The variation in the bank credit available to the private

sector in six countries of the South Pacific between 1982 and 2009 was studied by Sharma and Gounder (2012). In their examination, they treated available credit as a dependent variable and the following variables were considered independent: average interest rate on the loans, the rate of inflation, ratio of deposits to GDP, size of the banks' assets of output, a dummy variable reflecting the existence of a financial market, and GDP. The outcomes revealed that higher average interest rates on loans and higher inflation rates had a negative effect on the rate of growth in credits, whereas the size of the deposits and assets had a positive influence on the growth of credit.

Russian banks were studied by Chernykh and Theodossiou (2011), who showed that the majority of banks approved only 50% of their total resources in the form of long-term loans to the business sector, with a vast difference in the ratio of one bank to another. They also identified different levers such as the capital, volume and availability of long-term liabilities that determine a bank's capability to raise long-term commercial loans; bank ownership did not influence the size of loans. Further, banks were reluctant to issue a commercial loan for longer than three years, and those that operate with a low level of capital and in highly competitive areas were also hesitant to approve long-term loans. Several complications were encountered by banks when granting long-term loans to companies; for instance, poor protection of creditors' rights, and lower creditworthiness of borrowers.

Commercial banks in Nigeria were studied by Olokoyo (2011) to identify bank lending factors during the period 1980–2005, and their influence on banks' lending behaviour. Loans and advances issued by Nigerian banks were taken as dependent variables, and the independent variables were the size of the deposit, the size of the investment portfolio, the interest rate on the loans, the reserve requirement ratio and the liquidity ratio. These variables were validated by a regression analysis that also confirmed the statistical importance of the study model. The size of deposits of commercial banks had the greatest influence on the lending behaviour of Nigerian banks and to further improve bank lending behaviour, the banks must attract more deposits.

Berrospide and Edge (2010) used balance sheet data for large BHCs and panel regressions over the estimation period 1990Q3–2008Q3 for VARs. The bank's capital available for lending was the determining factor that linked financial conditions to the real activities of the bank. The authors assessed bank lending capacity of large banks using a shared regression analysis and reported a small influence of capital on the size of bank loans.

Credit markets have been influenced remarkably by credit derivatives, which are the latest invention in the credit field. To investigate the link of credit derivatives to an increment in bank credit supply, Hirtle (2008) took a small dataset of individual corporate loans in which a sample was formulated with 979 observations taken from 58 banks initialising from 1997Q2 to 2006Q4. Around 550,000 private, industrial and commercial loans were examined to obtain these 979 bank-level observations. From the outcomes' analysis, a greater bank credit supply for long-term loans was discovered on the basis of the utilisation of more credit derivatives. The long-term loans of bank credit were referred to as newly negotiated loan extensions to big corporate firms, which were not meant for commitment lending. The findings suggest that the extension of credit derivatives may not be of more benefit to merely large corporations most probably known with 'named credits' in such transactions. However, the influence of credit derivatives can be felt through the terms of lending also; that is, longer loan maturities with lower spread, in place of loan volume. Overall, credit derivatives were found to be beneficial for banks in terms of other hedging forms.

An approach linked with demand and supply indicators was investigated by Iriniand Gerti.A vector error correction mechanism was utilised to recognise and assess the long-term determinants of bank credit to the private sector of Albania, using data from 2001Q1to 2011Q4. The results identify the existence of an adjustment mechanism that assists in regaining a state of equilibrium through bank credit. They also imply that lending from banks demonstrates a rise in economic growth and a higher lending demand as seen through financial liberalisation, financial intermediation and banking. In this period, the effects of consumption smoothing and demand valuation were seen in the exchange rate. In addition, the creation of more lending incentives was witnessed through a more qualitative bank credit, reduced government domestic borrowing, and lower costs of lending.

Numerous research studies have examined the factors that determine lending; either supply-side determinants, demand-side determinants or both, in the same model. Other studies try to distinguish the effect of both types of determinant in two separate equations.

Fluctuations in property markets and cyclic movements in national economies have often contributed to a knock-off effect on credit markets. Although much effort has been expended on documenting this phenomenon, it is perceived that there has been no formal effort in this regard. Correspondingly, Hofmann (2001) could be credited with initiating a study to understand the

determinants associated with credit in the non-banking private sector, in the context of 16 industrialised nations beginning in 1980, while co-integrating VAR. Associated analyses concluded that long-running credit development may not be justified on the basis of simple factors determining demand. Instead, it was seemingly associated with property prices, which were taken in conjunction with a weighted average corresponding to residential and commercial property rates in the context of the overall setup. This contributes to our understanding of the dynamics associated with real credit in terms of GDP in addition to property rates, but contrasts with actual interest rates. Such long-term relationships could be interpreted in terms of extended credit demand relationships, which would reflect the extent of credit supply available. The Cholesky decomposition paradigm, in conjunction with impulse response analysis, concluded that there is a major two-way dynamic relationship with regard to bank credit versus property rates. It was also concluded that fluctuations in the short-term real interest rates have a corresponding influence on bank credit, the GDP and prevailing property rates.

The factors influencing loans in the Euro zone were analysed by Calza, Gartner and Sousa (2003), who used the Johansen model to provide an understanding of the interrelationships between loans, GDP and interest rates. They concluded that long-term loans are influenced by GDP levels while being negatively affected by short- and long-term interest rates. The associated signs and magnitude related to the coefficients demonstrate a co-integrating vector that reflects a long-run demand equation. The associated short-term loan dynamics relating to the requirements of the overall Euro zone were correspondingly developed on the basis of a vector error correction model (VECM). Multiple tests conducted in the paradigm of the VECM led to conclusions based on tests associated with stability within the modelled parameters. This reflects a lack of breaks in the overall structure associated with the period of the sample: between Q1 of 1980 and Q2 of 1999. Thus, the model reflects the progress in loans disbursed within the Euro zone in the private sector.

Cottarelli, Dell'Ariccia and Vladkova-Hollar (2005) reflected on the long-term relationship between bank credit within the private sector and the GDP ratio, in the context of multiple economic and institutional variables associated with a few non-transition developing and industrialised countries. The equilibrium of the credit to GDP ratio within Central and Eastern Europe (CEE) in the Balkans is used as a measure, leading to the conclusion that overcrowding affects the overall scenario in relation to a negative coefficient associated with the public debt ratio. The measure is also influenced by the ratios associated with the levels of loan available in conjunction to the GDP per capita, and the level of inflation observed above a specific measure,

which has an apparent negative effect on the dependent variable. Increased levels of financial liberalisation and the extent of transparency in accounting methodologies employed contributed to higher bank credit versus GDP ratios.

Égert, Backé and Zumer (2006) evaluated how domestic bank credit within the private sector accounts for a percentage of the GDP, for 11 countries in the CEE. Three procedures were used to draw up the model, including the fixed effect ordinary least squares (OLS), the panel dynamic OLS, and the mean group estimator. The 43 countries evaluated were further subdivided into smaller groups. The researchers initiated the study by first drawing a baseline model to conclude negative relationships vis-à-vis the private credit in circulation, with GDP ratio as a dependent variable in the context of bank credit in the public sector, lending rates, the level of inflation; and the existing spread in the context of the lending and deposit rates reflective of the level of financial liberalisation. Thus, the GDP per capita was concluded to be positive with respect to the dependent variable. This helps understand the integrity of the overall model while utilising alternative measures associated with the explanatory variables instead of the baseline equations associated with GDP per capita by real GDP growth, versus actual industrial production figures, the long- and short-term rates of lending, the Producer Price Index by Consumer Price Index figures, and the related. Finally, the prevailing housing rates were aligned with a dummy towards the credit registry.

Albulescu (2009) utilised OLS processes to understand two equations associated with the credit growth rate in relation to the domestic currency, with foreign denominated monies as a dependent variable in the Romanian context. With the first equation, the researcher calculated credit growth rates proportional to economic growth, the level of deposits in the internal money markets and employment rates, all of which interact inversely with increases in wages and prevailing interest rates. The second equation is associated with the dynamics associated with foreign currencies in terms of net wages and the levels of foreign currency deposits. Correspondingly, the ratios associated with foreign currency credit versus deposits is a major issue that is negatively related in terms of growth rates attributed to the foreign currency credits that are extended.

In conjunction with the GMM processes, Köhler, Hommel and Grote (2006) identified multiple factors influencing the total credit extended to the private sector, and the same denominated within the domestic ‘Albanian lek’ for 2004–06. The study reported a positive correlation associated with the dependent variable in terms of NEER, GDP, the liquidity within the banking

system and the interrelations within monetary policy indicators and liquidity, even though the last two factors were not major determinants. On a related note, the relationship could be construed to be negative with regard to the repurchase agreement rate, the overall size of the institution and how monetary policy and size relate to each other.

Suljoti and Hashorva (2012) evaluated residential price versus mortgage loans in an empirical context for the period 1998–2010, concluding that these factors are proportional to each other. Mortgage loans correlate with income levels but are inversely proportional to interest rates. Suljoti and Hashorva (2012) concentrated on the determinants of credit growth post-2008, for a panel of 10 countries, between 2008Q4 and 2011Q3. Loans for economies in the aftermath of the financial crisis were adversely influenced in terms of NPLs and associated interest rates, although overall economic growth, sources of funds and foreign borrowings positively stimulated lending.

It is hoped that the study will provide a better understanding of factors related to the determinants of bank credit in the Albanian context. Although earlier studies may have touched on the issue in the context of Albania as one country in a panel, this study specifically focuses on that country. Therefore, the other studies were examined for reference purposes. Additionally, both demand and supply factors are included in the study together, instead of these determinants being considered individually. Further, the study focuses on a longer time span with regard to the state of bank credit in the country.

## 3.5 Summary

The financial industry has changed much in recent decades, stimulated by increased competition, deregulation, technological revolution and the demand for higher levels of profitability. This has led to the adoption of ambitious growth and diversification strategies in major financial institutions in advanced countries. These dynamic changes produced a rapid and profound deregulation of the industry, which was enhanced by a prolonged period of low interest rates and high liquidity. The rapid consolidation of the financial sector at the national and international levels has taken place both in specific segments and across the entire spectrum of the industry, conforming huge financial conglomerates that offer trading and investment banking, insurance and pension funds, and other services. However, this dynamic, which is usually justified by

arguments about efficiency and economies of scale, has raised concerns about the stability of the global financial system.

Banks have boosted their traditional leverage strategy, although dangerously procyclical management is conditioned by the expected risk. Thus, to the extent that the increased proportion of assets are financed with debt, banks became more profitable but also more risky. In addition, the increasing integration of financial systems and the proliferation of innovative instruments that facilitated the transactions and risk diversification converted banks into institutions that were extremely complex and difficult to control by regulators and governments.

The higher intermediation costs resulting from the new Basle rules will result in higher costs of funding and saving less reward. This is particularly complex because agents in the banking sector are the only source of funding and positioning of its surpluses. Consequently, SMEs and households with moderate and low income should be the most affected sectors. From the geographical point of view, the asymmetries could be equally remarkable.

Although the GFC was generated locally, where good financial practices had deteriorated due to a lack of timely response by supervisory authorities, the interrelationship between markets made possible through financial innovation. Thus, a local crisis became a crisis of confidence that affected financial markets.

This crisis of confidence was only corrected abruptly; without discrimination between types of markets, asset classes and/or types of issuer, excess optimism that affected agents has intervened in financial markets (as well as plaintiffs as suppliers of resources) as well as supervisors who, in a way, were engrossed with watching the benefits of financial innovation without paying enough attention to the proper functioning of the market discipline. When actors and agents in financial markets ‘woke up’, they found that the chain reactions caused by the globalisation of financial markets had an inertia that was difficult, if not impossible, to control. This time, unlike in earlier financial crises, the confidence crisis became a liquidity crisis.

What began as a crisis in a very specific segment of the US mortgage market penetrated, with surprising speed, the heart of the financial system–the interbank market–forcing other central banks to intervene substantially in concerted and creative ways. The counterparty risk among financial institutions has increased significantly, making these institutions subject to significant

losses and many pressures on their balance sheets. The wide exposure of certain entities, primarily the US and Europe, to complex products used for the securitisation of low-quality mortgages originated in the US, along with the difficulty of valuing non-liquid markets and products, especially when their risks are not are properly measured by credit rating agencies and this has been a key element in the rapid deterioration in financial systems.

The mutability of this crisis, which originated in the US mortgage market, has revealed the existence of a number of weaknesses in the functioning of financial markets in more developed countries. These weaknesses need careful analysis, while requiring corrective actions that will strengthen the solidity of the financial system. Doubts about the market's ability to overcome this situation by itself in an economically acceptable way are intensified by the very events arising in the financial sector, where, there are voices demanding action, more or less directly, from an aggressive public sector, both in terms of monetary and fiscal policies, and through the use of public money to solve the crisis.

# Chapter 4: Research Methodology

## 4.1 Introduction

The literature indicates a positive relationship between the use of securitisation and other credit derivatives, and the supply of credit (Cebenoyan & Strahan, 2004; Franke & Krahnen, 2005; Goderis, et al., 2006). However, it is not clear if all customers benefit from these effects of securitisation (Hirtle, 2008). By removing non-liquid assets from a bank's balance sheet, securitisation provides funds and regulatory capital to increase lending activity. Further, due to the increased options for risk management through securitisation, lending options increase. Goderis et al. (2006) reported that banks that have issued at least one collateralised loan obligation experienced a growth of ~50% in their purposes of loan levels. Franke and Krahnen (2005) provided evidence that banks that use loan sales increase their loan portfolio, thereby increasing the systematic risk of the issuing bank. Instefjord (2003) showed that securitisation increases credit growth and thus enhances the competitiveness of the underlying credit market. In a micro-level analysis of securitisation of bank lending, Hirtle (2008) showed that credit derivatives increase the supply of credit in newly negotiated loans only to large corporate borrowers; not to smaller borrowers.

Further, using detailed datasets, Altunbas et al. (2007) showed that the usage of credit derivatives primarily affects the terms of lending, such as maturity and spreads, rather than the loan volume. This suggests that securitisation has made the bank lending channel less sensitive to monetary policy. This is a worrying effect of securitisation, as monetary policy becomes ineffective if securitisation becomes widely used across the financial system. It has also strengthened the capacity of banks to issue more new loans, and this effect increases when the economy is in a boom. Shin (2009) related the use of securitisation to the sub-prime crisis. He argued that the crisis originated in the increased supply of loans. This was caused by use of securitisation and the search for new assets to fill banks' balance sheets. The higher risk-taking capacity of the shadow banking system led to expanding balance sheets and an increase in leverage. After all the good-quality borrowers had been serviced, banks continued to search for more opportunities, even among sub-prime borrowers, who ultimately defaulted on their obligations. Credit growth will be

measured as a percentage of change of total loans of a banking institution with regard to the same variable in the previous quarter.

Recent developments following the working environment of economic units led to changes in the perception of the nature of the relationship between economic units and the community that works inside. The question is whether unit managers were fully aware of these developments and should use the latest techniques and methods to maximise profitability in light of acceptable risk. This is particularly true for banks and similar financial institutions given the nature of their financial resources, which necessitates the use of appropriate policies.

Securitisation of debt provides many advantages, especially for banks that seek to provide appropriate financial instruments. It enables them to (i) rid themselves of the burden of servicing these assets and guaranteed due dates until debt maturity (such as conservation and maintenance expenses); and (ii) improve the liquidity and credit markets to increase the availability of credit to borrowers and give them the opportunity to access funds at low cost. However, that does not mean securitisation is free of difficulties, including (i) estimating the elements of future cash flows, especially with the investment; and (ii) defining risk belonging to each of the parties to the securitisation before the completion of the securitisation process.

In the current study, the review of related literature on the effect of asset securitisation on bank credit growth finds was limited to research that investigated the effect of securitisation and other lending determinants of credit growth on bank credit growth. Consequently, the effect of asset securitisation remains ambiguous, especially with respect to the effect of the securitisation process on bank credit growth.

The current study investigates the effect of asset securitisation and other credit growth determinants on credit growth of banking institutions and how this financial tool can improve the operational performance of banking institutions.

Although some effort has gone into empirical analysis of the securitisation process, a number of key issues remain a matter of debate or are ambiguous. Based on the background ideas and aspects of the problem presented in previous chapters, this research focuses on addressing the following question:

*To what extent do asset securitisation and other credit growth determinants affect the credit growth of banking institutions in terms of credit growth during crisis and non-crisis periods (pre- and post-GFC) ?*

The following sub-questions were designed to answer the main question:

- What is the nature of the relationship between asset securitisation and other credit growth determinants, and growth in business loan activity during crisis and non-crisis periods?
- What is the nature of the relationship between asset securitisation and other credit growth determinants, and growth in housing loan activity during crisis and non-crisis periods?

The primary objective of any investor is maximising return and minimising risk. The funding mechanism of securitisation is a recent innovation (as an instrument of OBS activities or non-traditional banking activities) that depends on pooling financial assets and issuing securities (bonds backed by future cash flows of those pooled assets) that are repaid via cash flows generated by these assets. On the other hand, securitisation converts non-liquid assets of financial institutions to liquid assets to be used as an alternative source of funding. This can be achieved through a real sale of the assets to a bankruptcy-remote vehicle that funds the process by issuing securities. This process can create a class of securities in which the underlying risk is removed from the originator, and credit quality is higher in general.

Therefore, the main objectives of this study are to:

- Examine the effect of using asset securitisation (OBS activities) and other credit growth determinants, on the credit growth of banking institutions (originators).
- Evaluate the relationship between bank credit growth determinants in different periods (pre-GFC, GFC and post-GFC).

This study is important because it addresses a central issue that led to crisis for the largest economies in the world, causing recession and high unemployment rates unseen for decades, and that also was one of the main causes of the GFC, which not only lead to the decline of financial markets but also spread to other economic sectors. The research also examines the implications of the crisis on local and global economy levels, and contributes towards a clear picture about the positive and negative effects of using asset securitisation as a tool for modern financial institutions. Finally, it will contribute to knowledge about the causes of the GFC; thus economists

and experts, and researchers and students will benefit from the study's recommendations, which will promote the development of appropriate solutions to such crises.

To achieve the research aims and objectives, the research methodology consists of the basis and the processes of the approach taken to address the research questions.

Given the importance of using asset securitisation in the current financial system, it is necessary to understand how it affects the banking sector at the macro and micro scale. We need to know what the effects of securitising assets are on banks' credit growth by using growth indicators for business and housing loan activity. Some studies have discussed the effects of securitisation on credit growth, but the variables used did not resolve ambiguities. Academics are increasingly doubtful that securitisation reduces bank risk and increases financial stability (Loutskina, 2005). Among other factors, the GFC has given rise to the view that securitisation destabilises the financial sector and increases systematic risks. The theory is unclear about the effect of securitising assets on the level of credit growth activity. This is mainly because of the different influences of securitisation on the efficiency of operational performance level of a bank through direct and indirect effects.

To test the relationship between securitisation activity and bank credit growth, this study begins with the determinants of bank credit growth and concentrates on the growth of both business and housing loan activity, which are used as financial performance indicators of a bank. The first indicator uses three different measures: credit growth (CG), business loans growth (BLG) and credit card loans growth (CCLG).The other indicator used four measures: housing loans growth (HLG), housing loans owned growth (HLOG), housing loans investment growth (HLIG) and housing loans others growth (HLOTG).

To outline the methodology adopted to achieve the research objectives, this chapter is divided into seven sections: the approach adopted to examine the effect of asset securitisation (non-traditional activities) and other credit growth determinants on bank credit growth; the data type and techniques used in data collection; the nature of the sample, including sample size; the study period; the approaches used to manage and analyse the data; and the process used to construct empirical models, including the identification and measurement of factors.

Developing an understanding of the economic and financial outlook of a bank's financial success and performance is possible through the use of different financial indicators. The analysis of the credit growth of a banking institution through financial indicators assists in the interpretation of indicators based on the relationship between these categories. These indicators are also frequently used to assess banking credit growth, and allow for comparative analysis among banks.

The measures used to evaluate the credit growth of banking institutions include commonly used indicators, balance sheets and income statements that are publicly available, along with relevant footnote information. The financial performance of banking institutions can be determined through a wide range of financial indicators.

The conceptual framework used here was developed and built from previous studies and is shown in Figure 4.1. This figure illustrates the relationship between indicators and factors; that is, the relationship of the dependent variable (credit growth) with independent variables, otherwise known as explanatory, or supply- and demand-side variables.

The study examines the determinants of credit growth of Australian banking institutions. The pooled OLS method is employed for data analysis. The explanatory variables consist of bank- or industry-specific factors, which represent the supply-side determinants and macroeconomic factors, which represent the demand-side determinants. The dependent variables serve as measures of credit growth of a banking institution, which is represented by business loan growth activity indicators (CG, BLG and CCLG) and housing loan growth activity indicators (HLG, HLOG, HLIG and HLOTG). This study includes a careful selection of 11 variables: eight representing explanatory variables (four each of supply- and demand-side determinants); two added as dummy variables to examine the impact of the GFC and securitising assets; and one that was excluded due to the limited study sample. The remaining 10 represent dependent variables.

## 4.2 Hypothesis Development

In developing hypotheses to be tested in research, the main objective is to examine whether there is a significant influence of each independent variable on the dependent variable, and to evaluate the significance of the combined effect of the independent variables on the dependent variable. Thus, the null and alternative hypotheses to be addressed in this study are:

**H0:** Supply-side factors (size, liquidity, deposits and asset securitisation), demand-side factors (GDP, inflation, interest rate and unemployment) and dummy variables (financial crisis and securitisation activity) have no significant effect on the credit growth of Australian banking institutions.

**H1:** **S**upply-side factors (size, liquidity, deposits and asset securitisation), demand-side factors (GDP, inflation, interest rate and unemployment) and dummy variables (financial crisis and securitisation activities) have a significant effect on the credit growth of Australian banking institutions.

**H0:** Supply-side factors (size, liquidity and deposits), demand-side factors (GDP, inflation, interest rate and unemployment) and financial crisis as a dummy variable have no significant effect on the credit growth of foreign banking institutions.

**H1:** Supply-side factors (size, liquidity and deposits), demand-side factors (GDP, inflation, interest rate and unemployment) and financial crisis as a dummy variable have a significant effect on the credit growth of foreign banking institutions.

## 4.3 The Determinants of the Credit Growth of Banking Institutions, and Selection of Variables

The determinants of the credit growth of banking institutions can be classified as bank-specific, and internal and external factors (bank-specific and macroeconomic factors). These internal and external factors can affect the output of banking functions. The internal determinants (classified in this study as supply-side factors) are the characteristics of banking institutions that could affect their credit supply in different ways. These factors can be affected internally by management decisions of the institution and thus are somewhat under institutional control. In contrast, external determinants represent the environmental conditions in which the banking institution operates, which are called sector-wide determinants (classified in this study as demand-side factors). These types of factors are beyond the control of the institution's management (out of control), which affects the credit supply (money supply) of the banking institution and reflects financial performance.

Some authors have suggested that supply and demand determinants (internal and external or macroeconomic) have an effect on the credit growth of banking institutions (Everaert et al., 2015; Saito, Savoia & Lazier, 2013).Therefore not all external factors have been included in previous

studies. In addition, to the best of the researcher's knowledge, the crucial element—the effects of using asset securitisation on the credit growth of banking institutions—has not been studied in the same sample as other factors. Therefore, this study will include all supply and demand factors that could influence the credit growth of banking institution and for which data are available, to fill this gap in the literature.

In addition to investigating the effect of asset securitisation and other lending determinants on the credit growth activity of banking institutions, this study examines whether relationships between banks' credit growth determinants were affected by the GFC, by considering three periods (pre-, during and post-GFC). Therefore, the methodology used in this thesis must be adapted in such a way that the sub-research questions are addressed. Three approaches are used to examine whether determinants of banks' credit growth were affected by the GFC: the first is the dummy variable approach, and the second is to compare the results of running three sub-samples. The dummy method addresses whether relationships were affected by the GFC, represented as a significant dummy variable for the study period, by dividing the sample into three sub-samples—pre-GFC, 2004–06; GFC, 2007–09; and post-GFC, 2010–12—similar to Ommeren (2011) and Dietrich and Wanzenried (2011).

For banking institutions, the return to stability and continuity in the banking industry was the main objective of their operating activities; therefore all plans and strategies were designed to achieve these purposes. Although this is not the sole objective of banking institutions (e.g. entities have other aims associated with existing in the industry, including social and economic development aims), the objective of the current study relates to the main aim of banking institutions (credit growth) as part of their financial performance. Credit growth can be measured using a range of indicators but this study employs two indicators: the credit growth base indicator will be measured using growth in business (CG, BLG and the CCLG) and housing (HLG, HLOG, HLIG and the HLOTG) loan activity.

Although the literature identifies other variables that can influence the growth of credit, these are not investigated here due to a lack of data and try to run the regressions according to the variables collected and available and run the equations with alternative specifications found.

This section describes the dependent and independent variables selected in this study to analyse bank credit growth. Table 4.1 provides a description, definitions and expected sign of variables for the equations given below.

The importance of banks lies in their important role in stimulating the overall money supply: they not only accept deposits but also generate those deposits. A banking system refers to a group of institutions that deal in credit, where most banks' revenue comes from credit activities and their benefits, and interest in the credit function comes from the duties of the bank on the grounds that the financial position of any bank is influenced by variables and many elements. However, the loans portfolio in particular occupies an important position at the centre of the instruments of the banking financial system. The importance of lending in the banking sector lies in it collecting savings and then re-injecting those savings into the economic system. Therefore, the soundness of the loan portfolio leads to the achievement of high returns for a banking institution at the lowest possible level of risks associated with decisions regarding the granting of credit. Credit cycles are correlated (though not perfectly) with economic cycles, as supply and demand for credit are tied to economic activity.

Credit growth due to using asset securitisation will be measured as the percentage change of total loans of a bank with regard to the same variable in the previous period:

$$CG = \alpha + \beta_1 CV_{i,t} + \varepsilon_{i,t} \qquad (1)$$

Where CG refers to the percentage of change in total loans of a banking institution with respect to the same variable in the previous quarter and *CV* refers to the set of control variables included in this study.

The CG indicator in this study is used as one measure of business loan growth activity, measured through using the following equation:

*CG = & change in total credit of a banking institution with respect to the same variable in the previous quarter.*

The indicator of business loans growth activity in this study is measured according to the following equation:

*BLG = % change in total business loans of a banking institution with respect to the same variable in the previous quarter.*

CCLG is another important indicator of business loan growth activity, measured here using the following equation:

*CCLG = % change in total credit card loans of a banking institution with respect to the same variable in the previous quarter.*

HLG is one way of measuring housing loan growth activity, using the following equation:

*HLG = % change in total housing loans of a banking institution with respect to the same variable in the previous quarter.*

HLOG indicator measures the growth of housing loans owned, which is used to indicate housing loan growth activity according to the following equation:

*HLOG = % change in total housing loans owned by a banking institution with respect to the same variable in the previous quarter.*

This indicator measures the growth of housing loans investment which used to measure housing loans growth activity this indicator could be measured through using the following equation;

*HLIG = % change in total housing investment loans of a banking institution with respect to the same variable in the previous quarter.*

The indicator HLOTG measures the growth of other types of housing loans, which are used as one of the indicators for housing loan growth activity according to the following equation:

*HLOTG = % change in total housing loans others of a banking institution with respect to the same variable in the previous quarter.*

The next section describes the independent variables selected in this study to analyse bank credit growth, organised according to the following dimensions: supply- and demand-side determinants. Supply-side factors are represented by bank size, total deposits, liquidity ratio and asset securitisation, and demand-side factors are represented by GDP, inflation rate, interest rate and unemployment rate (see Table 4.1).

Supply-side determinants, also known as internal indicators, are factors that are under the control of banking institutions. Such factors are often influenced by policies and decisions of a bank's management with regard to sources and uses of funds, capital, liquidity and expense management. Thus, the effect of internal factors on a bank's operational performance can be analysed by examining its balance sheet and income statement. The internal factors that would have an

immediate effect on a bank's operational performance are those factors that affect the credit growth of the banking institution.

After reviewing the relevant literature on determinants of the credit growth of banking institutions (Everaert et al., 2015; Saito, Savoia & Lazier, 2013), this study considers four internal factors (as supply-side factors) and four external factors (as demand-side factors) that are expected to have affected the credit growth of banking institutions in Australia from 2004Q1 to 2009Q4. The internal variables are bank size, liquidity, deposits and asset securitisation. The external variables are the growth of GDP, inflation rate, funding costs (interest rate) and unemployment rate; and the control dummy variables are financial crisis and securitisation activities. Brief accounts of these variables and their expected correlation signs are given below. As bank-specific variables affect the operational performance of specific banks they are within the scope of banking institutions that can control them, and the effects could be different for each bank in the same sector.

Bank size is represented as the natural logarithm of total assets (loga) because of the possibility of non-linearity (Flamini, Schumacher, & McDonald, 2009). In the financial literature, the total asset of any institution is used as an indicator of the size of that institution and the effect of this variable on a bank's credit growth is expected to be positive in general. Some authors, such as Uhomoibhi (2008), and Athanasoglou, Brissimis and Delis (2008) have suggested that banks with large size are able to be more efficient and obtain funds at lower costs than smaller ones, because of the size of the collateral they can provide in exchange (economic scale). Therefore, banks with larger size are more able to increase the fund supply to other economic sectors, and this factor could lead to higher stability for the banking institution. However, the influences of the factor 'too big to fail' should be taken into account also. Larger banking institutions may enjoy governmental guarantees of implicit rescue and thus these banking institutions operate with higher level of risks, which will affect the stability factor and the operational performance in general of banking institutions in a negative way:

*Size = Natural Logarithm of Total Assets (log A)*

Based on the above discussion, the following hypothesis can be outlined:

> Hypothesis 4.3.1: There is a significant and positive correlation between bank size and credit growth.

Insufficient liquidity (LQ) is one of the main factors behind the failures of banks. However, holding liquid assets in the balance sheet has opportunity costs with respect to higher proceeds. Goderis, Marsh, Vall-Castello, & Wagner, (2007) and Loutskina (2011) have reported a positive significant relationship between the liquidity of banks and their credit growth. Therefore, in periods of instability, banking institutions prefer to hold more cash and liquid assets to decrease the risk associated with such environmental conditions. Therefore, the liquidity of banking institutions is correlated negatively with credit growth. This factor can be measured by the ratio of liquid assets/total assets (LQ).Higher ratios indicate banks in higher liquidity (Goderis, Marsh, Vall-Castello, & Wagner, 2007; Loutskina, 2011).Securitising assets have reduced the need for keeping high liquidity in balance sheets to meet unexpected demand from depositors (Loutskina, 2005):

$$Liquidity = Liquid\ Assets/Total\ Assets$$

Based on the above discussion the following hypothesis can be outlined:

> Hypothesis 4.3.2: There is a significant and positive correlation between the liquidity ratio and credit growth of banking institutions.

Deposits (TD) are considered one of the main funding sources for banking institutions and the lowest cost of funds: increased deposits mean more funds available to be granted as different types of credit (loans and facilities). As a result, the credit supply side will be increased, which will reflect on credit growth and lead to an increase in interest margin and profit. Thus, the relationship of deposits with bank credit growth is expected to be positive. Based on the above discussion the following hypothesis can be outlined:

> Hypothesis 4.3.3: There is a significant and positive correlation between the deposits and credit growth of banking institutions.

Asset securitisation (SECTA) is considered one of the main factors behind increases in liquidity because its purpose is to increase the credit ability of banking institutions, as explained by Martín-Oliver and Saurina (2007) and Mazzuca and Battaglia (2011), who indicated that the main determinant of securitising assets is the possibility to increase the liquidity ratios and thus increase the opportunity of diversifying the fund resources of securitised banking institution. This could be associated with the use of liquidity from securitising assets transactions that could achieve other purposes (not necessarily related to an increase in bank credit) such as reducing the leverage or re-organising the assets portfolio to achieve liquidity purposes. These aspects will be measured as

the securitisation activity of a bank. Securitisation activity will be measured against total assets of the bank:

*SECTA = Asset Securitised/Total Assets*

Based on the above discussion the following hypothesis can be outlined:

> Hypothesis 4.3.4: There is a significant and positive correlation between the asset securitisation and credit growth of banking institutions.

Demand-side determinants (or external factors) are those related to industry-specific and macroeconomic scenarios that reflect the economic and legal environment within which a banking institution and the industry to which it belongs operates. Such factors are beyond the control of bank management yet are expected to influence the profitability of the bank. External factors can be analysed by examining the overall economic scenario within which a bank operates, as well as the characteristics of the specific industry to which the bank belongs.

According to the structure–conduct performance (SCP) theory, a positive sign for this variable could indicate a high degree of concentration because banks in highly concentrated markets tend to collude, which can lead to monopoly powers. On the other hand, not all studies have found evidence to support the SCP theory. The expected sign of concentration is subject to empirical investigation. The efficient structure theory (EST) refutes this idea. The results of Bourke (1989) and Molyneux and Thornton (1992) show that bank concentration ratio has a positive and significant effect on the performance of banking institutions, which supports the SCP theory. However, other studies, such as those of Remoundos (2003) and Staikourasand Wood (2004) lead to precisely the opposite result, which tends to support the EST.

Ramlall (2009) defined the Herfindahl–Hirchman Index (HHI) as the summation of each bank's market share (squared) for a particular year. For a perfectly competitive market, HHI would be slightly greater than 0, and with a monopoly, it would be equal to 1. The less concentrated a banking market, the more it is dominated by smaller banks (Chen & Liao, 2011) and the higher the value if HHI. Kuntet al. (2000) argued that competition among banks is the result of development of a country's banks. As banks are developed, competition increases and as a result, banks become more efficient but their profitability is reduced. The resulting monopolistic tendencies will create higher profits for banks because of resulting higher lending costs and lower

borrowing costs. Thus, concentration will have a positive effect on bank profitability (Ommeren, 2011).

Bank concentration is calculated as the total assets held by the three largest banking institutions in the country, divided by the total assets of all bank institutions in that country. Based on the above discussion the following hypothesis can be outlined:

> Hypothesis 4.3.5: There is a significant and positive correlation between market concentration and the credit growth of banking institutions.

Note that this factor will be excluded from this study due to the small number of banking institutions (particularly of institutions using securitisation transactions) for which data are available.

Macroeconomic stability includes the growth of GDP, interest rate, unemployment rate, inflation rate, political instability and other macroeconomic indicators that could affect the credit growth of banking institutions. For example, GDP has an effect on demand for assets of banking institutions, and in practice, a decline in the growth of GDP will decrease demand for credit, which in turn has a negative effect on profitability of banking institutions and will therefore reflect on performance in a negative way. On the other hand, during economic growth periods, reflected in positive GDP growth, the demand for credit (funds) will be high because of the nature of business cycles. In boom periods, credit demand is at a higher level than in recession periods.

Macroeconomic control variables are likely to influence asset quality and will therefore influence all credit growth indicators for banking institutions.

The real growth rate of GDP is included because investment opportunities are likely to be positively correlated with the business cycle of the economy. Further, in a boom period, borrowers' solvency is likely to be higher, which will increase asset quality on the bank's balance sheet. Therefore, this study anticipates a positive sign of GDP growth with all relevant factors (Levine, 2000). The growth of GDP will lower the fraction of non-performing loans, increasing bank credit growth; thus the growth of GDP will have a positive effect on bank credit growth, as there are likely to be more good investment opportunities in a boom period (Athanasoglou et al., 2008).Based on this, the following hypothesis can be outlined:

> Hypothesis 4.3.6: There is a significant and positive correlation between the growth of GDP and the credit growth of banking institutions.

The inflation rate (INF) is expected to be positively related to credit growth. Low levels of inflation are not necessarily bad; they can be signs of a booming economy in which high demand will cause prices to increase, generating inflation. Further, low inflation eases adjustments of real wages due to the presence of nominal downward wage rigidity in labour markets (Guru et al., 2002). However, if inflation becomes very high, it can cause pain to an economy. This study expects to find that inflation has a positive effect on the credit growth of banking institutions (Jiang et al., 2003).This will also depend on whether a bank anticipates inflation. Increases in inflation rates will lead to increases in demand for credit, and Guo and Stepanyan (2011) reported such a positive relationship. As inflation is highly correlated with the interest rate, higher inflation will lead to higher profit margins and higher profitability. Thus, the inflation indicator will have a positive effect on bank credit growth in this analysis, leading to the following hypothesis:

> Hypothesis 4.3.7: There is a significant and positive correlation between the inflation rate and credit growth of banking institutions.

The interest rate (IR) or fund cost is related to the cost of funds, which is represented as interest rate. The coefficient of the current interest rate remains ambiguous. Higher interest rates will increase the costs of funding to banking institutions, which is expected to have a negative effect on the demand side. Moreover, higher interest rates will attract risky borrowers and will lead to a lower probability of repayment by safe borrowers. Therefore, higher interest rates might reduce asset quality and lead to credit rationing. The ultimate effect of interest rates on the different factors of a bank are unclear (Cheang, 2005; Staikouras & Wood, 2003), but the following hypothesis will be tested here:

> Hypothesis 4.3.8: There is a significant and negative correlation between the interest rate and credit growth of banking institutions.

The last macroeconomic control variable considered in this study is the unemployment rate (UNEMP), which is expected to have a negative effect on credit growth. High unemployment rates reduce asset quality because the probability of default increases, reducing profitability and bank stability. Moreover, high unemployment will lower the probability that new loans will be accepted and therefore unemployment will also have a negative effect on credit growth. Based on this, the following hypotheses will be tested:

> Hypothesis 4.3.9: There is a significant and negative correlation between the unemployment rate and credit growth of banking institutions.

To include the effects of financial disturbances (GFC) related to the sub-prime financial crisis that began in June 2007, this study considers a control variable (dummy) that takes a value of 1 during the crisis period from 2007Q1 to 2009Q4, and 0 both before (pre-GFC), 2004Q1–2006Q2 and after the crisis (post-GFC), 2010Q1–2012Q4.

Asset securitisation (SECDUM) is included to examine the operational performance of securitised and non-securitised banking institutions, which will be measured as a dummy variable that takes a value of 1 if the bank had used securitisation in that year and of 0 otherwise. Most emphasis will be placed on the measure of securitisation as a percentage of total assets, but other methods will be used as a check.

The following section presents the measurements that were used to operationalise the variables of this study.

## Table 4.1: Description, Definitions and Expected Sign of Variables for the Equations in the Text

| Variables | | Designation | Description/ Measure | Ex. Sign |
|---|---|---|---|---|
| **Dependent Variables;** | | | | |
| | Business loans activity | | | |
| | | CG | Credit growth | |
| | | BLG | Business loan growth | |
| | | CCLG | Credit card loan growth | |
| | Housing loans activity | | | |
| | | HLG | Housing loan growth | |
| | | HLOG | Housing loan owned growth | |
| | | HLIG | Housing loan investment growth | |
| | | HLOTG | Housing loan others growth | |
| **Independent variables** | | | | |
| **Bank-specificdeterminants (Internal factors)** | Supply-side factors | | | |
| | Size | log A | Natural Logarithm of Total Assets (log A) | (+/-) |
| | Liquidity (LQ) | LQ | Liquid assets /Total assets | (+/-) |
| | Deposit (TD) | TD | Total Deposits | |
| | Asset Securitisation (SECTA) | SECTA | Total securitised assets/total assets | (+/-) |
| | | MSECTA | Mortgage securitised assets/total assets | (+/-) |
| **Macroeconomic Independent Variables (External factors)** | demand-side factors | | | |
| | Annual Real GDP | GDP | The yearly real GDP growth (%); | (+/-/no) |
| | | | RGDP Growth= (RGDP t - RGDP t-1) / (RGDP t-1) | |
| | Real Interest Rate (IR) | IR | Lending interest rate adjusted for inflation as measured by the GDP deflator | (+/-) |
| | Inflation (INF) | INFL | Inflation deflated by the GDP | (+/-/no) |
| | Unemployment (UNEMP) | UNEMP | Unemployment rate= Number of unemployed/Labour force *100 | (-) |
| **Control variables** | | | | |
| **Control Variables** | Market Concentration (MC) | (MC3) | The three-bank concentration ratio (CR3) = (ratio of the total deposits of the three largest banks to the total deposits of all the banks) | (+/-) |
| | | | The assets of the three largest banks/total assets. | |
| | | Herfindahl-Hirschman Index (HHI) | (the sum of squared market shares of deposits of all the banks) | (+/-) |
| | | | Sum of squared market shares of all banks | |
| | Sub-prime Crisis | (GFC) Dummy | =0 : before crisis | |
| | | | =1 : after crisis | |
| | Securitisation | SECTA Dummy | =0 : securitised bank | |
| | | | =1 : non-securitised bank | |

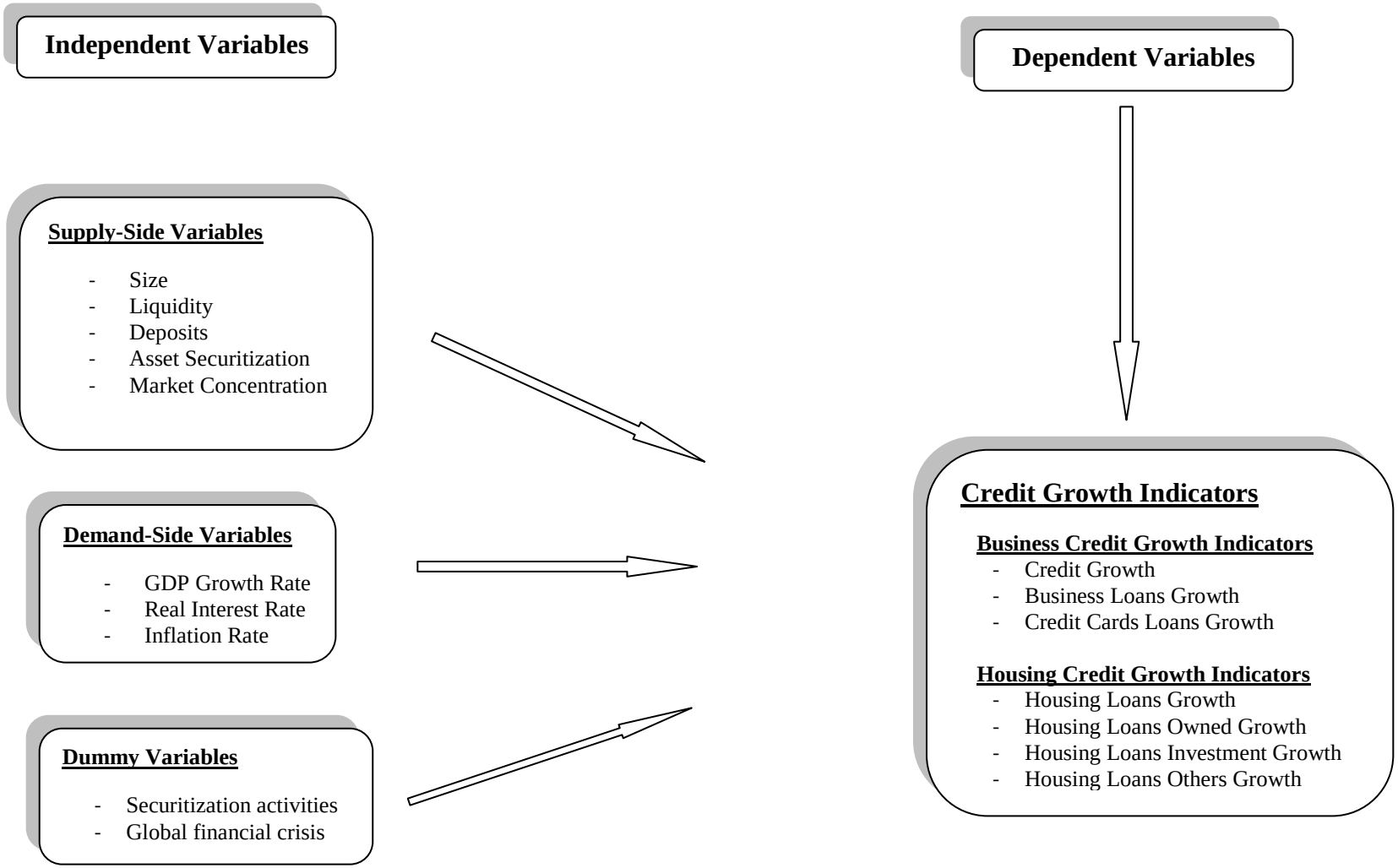



**Figure 4.1: Schematic Diagram Showing the Relationship between Variables**

## 4.4 Data Collection, Analysis and Presentation

This study uses secondary data sources to measure the effects of asset securitisation and other lending determinants on the credit growth of banking institutions, extracted from quarterly data for 2004Q1–2012Q4. Bank-specific variables representing supply-side factors were obtained from the annual reports and financial statements of banks in the study sample, which are available from their websites. Some data were obtained from statistical bulletins reporting the analysis of financial statements of banking institutions issued by the Reserve Bank of Australia (RBA), and from the databases of APRA, Thomson Reuters DataStream and international organisations such as the International Monetary Fund and World Bank. These data were collected using a data collection sheet, and were coded and organised, and then analysed statistically using STATA.

A multiple linear regression model and *t*-statistics are used to determine the relative importance (sensitivity) of each explanatory variable in affecting the credit growth of the banking sector. The moderating influence of asset securitisation is also evaluated by using securitisation as a dummy variable. The Winsor values of explanatory variables are used to explain bank performance in a particular period.

This study also introduced macroeconomic and industry-specific variables that represent the demand-side factors outlined in the empirical analysis section. The GDP per capita annual growth rate (%), annual inflation (%) in terms of the GDP deflator, real interest rate (%) and unemployment rate (%) were obtained from World Bank indicators and the Thomson Reuters DataStream database.

This study concentrates on a sample of 35 banks operating in Australia. The sample has been divided into two chapters. Chapter 5 concentrates on 10 Australian-owned domestic banks, six of which made at least one securitisation transaction during the study period (2004Q1–2012Q4); the remaining four were not securitised. This sample was limited by the availability of securitisation data and other factors. Chapter 6 concentrates on the foreign banks (subsidiary and branches), which were analysed and treated as non-securitised banks.

## 4.5 Model Specification

This study examines the degree of influence of (i) asset securitisation and other factors on the credit growth of domestic banking institutions, and (ii) factors affecting the credit growth of foreign banking institutions. The main purpose of any banking institution is accept deposits and gain credit to maximise returns and minimise risks associated with that operating income, which can be measured through a factor known as quality performance in the banking literature. To measure credit growth, this study uses both business and housing loans indicators. Business loan growth activity is measured using CG, BLG and CCLG and housing loan growth activity is measured using HLG, HLOG, HLIG and HLOTG.

Banking institutions are affected by factors, some of which stem from the economic environment and some from the internal and external operating environment.

To measure business loans growth activity of banking institution, this study employs three indicators (CG, BLG and CCLG), which are used to take into account the different financial structures among banking institutions. This factor was explained by Claessens and Laeven (2004) as 'the percentage of the change of dependent variable of a banking institution with regarded to the same variable in previous quarter'.

This study employ spooled OLS for the purpose of testing determinants according to a series of models. To analyse and evaluate the effect of asset securitisation and other credit growth determinants on the credit growth of banking institutions and test the hypotheses of the study, a multiple linear regression model (MLRM) is employed that relates bank credit growth to a set of independent variables including securitisation. The related theoretical model can be written mathematically as follows:

$$\boldsymbol{CG_{i,t}} = \alpha+\beta_1 \mathrm{Size}_{i,t} + \beta_2 \mathrm{TD}_{i,t} + \beta_3 \mathrm{LQ}_{i,t} + \beta_4 \mathrm{SECTA}_{i,t} + \beta_5 \mathrm{GDP}_{i,t} + +\beta_6 \mathrm{IR}_{i,t} + \beta_7 \mathrm{INF}_{i,t} + \beta_8 \mathrm{UNEMP}_{i,t} + \beta_9 \mathrm{GFC}_{i,t} + \beta 10 \mathrm{SECDUMi,t} + \varepsilon i,t \quad \text{(Model 1)}$$

where

- $\mathrm{CG}_{i,t}$denotes credit growth, i denotes a bank and t, a year
- $\alpha$is the intercept
- $\mathrm{Size}_{i,t}$ denotes size of bank i at time t
- $\mathrm{LQ}_{i,t}$denotes liquidity of bank i at time t

- $TD_{i,t}$ denotes deposits of bank i at time t
- $\beta_1$–$\beta_{15}$are coefficient parameters
- $GDP_{i,t}$denotes the growth of GDP at time t
- $IR_{i,t}$denotes the interest rate at time t
- $INF_{i,t}$denotes the inflation rate at time t
- $UNEMP_{i,t}$denotes unemployment rate at time t
- $SECTA_{i,t}$denotes asset securitisation of bank i at time t
- $GFC_{i,t}$denotes the time t relative to the GFC (1=financial crisis, 0=otherwise)
- $SECDUM_{i,t}$ denotes asset securitisation of bank i at time t (1= securitised bank, 0= non-securitised bank)
- $\varepsilon_{i,t}$is an error term where i is cross-sectional and t is a time identifier.

To analyse and evaluate the effect of the use of asset securitisation and other credit growth determinants on BLG of banking institutions, and to test the related hypothesis, a MLRM is used to relate bank BLG to a set of independent variables including securitisation. The related theoretical model can be written mathematically as follows:

$$\boldsymbol{BLG_{i,t}} = \alpha+\beta_1 Size_{i,t} + \beta_2 TD_{i,t} + \beta_3 LQ_{i,t} + \beta_4 SECTA_{i,t} + \beta_5 GDP_{i,t} + +\beta_6 IR_{i,t} + \beta_7 INF_{i,t} + \beta_8 UNEMP_{i,t} + \beta_9 GFC_{i,t} + \beta 10 SECDUMi,t+\varepsilon i,t \quad \text{(Model 2)}$$

where

$BLG_{i,t}$denotes business loan growth (i denotes a bank, t a year) and the other terms are the same as in Model 1.

The following equation analyses the effect of asset securitisation and other credit growth determinants on the growth of credit card loans (CCLG) for banking institutions. To test the related hypothesis, a MLRM is used to relate bank CCLG to a set of independent variables including securitisation. The theoretical model can be written mathematically as follows:

$$\boldsymbol{CCLG_{i,t}} = \alpha+\beta_1 Size_{i,t} + \beta_2 TD_{i,t} + \beta_3 LQ_{i,t} + \beta_4 SECTA_{i,t} + \beta_5 GDP_{i,t} + +\beta_6 IR_{i,t} + \beta_7 INF_{i,t} + \beta_8 UNEMP_{i,t} + \beta_9 GFC_{i,t} + \beta 10 SECDUMi,t+\varepsilon i,t \quad \text{(Model 3)}$$

where

$CCLG_{i,t}$denotes credit card loan growth (i denotes a bank, t a year) and the other terms are the same as in Model 1.

Housing loan growth activity measured is by the variables HLG, HLOG, HLIG and HLOTG, which take into account the different financial structures (leverage ratios) among banking institutions. The pooled OLS approach is used to test these determinants in the models described next.

To examine and evaluate the effect of asset securitisation and other credit growth determinants on the growth of housing loans (HLG) of banking institutions and to test the related hypothesis, the study employs a MLRM that relates bank HLG to a set of independent variables including securitisation. The theoretical model can be written mathematically as follows:

$$\boldsymbol{HLG_{i,t}} = \alpha+\beta_1 \text{Size}_{i,t} + \beta_2 \text{TD}_{i,t} + \beta_3 \text{LQ}_{i,t} + \beta_4 \text{SECTA}_{i,t} + \beta_5 \text{GDP}_{i,t} + +\beta_6 \text{IR}_{i,t} + \beta_7 \text{INF}_{i,t} + \beta_8 \text{UNEMP}_{i,t} + \beta_9 \text{GFC}_{i,t} + \beta 10 \text{SECDUMi,t} + \varepsilon i,t \quad \text{(Model 4)}$$

where

$\text{HLG}_{i,t}$ denotes housing loan growth (i denotes a bank, t a year) and the other terms are the same as in Model 1.

To assess the effect of asset securitisation and other credit growth determinants on the HLOG of banking institutions and to test the related hypothesis, the study employs a MLRM that relates bank HLOG to a set of independent variables including securitisation. The theoretical model can be written mathematically as follows:

$$\boldsymbol{BLOG_{i,t}} = \alpha+\beta_1 \text{Size}_{i,t} + \beta_2 \text{TD}_{i,t} + \beta_3 \text{LQ}_{i,t} + \beta_4 \text{SECTA}_{i,t} + \beta_5 \text{GDP}_{i,t} + +\beta_6 \text{IR}_{i,t} + \beta_7 \text{INF}_{i,t} + \beta_8 \text{UNEMP}_{i,t} + \beta_9 \text{GFC}_{i,t} + \beta 10 \text{SECDUMi,t} + \varepsilon i,t \quad \text{(Model 5)}$$

where

$\text{HLOG}_{i,t}$ denotes housing loan owned growth (i denotes a bank, t a year) and the other terms are the same as in Model 1.

To examine the effect of asset securitisation and other credit growth determinants on the HLIG of banking institutions and to test the related hypothesis, the study employs a MLRM that relates bank HLIG to a set of independent variables including securitisation The theoretical model can be written mathematically as follows:

$$\boldsymbol{BLIG_{i,t}} = \alpha+\beta_1 \text{Size}_{i,t} + \beta_2 \text{TD}_{i,t} + \beta_3 \text{LQ}_{i,t} + \beta_4 \text{SECTA}_{i,t} + \beta_5 \text{GDP}_{i,t} + +\beta_6 \text{IR}_{i,t} + \beta_7 \text{INF}_{i,t} + \beta_8 \text{UNEMP}_{i,t} + \beta_9 \text{GFC}_{i,t} + \beta 10 \text{SECDUMi,t} + \varepsilon i,t \quad \text{(Model 6)}$$

where

$\text{HLIG}_{i,t}$ denotes housing loan investment growth (i denotes a bank, t a year) and the other terms are the same as in Model 1.

This study uses HLOTG as an indicator for evaluating the effect of asset securitisation and other credit growth determinants on the HLOTG of banking institutions. To test the related hypothesis, the study employs a MLRM that relates bank HLOTG to a set of independent variables including securitisation. The theoretical model can be written mathematically as follows:

$$\boldsymbol{BLOTG_{i,t}} = \alpha+\beta_1 \text{Size}_{i,t} + \beta_2 \text{TD}_{i,t} + \beta_3 \text{LQ}_{i,t} + \beta_4 \text{SECTA}_{i,t} + \beta_5 \text{GDP}_{i,t} + +\beta_6 \text{IR}_{i,t} + \beta_7 \text{INF}_{i,t} + \beta_8 \text{UNEMP}_{i,t} + \beta_9 \text{GFC}_{i,t} + \beta 10 \text{SECDUMi,t} + \varepsilon i,t \quad \text{(Model 7)}$$

where

$\text{HLOTG}_{i,t}$ denotes housing loans others growth (i denotes a bank, t a year) and the other terms are the same as in Model 1.

## 4.6 Summary

In this chapter, the methodology and empirical approaches employed in the study were discussed. The deductive approach is adopted, in which the theory and deduced hypotheses are initially developed, after which data are collected and analysed for the purpose of supporting or disproving a hypothesis. This approach was selected because of the nature of the topic, which has some support from the literature. The results are enhanced by a study design that merges techniques used in the literature. The study design adopted is the case study method in which the aim is to determine the effect of asset securitisation and other lending determinants on bank credit activity of Australian banking institutions. The overarching, fundamental objective is to provide evidence and introduce a better understanding of the effect of financial innovation on the operational performance of banking institutions.

The data are collected and analysed using quantitative methods. Reliable sources are used to extract historical secondary data pertaining to asset securitisation and other lending determinants outlined for use in this study, in addition to other relevant economic data.

Moreover, this chapter provided details about the nature of the data that were collected and the methods used, the sampling technique employed including the sample size, and the methodology utilised for organisation and data interpretation. In addition to unbalanced panel regression estimation, the OLS model is used in this study. Fixed and random effects models were tested, and based on these Hausman test results the random effects model was selected to estimate the model. In the next chapter, the hypotheses developed are tested using regression analysis and the findings of the data analysis with respect to bank credit growth measurements are discussed.

# Chapter 5: Results and Discussion—Domestic Bank Credit Growth

This chapter reports the main empirical findings of the thesis, focusing on how asset securitisation affects the credit growth of domestic and foreign banks operating in Australia. Two main indicators were used to measure the growth of bank's credit: business and housing credit growth activity. Business credit growth activity included credit growth, business loan growth and credit card loan growth, and housing credit growth activity consisted of growth of housing loans, housing loans owned, housing loans investment and housing loans others.

The effect of securitising assets and other lending determinants on the credit growth of banking institutions was analysed using the correlation and multiple regression analysis (pooled OLS) technique and fixed and random effects models for quarterly panel data (2004Q1–2012Q4). The empirical models were explained and discussed in Chapter 4.

The 68 banks operating in Australia at the time of the study had different types of ownership: some domestic and others foreign. According to a report of APRA (2013), 20 of these were Australian-owned banks (local) and the rest (48) were foreign. Eight were subsidiary foreign banks and 40 were branches of foreign banks. However, data were available for only 52banking institutions and after excluding those with missing observations, only 35 remained for inclusion in the study. Of these, 10were domestic banks—only six of which were securitising assets; the remainder did not securitise their assets (non-securitised banks) —and 25 were either subsidiaries or branches of foreign banks. Those 25 banks had no asset securitisation element in their reports or financial statements, so they are considered in this study as non-securitised banks. The analysis and results are divided between two chapters. See the banks' list of the study sample in table 1 in the Appendix.

This chapter analyses the effect of securitising assets and other factors expected to have an effect on business and housing credit growth activity for domestic banks (some of which employ securitisation); and the effect of the GFC; and compares the effects of the GFC (pre-GFC, GFC and post-GFC) between securitised and non-securitised banks by using the dimensions of both supply-side (internal factors/bank characteristics) and demand-side determinants (external/macroeconomic factors).The research employed OLS models to examine the impact of GFC on these determinants in combination, to assess the extent of change from a variety of

economic cycles (GFC periods). Hasuman tests were used on seven models that employed pooled, fixed and random effects to select the most appropriate model for the data (as described in Chapter 4), which was found to be the random effects model. Therefore, the random effects model results form the basis for all discussions presented in this chapter.

As mentioned previously, due to data limitations with respect to securitising assets (securitising loans portfolio) and other variables, only six securitising banks could be included in the analysis. Therefore, analyses reported in this chapter are divided into two sections: in the first section, an analysis is conducted on the entire study sample of 10 domestic banks (six securitised and four non-securitised) to investigate the impact during the three periods considered (before, during and after the GFC), concentrating on the factors affecting the banks' credit growth. A regression analysis was conducted using the specified equations from Chapter 4to test the effect of securitising assets (securitising loans portfolio) on banks' credit growth as measured by CG.

The chapter is structured as follows: the descriptive statistics and the correlation matrix are presented in Sections 7.2 and 7.3, and then the regression results from the OLS estimation method are presented to test the effect of securitising assets and other lending determinants on banks' credit growth, and analyse the impact of the GFC. In the fourth section, different robustness checks are run to ensure that the main findings do not depend on the specific setting. The study then applies a different estimation method that controls for random effects, using random effects model estimation rather than the OLS regression method. The results are then interpreted, first for the securitised banks and then the non-securitised banks, with respect to the impact of the GFC on these domestic banking institutions operating in Australia during 2004 and 2012.

## 5.1 Descriptive Statistics for Bank Credit Activities

The statistics in Table 5.1 assist with checks, for example, the uncertainty data. Tables 5.1–5.3 provide summary statistics for the indicators of bank business credit activity (dependent variables), which are expressed as credit growth, business loans growth and credit card loans growth for the period 2004Q1–2012Q4, divided into three periods relative to the GFC (pre-GFC, 2004–06; GFC, 2007–09; and post-GFC, 2010–12). All variables have 420 observations, except for LQ, TD and SECTA, which have fewer.

**Table 5.1: Descriptive Statistics for Business Credit Growth Variables for the Pre-GFC Period**

| Variable | Observations | Minimum | P25 | MEAN | P75 | Maximum | Std. Dev. | Skewness | Kurtosis |
|---|---|---|---|---|---|---|---|---|---|
| Dependent variables | | | | | | | | | |
| CG | 420 | -0.2784 | -0.0123 | 0.0411 | 0.0841 | 0.4605 | 0.1693 | 0.6235 | 4.1479 |
| BLG | 420 | -0.2784 | -0.0235 | 0.0407 | 0.0855 | 0.4752 | 0.1736 | 0.7207 | 4.1955 |
| CCLG | 420 | -0.0106 | 0.0000 | 0.0098 | 0.0000 | 0.0632 | 0.0209 | 1.8183 | 4.6782 |
| Independent Variables | | | | | | | | | |
| Supply Factors | | | | | | | | | |
| Size | 420 | 2.2801 | 3.1523 | 3.7257 | 4.1847 | 5.4721 | 0.8399 | 0.2843 | 2.6160 |
| LQ | 419 | 0.0009 | 0.0124 | 0.0935 | 0.1623 | 0.3173 | 0.1042 | 0.9903 | 2.5994 |
| TD | 401 | 4.3499 | 6.6456 | 7.9546 | 9.1382 | 11.9605 | 1.9763 | 0.2442 | 2.5339 |
| SECTA | 133 | 0.00187 | 0.00977 | 1.12361 | 0.45747 | 9.76403 | 2.7742 | 2.71447 | 8.63651 |
| Demand Factors | | | | | | | | | |
| GDP | 420 | 0.0426 | 0.0613 | 0.0778 | 0.0964 | 0.1172 | 0.0225 | 0.2562 | 2.0373 |
| INFL | 420 | 0.0204 | 0.0243 | 0.0286 | 0.0322 | 0.0400 | 0.0061 | 0.7110 | 2.3769 |
| IR | 420 | 0.0534 | 0.0541 | 0.0558 | 0.0567 | 0.0612 | 0.0023 | 1.0943 | 3.2106 |
| UNEMP | 420 | 0.0430 | 0.0480 | 0.0509 | 0.0545 | 0.0600 | 0.0047 | 0.1810 | 2.3246 |

See Table 4.1 for variable definitions.

**Table 5.2: Descriptive Statistics for Business Credit Growth Variables during the GFC**

| Variable | Observations | Minimum | P25 | MEAN | P75 | Maximum | Std. Dev. | Skewness | Kurtosis |
|---|---|---|---|---|---|---|---|---|---|
| Dependent Variables | | | | | | | | | |
| CG | 420 | -0.2784 | -0.0303 | 0.0444 | 0.0871 | 0.4605 | 0.1665 | 0.7368 | 4.0992 |
| BLG | 420 | -0.2784 | -0.0372 | 0.0368 | 0.0821 | 0.4752 | 0.1632 | 0.8212 | 4.5163 |
| CCLG | 420 | -0.0106 | 0.0000 | 0.0055 | 0.0000 | 0.0632 | 0.0169 | 2.4495 | 7.9692 |
| Independent Variables | | | | | | | | | |
| *Supply Factors* | | | | | | | | | |
| Size | 420 | 2.2801 | 3.5058 | 3.9699 | 4.4761 | 5.5566 | 0.8435 | 0.0038 | 2.7847 |
| LQ | 417 | 0.0009 | 0.0126 | 0.0737 | 0.1042 | 0.3173 | 0.0825 | 1.4279 | 4.2574 |
| TD | 407 | 4.3499 | 7.2392 | 8.4937 | 9.7608 | 12.1783 | 1.9587 | 0.0437 | 2.7560 |
| SECTA | 131 | 0.00152 | 0.01747 | 0.95287 | 0.27592 | 9.76403 | 2.50581 | 2.99308 | 10.4037 |
| *Demand Factors* | | | | | | | | | |
| GDP | 420 | -0.0657 | 0.0120 | 0.0618 | 0.1072 | 0.1434 | 0.0589 | -0.6982 | 2.5135 |
| INFL | 420 | 0.0119 | 0.0196 | 0.0282 | 0.0399 | 0.0498 | 0.0120 | 0.4526 | 1.8962 |
| IR | 420 | 0.0335 | 0.0406 | 0.0597 | 0.0746 | 0.0788 | 0.0167 | -0.4759 | 1.6718 |
| UNEMP | 420 | 0.0400 | 0.0415 | 0.0473 | 0.0540 | 0.0580 | 0.0065 | 0.4619 | 1.5584 |

Source: STATA output from the banks' financial statements

**Table 5.3: Descriptive Statistics for Business Credit Growth Variables in the Post-GFC Period**

| Variable | Observations | Minimum | P25 | MEAN | P75 | Maximum | Std. Dev. | Skewness | Kurtosis |
|---|---|---|---|---|---|---|---|---|---|
| Dependent Variables | | | | | | | | | |
| CG | 420 | -0.2784 | -0.0382 | 0.0082 | 0.0476 | 0.4605 | 0.1259 | 0.6547 | 5.9244 |
| BLG | 420 | -0.2784 | -0.0506 | 0.0093 | 0.0519 | 0.4752 | 0.1351 | 0.8540 | 5.8121 |
| CCLG | 420 | -0.0106 | 0.0000 | 0.0030 | 0.0000 | 0.0632 | 0.0133 | 3.1558 | 13.1253 |
| Independent Variables | | | | | | | | | |
| Supply Factors | | | | | | | | | |
| Size | 420 | 2.2801 | 3.6032 | 4.0006 | 4.5172 | 5.5566 | 0.8380 | -0.0096 | 2.9573 |
| LQ | 417 | 0.0009 | 0.0106 | 0.0875 | 0.1382 | 0.3173 | 0.0959 | 1.1269 | 3.1211 |
| TD | 399 | 4.3499 | 7.6542 | 8.6465 | 10.2291 | 12.1783 | 1.9679 | -0.0033 | 2.8909 |
| SECTA | 129 | 0.00152 | 0.01075 | 0.23604 | 0.17673 | 2.83972 | 0.50394 | 3.14847 | 12.6505 |
| Demand Factors | | | | | | | | | |
| GDP | 420 | 0.0005 | 0.0232 | 0.0581 | 0.0873 | 0.1449 | 0.0406 | 0.4913 | 2.5341 |
| INFL | 420 | 0.0121 | 0.0210 | 0.0266 | 0.0319 | 0.0355 | 0.0071 | -0.7174 | 2.3286 |
| IR | 420 | 0.0374 | 0.0430 | 0.0463 | 0.0486 | 0.0525 | 0.0043 | -0.7481 | 2.4679 |
| UNEMP | 420 | 0.0490 | 0.0500 | 0.0518 | 0.0535 | 0.0580 | 0.0027 | 1.0317 | 2.8890 |

Source: STATA output from the banks' financial statements

Table 5.1 provides descriptive statistics for the independent variables (supply- and demand-side determinants) in the empirical analysis to determine the credit growth of Australian banking institutions prior to the GFC. On average, CG was 0.0411 before the GFC, whereas during and after the GFC, the average values were 0.0444 (Table 5.2) and 0.0082 (Table 5.3), respectively. This table indicates a credit growth rate difference, as the maximum value was 0.4605 and the minimum was –0.2784 over the pre-GFC period, while the maximum and minimum values were 0.4605 and –0.2784 respectively during both the GFC and post-GFC periods. For BLG and CCLG, the same pattern was observed; that is, average BLG and CCLG was 0.0407 and 0.0098, respectively, prior to the GFC, compared with 0.0368 and 0.0055 during the GFC and 0.0093 and 0.0030 during the post-GFC study period. Also with BLG and CCLG, there was a credit growth difference: the maximum values were 0.4752 and 0.0632 respectively for the pre-GFC period, whereas during the GFC they were 0.4752 and 0.0632 respectively, and after the GFC they were 0.4752 and 0.0632; the respective minimum values for BLG and CCLG were –0.2784, –0.0106. The minimum value of BLG was the same as that of CG for the pre-GFC period, and the minimum values during both the GFC and post-GFC periods were the same, at –0.2784 and –0.0106 respectively.

In addition, in the same table mentioned above, the descriptive statistics are provided for the dependent variables, bank-specific characteristics (supply-side determinants) and macroeconomic and industry-specific factors (demand-side determinants) used for empirical analyses. The analysis here concentrated on eight independent variables that determine bank credit growth: four are supply-side determinants (Size, TD, LQ and SECTA) and four are considered to be demand-side determinants (GDP growth, INF, IR and UNEMP). For supply-side determinants, as can be seen from the table on independent variables, Size, TD, LQ and SECTA have minimum values of 2.2801, 0.0009, 4.3499 and 0.00187 during the pre-GFC period, which do not differ from minimum values during the GFC and post-GFC periods.

With respect to the demand-side determinants, the mean GDP annual growth rate was 7.8% during the pre-GFC period, as GDP rates are important for economic stability, and the maximum percentage was 11.7%. GDP growth rates were 0.1434 and 0.1449 respectively for the GFC and post-GFC periods. Interest rates ranged from 0.0558 (5.6%) to 0.0612 (6.1%) during the pre-GFC period and 0.0597–0.0788 during the GFC period, whereas following the GFC they decreased to 0.0463–0.0525. Inflation rates during the pre-GFC period ranged from 0.0286 (2.9%) to 0.0400 (4%), whereas during GFC they were 0.0282–0.0498 and during the post-GFC period they tended to be lower, at 0.0266–0.0355. In contrast, the unemployment rate had mean and maximum values of 0.0509 (5.1%) and 0.0600 (6%) respectively during the GFC period 0.0473 and 0.0580 respectively. Meanwhile, during the post-GFC period 0.0518 and remain the same as the value during GFC period 0.0580 respectively. The table below provides descriptive statistics for the indicators of bank housing credit activity (dependent variables) expressed as housing loans growth, housing loans owned growth, housing loans investment growth and housing loans other growth for the pre-GFC, GFC and post-GFC periods.

## 5.2 Descriptive Statistics for Independent Variables

Tables 5.4–5.6 provide descriptive statistics for the independent variables (supply- and demand-side determinants) in the empirical analysis to determine the credit growth of Australia banking institutions according to bank size, total deposits, liquidity ratio and assets securitisation, along with macroeconomic variables including the growth of GDP, interest rates, inflation rates and unemployment rates.

**Table 5.4: Descriptive Statistics of Housing Credit Growth during Pre-GFC**

| Variable | Observations | Minimum | P25 | MEAN | P75 | Maximum | Std. Dev. | Skewness | Kurtosis |
|---|---|---|---|---|---|---|---|---|---|
| Dependent Variables | | | | | | | | | |
| HLG | 420 | -0.0653 | 0.0000 | 0.0084 | 0.0258 | 0.1266 | 0.0380 | 0.7583 | 4.8791 |
| HLOG | 420 | -0.0500 | 0.0000 | 0.0126 | 0.0282 | 0.1127 | 0.0356 | 1.0211 | 4.2386 |
| HLIG | 420 | -0.0684 | 0.0000 | 0.0054 | 0.0190 | 0.0982 | 0.0340 | 0.2826 | 4.5630 |
| HLOTG | 420 | -0.0738 | 0.0000 | 0.0089 | 0.0183 | 0.0885 | 0.0330 | 0.3439 | 4.4788 |
| Independent Variables | | | | | | | | | |
| Supply Factors | | | | | | | | | |
| Size | 420 | 2.2801 | 3.1523 | 3.7257 | 4.1847 | 5.4721 | 0.8399 | 0.2843 | 2.6160 |
| LQ | 419 | 0.0009 | 0.0124 | 0.0935 | 0.1623 | 0.3173 | 0.1042 | 0.9903 | 2.5994 |
| TD | 401 | 4.3499 | 6.6456 | 7.9546 | 9.1382 | 11.9605 | 1.9763 | 0.2442 | 2.5339 |
| SECTA | 133 | 0.00187 | 0.00977 | 1.12361 | 0.45747 | 9.76403 | 2.7742 | 2.71447 | 8.63651 |
| Demand Factors | | | | | | | | | |
| GDP | 420 | 0.0426 | 0.0613 | 0.0778 | 0.0964 | 0.1172 | 0.0225 | 0.2562 | 2.0373 |
| INFL | 420 | 0.0204 | 0.0243 | 0.0286 | 0.0322 | 0.0400 | 0.0061 | 0.7110 | 2.3769 |
| IR | 420 | 0.0534 | 0.0541 | 0.0558 | 0.0567 | 0.0612 | 0.0023 | 1.0943 | 3.2106 |
| UNEMP | 420 | 0.0430 | 0.0480 | 0.0509 | 0.0545 | 0.0600 | 0.0047 | 0.1810 | 2.3246 |

**Table 5.5: Descriptive Statistics of Housing Credit Growth during GFC**

| Variable | Observations | Minimum | P25 | MEAN | P75 | Maximum | Std. Dev. | Skewness | Kurtosis |
|---|---|---|---|---|---|---|---|---|---|
| Dependent Variables | | | | | | | | | |
| HLG | 420 | -0.0653 | 0.0000 | 0.0135 | 0.0267 | 0.1266 | 0.0422 | 0.9995 | 4.6241 |
| HLOG | 419 | -0.0500 | 0.0000 | 0.0163 | 0.0290 | 0.1127 | 0.0369 | 1.1967 | 4.3021 |
| HLIG | 420 | -0.0684 | 0.0000 | 0.0080 | 0.0195 | 0.0982 | 0.0361 | 0.5530 | 4.3955 |
| HLOTG | 420 | -0.0738 | 0.0000 | 0.0012 | 0.0000 | 0.0885 | 0.0365 | 0.3277 | 4.2497 |
| Independent Variables | | | | | | | | | |
| Supply Factors | | | | | | | | | |
| Size | 420 | 2.2801 | 3.5058 | 3.9699 | 4.4761 | 5.5566 | 0.8435 | 0.0038 | 2.7847 |
| LQ | 417 | 0.0009 | 0.0126 | 0.0737 | 0.1042 | 0.3173 | 0.0825 | 1.4279 | 4.2574 |
| TD | 407 | 4.3499 | 7.2392 | 8.4937 | 9.7608 | 12.1783 | 1.9587 | 0.0437 | 2.7560 |
| SECTA | 131 | 0.00152 | 0.01747 | 0.95287 | 0.27592 | 9.76403 | 2.50581 | 2.99308 | 10.4037 |
| Demand Factors | | | | | | | | | |
| GDP | 420 | -0.0657 | 0.0120 | 0.0618 | 0.1072 | 0.1434 | 0.0589 | -0.6982 | 2.5135 |
| INFL | 420 | 0.0119 | 0.0196 | 0.0282 | 0.0399 | 0.0498 | 0.0120 | 0.4526 | 1.8962 |
| IR | 420 | 0.0335 | 0.0406 | 0.0597 | 0.0746 | 0.0788 | 0.0167 | -0.4759 | 1.6718 |
| UNEMP | 420 | 0.0400 | 0.0415 | 0.0473 | 0.0540 | 0.0580 | 0.0065 | 0.4619 | 1.5584 |

**Table 5.6: Descriptive Statistics of Housing Credit Growth during Post-GFC**

| Variable | Observations | Minimum | P25 | MEAN | P75 | Maximum | Std. Dev. | Skewness | Kurtosis |
|---|---|---|---|---|---|---|---|---|---|
| Dependent Variables | | | | | | | | | |
| HLG | 420 | -0.0653 | 0.0000 | 0.0157 | 0.0227 | 0.1266 | 0.0397 | 1.4088 | 5.3752 |
| HLOG | 418 | -0.0500 | 0.0000 | 0.0125 | 0.0179 | 0.1127 | 0.0336 | 1.5111 | 5.8238 |
| HLIG | 420 | -0.0684 | 0.0000 | 0.0110 | 0.0174 | 0.0982 | 0.0339 | 0.8210 | 4.8443 |
| HLOTG | 420 | -0.0738 | 0.0000 | -0.0019 | 0.0000 | 0.0885 | 0.0296 | 0.2447 | 5.6233 |
| Independent Variables | | | | | | | | | |
| Supply Factors | | | | | | | | | |
| Size | 420 | 2.2801 | 3.6032 | 4.0006 | 4.5172 | 5.5566 | 0.8380 | -0.0096 | 2.9573 |
| LQ | 417 | 0.0009 | 0.0106 | 0.0875 | 0.1382 | 0.3173 | 0.0959 | 1.1269 | 3.1211 |
| TD | 399 | 4.3499 | 7.6542 | 8.6465 | 10.2291 | 12.1783 | 1.9679 | -0.0033 | 2.8909 |
| SECTA | 129 | 0.00152 | 0.01075 | 0.23604 | 0.17673 | 2.83972 | 0.50394 | 3.14847 | 12.6505 |
| Demand Factors | | | | | | | | | |
| GDP | 420 | 0.0005 | 0.0232 | 0.0581 | 0.0873 | 0.1449 | 0.0406 | 0.4913 | 2.5341 |
| INFL | 420 | 0.0121 | 0.0210 | 0.0266 | 0.0319 | 0.0355 | 0.0071 | -0.7174 | 2.3286 |
| IR | 420 | 0.0374 | 0.0430 | 0.0463 | 0.0486 | 0.0525 | 0.0043 | -0.7481 | 2.4679 |
| UNEMP | 420 | 0.0490 | 0.0500 | 0.0518 | 0.0535 | 0.0580 | 0.0027 | 1.0317 | 2.8890 |

Table 5.4 gives descriptive statistics for the dependent variables in this study. The analysis focuses on three business credit activity indicators: HLG, HLOG, HLIG and HLOTG. On average, HLG was 0.0084 during the GFC period whereas HLG values were higher, at 0.0135 and 0.0157 respectively, during the GFC and post-GFC periods. This table highlights a HLG difference, as the maximum value was 0.1266 and minimum was–0.0653, and the values during GFC and after the GFC were the same as the values before the GFC.

HLOG, HLIG and HLOTG on average were 0.0126, 0.0054 and 0.0089 respectively during pre-GFC period while during the GFC period they were 0.0163, 0.0080 and 0.0012 respectively and 0.0125, 0.0110 and –0.0019 respectively during the post-GFC period. Also with HLOG, HLIG and HLOTG there exists a housing loans growth difference as the maximum values were 0.1127, 0.0982 and 0.0885 respectively and minimum values were–0.0500, –0.0684 and –0.0738: the minimum value of BLG was the same as the minimum value of CG and there were no changes in the values during and after the GFC, from before the GFC.

Table 5.4 provides the descriptive statistics for dependent variables, bank-specific characteristics (supply-side determinants), macroeconomic and industry-specific factors (demand-side determinants) in the study. The analysis concentrates on eight independent variables that determine bank credit growth: four supply-side determinants (Size, TD, LQ and SECTA) and four demand-side determinants (INF, IR and UNEM). For supply-side determinants, Size, TD, LQ and SECTA during the pre-GFC period had minimum values of 2.2801, 0.0009, 4.3499 and 0.00187 respectively, and these values did not change, except that SECTA declined to 0.00152 during the GFC and post-GFC periods.

GDP annual growth rates were on average 7.8 % during the GFC period compared with 0.0618 and 0.0581 during the GFC and post-GFC periods respectively. The maximum annual GDP growth rate was 11.7 % during the GFC period, compared with 0.1434 and 0.1449 during the GFC and post-GFC periods respectively. Interest rates had mean and maximum values of 0.0558 (5.6%) and 0.0612 (6.1%) respectively compared with 0.0597 and 0.0788 during the GFC period, and during the post-GFC period were 0.0463 and 0.0355 respectively. In addition, inflation rates had mean and maximum values of 0.0286 (2.9%) and 0.0400 (4%) respectively during the pre-GFC period compared with 0.0282 and 0.0498 during the GFC period respectively, and during the post-GFC period were 0.0266 and 0.0525 respectively. In contrast, the unemployment rate had mean and maximum values of 0.0509 (5.1%) and 0.0600 (6%) respectively during the pre-GFC period, compared with0.0473 and 0.0580 respectively during the GFC period and during the post-GFC period, when they were 0.0518 and 0.0580 respectively.

Table 5.7 presents the correlation matrix for dependent and independent variables. An index of the direction and extent of the association between the two sets of scores is obtained through the coefficient of correlation, without suggesting causality. The direction of the correlation is determined by the sign of the coefficient, and the magnitude is determined by the coefficient's absolute value. The correlation matrix establishes whether the data have aspects of multicollinearity. Multicollinearity is a situation in which some or all of the explanatory variables are related to each other to a large extent, which makes it difficult to identify the factor that is affecting the dependent variable.

**Table 5.7: Correlation Matrix of Explanatory Variables (Business Credit Growth)**

| | CG | BLG | CCLG | Size | LQ | TD | SECTA | GDP | INFL | IR |
|---|---|---|---|---|---|---|---|---|---|---|
| CG | | | | | | | | | | |
| BLG | 0.971 | | | | | | | | | |
| CCLG | -0.008 | -0.011 | | | | | | | | |
| Size | 0.012 | 0.007 | 0.345 | | | | | | | |
| LQ | 0.005 | 0.015 | -0.095 | -0.101 | | | | | | |
| TD | 0.067 | 0.089 | 0.096 | 0.488 | -0.193 | | | | | |
| SECTA | -0.036 | -0.036 | -0.093 | -0.562 | -0.034 | -0.675 | | | | |
| GDP | 0.091 | 0.092 | 0.063 | -0.033 | 0.030 | -0.057 | 0.047 | | | |
| INFL | 0.097 | 0.077 | 0.018 | 0.009 | 0.036 | 0.004 | 0.042 | 0.540 | | |
| IR | 0.180 | 0.165 | 0.064 | -0.042 | 0.063 | -0.074 | 0.118 | 0.422 | 0.637 | |
| UNEMP | -0.206 | -0.187 | -0.056 | -0.013 | -0.026 | -0.010 | -0.062 | -0.390 | -0.534 | -0.738 |

Multicollinearity exists when there is a high correlation between explanatory variables. Kennedy (2003) emphasised that a correlation coefficient >0.70 for a pair of variables indicates multicollinearity. Since all values in Table 5.7are <0.70, the study variables do not exhibit multicollinearity, which leads to greater reliability for the regression model.

The existence of the problem of multicollinearity was tested using a correlation coefficient test and variance inflation factors (VIF). Correlations>0.8 (0.75) between independent variables indicates inexistence of multicollinearity problem (Gujarati, 2012). Therefore, as can be seen from the Table 5.7 there is no multicollinearity problem with any of the independent variables, as the correlation coefficients between these independent variables were <0.75.As can be seen from Table 5.7 there is no serious multicollinearity problem with the business credit growth independent variables CG, BLG and CCLG.

This section examines the relationships among the identified bank-specific factors and business credit growth as expressed by CG, BLG and CCLG. The relationship was explained by the parameter coefficients between the explanatory and explained variables. The coefficients show the magnitude and direction of the relationships, whether it is strong, weak positive or negative. The higher the values the stronger the relationship, and the smaller the coefficient is an indicator of a weak relationship. The sign also shows the direction of the relationship. The positive sign shows a positive relationship and the negative shows the opposite.

Table 5.7 shows the relationships among the dependent and independent variables. Among the supply-side determinants, bank size was considered as an independent variable that could affect business credit growth, which is expressed as the natural logarithm of total assets and is positively related in all bank business credit indicators, as large banks are likely to be more efficient than small banks and are able to acquire funds at a lower cost due to the amount of collateral they can provide; however, the relationship is very weak using BLG as an indicator. This relationship may indicate that banks face no volatility in earnings due to leverage. This is in line with the conventional argument that large size encourages banks to invest in safer assets such as lower risk loans or securities, which may affect bank operational performance (Bouwman, 2009).The liquidity ratio, expressed as liquid assets to total assets, was positively correlated with CG and BLG: increasing the liquidity ratio of banking institutions will increase their capability to gain credit and hence there will be more credit available at the domestic level (Olokoyo, 2011); although, the correlation was very weak for CG. However, the liquidity ratio had a negative relationship with the CCLG indicator. This indicates that poor asset quality or a high ratio of non-performing loans to total assets is related to poor operational performance of banking institutions. The other explanatory variable, total deposits (TD), is positively correlated to all of the business credit indicators, which means any increase in the volume of deposit will be transformed into credit (Assefa, 2014). The coefficient of the domestic deposits volume demonstrates that the total deposit plays a major role in affecting credit growth of banking institutions. Meanwhile, asset securitisation, expressed as the ratio of total assets securitised to total assets, is negatively related to all business credit indicators. It is known that one of the main reasons for securitising assets is the possibility to increase liquidity ratios and thus increase the opportunity to diversify the fund resources of a securitised banking institution. This purpose could be associated with the way of using the liquidity obtained from securitising assets transactions, which could be used to achieve other purposes that are not necessarily related to an increase in bank credit, such as reducing the leverage or re-organising the assets portfolio to achieve liquidity purposes (Martín-Oliver & Saurina, 2007; Mazzuca & Battaglia, 2011).

In contrast, for the demand-side determinants, the growth of GDP was positively correlated with all business credit indicators. This supports the view that in a boom period, there are more attractive investment opportunities and borrowers are more solvent, and agrees with the results of Imran and Nishat (2013) who explained that any increase in GDP will enhance returns in the industrial sector and that wages will be increased and therefore total deposits will be increased as

a result of increasing GDP. This increase will be reflected in increasing liquidity ratios for banking institutions and the capability of lending banking institutions will increase to meet the increasing needs of investment in other economic sectors (Assefa, 2014; Guo & Stepanyan, 2011; Imran & Nishat, 2013; Olokoyo, 2011).

The other macroeconomic variable is inflation rate, which was positively correlated with all business credit indicators. This is probably due to the fact that inflation could affect the value for money, purchasing power of people and the real interest rate that banks charge and receive. This result was expected, and agrees with those of Guo and Stepanyan (2011) who explained that any increase in INFL will reflect on increasingly higher demand for credit. The interest rate was positively correlated to all business credit indicators, but not significant. Higher interest rates will lower the demand for credit, which explains the negative coefficient with respect to credit growth. Meanwhile, the unemployment rate was negatively correlated with all business credit indicators, which is in line with expectation and supports an explanation that increasing unemployment rates will reduce the ability of borrowers to payback their loans and defaults will increase.

This section discusses the relationship between the bank-specific factors and their relationship with bank performance as expressed by HLG, HLOG, HLIG and HLOTG. The relationship was assessed by the parameter coefficients between the explanatory and explained variables.

**Table 5.8: Correlation Matrix of Explanatory Variables (Housing Credit Growth)**

| | **HLG** | **HLOG** | **HLIG** | **HLOTG** | **Size** | **LQ** | **TD** | **SECTA** | **GDP** | **INFL** | **IR** |
|---|---|---|---|---|---|---|---|---|---|---|---|
| HLG | | | | | | | | | | | |
| HLOG | 0.877 | | | | | | | | | | |
| HLIG | 0.859 | 0.690 | | | | | | | | | |
| HLOTG | 0.171 | 0.149 | 0.182 | | | | | | | | |
| Size | 0.246 | 0.252 | 0.268 | 0.053 | | | | | | | |
| LQ | -0.095 | -0.113 | -0.069 | -0.028 | -0.101 | | | | | | |
| TD | -0.060 | -0.024 | -0.073 | -0.131 | 0.488 | -0.193 | | | | | |
| SECTA | -0.048 | -0.069 | -0.044 | 0.007 | -0.562 | -0.034 | -0.675 | | | | |
| GDP | -0.048 | -0.027 | -0.035 | 0.064 | -0.033 | 0.030 | -0.057 | 0.047 | | | |
| INFL | 0.042 | 0.073 | 0.058 | -0.003 | 0.009 | 0.036 | 0.004 | 0.042 | 0.540 | | |
| IR | 0.048 | 0.083 | 0.022 | 0.051 | -0.042 | 0.063 | -0.074 | 0.118 | 0.422 | 0.637 | |
| UNEMP | -0.046 | -0.090 | -0.029 | 0.039 | -0.013 | -0.026 | -0.010 | -0.062 | -0.390 | -0.534 | -0.738 |

Table 5.8 shows the relationship between the dependent and independent variables. With respect to supply-side determinants, bank size was positively related to all the bank housing credit indicators, as large banks are likely to be more efficient than small banks and able to acquire funds at a lower cost due to the amount of collateral they can provide; however, the relationship is very weak in the case of BLG as an indicator. Liquidity ratio was negatively related to all bank housing credit indicators, which suggests that poor asset quality or high ratio of non-performing loans to total assets is related to poor operational performance of banking institutions. For the other supply-side factors, TD is negatively related to all the bank housing credit indicators. This may be due to the fact that liquidity management is more related to fulfilling depositors' obligations (safeguarding depositors) than investment. SECTA was negatively related to HLG, HLOG and HLIG. One of the main determinants of securitising assets is the possibility of increasing liquidity ratios and thus increasing the opportunity of diversifying the fund resources of securitised banking institutions, so this purpose could be associated with the way of using the liquidity obtained from securitising assets transactions, which could be used to achieve other purposes not necessarily related to an increase in bank credit, for example reducing the leverage or re-organising the assets portfolio for liquidity purposes. However, securitising had a positive correlation with HLOTG, consistent with the view of securitising assets as an alternative or additional funding source that can be used to cover the credit demand to grant additional loans (Altunbas et al., 2009).

With respect to demand-side determinants, the growth of GDP was negatively related to HLG, HLOG and HLIG. This may be due to economic circumstances not generating sufficient additional domestic deposits in the short term, which may be way it does not affect bank credit significantly (Ongore & Kusa, 2013).However, GDP growth had a positive correlation with HLOTG. This relationship supports the view that there are more attractive investment opportunities in a boom period and borrowers are more solvent. The INFL rate was positively related to HLG, HLOG and HLIG, which may be due to the fact that inflation could affect value for money, the purchasing power of people and the real interest rate that banks charge and receive. This result was expected and is in line with the findings of Guo and Stepanyan (2011), who explained that any increase in INFL will be reflected in higher demand for credit. However, unemployment rates were negatively correlated with HLOTG. Interest rate was positively related with all bank housing credit indicators. Higher interest rates will lower the demand for credit, which explains the negative coefficient with respect to credit growth. The unemployment rate was negatively related to HLG, HLOG and HLIG,

as expected, and supports the explanation that increased unemployment rates will affect the ability to pay back loans and defaults will increase. However, the unemployment rate had a positive correlation with HLOTG.

## 5.3 Bank Credit Growth—Pooled Ordinary Least Squares Model Results

The analysis begins with pooled OLS regressions to test the effect of securitising assets (securitising loans portfolio) and other factors on banks' credit growth and to analyse the impact of the GFC. OLS regressions for securitising assets (securitising loans portfolio) and other explanatory factors for banks' credit growth, along with different sets of supply- and demand-side factors as explanatory variables, were performed to investigate the effect of securitising assets and other factors on bank credit growth by dividing the sample of domestic banks into securitised and non-securitised banks. The hypotheses stated in Chapter 2 are tested and the results are discussed.

This section presents the regression results, interprets the findings for domestic banking institutions and discusses the relationship among the identified bank-specific factors and with bank credit growth as expressed by business credit growth activity and the growth of housing loans activity. The relationship was assessed by the parameter coefficients between the explanatory and explained variables. The coefficients show the importance and trend of relationships, whether they are positive or negative and significant or non-significant (strong or weak). The higher the value the stronger the relationship, and a similar coefficient is an indicator of a weak relationship. The sign indicates the direction of the influence: a positive sign shows a positive relationship and a negative, the opposite.

Table 5.9 presents the effect of dependent and independent variables on bank credit growth indicators during the three different study periods (before, during and after the GFC).

## Table 5.9: Ordinary Least Squares Estimation for the Effect of Securitising Assets on Bank Credit Growth

| **Dependent variable** | **Models** | | | | | |
|---|---|---|---|---|---|---|
| CG | Securitised | | | Non- securitised | | |
| | Pre-GFC | GFC | Post-GFC | Pre-GFC | GFC | Post-GFC |
| **Independent variables** | (1) | (2) | (3) | (4) | (5) | (6) |
| Supply Factors | | | | | | |
| Size | 0.058 | -0.112 | -0.075 | -0.014** | -0.049*** | -0.026 |
| | (0.65) | (-0.77) | (-0.68) | (-2.46) | (-2.92) | (-1.42) |
| TD | -0.034 | 0.040 | 0.026 | 0.006* | 0.007 | 0.007 |
| | (-0.76) | (0.74) | (0.58) | (1.83) | (0.89) | (1.00) |
| LQ | 0.055 | -1.210 | 1.241* | 0.025 | -0.035 | -0.018 |
| | (0.11) | (-1.47) | (1.93) | (0.90) | (-0.74) | (-0.16) |
| SECTA | -0.020 | 0.019 | -0.026 | | | |
| | (-1.33) | (0.21) | (-0.17) | | | |
| Demand Factors | | | | | | |
| GDP | -0.828* | -0.042 | -0.301 | -0.454* | -0.403* | 0.072 |
| | (-1.94) | (-0.18) | (-1.52) | (-1.88) | (-1.69) | (0.48) |
| INFL | -2.323 | 0.286 | 0.417 | -1.279 | 2.204* | 0.416 |
| | (-0.98) | (0.13) | (0.51) | (-1.42) | (1.70) | (0.72) |
| IR | 0.795 | -0.829 | -3.304 | 1.101 | -1.609 | -2.049 |
| | (0.16) | (-0.38) | (-1.50) | (0.47) | (-1.18) | (-1.64) |
| UNEMP | -8.261* | -4.950 | 0.877 | -2.551 | -3.777 | 4.224 |
| | (-1.84) | (-1.08) | (0.41) | (-1.04) | (-1.30) | (1.46) |
| Constant | 0.613 | 0.475 | 0.196 | 0.198 | 0.486** | -0.033 |
| | (1.23) | (1.13) | (0.77) | (0.75) | (2.37) | (-0.20) |
| Observations | 48 | 48 | 48 | 120 | 120 | 120 |
| R-squared | 0.269 | 0.202 | 0.228 | 0.147 | 0.184 | 0.167 |
| Adjusted R-squared | 0.119 | 0.038 | 0.070 | 0.085 | 0.125 | 0.107 |
| F-statistic | 3.139 | 1.459 | 1.894 | 2.793 | 1.691 | 1.554 |
| Prob (F-stat) | 0.008 | 0.204 | 0.089 | 0.007 | 0.108 | 0.147 |

*Notes:*

(1) ***Dependent Variables*** were measured as a percentage of change for each bank with regard to the same variable in the previous quarter. They include the ***business credit growth activity*** CG, measured as a percentage of change of total loans for a banking institution, BLG and CCLG. The ***housing credit growth activities*** include HLG, HLOG, HLIG and HLOTG.

(2) ***Independent Variables are*** divided into ***supply factors***: Size, which represents bank size and was calculated using the natural logarithm of total assets; TD; LQ, the liquidity of bank (cash and securities over total assets); SECTA, asset securitisation, measured as the ratio of total securitised assets to total assets. The ***Demand Factors are*** GDP-G, the real annual GDP growth rate; IR, interest rate; INFL, inflation rate (annual consumer price inflation as percentage); UNEMP, unemployment rate. Dummy variables are GFC, Global Financial Crisis (pre-GFC, GFC and post-GFC (1 = financial crisis, 0otherwise); SECDUM, securitisation (1= securitised bank, 0= non-securitised bank).

(3) Values in parentheses are *t*-statistics: ***, ** and * indicate significance at the 1%, 5% and 10% levels respectively.

Considering the supply-side determinants, known as internal factors related to bank-specific characteristics, the results provide some empirical evidence for the coefficient of Size (expressed as the natural logarithm of total assets in the case of securitised banks in Model 1) during pre-GFC period having a positive effect on the CG, as large banks are likely to be more efficient than small banks and are able to acquire funds at a lower cost due to the amount of collateral they can provide. This agrees with expectation, but the effect is rather insignificant and weak, so will have no major influence on CG, whereas the coefficient of the effect during both the GFC and post-GFC periods in Models 2 and 3 is negative in both cases (although this effect is not significant so no strong relationship can be inferred in either case). In contrast, in the case of non-securitised banks over all three periods, the coefficient of Size negatively affected CG in all models; however, the coefficient of the effect during the pre-GFC and GFC periods in Models 4 and 5 were significant at the 5% and 1% level, respectively, with the opposite sign to that anticipated. The coefficient of the effect during the post-GFC period in Model 6 was negative but not significant, so this factor will have no major effect on CG. This conclusion is in line with results reported by De Haas, Ferreira and Taci (2010); that small banks are unable to lend to large institutions due to the limitation of their size because they are more restricted by regulatory lending limits. It is also possible that the 'size' effect may be operating here. Small firms tend to have more growth than larger firms.

The effect of TD on CG in the case of securitised banks was not significant across all models and all three periods, but found to be negative during the pre-GFC period in Model 1 and positive with respect to CG both during and after the GFC in Models 2 and 3, which is in line with what was expected, According to Brown and Davis (2010), this impact, especially during the GFC, could be related to government guarantees on banks deposits and wholesale funding for the four largest Australian banks rated as AA by S & P in mid-2009based on data from October 2008; therefore, this policy reflected increasing financial performance of the four major banks regardless of deposits being affected by 20–25% at the end of 2007,although the ability of the major four banks increased their additional equity capital and as a result of this policy they were rated among the top 40 global banking institutions. However, in both cases the effect was not significant and was very weak, therefore TD will have no major effect on CG. This effect can be explained by the following: (i) the effect appears to be clearer for other types of loans in the other credit growth indicators; (ii) securitised banks not only depend on deposits as their main source of funds but are also more dependent on, or associated with, cash flow of securitising asset transactions; (iii) as

explained by Imran and Nishat (2013), loans are not issued instantaneously from the current money volume deposited by account holders, which is in line with the point of view of the loanable funds theory. The outcome is correct as the sign of the effect is positive; therefore, any increase in banks' funds will reflect on the credit supply side (Assefa, 2014). Additionally, the deposits factor was used as an indicator of both supply and demand of credit; thus, it is possible that after deregulation, deposits were an unsuitable indicator of domestic demand for credit (Krishnamurthy, 2013). However, in the case of non-securitised banks, the coefficient of TD effect across all models and all three periods was positive with respect to CG. The effect of TD on CG during the pre-GFC period in Model 4 was positive and significant at the 10% level, in line with Olokoyo (2011), who explained that total deposits are one element of the total liabilities of banks used as a major funding resource to increase the capability of credit of banking institution, thus creating more effective results. Similarly, Assefa (2014) indicated that the coefficient of the domestic deposits volume demonstrates that total deposits play a major role in the credit growth of banking institutions. As a result, all other factors being constant, any increase in the volume of deposits will be transformed into credit. The implication of the result is that as bank deposits increase, assets and liquidity also increase, and as a result they provide more credit at the domestic level. This conclusion is in line with findings of Imran and Nishat (2013).Similarly, this effect during both the GFC and post-GFC periods in Models 5 and 6 was positive. However, in both cases the effect was not significant and is very weak, thus no major effect can be considered with respect to CG through these periods.

The effect of LQ in the case of securitised banks (expressed as liquid assets to total assets) on CG during both the pre-GFC and GFC periods in Models 1 and 2was not significant. During the pre-GFC period in Model 1the effect is positive, in line with expectation, but the effect is rather insignificant so will have no major effect on CG. The coefficient of this effect during the GFC period in Model 2 was negative but not significant, whereas the effect of LQ on CG during the post-GFC period in Model 3 was significant with the expected positive sign at the 10% level. Thus, this result is in line with the findings of Imran and Nishat (2013), who indicated that increasing the liquidity ratio of banking institutions will increase their capability to gain credit and make credit more available at the domestic level. This conclusion enhances the theory of loanable funds and the empirical results (Imran & Nishat, 2013; Olokoyo, 2011). In contrast, the effect of LQ on CG in the case of non-securitised banks across all models in all three periods was not significant and only positive during the pre-GFC period in Model 4, which is in line with what

was expected. However, the effect is very weak so will have no major effect on CG. Otherwise, the coefficient was negative during both GFC and post-GFC periods in Models 5 and 6.

The above table also reports that the other important supply-side factor affecting CG is securitising assets (SECTA), represented by total securitising assets to total assets: the effect of SECTA was not significant with respect to CG across all models in all three periods, as securitisation increases funding options. However, as this result was not significant, the analysis does not lead to strong conclusions, which found to be negative with inverse sign of what was anticipated during pre-GFC period in Model 1. However, the effect was positive during the GFC period in Model 2, in line with what was expected; although the effect is very weak so will have no major effect on CG. In contrast, the coefficient of this effect during the post-GFC period in Model 3 was negative, which was the opposite of the expected sign based on the results of Martín-Oliver and Saurina (2007) and Mazzuca and Battaglia (2011). These authors found that the main driver for securitising assets is the possibility of increasing liquidity ratios and thus increasing the opportunity to diversify the fund resources of securitised banking institution. This may be associated with the way of using the liquidity from securitising assets transactions, which may achieve other purposes not necessarily related to an increase in bank credit, such as reducing the leverage or re-organising the assets portfolio to achieve liquidity purposes.

In contrast, with respect to demand-side determinants (external or macroeconomic factors) related to the macroeconomic environment of Australian banking institutions during the three periods considered (pre-GFC, GFC and post-GFC periods).

The coefficient for growth of GDP in the case of securitised banks during the pre-GFC period in Model 1 was negative and significant only at the 10% level, the opposite of what was expected. A positive sign was expected because there are more attractive investment opportunities in a boom period and borrowers are more solvent. However, as this variable was not significant, the result does not refute the conventional argument and supports the view that the coefficient of GDP growth is not necessarily positively associated with operational performance of banking institutions (Flamini et al., 2009).This result may also arise because the economic circumstances could not generate sufficient additional domestic deposits in the short term, hence it does not affect bank credit significantly (Ongore & Kusa, 2013). The trend in GDP growth will influence the demand on the assets of banking institutions: when the growth of GDP is negative the growth

of credit demand will decline and negatively affect the operational performance of banking institutions (Ongore & Kusa, 2013). This explanation is based on the argument of Silva, Oreiro, de Paula and Sobreira (2007) that the effect of GDP on bank spread will be negative in the case of a default effect. High performance of the economy reduces the effect of bank default, whereas banking institutions tend to increase their lending rates when there is an increase in GDP, which increases credit demand (Tan, 2012). This effect during both the GFC and post-GFC periods in Models 2 and 3 was also negative but not significant; thus the relationship is not strong enough to be considered to have a major effect on CG. Meanwhile, in the case of non-securitised banks, the coefficient of GDP during both the pre-GFC and GFC periods in Models 4 and 5 was negative, the opposite sign to what was expected. However, this was only significant at the 10% level in both cases. In contrast, the effect was positive (but not significantly so) and very weak during the post-GFC period in Model 6, so will have no major effect on CG, in line with expectation and the results of Imran and Nishat (2013). These authors explained that any increase in GDP will enhance returns in the industrial sector and wages will be increased, so total deposits will increase, as will the liquidity ratio of banking institutions and their ability to meet the increasing investment needs of the other economic sectors. Therefore, these results support the idea that GDP growth is associated positively with credit growth, a finding consistent with the empirical literature (e.g. Assefa, 2014; Guo & Stepanyan, 2011; Imran & Nishat, 2013; Olokoyo, 2011).

The analysis also showed that inflation rate (INFL) in the case of securitised banks, which was expected to have a significant positive effect, was not significant across all models in all three periods considered: INFL had a negative effect with respect to CG during the pre-GFC period in Model 1. The negative sign may be due to the fact that INFL could affect value for money (money time value), currency purchasing power and real interest rates that banking institutions charge and receive (Ongore & Kusa, 2013).Although the effect was positive during both the GFC and post-GFC periods in Models 2 and 3, it was very weak so no major effects on CG can be attributed to INFL. Meanwhile, the coefficient of the effect of INFL on CG for non-securitised banks during the pre-GFC period in Model 4 was negative and non-significant, whereas the effect during the GFC period in Model 5 was positive as expected and significant at the 10% level. This result meets expectation and agrees with the results of Guo and Stepanyan (2011), who explained that any increase in INFL will result in higher demand for credit. They also reported a positive effect of inflation rate on credit growth**.** The effect on CG was positive but not significant and was weak during the post-GFC period in Model 6.

Inflation can have a positive or negative sign in theory. Low levels of inflation can indicate a growing economy with rising demand and rising prices, which could have a positive effect on bank stability. However, as inflation reaches high levels, it can bring an economy to a standstill and have a large negative effect on macroeconomic stability and economic growth. High inflation will have a negative effect on bank stability. Other macroeconomic factors affecting CG and considered in this analysis include funding costs measured using IR; this effect was non-significant in the case of securitised banks across all models in all three periods considered. Higher interest rates will lower the demand for credit, which explains the negative coefficient with respect to credit growth. This coefficient was positive during the pre-GFC period in Model 1, contrary to expectation. This suggests that banks were able to create a buffer without attracting too many risky borrowers through adverse selection. However, the coefficient was negative during both the GFC and post-GFC periods in Models 2 and 3, which is in line with expectation although the effect was very weak so will have no major effect on CG. In the case of non-securitised banks, the effect of IR on CG was non-significant across all models in all three periods. This effect was positive during the pre-GFC period in Model 4 but negative for both the GFC and post-GFC periods in Models 5 and 6, in line with what was expected although the effect was very weak and thus will have no major effect on CG.

Finally, the effect of unemployment rate (UNEMP) on CG for securitised banks was negative as expected, but only significant at the 10% level during the pre-GFC period in Model 1,and was also negative but not significant during GFC period in Model 2, thus will have no major effect on CG. The effect was positive but not significant during the post-GFC period in Model 3, which is in line with expectation. The effect of UNEMP on CG in the case of non-securitised banks was non-significant across all models in all three periods, whereas during both the pre-GFC and GFC periods in Models 4 and 5 the coefficient was negative, in line with what was anticipated. However, it was not significant, so will have no major effect on CG. During the post-GFC period in Model 6 the effect was positive—counter to expectation—but not significant.

### 5.3.1 Discussion of Ordinary Least Squares Findings

This empirical study found that for securitised banks during pre-GFC and GFC periods, none of the supply-side determinants examined here had significant effects on credit growth, which means

that none of the supply factors can be considered as drivers of CG leading up to and during the GFC. After the GFC, LQ had a significant effect on credit growth, so this factor is considered to influence banks' credit growth during this period. This outcome is in line with what was expected and supports the related hypothesis. In addition, the ratio of securitising assets to total assets, expect to be one of the main supply determinants in this study, had no effect on CG in any of the three periods considered; therefore the results do not support the hypothesis relating to a significant positive effect on credit growth. In contrast, by considering the macroeconomic variables, both GDP and UNEMP have a significant effect on CG so these factors can be considered as drivers of banks' CG during the pre-GFC period. However, the coefficient for GDP was significant but with the reverse sign to that expected, so does not support the tested hypothesis; whereas the coefficient for UNEMP was as expected, thus supporting the related hypothesis. Otherwise, the results for the GFC and post-GFC periods revealed no significant correlations for any of the demand-side determinants; therefore, no hypotheses relating to demand-side determinants were supported for the GFC or post-GFC periods.

For non-securitised banks, Size was significant during both pre-GFC and GFC periods but with a different sign than anticipated; therefore the related hypothesis was not supported. However, the factor of TD positively and significantly affected CG, in line with what was expected, so the related hypothesis was supported. Otherwise, no other supply-side determinants, even during the post-GFC period, were found to have an effect on CG. On the other hand, with respect to the demand determinants, the effect of GDP growth in both the pre-GFC and GFC periods was significant with a different sign than anticipated; therefore, the hypothesis relating to the effect of GDP on CG was not supported. However, as expected, the effect of INFL was positive and significant only during the GFC period; therefore this result supports the hypothesis of the effect of INFL on CG. In other periods the effect on CG was not significant.

## 5.4 Random Effects Panel Data Estimation

To check for multicollinearity, the study computed VIFs for all independent variables based on a pooled OLS regression. The corresponding factors were all below the critical value. In addition, pair wise correlation coefficients between these variables were also rather small.

To ensure that main findings do not depend on the specific setting, different robustness checks were run. First, an estimation method was applied that controls for bank random effects. Instead of using the OLS regression method, the study estimates the model using the random effects panel estimation method. Note that the dummy variables, which do not vary over time, were excluded. The results of the random effects estimation confirmed the main findings reported above. Second, Winsor values for explanatory variables were calculated to explain bank credit growth in a particular period. This is to remove outliers in the data. In terms of the size of coefficients and significance levels, the results were very similar to those reported earlier. Third, to check for stability of the parameter estimates, the regressions were re-run omitting individual variables. The analyses proved to be insensitive towards leaving out these variables one by one. Given that collinearity among the independent variables also is not a problem, all variables were included in the model. Finally, each bank category was omitted in turn from the results to assess whether any one of them had a disproportionate influence on the results. The results from this robustness test confirmed the findings from the main sample as well.

To test the relationship between securitisation activities, other lending determinants and banks' credit growth, the analysis stated with the determinants of banks' credit growth and selected business credit growth activity, which were used as one of the financial or operational performance indicators of a bank that was measured using three indicators (CG, BLG and CCLG).

### 5.4.1Determinants of Credit Growth

The random effects (RE) panel estimation regression results for the effect of securitising assets on domestic banks' credit growth, and factors affecting banks' credit growth, were analysed. RE estimation for related models specified as in the previous section were conducted. The hypotheses stated in Chapter 2 were tested and the results discussed to determine whether securitising assets (SECTA) and other factors influence bank credit growth as measured by the seven models mentioned in the previous section on OLS regression.

Table 5.10 illustrates the RE of the effect of using asset securitisation and other lending determinants on credit growth during the three periods spanning the GFC.

**Table 5.10: Random Effects Model Estimation for the Effect of Securitising Assets on Bank Credit Growth**

| **Dependent variable** | **Models** | | | | | |
|---|---|---|---|---|---|---|
| CG | Securitised | | | Non- securitised | | |
| | Pre-GFC | GFC | Post-GFC | Pre-GFC | GFC | Post-GFC |
| **Independent variables** | (1) | (2) | (3) | (4) | (5) | (6) |
| Supply Factors | | | | | | |
| Size | 0.058 | -0.112 | -0.075 | -0.016** | -0.042** | -0.026 |
| | (0.65) | (-0.79) | (-0.55) | (-2.06) | (-2.54) | (-1.62) |
| TD | -0.034 | 0.040 | 0.026 | 0.005 | 0.004 | 0.007 |
| | (-0.90) | (0.77) | (0.49) | (0.86) | (0.43) | (0.99) |
| LQ | 0.055 | -1.210* | 1.241 | 0.035 | -0.057 | -0.049 |
| | (0.08) | (-1.92) | (1.59) | (0.52) | (-0.42) | (-0.41) |
| SECTA | -0.020 | 0.019 | -0.026 | | | |
| | (-0.77) | (0.29) | (-0.18) | | | |
| Demand Factors | | | | | | |
| GDP | -0.828* | -0.042 | -0.301 | -0.455** | -0.399* | 0.073 |
| | (-1.92) | (-0.14) | (-1.41) | (-2.07) | (-1.81) | (0.47) |
| INFL | -2.323 | 0.286 | 0.417 | -1.272 | 2.168 | 0.419 |
| | (-1.22) | (0.13) | (0.34) | (-1.38) | (1.38) | (0.46) |
| IR | 0.795 | -0.829 | -3.304* | 1.142 | -1.572 | -2.042 |
| | (0.16) | (-0.35) | (-1.89) | (0.45) | (-0.91) | (-1.57) |
| UNEMP | -8.261*** | -4.950 | 0.877 | -2.556* | -3.758 | 4.226** |
| | (-2.67) | (-1.05) | (0.33) | (-1.69) | (-1.07) | (2.10) |
| Constant | 0.613 | 0.475 | 0.196 | 0.211 | 0.473* | -0.033 |
| | (1.53) | (1.31) | (0.73) | (1.06) | (1.74) | (-0.22) |
| N | 48 | 48 | 48 | 120 | 120 | 120 |
| Overall $R^2$ | 0.269 | 0.202 | 0.228 | 0.144 | 0.182 | 0.166 |
| $Chi^2$ | 14.373 | 9.879 | 11.526 | 11.481 | 12.590 | 16.327 |
| P | 0.073 | 0.274 | 0.174 | 0.176 | 0.127 | 0.038 |

*Notes:* See Table 5.1 for a description of the variables. Values in parentheses are *t*-statistics; ***, ** and * indicate significance at the 1%, 5% and 10% levels respectively.

The results for the RE models are quite similar to the OLS model regression results. For example, in the case of securitised banks in all models over all three periods, the effect of bank-independent variables on the dependent variable is similar to the OLS regression results.

Slight differences in significance were observed among the estimation results for the three time periods. On the supply side, the coefficient for the effect of Size on CG in the case of securitised banks was not significant across the three periods considered, so will have no major effect on banks' credit growth. However, for non-securitised banks the Size effect was negative across all three periods considered and significantly so (at the 5% level) for both the pre-GFC and GFC periods, with a different sign than anticipated, but in agreement with Andries, Corsu and Ursu (2012), who found that the effect of bank size was significant and negatively correlated with operational performance, but otherwise was not significant. Therefore, these results are consistent with OLS regression results for both securitised and non-securitised banks in the three periods considered; thus, the results confirm that the effect of the Size variable on CG is the same as for the OLS regression result.

The volume of domestic deposits had no significant effect in the three periods considered: it was found to have a negative effect on credit growth before the GFC period but otherwise was positive, in line with what was expected, but non-significant. Thus it will have no major effect on banks' credit growth and the results for all three periods did not support the related hypothesis. However, in the case of non-securitised banks the influence of TD on CG was positive and non-significant in all three periods: banks with more deposits funding (stable) could expand their supply of loans, particularly during the GFC period. In addition, the effect of TD during the GFC period in the case of non-securitised banks was less significant in the RE regression (only at the 5% level) than in the OLS regression (1%), although the results are otherwise consistent. Further, the size effect during the pre-GFC period in Model 4 with RE regression was still positive but was not significant, unlike the OLS regression result. Again, these results are consistent with OLS regression results only during GFC and post-GFC periods in Models 5 and 6, otherwise inconsistent with OLS regression results.

The liquidity ratio was only significant during the GFC period, and with a different sign than anticipated. This correlation might be explained if holding liquid assets in balance sheets has opportunity costs of higher proceeds. However, in periods of instability, banking institutions prefer to hold more cash and liquid assets to decrease risks associated with the surrounding environmental conditions. Therefore, the liquidity of banking institutions in this case was correlated negatively with credit growth, but was not significant, therefore the related hypothesis was not supported in any of the three periods. This is inconsistent with the OLS regression results

in both cases during the GFC, although those were significant at the 10% level and not significant in the post-GFC period. In the case of non-securitised banks, the effect was positive only during the pre-GFC period, but was not significant in any of the three periods considered, thus this factor had no major effect on banks' credit growth. In this case, highly liquid banking institutions were more likely to expand their supply of loans, particularly during the GFC period; therefore, the related hypothesis is not supported for any of the three periods considered, consistent with the OLS regression results.

The results for all models confirmed that the effect of securitisation on the dependent variable is the same as seen with the OLS regression. The coefficient for securitising assets also was not significant in any of the three periods considered; a negative effect on credit growth was inferred during both the pre- and post-GFC periods and a positive effect during the GFC period, but as this was not significant it will have no major effect on banks' credit growth. Securitising assets as a capital relief and funding source may have reversed during the GFC period, thus the results for all three periods even though the effect was positively related during GFC periods did not support the related hypothesis. These results are consistent with OLS regression results in all cases.

In contrast, for demand-side determinants, the GDP variable had a negative coefficient for its effect on credit growth in all three periods, although this was significant only for the pre-GFC period. Therefore the related hypothesis was not supported in any of the three periods considered in this type of banking institutions. Again, these findings are consistent with the OLS regression results. This means that the business sector does not really depend on bank loans or facilities as a major source of funding. In the case of non-securitised banks, the effect of GDP was negative and statistically significant during both the pre-GFC and GFC periods; otherwise, the effect was positive, in line with what was expected. However it was not significant so will have no major effect on the banks' credit growth and the related hypothesis was not supported in any of the three periods considered. Again, these findings are consistent with OLS regression results.

The INFL had a negative sign for the pre-GFC period (the opposite of what was expected) whereas its sign was positive for the GFC and post-GFC periods, in line with what was expected but not significant even in all three periods. Therefore, this factor has no major effect on banks' credit growth and the related hypothesis is not supported in any of the three periods, consistent with the OLS regression results. The hypothesis relating to the effect of INFL in the case of non-

securitised banks was not supported in any of the three periods, matching the result for securitised banks during all three periods; therefore, in this case, this factor has no major effect on the banks' credit growth. These outcomes were consistent with the OLS regression results in Models 4 and 6, but inconsistent with OLS regression results from Model 5, which became non-significant.

The third of the demand-side factors affecting CG was interest rates, which had a positive effect during the pre-GFC but was not significant. The effect was negative, but significant only at the 10% level, during the post-GFC period in line with what was expected; therefore, this result supports the related hypothesis. During the post-GFC period, the effect was negative and significant at the 10% level, in line with expectation but inconsistent with the OLS regression result, which was negative and not significant.

In the case of non-securitised banks, the effect had the same sign as in the case of securitised banks but was not significant in any of the three periods; therefore, this factor has no major effect on banks' credit growth and the related hypothesis is not supported in any of the three periods. These outcomes are consistent with the OLS regression results.

The last factor examined for demand-side determinant effects on credit growth was unemployment rate, which had a negative influence on credit growth during both the pre-GFC and GFC periods, although this was only significant for the pre-GFC period. This result is as expected for the pre-GFC period, so supports the related hypothesis. It was positive during the post-GFC period but not significant. These results are consistent with the OLS regression results.

In the case of non-securitised banks it had the same sign as for securitised banks, and was significant during both pre- and post-GFC periods, although its sign was negative and positive, respectively; otherwise it was not significant so the related hypothesis was supported only for the pre-GFC period. Again, these outcomes are consistent with OLS regression results only for Model 5 during the GFC. In other models, the findings are inconsistent with OLS regression results. The IR effect during the pre-GFC period in RE regressions was still negative but became significant (at the 10% level), whereas in the OLS regression it was not significant. For the post-GFC period in Model 6 it was still positive but was significant at the 5% level, in contrast to the non-significant result for the OLS regression.

The results show that effects on credit growth in the case of securitised banks for all three periods were significant only for LQ during the GFC period, with a different sign than anticipated; therefore, the hypothesis relating to the effect of LQ on CG is not supported. The effects of other supply determinants considered in this study were mixed but none were significant in any of the three periods, thus there is no major effect on CG. On the other hand, securitising assets, considered one of the main supply-side factors in this study, has no effect on CG, so the hypothesis regarding the effect of securitising assets on banks' credit growth is not supported. At the macroeconomic view, both GDP and UNEMP have significant effects on CG so they can be considered as drivers of banks' CG during the pre-GFC period; however, the coefficient of the GDP was an unexpected negative sign, so the related hypothesis was not supported. However, the coefficient for UNEMP was as expected, so the related hypothesis is supported. Further, the effect of interest rates was significant during the post-GFC period, which is in line with the expectation that higher interest rates will lower the demand for credit, consistent with its negative coefficient with respect to credit growth; thus the related hypothesis supported. Otherwise, the effect was not significant so interest rates will have no major effect on CG and the related hypotheses are not supported.

In the case of non-securitised banks, the effect of Size during both pre-GFC and GFC periods was significant, but with a different sign than anticipated; therefore, the related hypothesis is not supported in all three periods. No other variables for supply determinants had significant effects, thus they will have no major effect on CG and the related hypotheses are not supported. On the other hand, when using macroeconomic factors as demand determinants, the effect of GDP in both pre-GFC and GFC periods was significant, albeit with a different sign than anticipated so that the related hypothesis is not supported. The influence of UNEMP during both pre-GFC and post-GFC periods was significant with a different sign than anticipated for the pre-GFC period; therefore the related hypothesis not supported. However, the coefficient for the post-GFC period was significant, which is in line with what was expected so the related hypothesis is supported.

### 5.4.2 Determinants of Business Loans Growth (BLG)

Table 5.11 provides the results from the RE model estimation for the effect of asset securitisation and other lending determinants on BLG.

**Table 5.11: Random Effects Model Estimation for the Effect of Securitising Assets on Bank Business Loans Growth**

| **Dependent variable** | **Models** | | | | | |
|---|---|---|---|---|---|---|
| BLG | Securitised | | | Non- securitised | | |
| | Pre-GFC | GFC | Post-GFC | Pre-GFC | GFC | Post-GFC |
| **Independent variables** | (1) | (2) | (3) | (4) | (5) | (6) |
| Supply Factors | | | | | | |
| Size | 0.025 | -0.227** | 0.104 | 0.014** | 0.008 | -0.095** |
| | (0.23) | (-2.01) | (0.51) | (2.53) | (0.94) | (-2.56) |
| TD | -0.016 | 0.090** | -0.006 | -0.000 | -0.000 | 0.029* |
| | (-0.35) | (2.16) | (-0.07) | (-0.00) | (-0.05) | (1.86) |
| LQ | 0.249 | -0.521 | 1.453 | -0.020 | -0.008 | 0.019 |
| | (0.31) | (-1.04) | (1.24) | (-0.37) | (-0.11) | (0.09) |
| SECTA | -0.033 | -0.044 | 0.410* | | | |
| | (-1.05) | (-0.87) | (1.91) | | | |
| Demand Factors | | | | | | |
| GDP | -0.374 | 0.347 | -0.532* | -0.439** | 0.036 | -0.039 |
| | (-0.72) | (1.45) | (-1.66) | (-1.99) | (0.26) | (-0.21) |
| INFL | -4.597** | -3.906** | 1.232 | -2.018** | -2.004** | 0.473 |
| | (-2.01) | (-2.26) | (0.67) | (-2.18) | (-2.00) | (0.42) |
| IR | -0.978 | 2.241 | -0.016 | -0.375 | 1.425 | -1.818 |
| | (-0.16) | (1.18) | (-0.01) | (-0.15) | (1.29) | (-1.14) |
| UNEMP | -7.489** | 0.955 | 0.249 | -3.883** | -1.349 | 1.596 |
| | (-2.01) | (0.25) | (0.06) | (-2.56) | (-0.60) | (0.65) |
| Constant | 0.676 | 0.125 | -0.527 | 0.279 | 0.031 | 0.260 |
| | (1.40) | (0.43) | (-1.30) | (1.41) | (0.19) | (1.04) |
| Observations | 48 | 48 | 48 | 120 | 120 | 120 |
| Overall $R^2$ | 0.202 | 0.246 | 0.265 | 0.145 | 0.110 | 0.300 |
| $Chi^2$ | 9.891 | 12.718 | 14.092 | 15.051 | 13.542 | 12.077 |
| Prob (F-stat) | 0.273 | 0.122 | 0.079 | 0.058 | 0.095 | 0.148 |

*Notes:*
(1) See Table 5.1 for a description of the variables
(2) Values in parentheses are *t*-statistics; ***, ** and * indicate significance at the 1%, 5% and 10% levels respectively

The analysis identified some significant differences among the estimation results for the three periods, both with respect to the significance and size of the coefficients. The models estimated across all three periods for the business loan growth measure can be observed in supply-side determinants: the effect of Size on BLG was positive as expected, but not statistically so for both

pre- and post-GFC periods. Therefore this factor has no major effect on banks' business loans growth in those periods, otherwise it was negative and significant, and so the related hypothesis is not supported in any of the three periods considered. However, in the case of non-securitised banks, the coefficient for the effect of Size on BLG was significant during the pre- and post-GFC periods; and positive during the pre-GFC period as expected, supportinghypothesis1.This is unsurprising because a large bank is probably more efficient and can gain easier access to cheap funds, as it can provide a large amount of collateral. However, the coefficient for Size was negative following the GFC, the opposite sign than anticipated; otherwise it was positive but not significant and thus the related hypothesis was not supported in either period. In addition, TD in the case of securitised banks had a significant effect with the anticipated positive sign only for the GFC period, a result supporting hypothesis 4.3.2; otherwise it was negative and not significant so the related hypothesis is not supported in either case.

In the case of non-securitised banks the effect was only positive (and significant) during the post-GFC period, in agreement with expectation, so hypothesis 4.3.2 is supported; otherwise, the coefficient for this effect was negative but not significant and the related hypothesis is not supported in any period. The LQ had no significant effect on BLG indicators during all three periods, so will have no major effect on BLG. The effect was positive during both pre- and post-GFC periods as expected and this finding does not support hypothesis 4.3.3. It had a negative sign otherwise. The effect of LQ in the case of non-securitised banks was only positive during the post-GFC period, which is in line with what was expected but was not significant; therefore this finding does not support hypothesis 4.3.3. Otherwise the coefficient was negative and not significant. The coefficient for SECTA was positive and showed a significant effect on BLG only during the post-GFC period as expected; this finding does support hypothesis 4.3.4. This result is consistent with the view of securitising assets as an alternative or additional funding source that can be used to cover credit demand and grant additional loans (Altunbas et al., 2009). Otherwise, the coefficient for this effect was negative and not significant.

In contrast, for demand-side determinants, the effect of GDP on BLG was negative during both pre- and post-GFC periods but significant only for the post-GFC period, contrary to expectation in both cases, providing no support for hypothesis 4.3.5. Otherwise, the effect was positive but not significant so will have no major effect on banks' business loans growth. The effect of GDP on BLG for non-securitised banks was negative during both pre- and post-GFC periods but only

significant for the pre-GFC period, so this finding does not support hypothesis 4.3.5; otherwise it was positive but not significant in both cases so the related hypothesis is not supported in any.

The coefficient for INFL affecting BLG was negative and significant for both the pre-GFC and GFC periods, counter to expectation. However, this result was consistent with Boyd and Champ (2006), who found that a higher inflation rate reduces the actual rate of ROA of the institution, which reduces its savings and thus encourages both poor- and good-quality borrowers. This will reflect on the ability of banking institutions to distinguish between good-quality borrowers and poor ones, therefore affecting their lending functions. Moreover, Kashyap andStein (2000) illustrated that any increase in economic activity in turn increases the income and profits of borrowers. Similarly, Tan (2012) argued that any increase in inflation rate can be considered a sign of the volatile condition of the economy, and thus a riskier market. Thus banking institutions tend to increase the interest rate on loans to compensate for the associated risk through economic circumstances; as a result, the effect will be negative on credit demand (which implies that the inflation rate in fact dampens the growth of credit; Guo & Stepanyan, 2011). Otherwise, the coefficient was positive but not significant, in line with what was expected. However, the relationship was very weak so will have no major effect on banks' business loans growth and does support hypothesis 4.3.6. In the case of non-securitised banks, the effect during both pre-GFC and GFC periods was significant and negative sign, which was not anticipated; therefore, this finding does not support hypothesis 4.3.6. Otherwise the sign of the coefficient was positive, which is in line with expectation, although it was not significant so will have no major effect on banks' business loans growth and the related hypothesis is not supported in any of the three periods. IR had a negative effect during both pre- and post-GFC periods, in line with what was expected but not significant; therefore, this finding does not support hypothesis 4.3.7 in both cases. The effect was positive during the GFC but not significant across all three periods so will have no major effect on the banks' business loans growth in any of the three cases. In the case of non-securitised banks the coefficient for the effect was the same sign as for securitised banks (negative) but this was not significant during either pre-or post-GFC periods; therefore, this finding does not support hypothesis 4.3.7. The effect was positive during the GFC period but not significant so will have no major effect on banks' business loans growth in any of the three cases. The effect of UNEMP on BLG was negative and significant during the pre-GFC period as expected; therefore, this finding supports hypothesis 4.3.7. The effect was positive but not significant during the GFC and post-GFC periods, counter to expectation. In the case of non-securitised banks the effect was

negative during both pre-GFC and GFC periods but significant only for the pre-GFC period, which is in line with expectation, so this finding supports hypothesis 4.3.7; otherwise the effect was positive but not significant.

The RE regression model results for securitised banks during the three periods revealed that Size and TD had significant effects during the GFC period. Size had a different sign than anticipated so the related hypothesis for the effect is not supported; whereas the effect of TD had the expected positive sign so the related hypothesis is supported. The effect of SECTA, considered one of the main supply determinants, was positive on BLG, so the hypothesis relating to the effect of securitising assets on banks' credit growth is supported in this case, but only during the post-GFC period. In contrast, for the macroeconomic determinants the effect of both the GDP and INFL variables was significant but with different signs than anticipated during the post-GFC period for GDP, and during both pre-GFC and GFC periods for INFL. Therefore the related hypotheses are not supported in either cases. Also, the coefficient of UNEMP had the expected sign, so the hypothesis relating to the effect of UNEMP on banks' business loans growth is supported, but only for the pre-GFC period. Otherwise, the findings for supply and demand determinants not mentioned here but included for all three periods did not support any of the related hypotheses.

Regarding non-securitised banks supply determinants, the coefficient for Size during the pre-GFC period was significant and positive, as expected because a large bank is probably more efficient and can gain easier access to cheap funds as it can provide a large amount of collateral; therefore the related hypothesis is supported. The effect during the post-GFC period was significant but with a different sign than anticipated so the related hypothesis is not supported. Also the effect of TD during the post-GFC period was as expected so the related hypothesis is supported.

When respect to macroeconomic determinants as demand factors, the effects of GDP during the pre-GFC period and INFL during both pre-GFC and GFC periods were significant but with different signs than anticipated; thus the related hypotheses for the effect of both factors on BLG are not supported. The effect of UNEMP was significant and negative during the pre-GFC period in line with expectation; therefore the related hypothesis is supported in this case. Otherwise, the findings of all variables for supply and demand determinants not described here were not significant, so these variables will have no major effect and the related hypotheses with respect to BLG are not supported.

### 5.4.3 Determinants of Credit Card Loans Growth (CCLG)

Table 5.12 summarises the RE regression results for the effect of securitising assets and other lending determinants on the growth of credit card loans during the three periods considered in this study, for both securitised and non-securitised banks.

**Table 5.12: Random Effects Model Estimation for the Effect of Securitising Assets on Bank Credit Card Loans Growth**

| | **Securitised** | | | **Non- securitised** | | |
|---|---|---|---|---|---|---|
| CCLG | Pre-GFC | GFC | Post-GFC | Pre-GFC | GFC | Post-GFC |
| MODEL | (1) | (2) | (3) | (4) | (5) | (6) |
| Supply Factors | | | | | | |
| Size | -0.178*** | 0.017 | 0.010 | -0.007 | 0.002 | 0.001 |
| | (-6.48) | (0.35) | (0.17) | (-1.03) | (0.40) | (0.29) |
| TD | 0.079*** | -0.006 | 0.010 | -0.001 | 0.005 | 0.003 |
| | (6.80) | (-0.36) | (0.43) | (-0.22) | (1.40) | (1.33) |
| LQ | 0.088 | 0.039 | 0.105 | 0.036 | -0.026 | 0.013 |
| | (0.42) | (0.18) | (0.31) | (0.87) | (-0.70) | (0.36) |
| SECTA | -0.037*** | -0.013 | 0.126** | | | |
| | (-4.56) | (-0.58) | (2.03) | | | |
| Demand Factors | | | | | | |
| GDP | -0.186 | 0.028 | 0.071 | -0.258*** | 0.062 | 0.041 |
| | (-1.41) | (0.28) | (0.76) | (-2.73) | (1.21) | (0.73) |
| INFL | -1.600*** | 0.257 | 0.114 | -1.501*** | -0.136 | 0.220 |
| | (-2.74) | (0.35) | (0.21) | (-3.77) | (-0.36) | (0.66) |
| IR | 0.316 | -0.633 | -0.859 | -0.698 | -0.415 | -0.806* |
| | (0.20) | (-0.78) | (-1.13) | (-0.64) | (-1.02) | (-1.72) |
| UNEMP | -2.110** | -1.633 | 0.253 | -3.108*** | -1.337* | -0.848 |
| | (-2.22) | (-1.01) | (0.22) | (-4.78) | (-1.65) | (-1.17) |
| Constant | 0.221* | 0.113 | -0.145 | 0.330*** | 0.054 | 0.048 |
| | (1.79) | (0.91) | (-1.24) | (3.61) | (0.74) | (0.91) |
| Observations | 48 | 48 | 48 | 120 | 120 | 120 |
| Overall $R^2$ | 0.656 | 0.140 | 0.234 | 0.236 | 0.146 | 0.085 |
| $Chi^2$ | 74.368 | 6.330 | 11.895 | 31.004 | 10.633 | 7.954 |
| Prob (F-stat) | 0.000 | 0.610 | 0.156 | 0.000 | 0.223 | 0.438 |

*Notes:*
(1) See Table 5.1 for a description of the variables
(2) Values in parentheses are *t*-statistics; ***, ** and * indicate significance at the 1%, 5% and 10% levels respectively

Slight differences insignificance can be seen between the three periods considered for the credit card loans growth indicator. For securitised banks, the effect of Size on CCLG was negative, contrary to expectation but was only significant during the pre-GFC period; therefore, this finding does not support hypothesis 4.3.1. Size had a positive effect during both the GFC and post-GFC periods in line with expectation, but this was not significant so will have no major effect on the CCLG and this finding does not support hypothesis 4.3.1. The Size coefficient in the case of non-securitised banks was the same as for securitised banks but not significant in any period: it was negative only for the pre-GFC period, otherwise positive, which is in line with what was anticipated but not significant thus will have no major effect on CCLG. Therefore, this finding does not support hypothesis 4.3.1.

Total deposits in the case of securitised banks had a positive effect during both the pre- and post-GFC periods as expected, but this was significant only for the pre-GFC period so hypothesis 4.3.2 is supported for this period; the coefficient was negative during the GFC and positive afterwards, as expected but in both cases was not significant so will have no major effect on CCLG. In the case of non-securitised banks the coefficient of the effect was negative during the GFC and post-GFC periods, counter to expectation although it was not significant; therefore, this finding supports hypothesis 4.3.2. The effect was negative during the pre-GFC period but not significant.

The liquidity ratio was positively related to CCLG as expected but was not significant so this result does not support hypothesis 4.3.3. In the case of non-securitised banks the effect was also positive during both pre- and post-GFC periods as anticipated but was not significant so these findings did not support hypothesis 4.3.3. Otherwise the coefficient was negative and not significant.

The other important factor analysed in this study was securitising assets as a proportion of total assets, which had a significant effect on CCLG before and after the GFC, and was negative during the pre-GFC period. This result contrasts with expectations based on theory, as securitisation increases access funding and risk management options. However, the effect was significantly positive following the GFC in line with expectation so hypothesis 4.3.4 is supported. Otherwise the coefficient of this effect was negative and not significant.

For demand-side determinants, the effect of growth of GDP on CCLG was negative prior to the GFC, but positive during and after the GFC, counter to expectation but not significantly so for any period. Thus, GDP growth will have no major effect on CCLG and these findings do not support hypothesis 4.3.5. The effect of GDP in the case of non-securitised banks was significant and negative as anticipated but only before the GFC when the results do not support hypothesis 4.3.4. Otherwise the effect was positive as expected but not significant so will have no major effect on banks' credit card loan growth in either case, not supporting hypothesis 4.3.5.

The coefficient of INFL was significant only during the pre-GFC period with the opposite sign than expected, so the related hypothesis is not supported by this finding, which is in line with Athanasoglou, Delis and Staikouras, 2006. These authors discussed how in the Greek case, the effectand direction of the correlation of inflation on operational performance remains unclear (see also Ongore & Kusa, 2013; Vong & Chan, 2009).Otherwise the effect was positive during both the GFC and post-GFC periods as expected but not significant so would have no major effect in either case. This finding did not support hypothesis 4.3.6. For non-securitised banks, the coefficient was negative during both pre-GFC and GFC periods, counter to expectation but was not significant during the pre-GFC period; therefore, this finding did not support hypothesis 6.4.3. Otherwise the effect was positive as expected, although was not significant so will have no major effect in both cases and hypothesis 4.3.6 is not supported.

The effect of interest rates was positive before the GFC, counter to expectation, but this was not significant so will have no major effect on CCLG and hypothesis 4.3.7 is not supported. The coefficient had the expected negative sign during both the GFC and post-GFC periods but was not significant so this will have no major effect on CCLG in both cases and hypothesis 4.3.7 is not supported. In the case of non-securitised banks, the effect was negative in all three periods as expected but only significant for the post-GFC period; therefore, this finding supports hypothesis 4.3.7.

The last demand-side determinant expected to influence CCLG is unemployment rate, which had a negative effect on credit card loan growth during both the pre-GFC and GFC periods as expected (but this was only significant before the GFC), so this result supports hypothesis 4.3.8. Otherwise the effect was positive, which is not in line with what was expected but was not significant so will have no major effect. The unemployment rate effect for non-securitised banks

was negative over all three periods as expected but significant only for the pre-GFC and GFC periods, thus the related hypothesis is supported. Otherwise, the effect was not significant.

### 5.4.4 Discussion of Findings relating to Business Loan Activities

In general, in the case of securitised banks the effect of Size and TD during the GFC period was significant but with a different sign than anticipated for bank Size, so the related hypothesis was not supported. The sign for TD was as expected so the hypothesis relating to the effect of TD is supported. Additionally the effect of SECTA on CCLG was positive so the related hypothesis is supported only during the post-GFC period; whereas the effect during the pre-GFC period was significant with a different sign than anticipated so the hypothesis relating to the effect of SECTA on CCLG is not supported in the pre-GFC period. In contrast, for the demand determinants expressed as macroeconomic variables, the effect of INFL was only significant during the pre-GFC period, with a different sign than anticipated, so the related hypothesis not supported. The coefficient of UNEMP was negative and significant as expected; therefore the hypothesis relating to the effect of UNEMP on banks' credit card loans growth is supported only during the pre-GFC period. The findings for other variables not described above but included in this study did not support any of the hypotheses relating to supply and demand determinants.

For non-securitised banks during all three periods, none of the supply determinants supported any of the related hypotheses, as none had a significant influence on credit card loans growth. On the other hand, the results for macroeconomic variables showed that the effect of both GDP and INFL during the pre-GFC period is significant although with a different sign than anticipated, therefore the hypotheses relating to the effect of both factors on CCLG are not supported. The effect of interest rates was significant only during the post-GFC period, with the expected negative sign. Higher interest rates will lower the demand for credit, which explains the negative coefficient with respect to credit growth; therefore the related hypothesis is supported. The effect of UNEMP was significant with the expected negative sign during both the pre-GFC and GFC periods so the related hypothesis is supported in both these cases. The findings for the supply and demand variables that were included but not mentioned above were not significant so will have no major effect and the hypotheses relating to their effect on CCLG are not supported.

In the present study, and through analysing this section which is about the effect of asset securitisation and other lending determinants on the business credit activities more specific evaluate the effect of the independent variables considered in this study on the dependent variables which they are represented in three indicators the growth of credit, business loans and credit card loans in Australian banks during the three periods considered between 2004Q1 and 2012Q4.

This empirical study has shown that the effect of bank size on the first indicator (CG) was not significant over all three periods, but was negative and significant for BLG during the GFC period and for CCLG in the pre-GFC period for securitised banks. However, the effect of bank size for non-securitised banks with respect to CG was significant but with a different sign than anticipated during both the pre-GFC and GFC periods. This effect was positive during the pre-GFC period and negative during the GFC period; however no significant effect was observed from the regression outputs using CCLG as an indicator of the BCG.

Another explanatory factor was TD, which had no significant effect on credit growth during all three periods in either securitised or non-securitised banking institutions. The effect of total domestic deposits on BLG was positive and significant during the GFC period for securitised banks but positive only during the post-GFC period in the case of non-securitised banks. CCLG as an indicator was only significant and positive during the pre-GFC period in the case of securitised banks, as expected and in support of the relevant hypotheses. However, none of the three periods considered in the case of non-securitised banks showed any significant effect on CCLG.

The nature of the relationship between LQ (expressed as liquid assets to total assets) on CG was mixed: it was significant with the opposite sign than anticipated during the GFC period in the case of securitised banks, whereas there was no significant relationship in the case of non-securitised banks in any of the three periods considered. By applying the same model and using BLG instead of CG as the dependent variable and also using CCLG instead of BLG in the other models examined, the regression output for the effect of LQ in all three periods in both regression models did not show any strong correlations for either securitised or non-securitised banks.

Securitising assets to total assets was used as a factor to examine the effect of securitisation on credit growth: its relationship with CG was not significant during any of the three periods

considered but during the post-GFC period the regression outputs showed a significant and positive correlation with BLG. The effect of SECTA on the CCLG was significant with a different sign than anticipated during the pre-GFC period; however, the finding during the post-GFC period was significant and in line with what was expected.

GDP growth was one of the demand-side determinants and it had a significant relationship with CG only during pre-GFC period but, in the case of securitised banks, with a different sign than anticipated. For non-securitised banks, the relationship was significant in both the pre- and post-GFC periods with a negative sign for the credit growth indicator. The coefficient was negative and significant for BLG during the post-GFC period for securitised banks, and before the GFC for non-securitised banks. Further, using CCLG instead of BLG, the effect was significant but with a different sign than anticipated during the pre-GFC period for non-securitised banks; whereas the effect of GDP on CCLG was not significant in the case of securitised banks.

The second demand-side factor used in this analysis is inflation rate with respect to CG, which had no significant effect overall three periods for both securitised and non-securitised banks. Using BLG, the effect was significant but with a different sign than anticipated during both the pre-GFC and GFC periods for both categories of bank. Using CCLG, the effect was negative and significant, but only during the pre-GFC period, for both securitised and no-securitised banks.

IR was found to negatively affect CG but this was only significant during the post-GFC period in the case of securitised banks. There was no significant effect for non-securitised banks in any of three periods, which was true also for BLG in any of three periods, for both securitised and non-securitised banks. With respect to IR using CCLG instead of BLG, the results were not significant in any of three periods for securitised banks; whereas the effect was significant and negative during the post-GFC period.

The last factor used in this analysis as one of the demand-side factors was the unemployment rate, which significantly and negatively affected credit growth for securitised banks. It was also negative and significant during the pre-GFC period and positive with respect to CG in the case of non-securitised banks. Unemployment was a significant factor only during the pre-GFC period with a negative coefficient for both securitised and non-securitised banks. Using CCLG instead of BLG indicated significant and negative effects only during the pre-GFC period for securitised

banks but in the case of non-securitised banks it was significant and negative during both the pre-GFC and post-GFC periods.

## 5.5 Empirical Results for Housing Credit Growth Activities

### 5.5.1 Determinants of Housing Loan Growth (HLG): Findings and Discussion

Housing credit growth activity was used as one of the financial performance indicators for a bank and was measured using four indicators: HLG, HLOG, HLIG and HLOTG. Table 5.13 presents the results for the analysis of the effect of using asset securitisation and other lending determinants on housing loan growth during the three different periods considered in the study.

**Table 5.13: Random Effects Estimation—Housing Loans Growth**

| | **Securitised** | | | **Non- securitised** | | |
|---|---|---|---|---|---|---|
| HLG | Pre-GFC | GFC | Post-GFC | Pre-GFC | GFC | Post-GFC |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Supply Factors | | | | | | |
| Size | 0.137* | 0.011 | -0.221* | -0.015 | -0.010 | -0.022*** |
| | (1.79) | (0.11) | (-1.96) | (-1.63) | (-1.11) | (-3.04) |
| TD | -0.077** | -0.002 | 0.067 | 0.001 | -0.005 | 0.006 |
| | (-2.39) | (-0.06) | (1.52) | (0.09) | (-0.84) | (1.58) |
| LQ | -0.080 | -0.814* | 1.237* | 0.036 | 0.005 | 0.046 |
| | (-0.14) | (-1.78) | (1.90) | (0.51) | (0.08) | (0.77) |
| SECTA | -0.023 | 0.047 | -0.224* | | | |
| | (-1.01) | (1.01) | (-1.88) | | | |
| Demand Factors | | | | | | |
| GDP | -0.947** | -0.249 | -0.013 | -0.498*** | -0.176* | 0.075 |
| | (-2.57) | (-1.14) | (-0.08) | (-2.64) | (-1.65) | (0.68) |
| INFL | -0.684 | 3.165** | -0.053 | -0.565 | 2.123*** | -0.155 |
| | (-0.42) | (2.01) | (-0.05) | (-0.71) | (2.77) | (-0.23) |
| IR | 1.747 | -3.326* | -4.153*** | 1.610 | -1.724** | -1.617* |
| | (0.40) | (-1.92) | (-2.84) | (0.74) | (-2.05) | (-1.73) |
| UNEMP | -6.896*** | -7.006** | -0.079 | -2.108 | -3.068* | 1.770 |
| | (-2.60) | (-2.05) | (-0.04) | (-1.63) | (-1.81) | (1.22) |
| Constant | 0.526 | 0.473* | 0.585*** | 0.170 | 0.325** | 0.072 |
| | (1.53) | (1.81) | (2.59) | (0.97) | (2.39) | (0.71) |

| | | | | | | |
|---|---|---|---|---|---|---|
| Observations | 48 | 48 | 48 | 120 | 120 | 120 |
| Overall $R^2$ | 0.425 | 0.205 | 0.289 | 0.106 | 0.115 | 0.140 |
| $Chi^2$ | 28.834 | 10.084 | 15.849 | 10.904 | 9.986 | 18.015 |
| Prob (F-stat) | 0.000 | 0.259 | 0.045 | 0.207 | 0.266 | 0.021 |

*Notes:* (1) See Table 5.1 for a description of the variables. (2) Values in parentheses are *t*-statistics; ***, ** and * indicate significance at the 1%, 5% and 10% levels respectively

The effect of Size as a supply-side determinant was positive during both pre-GFC and GFC periods as expected, but was only significant before the GFC so this finding supports hypothesis 4.3.1. Following the GFC the effect was significant but in the opposite direction to expectation, so this finding does not support the related hypothesis. Otherwise the effect was positive but not significant. In the case of non-securitised banks, the coefficient for Size was negative across all three periods but only significant during the post-GFC period, counter to expectation, so this finding does not support the related hypothesis.

The volume of domestic deposits had a significant negative effect in both the pre-GFC and GFC periods but was only significant during the pre-GFC period which was not as expected, therefore, the finding did not support hypothesis 4.3.2. Otherwise the effect was positive during the post-GFC period as expected, although not significant so this finding does not support hypothesis2. In the case of non-securitised banks the effect was positive during both pre-GFC and post-GFC periods as expected but was not significant so will have no major effect in both cases. Therefore, this finding does not support hypothesis 4.3.2. Otherwise the effect during the GFC was negative and not significant.

The coefficient for the liquidity ratio was negative, contrary to expectation, during both the pre-GFC and GFC periods but was only significant during the GFC period; thus the finding does not support hypothesis 4.3.3. The effect was positive and significant during the post-GFC period as expected; therefore, the finding supports hypothesis 4.3.3. In the case of non-securitised banks, the effect was positive in all three periods in line with what was expected but was not significant in any period, so hypothesis 4.3.3 is not supported.

The coefficient for SECTA was negative in both the pre- and post-GFC periods, which is the opposite of what was expected, although it was only significant during the post-GFC period. Therefore, this finding does not support hypothesis 4.3.4; otherwise the coefficient for the effect

was positive as expected, but not significant so it will have no major effect and the result supports hypothesis 4.3.4.

In contrast, for demand-side determinants, GDP growth had an unexpected negative sign during all three periods, although it was only significant during the pre-GFC period. It will have no major effect on banks' housing loan growth so the related hypothesis is not supported. In the case of non-securitised banks, the effect was significantly negative during both pre-GFC and GFC, contrary to expectation; otherwise, the effect was positive as expected although not significant, so will have no major effect on banks' housing loan growth and finding does not support hypothesis 4.3.5.

The effect of INFL on housing loan growth was negative but not significant during both the pre- and post-GFC periods with the opposite sign than anticipated. Otherwise, the effect was only significant, with the expected positive sign, during the GFC period; therefore, this result supports the related hypothesis. For non-securitised banks, the effect was the same as for securitised banks: contrary to expectation, it was negative during both the pre- and post-GFC periods. Thus, this finding does not support hypothesis 4.3.6. Otherwise the effect was positive and significant, as expected so this finding supports hypothesis 4.3.6.

The third demand-side determinant expected to influence housing loan growth was interest rates, which had an unexpected positive effect during the pre-GFC, although this was not significant. The effect during both GFC and post-GFC periods was significant with the expected negative sign so this finding supports hypothesis 4.3.7. For non-securitised banks, the effect was as for securitised banks in that it was significant with the expected sign during both the GFC and post-GFC periods; therefore, this finding supports hypothesis 4.3.7. Otherwise the effect was unexpectedly positive but not significant, which does not support hypothesis 4.3.7.

The last demand-side factor expected to influence HLG is the unemployment rate, which had a negative effect across all three periods as expected, but was significant only during the pre-GFC and GFC periods, supporting hypothesis 4.3.8 in both. This effect in the case of non-securitised banks was negative during both pre-GFC and GFC periods as expected but was only significant during the GFC, supporting hypothesis 4.3.8 forth at period. Otherwise, the effect was unexpectedly positive but not significant.

All variables measuring supply- and demand-side determinants had significant effects in at least one of the three periods considered. For securitised banks, the effect of Size was significant in both the pre-GFC and post-GFC periods with the expected positive sign during the pre-GFC period: a large bank is probably more efficient and has easier access to cheap funds as it can provide a large amount of collateral. Thus the related hypothesis is supported. Size was significant but with the opposite sign than anticipated during the post-GFC period; thus the related hypothesis is not supported. The effect of TD was significant with a different sign than anticipated only during the pre-GFC period so the hypothesis relating to the influence of TD was not supported. The liquid assets to total assets proportion also significantly influenced the growth in housing loans during both the GFC and post-GFC periods, but was in the opposite direction for the GFC period; thus the related hypothesis relating to the effect of LQ is supported only for the post-GFC period. The effect of SECTA was significant only during the post-GFC period with a different sign than anticipated, thus the hypothesis relating to the effect of SECTA is not supported in this case. For macroeconomic variables, the effect of GDP growth was significant only during the pre-GFC period with a different sign than anticipated; thus the related hypothesis is not supported. Also, INFL was significant only during the GFC period and the coefficient was positive as expected, so the related hypothesis is supported. The effect of IR had the expected negative sign during both the GFC and post-GFC periods: higher interest rates will lower the demand for credit, which explains the negative coefficient with respect to credit growth. Thus, the related hypothesis is supported. In addition, the effect of unemployment rate was significant and negative as expected, during both the pre-GFC and GFC periods; hence the related hypothesis is supported.

When analysing the effect of both supply- and demand-side variables on non-securitised banks it was found that the effect of Size was significant only during the post-GFC period with a different sign than anticipated; thus the related hypothesis is not supported. In contrast, by using the macroeconomic factors as demand determinants, all demand-side determinants had an effect on the growth of housing loans in at least one period. The effect of GDP growth was significant during both the pre-GFC and GFC periods with a different sign than anticipated; therefore the related hypotheses is not supported. The effect of INFL was significant with the expected positive sign during the GFC so the related hypothesis is supported. The effect of IR was significant during both GFC and post-GFC periods; but that of UNEMP was significant only during the GFC period. In both cases the effect was positive as expected, so the hypotheses regarding the effect of both IR and UNEMP are supported during those periods.

### 5.5.2Determinants of Housing Loan Owned Growth (HLOG): Findings and Discussion

Table 5.14 summarises the RE regression results for the effect of using asset securitisation and other lending determinants on HLOG during the three periods in both securitised and non-securitised banks.

**Table 5.14: Random Effects Estimation—Housing Loans Owned Growth**

| | **Securitised** | | | **Non- securitised** | | |
|---|---|---|---|---|---|---|
| HLOG | Pre-GFC | GFC | Post-GFC | Pre-GFC | GFC | Post-GFC |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Supply Factors | | | | | | |
| Size | 0.050 | -0.075 | -0.348*** | 0.007* | -0.009 | -0.022* |
| | (0.58) | (-0.82) | (-2.78) | (1.87) | (-1.62) | (-1.82) |
| TD | -0.025 | 0.030 | 0.139*** | -0.004 | -0.003 | 0.008 |
| | (-0.70) | (0.88) | (2.85) | (-1.25) | (-0.89) | (1.36) |
| LQ | -0.236 | -0.019 | 0.341 | -0.036 | 0.040 | 0.064 |
| | (-0.36) | (-0.05) | (0.47) | (-0.94) | (0.82) | (0.72) |
| SECTA | 0.003 | 0.001 | 0.012 | | | |
| | (0.12) | (0.03) | (0.09) | | | |
| Demand Factors | | | | | | |
| GDP | -0.949** | -0.501** | -0.046 | -0.335* | -0.309*** | 0.019 |
| | (-2.28) | (-2.56) | (-0.24) | (-1.70) | (-3.19) | (0.18) |
| INFL | -1.315 | 4.347*** | 0.074 | -0.456 | 2.642*** | -0.277 |
| | (-0.72) | (3.08) | (0.07) | (-0.55) | (3.83) | (-0.43) |
| IR | 8.711* | -3.182** | -2.066 | 4.706** | -1.786** | -0.637 |
| | (1.78) | (-2.05) | (-1.27) | (2.05) | (-2.34) | (-0.71) |
| UNEMP | -4.476 | -5.455* | 1.459 | -0.775 | -2.529 | 1.598 |
| | (-1.50) | (-1.78) | (0.59) | (-0.57) | (-1.64) | (1.15) |
| Constant | -0.089 | 0.460* | 0.262 | -0.158 | 0.268** | 0.021 |
| | (-0.23) | (1.96) | (1.05) | (-0.90) | (2.37) | (0.19) |
| Observations | 48 | 48 | 48 | 120 | 120 | 120 |
| Overall $R^2$ | 0.257 | 0.268 | 0.279 | 0.113 | 0.170 | 0.100 |
| $Chi^2$ | 13.473 | 14.293 | 15.087 | 14.207 | 22.812 | 6.766 |
| Prob (F-stat) | 0.097 | 0.074 | 0.057 | 0.077 | 0.004 | 0.562 |

*Notes:*

(1) See Table 5.1 for a description of the variables

(2) Values in parentheses are *t*-statistics; ***, ** and * indicate significance at the 1%, 5% and 10% levels respectively

There were slight differences in significance observed between the estimation results for the three time periods in the case of securitised banks with supply-side determinants. The relationship

between the Size and the growth of housing loans owned was positive during the pre-GFC period as expected but was not significant so will have no major effect on banks' housing loans owned growth; therefore, this finding does not support hypothesis 4.3.1. The coefficient was negative for both the GFC and post-GFC periods and only significant during the post-GFC period, which is the opposite of what was expected, so this finding does not support hypothesis 4.3.1. In the case of non-securitised banks, the effect was significant during both the pre- and post-GFC periods, but was positive during the pre-GFC (as expected, so hypothesis 4.3.1 is supported) but negative after the GFC, contrary to expectation, so this finding does not support hypothesis 4.3.1. Otherwise the effect was negative but not significant during the GFC period.

The coefficient for the volume of domestic deposits was positive as expected but only significant during the post-GFC period, supporting hypothesis 4.3.2 for that period. The effect in the case of non-securitised banks was negative during both the pre-GFC and GFC periods, opposite to what was expected although it was not significant and therefore does not support hypothesis 4.3.2. The effect during the post-GFC period was positive as expected but not significant, so the effect is very weak on banks' housing loans owned growth and does not support hypothesis 4.3.2.

The liquidity ratio had no significant effect on housing loans owned growth indicators across all three periods: it had an unexpected negative effect during the pre-GFC and GFC periods but was positive as expected during the post-GFC period. However, as these results were not significant, any effect will be weak and hypothesis 4.3.3 is not supported. For non-securitised banks the effect of LQ was negative during the pre-GFC period with the opposite sign expected, but positive as expected during the GFC and post-GFC periods. However, none of these results were significant, any effect on banks' housing loans owned growth will be weak and hypothesis 4.3.3 is not supported in any of the cases.

The coefficient for securitising assets to total assets was positive for its effect on housing loans owned growth as expected, but this was not significant so will have no major effect on banks' housing loans owned growth and hypothesis 4.3.4 is not supported.

Of demand-side determinants, the effect of GDP on housing loans owned growth for securitised banks was negative across all three periods but only significant during the pre-GFC and GFC periods. The negative sign was not as expected so the significant result does not support

hypothesis 4.3.5. For non-securitised banks, the coefficient had an unexpected negative sign and was significant during both pre-GFC and GFC periods; therefore this finding does not support hypothesis 4.3.5. The effect was positive as expected during the post-GFC period but not significant so will have no major effect on the HLOG and does not support hypothesis 4.3.5.

The effect of INFL on HLOG was unexpectedly negative during the pre-GFC period, but was not significant so hypothesis 4.3.6 is not supported. However, the effect was positive as expected during both the GFC and post-GFC periods although only significant during the GFC. This finding supports hypothesis 4.3.6 only during the GFC period. The effect in the case of non-securitised banks was positive as expected and significant only during the GFC period. Therefore the finding supports hypothesis 4.3.6 in this case; otherwise the effect was negative and not significant not supporting hypothesis 4.3.6 in either case.

The effect of funding cost IR was significant during both the pre-GFC and GFC periods and the coefficient of the effect was positive during the pre-GFC, contrary to expectation; therefore the finding does not support hypothesis 4.3.7. The effect was significant with the expected negative sign during the GFC period so this result supports hypothesis 4.3.7; otherwise the effect was negative but not significant, suggesting the relationship is very weak and has no major effect on banks' housing loans owned growth, and does not support hypothesis 4.3.7. The effect in the case of non-securitised banks had the same sign as for securitised banks, and was significant during both the pre-GFC and GFC periods. However, effect was unexpectedly positive during the pre-GFC period so does not support hypothesis 4.3.7. It was significantly negative as expected during the GFC, which supports hypothesis 4.3.7. Otherwise the coefficients were only weakly negative so this factor will have no major effect on HLOG and hypothesis 4.3.7 is not supported.

The effect of unemployment rates was negative during both the pre-GFC and GFC periods as expected but was significant only during the pre-GFC period. Therefore, only the pre-GFC finding supports hypothesis 4.3.8. The effect was unexpectedly positive after the GFC but was not significant, so this finding does not support hypothesis 4.3.8. The effect on HLOG for non-securitised banks was negative during both pre-GFC and GFC periods and positive after the GFC, but these results were not significant so unemployment will have no major effect on HLOG.

In general, for securitised banks, the effect of Size was significant during the post-GFC period with the opposite sign than anticipated, so the related hypothesis is not supported. However, the effect of TD was positive as expected and significant during the post-GFC period, thus the related hypothesis is supported. Otherwise, the findings for other variables during the three GFC periods were not significant and so did not support any hypotheses relating to supply-side determinants.

In contrast, the effect of GDP growth was significant during both pre-GFC and GFC periods with the opposite sign to that expected, thus the hypothesis related to this effect is not supported. INFL was also significant and positive as expected, but only during GFC period; therefore the related hypothesis is supported for that period. The effect of IR was significant during both pre-GFC and GFC periods but the sign was as expected only during the GFC period; thus the hypothesis relating to the influence of IR was supported only for the GFC period. Otherwise it was significant with a different sign so the related hypothesis is not supported. The effect of unemployment rate was significant during the GFC period with the expected negative sign so the related hypothesis is supported. For non-securitised banks only Size had a significant effect during the pre-GFC and post-GFC periods; however this was positive as expected only during the pre-GFC period so the related hypothesis is supported only for that period. The effect during the post-GFC period was significant and negative, not supporting the related hypothesis. The findings during the three periods for the remaining variables did not support any of the related hypotheses.

From the macroeconomic perspective, the effect of GDP growth was significant during both the pre-GFC and GFC periods with a different sign than anticipated; therefore the hypotheses relating to the GDP growth are not supported. The effect of INFL also was significant with the expected positive sign during the GFC period thus the related hypothesis is supported. The effect of IR was significant during both pre-GFC and GFC periods, but had the opposite sign than anticipated during the pre-GFC period whereas during the GFC it had the expected negative sign; thus the related hypothesis is supported only for the latter period.

### 5.5.3Determinants of Housing Loan Investment Growth (HLIG): Findings and Discussion

Table 5.15 has the RE regression results for the effect of securitising assets and other lending determinants on HLIG for the three study periods, for both securitised and non-securitised banks.

**Table 5.15: Random Effects Estimation—Housing Loans Investment Growth**

| | Securitised | | | Non- securitised | | |
|---|---|---|---|---|---|---|
| HLIG | Pre-GFC | GFC | Post-GFC | Pre-GFC | GFC | Post-GFC |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Supply Factors | | | | | | |
| Size | 0.024 | -0.094 | -0.302** | 0.005 | -0.004 | -0.025** |
| | (0.27) | (-1.08) | (-2.54) | (0.77) | (-0.47) | (-2.47) |
| TD | -0.011 | 0.036 | 0.126*** | 0.002 | -0.001 | 0.004 |
| | (-0.29) | (1.12) | (2.74) | (0.39) | (-0.19) | (0.93) |
| LQ | -0.105 | 0.009 | 0.515 | 0.016 | 0.076 | 0.003 |
| | (-0.16) | (0.02) | (0.75) | (0.28) | (1.24) | (0.03) |
| SECTA | -0.005 | -0.010 | 0.104 | | | |
| | (-0.18) | (-0.25) | (0.83) | | | |
| Demand Factors | | | | | | |
| GDP | -0.525 | -0.242 | -0.133 | -0.405** | -0.200** | 0.012 |
| | (-1.25) | (-1.31) | (-0.71) | (-2.06) | (-2.34) | (0.13) |
| INFL | -0.010 | 2.743** | -0.075 | -0.002 | 1.583** | -0.323 |
| | (-0.01) | (2.06) | (-0.07) | (-0.00) | (2.56) | (-0.56) |
| IR | 9.798** | -1.179 | -2.320 | 4.317* | -0.691 | -0.749 |
| | (1.99) | (-0.80) | (-1.51) | (1.89) | (-1.02) | (-0.92) |
| UNEMP | -0.673 | -1.770 | 1.532 | -0.935 | -1.463 | 2.137* |
| | (-0.22) | (-0.61) | (0.65) | (-0.69) | (-1.09) | (1.71) |
| Constant | -0.442 | 0.205 | 0.171 | -0.170 | 0.134 | 0.049 |
| | (-1.13) | (0.92) | (0.72) | (-0.96) | (1.13) | (0.51) |
| Observations | 48 | 48 | 48 | 120 | 120 | 120 |
| Overall $R^2$ | 0.183 | 0.187 | 0.307 | 0.100 | 0.098 | 0.170 |
| $Chi^2$ | 8.728 | 8.944 | 17.289 | 11.617 | 13.059 | 14.038 |
| Prob (F-stat) | 0.366 | 0.347 | 0.027 | 0.169 | 0.110 | 0.081 |

*Notes:* (1) See Table 5.1 for a description of the variables.
(2) Values in parentheses are *t*-statistics; ***, ** and * indicate significance at the 1%, 5% and 10% levels respectively

For securitised banks with respect to supply-side determinants, the effect of Size on HLIG was unexpectedly negative during the GFC and post-GFC periods but only significantly so for the latter; in the pre-GFC period the effect was positive as expected but not significant. Therefore, none of the findings support hypothesis 4.3.1, and Size will have no major effect. For non-securitised banks, Size had a positive effect as expected, prior to the GFC but this was not significant so will have no major effect on banks' housing loans investment growth and

accordingly hypothesis 4.3.1 is not supported. Otherwise, during the GFC and post-GFC periods the effect was unexpectedly negative (but only significant during the post-GFC period) and hence hypothesis 4.3.1 is not supported.

The volume of domestic deposits for securitised banks had an unexpected negative sign during the pre-GFC period but was not significant; therefore, this finding does not support hypothesis 4.3.2.Otherwise the influence during both the GFC and post-GFC periods was positive as expected but only significant after the GFC; therefore, this finding supports hypothesis 4.3.2 only during the post-GFC period. In the case of non-securitised banks, TD was positively related as expected during the pre- and post-GFC periods but not significantly so, thus this factor will have no major effect on HLIG in both cases and hypothesis 4.3.2 is not supported. The effect had an unexpected negative sign during the GFC but was not significant.

The liquidity ratio had an unexpected negative sign during pre-GFC period but this was not significant. In the other periods, the sign was positive but not significant; therefore, these findings do not support hypothesis 4.3.3, and suggest that LQ will have no major effect on HLIG. The effect of LQ for non-securitised banks was positive as expected but not significant across all three periods; thus LQ has no major effect on HLIG and hypothesis 4.3.3 is not supported.

The coefficient for the effect of securitising assets on HLIG was unexpectedly negative but not significant during the pre-GFC and GFC periods, and non-significantly positive for the post-GFC period; thus the results provide not support for hypothesis 4.3.4

In contrast, for demand-side determinants, the coefficient of the influence of GDP on housing loans investment growth had the opposite sign than anticipated but was not significant across all three periods, so will have no major effect on banks' housing loans investment growth. In the case of non-securitised banks, the effect of GDP on HLIG was unexpectedly negative and significant during both pre-GFC and GFC periods. Although the effect was in the expected direction for the post-GFC period, it was not significant. The results therefore do not support hypothesis 4.3.5 for either bank type.

The effect of INFL on HLIG in the case of securitised banks was positive as expected and significant during the GFC period, in line with hypothesis 4.3.6. However, the effect in the other

periods was non-significant but negative, thus will have no major effect in these cases, and this finding does not support hypothesis 4.3.6. For non-securitised banks, the effect of INFL was the same for the GFC period as for securitised banks, in support of hypothesis 4.3.6. However, the effect was the opposite of what was expected in the other periods and was not significant; thus this finding does not support hypothesis 4.3.6.

The third demand-side determinant affecting housing loans investment growth was interest rates, which had the opposite sign to that anticipated during the pre-GFC and this was significant. For the other periods, the signs were as expected but the values were not significant. For non-securitised banks, the sign was the opposite of that anticipated and was only significant during the pre-GFC period; in the other periods, the effects were in line with what was anticipated but were not significant. Thus, none of the findings regarding interest rates support hypothesis 4.3.7 and there will be no major effect on banks' housing loans investment growth. The effect of UNEMP was in line with what was expected during both the pre-GFC and GFC periods but was not significant; the variable was positively related in the post-GFC period but also was not significant. The effect of UNEMP for non-securitised banks was significant only for the post-GFC period with a different sign than anticipated. Therefore, these findings do not support hypothesis 4.3.8, and unemployment rates will have no effect on banks' housing loans investment growth.

The RE regression model results for securitised banks showed that the effect of Size was significant only during the post-GFC period but with the opposite sign to that anticipated, thus the related hypothesis was not supported for that period. However, the effect of TD was positive as expected and significant during the post-GFC period so the related hypothesis is supported for this period. In contrast, with respect to demand determinants, the influence of INFL was significant and had the expected sign during the GFC, so the related hypothesis is supported. However, the effect of IR was significant but with the opposite sign than expected, during the pre-GFC period so the related hypothesis is not supported. Findings for the other variables included for both supply- and demand-side determinants did not support any of the related hypotheses.

In the case of non-securitised banks, the effect of Size was significant only during the post-GFC period with a different sign than anticipated; thus the related hypothesis is not supported. No significant results were obtained with the other supply-side determinants in any of the three periods; therefore, the findings did not support any of the hypotheses relating to the effects of

supply determinants on housing loans investment growth. On the other hand, with respect to the effects of demand determinants, GDP growth had a significant effect during both the pre-GFC and GFC periods but with a different sign than anticipated; therefore the related hypotheses are not supported. The effect of INFL was significant with the expected positive sign only during the GFC period so the related hypothesis for the effect of INFL on HLIG is supported. However, both IR and UNEMP significantly influenced HLIG only during the pre-GFC period for IR, and the post-GFC period for UNEMP, both with a different sign than anticipated; thus the related hypotheses are not supported.

### 5.5.4Determinants of Housing Loan Others Growth (HLOTG): Findings and Discussion

Table 5.16 (next page) provides the RE regression results for the effect of using asset securitisation and other lending determinants on the HLOTG during the three study periods, for securitised and non-securitised banks.

**Table 5.16: Random Effects Estimation—Housing Loans Others Growth**

| | Securitised | | | Non- securitised | | |
|---|---|---|---|---|---|---|
| HLOTG | Pre-GFC | GFC | Post-GFC | Pre-GFC | GFC | Post-GFC |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Supply Factors | | | | | | |
| Size | 0.024 | -0.013 | 0.145* | -0.006 | -0.001 | 0.003 |
| | (0.41) | (-0.14) | (1.65) | (-0.88) | (-0.14) | (0.17) |
| TD | -0.021 | -0.007 | -0.082** | 0.009** | -0.001 | -0.009 |
| | (-0.87) | (-0.22) | (-2.38) | (2.11) | (-0.19) | (-1.26) |
| LQ | -0.227 | -0.413 | 1.734*** | 0.012 | 0.073 | 0.014 |
| | (-0.51) | (-1.03) | (3.41) | (0.23) | (1.09) | (0.15) |
| SECTA | -0.036** | -0.012 | -0.170* | | | |
| | (-2.10) | (-0.30) | (-1.83) | | | |
| Demand Factors | | | | | | |
| GDP | -0.343 | 0.429** | 0.024 | -0.300** | 0.328*** | 0.135* |
| | (-1.21) | (2.25) | (0.17) | (-1.97) | (3.32) | (1.77) |
| INFL | 2.183* | -3.708*** | 0.691 | 0.777 | -2.700*** | 0.405 |
| | (1.75) | (-2.70) | (0.87) | (1.21) | (-3.79) | (0.89) |
| IR | -1.978 | 1.134 | -0.926 | -0.792 | 1.328* | -0.466 |
| | (-0.60) | (0.75) | (-0.81) | (-0.45) | (1.70) | (-0.72) |
| UNEMP | 0.853 | -0.130 | 4.022** | 0.373 | 0.957 | 3.140*** |
| | (0.42) | (-0.04) | (2.30) | (0.36) | (0.61) | (3.15) |
| Constant | 0.192 | 0.172 | -0.059 | 0.013 | -0.055 | -0.104 |
| | (0.73) | (0.75) | (-0.34) | (0.09) | (-0.42) | (-0.91) |
| Observations | 48 | 48 | 48 | 120 | 120 | 120 |
| Overall $R^2$ | 0.380 | 0.334 | 0.593 | 0.216 | 0.181 | 0.056 |
| $Chi^2$ | 23.866 | 19.598 | 56.906 | 15.529 | 26.502 | 23.010 |
| Prob (F-stat) | 0.002 | 0.012 | 0.000 | 0.050 | 0.001 | 0.003 |

*Notes:*

*(1)* See Table 5.1 for a description of the variables

*(2)* Values in parentheses are *t*-statistics; ***, ** and * indicate significance at the 1%, 5% and 10% levels respectively

The effects of Size as a supply-side determinant of HLOTG had signs in accordance with expectation during the pre- and post-GFC periods but these were only significant post-GFC; therefore, this finding supports hypothesis 4.3.1 only for that period. The effect during the GFC was the opposite of that expected so this finding does not support hypothesis 4.3.1. Similarly, the coefficient for Size in the case of non-securitised banks (during both the pre-GFC and GFC

periods) had the opposite sign than expected. During the post-GFC period the sign was positive as expected although not significant so bank size will have no major effect on HLOTG and the related hypothesis is not supported.

The TD factor in the case of securitised banks negatively influenced HLOTG across all three periods but only significantly so for the post-GFC period; because a positive sign was expected, these results do not support hypothesis 4.3.2. In the case of non-securitised banks, the effect had the expected positive sign and was significant during the pre-GFC period so this finding supports hypothesis 4.3.2. In the other periods the effect was negative but not significant, so this finding also does not support hypothesis 4.3.2.

The values for LQ had the expected signs but were only significant during the post-GFC period, thus hypothesis 4.3.3 is supported only for that period. This relationship in the case of non-securitised banks also had signs as expected for all three periods although these were not significant so provide no support for hypothesis 4.3.3.

The coefficient for the asset securitisation variable had the opposite sign to that which was expected for all three periods but this only significant affected HLOTG during the pre and post-GFC periods so these findings provide no support for hypothesis 4.3.4.

For demand-side determinants, the effect of GDP on HLOTG for securitised banks was significant with the expected positive sign only during the GFC, supporting hypothesis 4.3.5 for this period. This may be explained by the fact that in a growing economy (represented by a growth in GDP), credit demand will increase due to the nature of business cycles: during boom periods credit demand is higher than in a depression (Athanasoglou et al., 2006). The effect during the pre-GFC period had the opposite sign to that expected, and was also negative but not significant during post-GFC period; thus these findings do not support the related hypotheses. In the case of non-securitised banks, the effect was significant in all three periods and was in the direction expected for the GFC and post-GFC periods; thus these findings support hypothesis 4.3.5, but only for those two periods.

The effect of INFL on HLOTG was significant for the pre-GFC and GFC periods but was positive as expected only for the pre-GFC period; thus only the finding for pre-GFC period supports the

related hypothesis. However during the post-GFC period, inflation had major effect on HLOTG, which does not support the related hypothesis. For non-securitised banks, the effect was significant only during the GFC but in the unexpected direction; in the other periods the effect was positive but not significant. Thus, inflation will have no major effect on HLOTG and the related hypothesis is not supported for this bank type.

The third demand-side determinant considered in this study for its effect on HLOTG was interest rates, which had signs in the expected direction for all periods, but these were not significant so the findings provide no support for hypothesis 4.3.7. For non-securitised banks, the effect was significant during the GFC period but with a different sign than anticipated; thus, this finding does support hypothesis 4.3.7. For the other periods, the effect had the expected negative sign but was not significant so this finding also does not support the related hypothesis.

The last demand-side determinant of HLOTG was the unemployment rate, which had a negative effect during both pre- and post-GFC periods as expected although the results were not significant. In the other periods, the effect was positive as expected, but not significant. Thus unemployment will have no major effect on HLOTG and hypothesis 4.3.8 is not supported. In the case of non-securitised banks the effect was negative as expected during the pre- and post-GFC periods but was not significant; the effect was significant and in the opposite (unexpected) direction during the GFC. Thus, the results provide no support for hypothesis 4.3.8.

The results for the RF regression model show that for securitised banks the effect of both Size and LQ was only significant for the post-GFC period, with the expected positive sign; thus the related hypotheses are supported for this period. The effect of TD was significant during the post-GFC period but with the opposite sign than anticipated; thus the related hypothesis is not supported. In addition, the effect of SECTA was significant during the pre-GFC and post-GFC periods but with the opposite sign than anticipated; thus the related hypotheses are not supported. The influence of GDP growth was significant and positive as expected during the GFC, providing support for the related hypothesis for that period. The effect of INFL was significant during the pre-GFC and GFC periods but the coefficient was positive as expected, and thus the relevant hypothesis supported, only for the pre-GFC. Unemployment rate had a significant effect only during the post-GFC period but with a different sign than anticipated, thus the related hypothesis is not supported.

In the case of non-securitised banks, TD was significant only during the pre-GFC period, but had a different sign than anticipated; so the hypothesis regarding the effect of TD on HLOTG is not supported. The effects of the other supply-side determinants were not significant in any of the three periods; thus the findings did not support any of the related hypotheses. In contrast, with respect to demand determinants, the influence of GDP growth was significant during all three periods, and with the opposite sign than expected or the pre-GFC period. Therefore the hypothesis related to the effect of GDP is not supported for this period. However, the sign was positive as expected during both GFC and post-GFC periods and thus the related hypotheses are supported. The influence of INFL was significant only during the GFC period but with a different sign than anticipated, thus the related hypothesis is not supported, The effects of IR and UNEMP were significant only during the pre-GFC period for IR and post-GFC period for UNEMP; both with a different sign than anticipated, thus the related hypotheses are not supported.

### 5.5.5 Discussion of Findings Relating to Housing Credit Activities

The present analysis examines the determinants of housing credit activity. More specifically, it evaluates the effect of the independent variables considered in this study on the dependent variables represented by four indicators—housing loans growth, housing owned loans growth, housing investment loans growth and housing loans others growth—in Australian banks between2004Q1 and 2012Q4, spanning the GFC.

Size only positively affected HLG and HLOG as dependent variables during the pre-GFC period: HLG in the case of securitised banks and HLOG in the case of non-securitised banks. Size negatively influenced HLG, HLOG and HLIG during the post-GFC period for both securitised and non-securitised banks and only negatively related to HLOG in case of non-securitised banks. Likewise, bank size positively affected HLOTG only during the post-GFC period in the case of securitised banks; in the case of non-securitised banks no significant effect was observed in any period considered.

TD was found to be negatively affecting HLG only during the pre-GFC period in the case of securitised banks; it had no significant effect in any period for non-securitised banks. The influence of TD on HLOG and HLIG was positive only during the post-GFC period for securitised banks; no significant effect was seen in any period for non-securitised banks. Also, the

relationship between TD and HLOTG was negative during the post-GFC period for securitised banks and positive during the pre-GFC period for non-securitised banks.

The relationship between liquidity ratio as a dependent variable and HLG was negative during the pre-GFC period, but its relationship with HLG and HLOTG was positive during the post-GFC period, for securitised banks. No significant relationships were observed for LQ with HLG or HLOTG for non-securitised banks. While in case of using HLOG and HLIG the effect of LQ in both cases in both securitised and non-securitised banks no significant effect found to be in all three periods considered.

The effect of securitising assets on HLG was significantly negative during the post-GFC period, but no significant effects were seen for the other periods. Examination of the effect of SECTA on both HLOG and HLIG revealed no significant effect in any period, but in the case of HLOTG the effect was negative during the pre and post-GFC periods.

In analyses of the effect of macroeconomic variables on housing credit growth, the growth of GDP was one of the demand-side factors found to have a negative effect on HLG during the pre-GFC period—in both securitised and non-securitised banks. During the GFC period the effect was negative for non-securitised banks. When using HLOG instead of HLG the effect was negative during the pre-GFC and GFC periods for both securitised and non-securitised banks. In the case of non-securitised banks the effect of GDP on HLIG was not significant; however, in the case of securitised banks the effect was significantly negative during the pre-GFC and GFC periods. The effect using HLOTG was positive only during the GFC period, in the case of securitised banks; for non-securitised banks there was a significant effect in all three periods but this was only positive during the GFC and post-GFC periods.

The second macroeconomic factor was INFL, which interestingly was found to be positively affecting HLG, HLOG and HLIG only during the GFC period—in both securitised and non-securitised banks. Otherwise, no significant effect was observed in any other period for either bank type. Meanwhile the effect of INFL on HLOTG was positive only during the pre-GFC period in the case of securitised banks; there was a negative effect during the GFC period for both securitised and non-securitised banks.

The effect of funding cost expressed as IR on HLG was negative during the GFC and post-GFC periods in both securitised and non-securitised banks. In the case of HLOG and HLIG, the effect was positive during the pre-GFC period in both securitised and non-securitised banks and negative for HLOG only during the GFC period, in both securitised and non-securitised banks. IR had no effect on HLOTG in any period for securitised banks, but there was a positive effect of IR during the GFC, in the case of non-securitised banks. No significant effect was observed in other periods.

When considering unemployment rate as the demand factor, the regression outputs revealed negative effects on HLG during the pre-GFC and GFC periods in the case of securitised banks, but a negative effect only during the GFC period for non-securitised banks. The effect of unemployment on HLOG was significant and negative only during the GFC period, in the case of securitised banks; whereas in non-securitised banks there was no significant effect in any period. Likewise when analysing the effect of UNEMP on HLIG, there was no significant effect in the case of securitised banks in any period; however for non-securitised banks there was a positive effect during the post-GFC period but not thereafter. Also there was a positive effect of unemployment on HLOTG during the post-GFC period in both securitised and non-securitised banks but not thereafter.

# Chapter 6: Credit Growth Determinants for Foreign Banks

This chapter investigates the determinants of credit growth for foreign banks by analysing the factors affecting business and housing credit growth activity for foreign banks (excluding securitisation activities because none practise securitising of assets, according to available information); and analyses the impact of the GFC through a comparison between the pre-GFC, GFC and post-GFC periods with respect to dimensions of both supply-side determinants (internal factors) and demand-side determinants (external/macroeconomic factors).This chapter is divided into two sections, the first analysing the effects of the independent variables on the business credit growth activity of foreign banks, and the second analysing their on the housing credit growth activity of foreign banks.

As mentioned previously data were limited or lacking with respect to the variables of interest for most banks, so the analyses here include only 25 banks. Therefore, the chapter first conducts analyses on the entire study sample of 25 foreign (non-securitised) banks with respect to the effect of the three periods, and then concentrates on the factors affecting the banks' credit growth.

A regression analysis was conducted using the specified equation to examine the effect of factors influencing the banks' credit growth, as measured by credit growth.

## 6.1 Determinants of Business Loan Activities of Foreign Banks

### 6.1.1 Analysis of Credit Growth—Findings and Discussion

The analysis begins with pooled OLS regressions to test the factors affecting bank's credit growth and analyse the effect of the GFC. OLS regressions variables and other explanatory factors that affecting the bank's credit growth along with different sets of supply-side factors and demand-side factors as explanatory variables are performed in order to investigate factors affecting bank's credit growth.

The chapter goes through the regression findings using OLS estimation method and the interpretation of the results in particular is to investigate the results of foreign banking institutions operating in Australia between 2004 and 2012 the effect of bank lending determinants on bank credit growth which they are none of them securitising assets with examining the effect of GFC.

The results of OLS regression are shown in Table 6.1, including the effects of dependent and independent variables on bank credit growth during the three periods considered in this study.

**Table 6.1: Ordinary Least Squares Regression Estimation of the Factors Affecting Credit Growth**

| **Dependent variable** | **CG** | | |
|---|---|---|---|
| | **Pre-GFC** | **GFC** | **Post-GFC** |
| | (1) | (2) | (3) |
| Supply Factors | | | |
| Size | -0.003 | 0.004 | 0.044*** |
| | (-0.21) | (0.21) | (3.08) |
| TD | -0.004 | 0.013** | -0.003 |
| | (-0.65) | (2.25) | (-0.65) |
| LQ | 0.182 | -0.205 | -0.335*** |
| | (1.25) | (-1.36) | (-3.46) |
| Demand Factors | | | |
| GDP | 0.938 | 0.344 | -0.256 |
| | (1.41) | (1.37) | (-1.09) |
| INFL | 4.301 | -3.978** | 0.990 |
| | (1.59) | (-2.03) | (0.70) |
| IR | 1.966 | 3.512* | 3.970* |
| | (0.24) | (1.70) | (1.90) |
| UNEMP | 4.011 | -1.747 | 3.387 |
| | (0.81) | (-0.42) | (1.04) |
| Constant | -0.445 | -0.103 | -0.476** |
| | (-0.69) | (-0.34) | (-2.14) |
| Observations | 280 | 284 | 276 |
| R-squared | 0.029 | 0.101 | 0.071 |
| Adjusted R-squared | 0.004 | 0.078 | 0.046 |
| F-statistic | 1.160 | 5.290 | 3.790 |
| Prob (F-stat) | 0.326 | 0.000 | 0.001 |

*Notes:*

(1) ***Dependent Variables*** were measured as a percentage of change for each bank with regard to the same variable in the previous quarter. They include the ***business credit growth activity*** CG, measured as a percentage of change of total loans for a banking institution, BLG and CCLG. The ***housing credit growth activities*** include HLG, HLOG, HLIG and HLOTG.

(2) ***Independent Variables*** are divided into ***supply factors***: Size, which represents bank size and was calculated using the natural logarithm of total assets; TD; LQ, the liquidity of bank (cash and securities over total assets); SECTA, asset securitisation, measured as the ratio of total securitised assets to total assets. The ***Demand Factors*** are GDP-G, the real annual GDP growth rate; IR; INFL, inflation rate (annual consumer price inflation as percentage); UNEMP, unemployment rate. Dummy variables are GFC, Global Financial Crisis (pre-GFC, GFC and post-GFC (1 = financial crisis, 0 otherwise); SECDUM, securitisation (1 = securitised bank, 0 = non-securitised bank)

(3) Values in parentheses are *t*-statistics: ***, ** and * indicate significance at the 1%, 5% and 10% levels respectively

Analysis of factors affecting credit growth showed that Size—considered one of the supply-side determinants on bank's credit growth—had a sign in accordance with what was expected but it was only significant during the post-GFC period; thus the related hypothesis is supported. In the other periods the effect was mixed: it was negative during the pre-GFC and positive during the GFC period but not significant in either. The volume of domestic deposits had the expected positive sign and was only significant through the period of the GFC; thus, this result supports the related hypothesis. The effect was negative during the pre and post-GFC periods but not significant, so will have no major effect on CG.

The effect of the liquidity ratio was significant but with different signs than anticipated during the post-GFC period; otherwise the effect was mixed, being positive before the GFC and negative during, but not significantly so. Thus, LQ will have no major effect on banks' credit growth. This finding does not support the related hypothesis in any of the three periods considered.

The results for demand-side determinants show that the effect of the GDP variable on CG was not significant across all models for the three periods. The coefficient was positive for the pre-GFC and GFC periods but the effect was very weak and the related hypothesis is not supported in either case. The INFL rate as significant only during the GFC period with the opposite sign to that expected; thus the related hypothesis is not supported. In the other periods INFL was positively related and had the expected sign but was not significant; thus INFL will have no major effect on the banks' credit growth and the related hypothesis is not supported. The third factor of demand-side determinants of credit growth examined in this study was the funding cost, represented as interest rate. This had a different sign than anticipated across all models in all three periods and was significant during both the GFC and post-GFC periods; therefore the findings do not support the related hypothesis, which may be due to interest rates affecting banks' rates of returns on the loans that they provide. Banks are likely to issue more loans when interest rates are high, but from the borrowers' perspective the demand on loans will decline when the cost of funds goes up. The effect during the pre-GFC period was negative but not significant. The last demand-side determinant that may affect credit growth is unemployment rate, which had no significant effect across all models in all three periods; although the coefficient was unexpectedly positive during the pre-GFC and post-GFC periods the value was not significant, so will have no major effect on CG and the related hypothesis is not supported in any of the three periods considered in the study.

The results of the OLS CG regression model show that the effects of Size during the post-GFC period and TD during the GFC period were significantly positive as expected; thus the related hypotheses are supported. The effect of LQ on credit growth was also significant but with a different sign from anticipated; thus the related hypothesis is not supported.

In contrast, the results for the macroeconomic variables show that the effect of INFL was significant during the GFC period but with a different sign than anticipated; therefore the related hypothesis is not supported. The effect was positive as expected during the GFC and post-GFC periods; thus the related hypothesis is supported. The effect of IR (funding cost) was significant during the GFC and post-GFC periods but with the opposite sign to that which was expected; thus the hypothesis for the effect of IR on credit growth is not supported.

The effect of supply- and demand-side determinants not mentioned here were all statistically non-significant in all three periods; therefore, the findings for those variables did not support any of the hypotheses relating to the effect of supply- and demand-side determinants on credit growth.

In order to check for multicollinearity, the study computed VIFs for all independent variables based on a pooled OLS regression. The corresponding factors are all below the critical values. In addition, this study besides computed pair wise correlation coefficients between these variables, which are also rather small. To ensure that main findings do not depend on the specific setting, this study runs different robustness checks. First, the study applies a different estimation method that controls bank RE. Instead of using the OLS regression method, the study estimates the model with the RE panel estimation method. Note that all the dummy variables, which do not vary over time, are dropped. Second, to check for the stability of the parameter estimates, regressions were re-run with individual variables omitted. The results proved to be insensitive towards leaving out these variables one by one. Given that collinearity among the independent variables also does not seem to be a problem, all variables were included in the model. Finally, each bank category was omitted in turn from the analysis to determine whether any one of them had a disproportionate influence on the results. The results from this robustness test confirmed the findings from the main sample specification as well.

To examine the effects of factors that might influence the growth of banks' credit, the analysis began by determining banks' credit growth and selecting business credit growth activity, used as

one of the financial performance indicators of a bank and measured using three indicators: CG, the BLG and the CCLG. The RE regression results for factors affecting the credit growth for foreign banks which they are included in this analyses. RE estimation for the regression models specified in the previous section were conducted. The hypotheses stated in Chapter 6 were tested and the results analysed to determine whether any of the factors influenced credit growth.

Based on the RE regression results in Table 6.2, some factors were considered and evaluated to determine whether they influence credit growth during the three study periods.

**Table 6.2: Random Effects Regression Estimation for Factors Affecting Credit Growth**

| **Dependent variable** | **CG** | | |
|---|---|---|---|
| | **Pre-GFC** | **GFC** | **Post-GFC** |
| | (1) | (2) | (3) |
| Supply Factors | | | |
| Size | -0.003 | 0.006 | 0.041* |
| | (-0.16) | (0.30) | (1.72) |
| TD | -0.004 | 0.013** | -0.000 |
| | (-0.66) | (2.16) | (-0.04) |
| LQ | 0.182 | -0.220 | -0.269* |
| | (1.39) | (-1.24) | (-1.78) |
| Demand Factors | | | |
| GDP | 0.938 | 0.346 | -0.246 |
| | (1.39) | (1.34) | (-1.03) |
| INFL | 4.301 | -4.002** | 1.012 |
| | (1.50) | (-2.17) | (0.71) |
| IR | 1.966 | 3.532* | 3.890* |
| | (0.25) | (1.74) | (1.93) |
| UNEMP | 4.011 | -1.719 | 3.529 |
| | (0.85) | (-0.41) | (1.14) |
| Constant | -0.445 | -0.113 | -0.502** |
| | (-0.73) | (-0.38) | (-2.22) |
| Observations | 280 | 284 | 276 |
| Overall R2 | 0.029 | 0.101 | 0.069 |
| Chi2 | 8.197 | 30.203 | 10.659 |
| Prob (F-stat) | 0.316 | 0.000 | 0.154 |

*Notes:* See Table 6.1 for a description of the variables. Values in parentheses are *t*-statistics; ***, ** and * indicate significance at the 1%, 5% and 10% levels respectively

The OLS regression results confirm all model results with respect to the bank size variable: there were some significant differences between the estimation results for different time periods for factors affecting credit growth. For supply-side determinants, the effect of Size on credit growth was positive as anticipated and significant only during the post-GFC period, supporting hypothesis 4.3.1. The effect was unexpectedly negative for the pre-GFC period and positive during the GFC but neither result was significant, which does not support the related hypothesis, consistent with the OLS regression results for all three periods. However, this effect was not significant, as for the OLS regression results.

The volume of domestic deposits had signs in accordance with expectations but these were significant only during the GFC period, supporting hypothesis 4.3.2; otherwise they were negative but not significant so will have no major effect on the banks' credit growth. These findings agree with those of the OLS regressions for all three periods considered. Also in line with OLS regression findings, the effect of liquidity ratio was unexpectedly negative and significant post-GFC, weakly positive during the pre-GFC and weakly negative during the GFC, so overall there was no support for hypothesis 4.3.3.

In contrast, for demand-side determinants, the effect of the GDP variable was not significant in any model in any period, although it was positive as expected during the pre-GFC and GFC periods and negative subsequently. Thus GDP will have no major effect on banks' credit growth and related hypothesis is not supported. Again, these outcomes are consistent with OLS regression results.

INFL was unexpectedly negative but only significant during the GFC period; it was positive during the pre- and post-GFC periods but not significant, will have no major effect on banks credit growth and hypothesis 4.3.5 is not supported. Again, these findings are in line with OLS regression findings during all three periods considered.

The third demand-side determinant examine for its effect on credit growth is IR, which had an unexpected positive sign across all models in all three periods but was only significant during the GFC and post-GFC periods. Otherwise, this effect was in accordance with what was expected but

not significant, thus will have no major effect. These findings do not support hypothesis 4.3.6, and agree with the OLS regression findings (see Table 6.1).

The last factor of the demand-side determinants of credit growth is unemployment rate, which was not significant across all models in all three periods; the coefficient was positive during the pre-GFC and post-GFC periods, which was not as expected. During the GFC it was negative but not significant. These findings suggest there will be no effect on credit growth and do not support hypothesis 4.3.7. Further, in all models the results confirm that the effect of the UNEMP variable on the dependent variable was the same as in the OLS regression findings for all three periods.

The effects of Size post-GFC and TD during the GFC were positive as expected, and significant; therefore the related hypotheses are supported in both cases. The effect of LQ post-GFC on business loans growth was significant with a different sign than anticipated; thus the related hypothesis is not supported in this case either.

The effect of INFL was significant during the GFC period with a different sign than anticipated; therefore the related hypothesis is not supported. The effect of IR (funding cost) was significant during the GFC and post-GFC periods, also with a different sign than anticipated; thus the hypothesis regarding the effect of IR on business loans growth is not supported.

The influence of factors not mentioned here was not significant in any period, so the findings during the three periods considered did not support any of the related hypotheses.

### 6.1.2 Analysis of Business Loan Growth (BLG) —Findings and Discussion

In the case of the growth of business loans, the RE regression results provided in Table 6.3allow an evaluation of determinants for their effect on credit growth during the pre-GFC, GFC and post-GFC periods which are discussed below.

**Table 6.3: Random Effects Regression Estimation for Factors Affecting Business Loans Growth**

| Dependent variable | BLG | | |
|---|---|---|---|
| | Pre-GFC | GFC | Post-GFC |
| | (1) | (2) | (3) |
| Supply Factors | | | |
| Size | -0.002 | 0.004 | 0.040* |
| | (-0.12) | (0.18) | (1.69) |
| TD | -0.004 | 0.013** | -0.000 |
| | (-0.63) | (2.22) | (-0.01) |
| LQ | 0.185 | -0.219 | -0.266* |
| | (1.38) | (-1.21) | (-1.73) |
| Demand Factors | | | |
| GDP | 0.927 | 0.373 | -0.163 |
| | (1.34) | (1.42) | (-0.66) |
| INFL | 4.402 | -4.030** | 0.639 |
| | (1.50) | (-2.15) | (0.44) |
| IR | 3.071 | 3.650* | 3.937* |
| | (0.38) | (1.76) | (1.89) |
| UNEMP | 4.650 | -1.573 | 3.368 |
| | (0.96) | (-0.37) | (1.05) |
| Constant | -0.542 | -0.126 | -0.492** |
| | (-0.87) | (-0.41) | (-2.11) |
| Observations | 280 | 284 | 276 |
| Overall $R^2$ | 0.028 | 0.104 | 0.061 |
| $Chi^2$ | 7.963 | 30.914 | 9.656 |
| Prob (F-stat) | 0.336 | 0.000 | 0.209 |

*Notes:* See Table 6.1 for a description of the variables. Values in parentheses are *t*-statistics; ***, ** and * indicate significance at the 1%, 5% and 10% levels respectively.

Models were estimated for all three periods considered. On the supply-side, the coefficient for the effect of bank size on banks' business loans growth was positive as expected, but only significant during the post-GFC period, supporting hypothesis 4.3.1. The coefficient was negative pre-GFC and positive during the GFC period, but neither was significant, so there will be no major effect on business loans growth during these periods and the related hypothesis is not supported.

The TD had the expected positive sign, which was significant during the GFC period so this finding supports hypothesis 4.3.2; otherwise the coefficients were negative but not significant so there was no support for hypothesis 4.3.2 before or after the GFC.

LQ was significant during the post-GFC period but negative, which was not anticipated; it was positive during the pre-GFC and negative during the GFC but not significant. Thus it will have no major effect on business loans growth and hypothesis 4.3.3 is not supported in any period.

For demand-side determinants, the effect of GDP was not significant across all models in any period, and the coefficient was positive as expected during the pre-GFC and GFC periods, but not significant; after the GFC the coefficient was negative but again not significant. Thus, there will be no major effect on business loans growth and hypothesis 4.3.4 is not supported. The effect of INFL was unexpectedly negative and significant only during the GFC, otherwise it was positive but not significant; therefore, these findings do not support hypothesis 4.3.5.

The third demand-side factor examined for its effect on the growth of business loans is the interest rate, which had the opposite sign than was anticipated across all models in all three periods and was significant during the GFC and post-GFC periods. There is no support for hypothesis 4.3.6. Finally, unemployment rate was not significant in any model in any period and the coefficient was unexpectedly positive during the pre-GFC and post-GFC periods, but was negative during the GFC; therefore, these findings do not support hypothesis 4.3.7.

Using business loans growth as an indicator of business credit activity as discussed above, it is apparent that all supply-side determinants had an effect on business loans growth in at least one period. The effect of Size during the post-GFC period and TD during the GFC was significant with the expected positive sign in both cases; thus the related hypotheses are supported. In contrast, the effect of LQ post-GFC on the business loans growth was significant but in a different direction than anticipated; thus the related hypothesis not supported in this case.

Using macroeconomic variables as demand-side determinants, the effect of INFL was significant during the GFC period but with the opposite sign to that anticipated, so the related hypothesis is not supported for that period. During the post-GFC period the effect was significant and positive as expected; therefore the hypothesis regarding the effect of INFL on business loans growth is supported for that period. The effect of IR (funding cost) was significant during the GFC and

post-GFC periods but in the opposite direction than anticipated so the hypothesis relating to the effect of IR on business loans growth is not supported.

The remaining factors considered in this study that were not mentioned above had no significant effect in any of three periods so do not provide support for any of the related hypotheses .

### 6.1.3Analysis of Credit Card Loan Growth (CCLG) —Findings and Discussion

The RE regression outputs are summarised in Table 6.4, which presents the determinants of CCLG during the three different study periods.

**Table 6.4: Random Effects Regression Estimation for Factors Affecting Credit Card Loans Growth**

| **Dependent variable** | **CCLG** | | |
|---|---|---|---|
| | **Pre-GFC** | **GFC** | **Post-GFC** |
| | (1) | (2) | (3) |
| *Supply Factors* | | | |
| Size | 0.002 | 0.002 | 0.001 |
| | (1.17) | (1.04) | (0.57) |
| TD | -0.001** | -0.000 | -0.000 |
| | (-2.26) | (-0.34) | (-0.71) |
| LQ | 0.010* | 0.010 | 0.004 |
| | (1.90) | (1.02) | (0.42) |
| *Demand Factors* | | | |
| GDP | -0.021* | 0.015* | 0.009 |
| | (-1.73) | (1.69) | (0.82) |
| INFL | -0.055 | -0.109* | -0.023 |
| | (-1.02) | (-1.75) | (-0.35) |
| IR | 0.005 | 0.066 | -0.171* |
| | (0.04) | (0.97) | (-1.83) |
| UNEMP | -0.127 | 0.037 | -0.180 |
| | (-1.49) | (0.27) | (-1.26) |
| Constant | 0.013 | -0.009 | 0.018 |
| | (1.06) | (-0.66) | (1.51) |

| | | | |
|---|---|---|---|
| Observations | 280 | 284 | 276 |
| Overall $R^2$ | 0.051 | 0.029 | 0.017 |
| $Chi^2$ | 14.871 | 7.553 | 5.750 |
| Prob (F-stat) | 0.038 | 0.374 | 0.569 |

*Notes:* See Table 6.1 for a description of the variables. Values in parentheses are *t*-statistics; ***, ** and * indicate significance at the 1%, 5% and 10% levels respectively.

The coefficient for the effect of bank size on credit cards loan growth was positive across all three periods considered in line with what was expected, but was not significant so this factor will have no major effect on CCLG; therefore, this finding does not support hypothesis 4.3.1.The effect of TD was in the opposite direction to that anticipated for all three periods although it was is only significant before the GFC; therefore, these findings do not support hypothesis 4.3.2 in any period. LQ had signs in accordance with what was expected in all three periods the coefficient was only significant during the pre-GFC period; thus hypothesis 4.3.3 is supported only during that period.

For demand-side determinants, the coefficient of the GDP variable was positive as expected during the GFC and post-GFC periods but only significant during the GFC; providing support for hypothesis 4.3.4 in that period. However, during the pre-GFC period, the coefficient was significantly negative, thus arguing against hypothesis 4.3.4 in that period.

Inflation rate was not significant for any model in any period, although the sign was negative as expected during the pre-GFC and post-GFC periods; however, the lack of significance suggests there will be no major effect on credit cards loans growth so this finding does not support hypothesis 4.3.5 otherwise the effect is negative and statistically is significant which is in this case is in line with what was expected therefore, this finding supports hypothesis 4.3.5.

Interest rates had the expected negative (and significant) effect during the post-GFC period, providing support for hypothesis 4.3.6. The effect was positive but not significant in the other periods. The last demand-side factor tested was unemployment rate, which was not significant in any model in any period, although the coefficient was negative as expected during the pre-GFC and post-GFC periods. However, there will be no major effect on credit cards loans growth and this finding does not support hypothesis 4.3.7. Otherwise, the effect was unexpectedly positive, providing no support for hypothesis 4.3.6.

### 6.1.4 Conclusion of Determinants of Business Loan Activities

In general and as explained above, the effect of the TD on credit card loans growth was significant only during the pre-GFC period with a different sign than anticipated; thus the related hypothesis is not supported. The effect of LQ during the pre-GFC period was significant with the expected positive sign, so the hypothesis regarding the effect of LQ on credit card loans growth is supported.

Among macroeconomic variables used to measure the effect of demand-side determinants on credit card loans growth, GDP growth was significant during the pre-GFC period but in the opposite direction to that anticipated; whereas it was significant and in the expected direction during the GFC. Therefore the hypothesis relating to the effect of GDP growth on credit card loan growth is supported during the GFC period only. The effect of INFL was significant during the GFC period but in the opposite direction than anticipated so the related hypothesis is not supported. Finally, the effect of IR was significant and negative as expected only during the post-GFC period; thus the related hypothesis is supported for that period.

Interestingly and unsurprisingly, all variables in both the supply and demand side that were used to examine the relationship between independent variables and dependent variables had the same effect on both CG and BLG.

The results of the RE regression models for the business credit activity of foreign banks suggested that Size had a positive effect on both CG and BLG but only during the post-GFC period. However, there was no effect of Size on CCLG in any period.

The coefficient for the TD variable, one of the supply-side factors, with respect to business credit activity was positive and significant for the GFC period for both CG and BLG but not significant signs were observed in the other periods. The effect of TD was negative in the CCLG regression model only during the pre-GFC period but not after. The liquidity ratio gave a negative sign only during the post-GFC period for both the CG and BLG indicators, but not otherwise; while the effect of LQ on CCLG was positive only during the pre-GFC period but not after.

The effect of GDP growth, one of the demand-side factors, was not significant in any of the three periods considered in the case of the CG and BLG indicators, but was negative during the pre-GFC period and positive during the GFC period; no significant effect was seen during the post-GFC period. The second demand-side factor is inflation rate, which was significant and negative during all three periods.

Interest rate was also considered as a demand-side determinant, and it had a positive effect during the GFC and post-GFC periods on the CG and BLG indicators; otherwise the effect was negative only during the post-GFC period in the case of the CCLG regression model. The last demand-side factor examined was unemployment rate, which had no significant effect in any period for any indicator.

## 6.2 Analysis of Housing Loan Activities—Findings and Discussion

### 6.2.1 Analysis of Housing Loan Growth (HLG) —Findings and Discussion

The other bank financial performance indicator used here was housing credit growth activity, which was measured using four indicators: HLG, HLOG, HLIG and the HLOTG. Table 6.5 provides a summary of the RE estimation regression findings regarding the determinants of credit card loans growth during the periods considered in this study.

**Table 6.5: Random Effects Regression Estimation for Factors Affecting Housing Loans Growth**

| Dependent variable | HLG | | |
|---|---|---|---|
| | Pre-GFC | GFC | Post-GFC |
| | (1) | (2) | (3) |
| *Supply Factors* | | | |
| Size | 0.013*** | 0.008 | -0.001 |
| | (2.70) | (1.56) | (-0.19) |
| TD | -0.002 | -0.003** | -0.002 |
| | (-1.46) | (-2.04) | (-0.88) |
| LQ | -0.038 | -0.057 | -0.025 |
| | (-1.37) | (-1.33) | (-0.73) |
| *Demand Factors* | | | |
| GDP | 0.101 | -0.069 | 0.057 |
| | (0.87) | (-1.22) | (1.39) |
| INFL | -0.059 | 0.428 | -0.085 |
| | (-0.12) | (1.05) | (-0.35) |
| IR | -1.987 | -0.250 | 0.148 |
| | (-1.46) | (-0.56) | (0.43) |
| UNEMP | 0.491 | -0.588 | -0.836 |
| | (0.61) | (-0.64) | (-1.57) |
| Constant | 0.055 | 0.037 | 0.064 |
| | (0.53) | (0.55) | (1.44) |
| Observations | 280 | 284 | 276 |
| Overall $R^2$ | 0.075 | 0.050 | 0.038 |
| $Chi^2$ | 16.369 | 8.917 | 6.214 |
| Prob (F-stat) | 0.022 | 0.259 | 0.515 |

*Notes:* See Table 6.1 for a description of the variables. Values in parentheses are *t*-statistics; ***, ** and * indicate significance at the 1%, 5% and 10% levels respectively.

There were slight differences in significance observed between the estimation results for the three time periods for the credit card loans growth indicator. In the case of securitised banks, in supply-side determinants, the coefficient for the effect of bank size on banks' housing loans growth had the expected sign and was significant during the pre-GFC period; therefore, this finding supports hypothesis 4.3.1.Otherwise the effect during the GFC period as positive, in line with what was expected but not significant thus will have no major effect on HLG and the related hypothesis is

not supported. In the post-GFC period the effect was the opposite of what was expected so the related hypothesis not supported.

The effect of TD was negative across all models in all three periods, implying that the effect was not as anticipated; however, it was only significant during the GFC period. Thus the findings do not support hypothesis 4.3.2 in any of the three periods considered. The effect of LQ was significant but in the opposite direction anticipated and was not significant across all models in all three periods considered; thus, this finding does not support hypothesis 4.3.3.

For the demand-side determinants considered in this study, the effect of the growth of GDP was not significant in any period. Although the coefficient was positive as expected during the pre-GFC and post-GFC periods it was not significant so will have no major effect on HLG; therefore, this finding does not support hypothesis 4.3.4.

The effect of INFL was not significant in any of the three periods and the coefficient was unexpectedly negative during the pre-GFC and post-GFC periods; although it was positive as expected during the GFC, this was not significant. Therefore hypothesis 4.3.5is not supported by any of these results, and INFL will have no major effect on HLG.

The third factor for demand-side determinants is interest rate, which had a negative effect as expected during the pre-GFC and GFC periods but this was not significant; the sign was negative after the GFC but also not significant. Thus, this factor will have no major effect on HLG and there is no support for hypothesis 4.3.6.

The last factor considered as a demand-side determinant was unemployment rate: its effect during the GFC and post-GFC periods was in the expected direction but not significant so will have no major effect on HLG and this finding does not support hypothesis 4.3.7. The sign for the pre-GFC period was not in the expected direction but also was not significant.

In general, the effect of Size was only significant and positive as expected during the pre-GFC period, which supports the related hypothesis. The effect of TD on housing loans growth was significant only during the post-GFC period but with a different sign than anticipated so the related hypothesis not supported in this case. None of the macroeconomic variables included as

demand-side factors had a significant effect in any of the periods, so will have no major effect on housing loans growth and the related hypotheses are not supported.

### 6.2.2 Analysis of Housing Loan Owned Growth (HLOG) —Findings and Discussion

Table 6.6 illustrates the relationship between the factors affecting the HLOG using the RE regression and the results show some differences among the three periods, with respect to both the significance and the size of the coefficients.

**Table 6.6: Random Effects Regression Estimation for Factors Affecting Housing Loans Owned Growth**

| **Dependent variable** | **HLOG** | | |
|---|---|---|---|
| | **Pre-GFC** | **GFC** | **Post-GFC** |
| | (1) | (2) | (3) |
| *Supply Factors* | | | |
| Size | 0.011 | 0.004 | 0.003 |
| | (1.63) | (0.70) | (1.06) |
| TD | -0.002 | -0.002 | -0.002* |
| | (-1.04) | (-1.44) | (-1.87) |
| LQ | -0.055* | -0.050 | -0.017 |
| | (-1.77) | (-1.47) | (-0.82) |
| *Demand Factors* | | | |
| GDP | -0.020 | -0.013 | 0.044 |
| | (-0.22) | (-0.38) | (1.35) |
| INFL | -0.091 | 0.292 | -0.110 |
| | (-0.23) | (1.20) | (-0.57) |
| IR | -1.920* | -0.236 | 0.098 |
| | (-1.73) | (-0.89) | (0.36) |
| UNEMP | -0.539 | -0.425 | -0.420 |
| | (-0.82) | (-0.78) | (-1.00) |
| Constant | 0.128 | 0.041 | 0.026 |
| | (1.47) | (0.91) | (0.83) |
| Observations | 280 | 283 | 274 |
| Overall $R^2$ | 0.079 | 0.053 | 0.040 |
| $Chi^2$ | 9.407 | 6.273 | 7.130 |
| Prob (F-stat) | 0.225 | 0.508 | 0.415 |

*Notes:* See Table 6.1 for a description of the variables. Values in parentheses are *t*-statistics; ***, ** and * indicate significance at the 1%, 5% and 10% levels respectively.

Among supply-side determents, the effect of Size on housing loans owned growth was in the direction anticipated across all models in all three periods but not significant in any of them; thus will have no major effect on HLOG and this finding did not support hypothesis 4.3.1.The second supply-side determinant was TD, which had the opposite effect to that anticipated in all models for all periods but was only significant during the post-GFC period. Thus, these findings did not support hypothesis 4.3.2. The effect of LQ on HLOG was unexpectedly negative for all models in all three periods but significant only for the pre-GFC period; thus there was no support for hypothesis 4.3.3 in any of the three periods considered.

For demand-side determinants, the effect of GDP was not significant in any model or period and the coefficient was only positive as expected during the post-GFC period. Thus this factor will have no major effect on HLOG and the findings did not support hypothesis 4.3.4 in any of the three periods considered.

INFL had a sign in accordance with what was anticipated only during the GFC period but it was not significant so will have no major effect on HLOG. The signs were unexpectedly negative during the pre- and post-GFC periods; therefore, these findings did not support hypothesis 4.3.5 in any of the three periods.

Interest rate had a sign in accordance with what was assumed only for the pre-GFC and GFC periods and this was only significant during the pre-GFC period, supporting hypothesis 4.3.6. The last demand-side factor examined that might influence HLOG as unemployment rate, which had the expected negative sign for all models in all periods but none were significant, thus this factor will have no major effect on HLOG and the findings do not support hypothesis 4.3.7.
The effect of TD on housing loans owned growth was only significant during the post-GFC period and with a different sign than anticipated; thus the related hypothesis is not supported. The effect of LQ was only significant during the pre-GFC period and with a different sign than anticipated; therefore the related hypothesis for this factor also is not supported. Similarly, the effect of the macroeconomic variable IR was significant only during the pre-GFC period with the unexpected positive sign so the related hypothesis is not supported.

The effects of any determinants not mentioned above were not significant in any period so, the findings did not support any of the related hypotheses.

### 6.2.3 Analysis of Housing Loan Investment Growth (HLIG): Findings and Discussion

A summary of the RE regression outputs is presented in Table 6.7, which includes the effects of the determinants on HLIG during the three different study periods.

**Table 6.7: Random Effects Regression Estimation for Factors Affecting Housing Loans Investment Growth**

| **Dependent variable** | **HLIG** | | |
|---|---|---|---|
| | **Pre-GFC** | **GFC** | **Post-GFC** |
| | (1) | (2) | (3) |
| *Supply Factors* | | | |
| Size | 0.005* | 0.000 | -0.002 |
| | (1.70) | (0.00) | (-0.41) |
| TD | 0.000 | -0.000 | -0.001 |
| | (0.03) | (-0.19) | (-0.46) |
| LQ | -0.022 | 0.012 | -0.028 |
| | (-1.13) | (0.34) | (-0.92) |
| *Demand Factors* | | | |
| GDP | 0.007 | -0.014 | 0.055 |
| | (0.08) | (-0.40) | (1.50) |
| INFL | -0.288 | 0.178 | 0.190 |
| | (-0.77) | (0.72) | (0.87) |
| IR | -1.646 | -0.194 | -0.220 |
| | (-1.59) | (-0.72) | (-0.71) |
| UNEMP | -0.257 | -0.316 | -0.304 |
| | (-0.42) | (-0.58) | (-0.64) |
| Constant | 0.093 | 0.021 | 0.036 |
| | (1.18) | (0.47) | (0.93) |
| Observations | 280 | 284 | 276 |
| Overall R2 | 0.036 | 0.000 | 0.023 |
| Chi2 | 9.640 | 0.741 | 7.487 |
| Prob (F-stat) | 0.210 | 0.998 | 0.380 |

*Notes:* See Table 6.1 for a description of the variables. Values in parentheses are *t*-statistics; ***, ** and * indicate significance at *the 1%, 5% and 10% levels respectively.*

The effect of bank size on HLIG was positive as expected during both pre-GFC and GFC periods but only significant for the pre-GFC period which is in line with what was expected; therefore,

hypothesis 4.3.1 is supported for the pre-GFC period. The effect had the opposite sign than anticipated during the post-GFC period. TD had the expected positive influence only during the pre-GFC period but this was not significant so will have no major effect on HLIG. The effect during the GFC and post-GFC periods was negative but not significant so the related hypothesis is not supported in any of these cases. The effect of LQ on HLIG was positive as expected during the GFC period but was not significant so will have no major effect; the coefficient was negative during both the pre- and post-GFC periods but also not significant. Therefore, these findings do not support the related hypothesis.

Among demand-side determinants, GDP had an effect in the anticipated direction during the pre-GFC and post-GFC periods but was not significant, thus will have no major effect on HLIG. During the GFC the effect was not significant, so the findings did not support hypothesis 4.3.4. The effect of INFL was positive as expected during the GFC and post-GFC periods but not significant, so will have no major effect on HLIG. Although the sign was negative for the pre-GFC period, this was not significant. Therefore, these findings do not support hypothesis 4.3.5. Interest rate had the expected negative sign across all models in all three periods but it was not significant so will have no major effect on HLIG. These findings do not support hypothesis 4.3.6. The effect of the last demand-side factor, unemployment rate, had a sign in accordance with what was assumed across all models in all three periods but none were significant thus this factor will have no major effect on HLIG and the findings did not support hypothesis 4.3.6.

The outcomes of the regression models indicate that Size is significant only during the pre-GFC period, with the expected positive sign, thus the hypothesis relating to the effect of bank size on the growth of housing investment loans is supported. The effect of all demand-side determinants was not significant in any of the three periods thus there will be no major effect on the growth of housing investment loans. Otherwise, the effect of factors not mentioned here was not significant in any of three periods considered and therefore there was no support for any of the related hypotheses.

### 6.2.4 Analysis of Housing Loan Others Growth (HLOTG): Findings and Discussion

Table 6.8summarises the output of RE regression analyses for the determinants of HLOTG during the three periods of the GFC.

**Table 6.8: Random Effects Regression Estimation for Factors Affecting Housing Loans Others Growth**

| DEPENDENT VARIABLE | HLOTG | | |
|---|---|---|---|
| | Pre-GFC | GFC | Post-GFC |
| | (1) | (2) | (3) |
| *Supply Factors* | | | |
| Size | 0.003 | -0.002 | 0.001 |
| | (1.05) | (-0.54) | (0.30) |
| TD | -0.001 | -0.001 | -0.001 |
| | (-1.14) | (-0.46) | (-0.90) |
| LQ | 0.023 | -0.016 | -0.017 |
| | (1.41) | (-0.46) | (-0.83) |
| *Demand Factors* | | | |
| GDP | -0.078 | -0.083** | 0.008 |
| | (-0.93) | (-2.20) | (0.40) |
| INFL | 0.134 | 0.456* | -0.146 |
| | (0.38) | (1.69) | (-1.19) |
| IR | 1.183 | -0.102 | 0.257 |
| | (1.20) | (-0.34) | (1.47) |
| UNEMP | 0.933 | -0.450 | 0.068 |
| | (1.59) | (-0.75) | (0.25) |
| Constant | -0.118 | 0.033 | -0.004 |
| | (-1.57) | (0.70) | (-0.16) |
| Observations | 280 | 284 | 276 |
| Overall $R^2$ | 0.040 | 0.034 | 0.006 |
| $Chi^2$ | 11.409 | 9.270 | 3.999 |
| Prob (F-stat) | 0.122 | 0.234 | 0.780 |

*Notes: See Table 6.1 for a description of the variables. Values in parentheses are t-statistics; ***, ** and * indicate significance at the 1%, 5% and 10% levels respectively.*

There were slight differences in the significance of the estimation results for the three time periods. Among the supply-side determinants analysed for their influence on housing loans others growth, bank size was not significant in any model or any period, although the coefficient was positive as expected during the pre- and post-GFC periods (but negative during the GFC); thus bank size will have no major effect on HLOTG and this finding does not support hypothesis 4.3.1.

TD had the opposite sign than anticipated but was non-significant in all models during the three periods; therefore, this finding does not support hypothesis 4.3.2. The effect of LQ was positive as expected but only during the pre-GFC period (negative otherwise) and it was not significant, thus will have no major effect. These findings provide no support for hypothesis 4.3.3.

Of the demand-side determinants GDP had a significant effect only for the GFC period but the sign was the opposite of that anticipated (as it was also for the pre-GFC period). The sign was positive post-GFC, but this was not significant so will have no major effect. Overall these findings do not support hypothesis 4.3.4.

The influence of INFL was positive as expected during the GFC period and significant, supporting hypothesis 4.3.5. The effect during the other periods was not significant (positive for the pre-GFC and negative for the post-GFC periods), thus will have no major effect on HLOTG and there is no support for hypothesis 4.3.5 in those periods.

With respect to the effect of IR on HLOTG, the sign was as anticipated during the GFC period but not significant, thus there will be no major effect and this finding does not support hypothesis 4.3.6. The effect was unexpectedly positive during the pre-GFC and post-GFC periods so these results do not support the related hypothesis.

The remaining demand-side determinant is unemployment rate, for which the expected effect was observed during the GFC period but it was not significant, thus will have no major effect. Otherwise the effect was the opposite of that anticipated; therefore, these findings do not support hypothesis 4.3.7.

Analysing the supply-side determinants of credit growth showed that none had a major effect on the growth of housing loans others in any of the three periods; thus none of the related hypotheses are supported.

The effect of growth of GDP was only significant during the GFC period, but with the opposite sign to that anticipated; therefore the hypothesis relating to the effect of GDP on housing loans others growth is not supported. The effect of INFL was significant with the expected positive sign

only during the GFC, supporting the hypothesis regarding the effect of INFL on the housing loans others growth.

Other factors not mentioned above had no significant effects in any of the three periods, thus the hypotheses relating to those factors are not supported.

### 6.2.5 Conclusion of Discussion on Determinants of Housing Loan Activities

This chapter analysed the determinants of housing credit activity via evaluation of the effects of independent variables on the dependent variables represented by four indicators: housing loans growth, housing owned loans growth, housing investment loans growth and housing loans others growth in Australian banks during the period 2004Q1–2012Q4, which spans the GFC.

Discussion of the effects of supply- and demand-side variables considered the findings of regression models measuring the relationship between both these factors and housing credit activity. The findings were mixed, including being positive or negative and strong or weak. The Size variable had a positive effect only during the pre-GFC period, on both HLG and HLIG, whereas it had no significant effect on HLOG and HLOTG in any period.

The TD factor had a negative effect on HLG in the GFC period and HLOG during the post-GFC period, but not otherwise. Its effects on both HLIG and HLOTG were not significant in any of the three periods considered.

The liquidity ratio had no significant effects in any of the three periods for HLG, HLIG or HLOTG, whereas in the regression model for HLOG it was negative but only during the pre-GFC period.

For macroeconomic factors, there was no significant effect of GDP growth or inflation rate (both considered as demand-side factors) in the regression models for HLG, HLOG and HLIG in any period. However, in the regression model for HLOTG, the effects of GDP growth and inflation rate were negative during the GFC period only.

Funding cost, represented in this study as interest rates and included as one of the demand-side factors, was negative only for HLOG; whereas there was no effect in the HLG, HLIG and HLOTG regression models.

Finally, there was no effect of unemployment rate in any of the four regression models in any of the three periods considered here to examine the effect of supply- and demand-side factors on housing credit activity.

# Chapter 7: Summary and Conclusion

## 7.1 Introduction

Global financial markets have changed substantially in recent decades. One of the main changes is the increased usage of financial innovations, especially OBS activities of which asset securitisation transactions are one type used by financial institutions.

Arguments about the costs and benefits of financial innovations are ongoing, but there is no clear answer about whether the effects of OBS activities on the financial industry are positive or not, and in which ways they might affect the players' behaviour in the banking sector, or the financial industry in general.

When a bank securitises its assets, it removes those assets from the balance sheet and places them as pooled assets by issuing securities to outside investors. In this way, the bank transfers risk to outside investors and can turn non-liquid assets into cash; this is the direct effect of securitisation. The literature does not provide a clear answer about the effects of securitisation on bank credit growth, although some authors did find that securitisation led to higher credit growth (e.g. Cebenoyan & Strahan, 2004; Franke & Krahnen, 2005; Goderis, et al., 2006).

The aims of this chapter are to discuss the derived conclusions and provide recommendations based on the analyses presented in Chapters 5 and 6.The chapter structure is as follows: a summary discussion of the research findings is presented in Section 7.2; Section 7.3 discusses the limitations of the current research; Section 7.4 makes recommendations in view of the conclusions; and Section 7.5 makes some suggestion for further research. Using quarterly data from over 40 Australian banks over the period 2004-12, this study provides some evidence that securitisation has a significant positive effect on a bank's credit growth, in some situations.

## 7.2 Summary of Findings

The importance of the role of banking institutions in economic growth and a country's development cannot be underestimated. A strong financial system is necessary for appropriate financial mediation. In recent decades, banks have changed their activities significantly. Instead of focusing on traditional functions such as accepting deposits and granting credit, banks nowadays concentrate increasingly on non-traditional activities such as asset securitisation, loan sales, underwriting and credit derivatives.

The financial industry, or more specifically the banking environment, has witnessed many reorganisations and policy reviews due to changes in operational environments and relationships between economic sectors in recent decades. Both the competitive and operational environment has become more challenging. There is more pressure on banking institutions to compete to continue operating and to achieve their sustainability objectives as banks became more integrated in the global financial system. To survive financial and economic shocks and achieve stability, it is important that banks understand the factors that influence their credit growth, and the extent of these influences. This study examined the effects of using asset securitisation on credit growth, and evaluated the determinants of credit growth for banking institutions operating in Australia. These determinants were classified into supply-side determinants, which are internal, or bank-specific characteristics; and demand-side factors, known as external or macroeconomic determinants.

This section discusses the effect of asset securitisation and other credit growth determinants (the independent variables) on dependent variables, which were represented by two main key indicators of credit growth in this study. These indicators include business and housing credit activity, each of which has different measures: for business credit activity the measures were CG, BLG and CCLG; and housing credit activity was measured using HLG, HLOG, HLIG and HLOTG. The explanatory variables used in the regression models were essentially financial and economic indicators that were either supply-side (financial indicators) or demand-side (macroeconomic factors) factors. The supply-side factors were bank size (bank total assets), total deposits, liquid ratio, asset securitisation and bank concentration; the demand-side factors were growth of GDP, inflation rate, interest rate and unemployment rate.

The research reported in this thesis aimed to investigate the role of securitising assets and other determinants on the nature of operational banking institutions and the credit growth of Australian's local and foreign banking institutions. The study used credit growth activity as a proxy for operational performance to evaluate the effect of asset securitisation and other factors on credit growth activity. Panel data were employed and analysed during three periods between 2004Q1 and 2012Q4, which span the GFC. To evaluate the effects, the research employed an analysis structure to better investigate the operational performance; the study depended not on measuring only total credit growth but used two main measures of credit growth activity, which were business and housing credit activity, each having different indicators.

The analysis outcomes were mixed but most of the empirical results confirmed that securitising assets did not have—unlike what was anticipated—positive effects on credit growth activity of banking institutions in either the pre-GFC ,GFC or post-GFC period (i.e. crisis and no-crisis periods).

The supply-side explanatory variables used in the regression models were essentially based on financial ratios and indicators, and included bank size, total deposits, liquidity ratio and asset securitisation.

### 7.2.1 The Effect of Asset Securitisation

***Securitising assets hypothesis***. One of the main drivers for securitising assets is the possibility of increasing liquidity ratios and thus increasing opportunities for diversifying the funding resources of a (securitised) banking institution; increasing their credit ability; and gaining economies of scale and/or scope. Hence, according to the regression results of this study, the effect on credit growth due to a bank's funding strategies with respect to non-deposits (securitising assets) was positive only during non-crisis periods, for both the BLG and CCLG indicators. This in consistent with the asset securitisation hypothesis, which states that securitising assets has a significant positive relationship with credit growth, because a highly liquid banking institution is more likely to expand its supply of loans (Martín-Oliver & Saurina, 2007; Mazzuca & Battaglia, 2011). However, this outcome could be associated with the way of using liquidity that comes from securitising assets transactions, which might be to achieve other purposes that do not necessarily create an increase in bank credit, such as reducing the leverage or re-organising the assets

portfolio to achieve liquidity purposes. Based on this, the effect of asset securitisation on credit growth on the other hand was found to be significant, with a different sign than anticipated (negative) when using the CCLG, HLG and HLOTG indicators during non-crisis periods. This is counter to the theory, as securitisation increases access to funding and risk management options. Therefore, securitising asset transactions could be used as a tool of risk transfer so that the cash flow gained from selling assets will not be used to grant more loans; rather it might go to enhance the liquidity ratio or for other purposes that motivate bank institutions to securitise their assets. In any case, the hypothesis was not supported.

### 7.2.2 The Effect of Other Supply-side Factors Considered in this Study

***Bank size hypothesis.*** The econometric analysis in this study identified important features of bank credit growth in Australia. The major outcome of the analysis was that greater total assets may not necessarily lead to higher profits. The negative coefficient for bank size might be due to diseconomies of scale suffered by banks due to uncontrollable increases in size. Larger loans and advances contribute towards profitability. This suggests that greater dependence on one major asset may lead to profitability but have a less significant effect on overall profitability.

In theory, large banks are likely to be more efficient than small banks and be able to acquire funds at a lower cost due to the amount of collateral they can provide. Therefore, considering the supply-side determinants (known as internal factors) related to bank-specific characteristics, the results provided some empirical evidence that the effect of bank size on credit growth indicators in the case of securitised banks was significant and positive for the HLG and HLOTG indicators during non-crisis periods. The results for non-securitised banks also showed a significant positive effect only during non-crisis periods—for the BLG and HLOG indicators—which is in line with expectation, so the related hypothesis was supported. In contrast, small banks are limited in their ability to lend to large institutions because they are more restricted by regulatory lending limits (Andries et al., 2012; De Haas et al., 2010). Accordingly, the regression results for non-securitised banks using the CG, BLG, HLG, HLOG and HLIG indicators showed that the effect was negative during non-crisis periods but that using the CG and HLOG indicators, the effect was negative only during crisis periods.

On the other hand, in the case of foreign banks, the effect of bank size on credit growth was only positive during non-crisis periods, using CG, BLG, HLG and HLIG indicators.

***Total deposits hypothesis.*** The coefficients for domestic deposits volume demonstrated that total deposits play a major role in credit growth of a banking institution. This means that, keeping other factors constant, any increase in the volume of deposits will be transformed into credit. The implications of this result are that as a bank's deposit increases, its assets and liquidity also increases and as a result they provide more credit at the domestic level (Assefa, 2014). This study provided evidence that the effect of TD on the credit growth of securitised banking institutions was positive during the crisis period but only using the BLG indicator. This result is consistent with the view of securitising assets as an alternative funding resource or additional funding source that can be used to cover the demand to grant additional loans (Altunbas et al., 2009).

In the case of non-securitised banks, the effect of total deposits was positive during non-crisis periods using CCLG, HLOG, HLIG and HLOTG and positive only during non-crisis periods using BLG and HLOTG indicators. This result aligns exactly with that of Olokoyo (2011) who explained that the total liabilities of a banking institution with respect to its total deposits is one element of total liabilities elements used as a major funding resource for increasing the credit capacity of banking institutions, thus providing more effective results.

In contrast, loans are not issued instantaneously from the current money volume deposited by account holders, which aligns with the loanable funds theory. The outcome is as expected because the sign of the effect was positive; therefore, any increase in a bank's funds will be reflected on the credit supply side (Assefa, 2014; Imran & Nishat, 2013).In addition, the deposits factor was used as an indicator of both the supply and demand of credit, but it is possible that following deregulation, the deposits factor has become unsuitable as an indicator of domestic demand for credit (Krishnamurthy, 2013). Consequently, the coefficient was negative during non-crisis periods using both the HLG and HLOTG indicators in the case of securitised banks but was non-negative for non-securitised banks. In the case of foreign banks, the effect of total deposit on credit growth was positive only during crisis periods for the CG and BLG indicators. In contrast, the effect was negative during non-crisis periods for the CCLG and HLOG indicators but negative only during the crisis periods for the HLG indicator.

***Bank liquidity hypothesis.*** Increasing the liquidity ratio of banking institutions will increase their capacity to grant more credit and make more credit available at the domestic level (Imran & Nishat, 2013). During the periods studied here, the effect of LQ on credit growth for securitised banks was positive only during non-crisis periods, for the BLG and HLOTG indicators. This conclusion supports the theory of loanable funds and the empirical results of Imran and Nishat (2013) and Olokoyo (2011).Holding liquid assets in balance sheet has an opportunity cost of greater proceeds. However, in periods of instability, banking institutions prefer to hold more cash and liquid assets to minimise the risks associated with the surrounding environmental conditions. Therefore, the liquidity of banking institutions here was correlated negatively with credit growth: during crisis periods the correlation had a negative sign for the CG and BLG indicators, which was not anticipated; whereas for non-securitised banks there was no effect in either crisis or non-crisis periods. These results provide evidence for the absence of significance of the liquidity ratio variable. On the other hand, the results seem to suggest that in the case of foreign banks the effect of LQ on credit growth is positive only during non-crisis periods (using the CCLG model). In contrast, this factor had a negative effect during non-crisis periods (using the CG, BLG and HLOG models).

### 7.2.3 The Effect of Demand-side (Macroeconomic) Factors

The explanatory variables for the demand side in the regression models were essentially economic indicators: growth of GDP, inflation rate, interest rate and unemployment rate. These external determinants are beyond the control of banks although banks can strategically position themselves to exploit opportunities or mitigate threats from this environment. The external environment includes the sociological, regulatory, political, technological and economic landscapes in which banks operate.

The results for the demand-side determinants related to the economic environment are summarised below.

***GDP hypothesis.*** As for the effect of macroeconomic indicators, the empirical findings seem to suggest that any increase in GDP will enhance the returns of the industrial sector and wages will increase; therefore total deposits will increase, which will be reflected in increasing liquidity ratios for banking institutions. The capacity of lending banking institutions will also increase to

meet the increasing needs for investment by other economic sectors (Imran & Nishat, 2013). Accordingly, the effect of GDP on credit growth in the case of securitised banks was positive as expected only during crisis periods (using HLOTG), whereas for non-securitised banks the effect was positive during both crisis and non-crisis periods (also using HLOTG).Therefore, the results suggest that GDP growth is positively associated with credit growth, a finding consistent with existing empirical evidence (Assefa, 2014; Guo & Stepanyan, 2011; Imran & Nishat, 2013; Olokoyo, 2011).

There are more attractive investment opportunities and borrowers are more solvent in boom periods. However, as the effect of GDP growth was negative, this result aligns with the conventional argument and supports the view that the coefficient for growth of GDP is not necessarily positive for the operational performance of banking institutions (Flamini et al., 2009).Also, this result may be due to economic circumstances not generating sufficient additional domestic deposits in the short term, and thus not affecting bank credit significantly (Ongore & Kusa, 2013). The trend of GDP growth is expected to influence demand on the assets of banking institutions: when the growth of GDP is negative, credit demand will decline and will negatively influence the operational performance of banking institutions (Ongore & Kusa, 2013). This explanation is based on the work of Silva, Oreiro, de Paula and Sobreira (2007), who argue that the effect of GDP on bank spreads will be negative because of the default effect: high performance of the economy reduces the effect of loan defaults, whereas banking institutions tend to increase their lending rates when there is an increase in GDP through increased credit demand (Tan, 2012). Hence, the coefficient of growth of GDP in the case of securitised banks had a negative coefficient with credit growth during non-crisis (for the CG, BLG, HLG and HLOG indicators) and crisis periods (for the HLOG indicator). This contrasts with the situation for non-securitised banks, for which coefficients were negative during non-crisis periods for the indicators CG, BLG, CCLG, HLG, HLOG, HLIG and HLOTG and likewise during crisis periods for CG,HLG,HLOG and HLIG. In the case of foreign banks, the effect of GDP on credit growth was positive only during the crisis period and only for the CCLG model; it had a negative effect on credit growth during non-crisis periods for the CCLG, and for crisis periods for HLOTG.

***Inflation rate hypothesis.*** Any increase in INFL will be reflected in increasingly higher demand for credit (Stepanyan, 2011). Further, Guo and Stepanyan (2011) reported a positive effect for inflation rate on credit growth**.**

In theory, the inflation rate can have either a positive or negative sign. Low levels of inflation can indicate a growing economy with rising credit demand and rising prices, which could have a positive effect on bank stability. However, as inflation reaches high levels, it can bring an economy to a standstill and have a large negative effect on macroeconomic stability and economic growth. Thus high levels of inflation will have a negative effect on bank stability.

The effect of INFL on credit growth in the case of securitised banks was positive during non-crisis periods only for the HLOTG model; during the crisis period it was positive for HLG, HLOG and HLIG. For non-securitised banks it was found to be positive during only crisis periods, for the HLG, HLOG and HLIG models.

In contrast, a higher inflation rate reduces the actual rate of ROA for the institution, which will reduce savings, thus encouraging both low-and high-quality borrowers, which in turn will influence the ability of banking institutions to distinguish between high- and low-quality borrowers, thereby affecting the lending functions of a banking institution (Boyd & Champ, 2006). Moreover, any increase in economic activity in turn increases the income and profits of borrowers (Kashyap & Stein, 2000) and any increase in inflation rate can be considered a sign of the volatile condition of the economy, and therefore a riskier market (Tan, 2012). Thus, banking institutions tend to increase their loan interest rates to compensate for the risks associated with such economic circumstances, and as a result the effect will be negative on credit demand (which implies that the inflation rate in fact dampens the growth of credit; Guo & Stepanyan, 2011). Thus, the effect of INFL on credit growth was negative in the case of both securitised and non-securitised banks during non-crisis periods (using the CG, BLG and CCLG indicators), but both types of bank the effect during crisis periods was negative only in case of BLG indicators. This negative sign was possibly due to the fact that INFL could affect the value for money (money time value), the currency purchasing power and the real interest rates that banking institutions charge and receive (Ongore & Kusa, 2013).There was a negative effect only during crisis periods (in the case of the HLOTG model) for both securitised and non-securitised banks (although the effect was positive during crisis periods using HLG, HLOG and HLIG indicators and during non-crisis periods for the HLOTG indicator).

In the case of foreign banks, inflation rate had a positive effect only during the crisis period (for the HLOTG model). In contrast, this factor negatively affected credit growth only during crisis periods (for the CG, BLG and CCLG models). As in the Greek case, the nature and magnitude of the effect of inflation on banks' operational performance remains unclear and debated (Athanasoglou et al., 2006; Ongore & Kusa, 2013; Vong & Chan, 2009).

***Interest rate hypothesis.*** Higher interest rates will lower the demand for credit, which explains the negative coefficient with respect to credit growth. The regression results showed that the effect of IR on credit growth in the case of securitised banks was negative during non-crisis periods (for the CG, HLG and HLOG models). In contrast, it was negative during the crisis period only in the case of the HLG model; whereas for the non-securitised banks it was negative during non-crisis periods (for the CCLG, HLG and HLOG models) and during the crisis period (for the HLG model). It was positive during non-crisis periods (for the HLOG, HLIG and HLOTG models).This indicates that banks are able to create a buffer without attracting too many risky borrowers through adverse selection, although the effect during crisis periods was positive only with the HLOTG model.

In the case of foreign banks, the effect of IR on credit growth was negative during non-crisis periods (using the CCLG and HLOG model); in contrast, the effect was negative during both non-crisis and crisis periods (using the CG and BLG models).

***Unemployment rate hypothesis.*** The effect of UNEMP on credit growth for securitised banks was negative during non-crisis periods (using the CG, BLG, CCLG, HLG and HLOG models), whereas during the crisis period it was negative only using the HLG and HLOG models. In the case of non-securitised banks, the effect was negative during non-crisis periods (for the CG, BLG and CCLG models).

In contrast, the effect was positive only during non-crisis periods in the case of securitised banks (and only using the HLOTG model); while in the case of non-securitised banks the effect on credit growth was positive only during crisis periods (using the CCLG and HLG models). On the other hand, in the case of foreign banks, there was no effect of UNEMP on credit growth.

### 7.2.4 Summary of findings

The results of the analysis are mixed regarding the effect of securitisation on bank credit growth; but, as expected, most of the empirical results confirm that securitising assets does not have a significant positive effect on credit growth in any of the three GFC periods considered (crisis or no-crisis periods). The proposition was that large banks are likely to be more efficient and able to acquire funds at a lower cost due to the amount of collateral they can provide. However, the empirical results inconsistently support this proposition. Total deposits have a significant effect from the perspective of securitising assets as an alternative and additional funding source that can be used to cover credit demand. Neither the asset securitisation nor liquidity ratio had a significant effect on bank credit growth. In contrast, the results for demand-side determinants show that interest rate and unemployment rate have a significant negative effect on credit growth. The inflation rate has a positive significant effect on credit growth. There is no effect of GDP. Securitisation activities enable the banking sector to better diversity their financial resources base as well as add flexibility to their financial resources and loan portfolio, enabling them to better cope with challenges arising in their operational environment. However, the random effects estimates in the study show that banking institutions do not, in fact, gain benefits from securitising assets.

Asset securitisation contributes to creating a more integrated market by providing new categories of financial assets that suit investors' preferred investment risk profile by increasing their capacity. If banking institutions know which factors are most likely to enhance their credit growth this could lead to increased competition in the marketplace, assisting in keeping prices low on the supply side of credit and thus encouraging growth in the business sector, which will drive job creation, resulting in a decrease in the unemployment rate.

## 7.3 Limitations

To survive in the face of financial and economic shocks and achieve the objective of remaining stable, it is important to identify the factors that influence banks' credit growth, and the extent of these influences. This study examined the effect of asset securitisation and other credit growth determinants on bank credit growth and evaluated the determinants of credit growth for banking institutions operating in Australia. These determinants were classified into supply-side

determinants, which are internal or bank-specific characteristics and demand-side factors—external or macroeconomic determinants. Two main key indicators of credit growth (independent variables) were considered in this study. These represented business and housing credit activity. Each of these indicators had different measures: business credit activity was measured using CG, BLG and CCLG, while the indicators for housing credit activity were HLG, HLOG, HLIG and HLOTG. The explanatory variables used in the regression models were financial and economic ratios. The study was limited to examining the effect of supply- and demand-side factors (internal and external factors) on credit growth, including bank size, total deposits, liquidity ratio, asset securitisation, deposits, market concentration, GDP, interest rates, inflation rate sand unemployment rates, with the GFC and asset securitisation as dummy variables. It is acknowledged that there are other determinants such as ROA, return on equity (ROE) and net interest margin that may also influence bank credit growth but were not included in this study. Future research could take into account such factors and examine their effects on bank credit growth.

## 7.4 Implications of this Study

### 7.4.1 Implications for Theory

This study contributes to knowledge about financial derivative tools and their effect on bank credit growth. Due to the lack of research on these effects in developed and developing countries, this study has provided insights into how the asset securitisation process compares with other financial resources with respect to their effect on the credit growth of banking institutions. It will fill an important gap in the existing literature regarding the influence of securitisation on bank credit growth and will highlight optimal securitisation policies and ratification of financial investments to achieve the principal objectives for three main units: financial institutions, shareholders and investors.

The contributions of this study are as follows; first, the study evaluates the role of additional bank supply- and demand-side factors with respect to bank credit growth and investigates the effect of using asset securitisation and other credit growth determinants on bank credit growth, divided into supply- and demand-side factors. To the best of the researcher's knowledge, this has not been considered before. In particular, this study includes asset securitisation and total deposits as supply-side factors and unemployment rate as one other demand-side determinant. Moreover, the

study considers liquidity ratio and bank size as other supply-side determinants; and GDP, interest rate and inflation rate as demand-side factors. Although these have been considered in some previous banking studies, this has not been done for Australian banking institutions in particular. The inclusion of these additional determinants significantly enhanced the capacity to explain the differences in credit growth between banking institutions in the study sample.

Second, this study used recent data up until2012, and was able to clearly take into account the effect of the recent GFC on bank credit growth: in fact, this study is one of the first to unambiguously investigate the effect of the GFC on the determinants of bank credit growth. In addition, to consider the whole period of 2004Q1–2012Q4, this study divided the sampling period into three sub-samples, namely 2004Q1–2006Q4, the pre-crisis period; 2007Q1–2009Q4,the crisis period and 2010Q1–2012Q4, the post-crisis period. The separate consideration of these three periods will lead to a better understanding of the effect of financial crises on the behaviour of banking institutions in general and on credit growth in particular.

### 7.4.2 Implications for Policy and Practice

The findings of this study have several implications for regulatory institutions, investors and banking institutions by providing evidence about key elements in the credit growth of banking institutions. The findings show that through increasing their share of non-balance sheet activities, banks can diversify their funding resources. They will also be able to secure additional funding and more flexible funding sources in the face of economic circumstances that affect their loan portfolios, which may increase their stability. These results support the findings of Mercieca, Schaeck and Wolfe (2007), Sanya and Wolfe (2011), Stiroh (2004) and Tabak, Fazio and Cajueiro (2011).

### 7.4.3 Implications for Shareholders, Investors and Local Businesses

Securitisation has benefits for shareholders with the lowest prices and long-term finance that depends on the non-desired fixed prices on the current date due to the effect of risks in the financial institutions.

Asset securitisation through established banks enables investors to make investment decisions suitable for their credit situation (credit qualification) and to focus on protections available

through the structure of the financial securities and the ability of the assets transferred to the financial securities to fulfil the target cash flow. Further, facts were driven by the findings of this study can be used as quid to analyse the financial statement to assist making informed equity investment decisions and other purposes.

For local businesses even expected investors to understand which economic, financial and operational factors are critical to follow and analyse in order to achieve the operational success and exist purpose.

### 7.4.4 Implications for the Financial Sector and Banking Institutions

For the financial sector, securitisation contributes to creating a more integrated market by providing new categories of financial assets that suit the risk needs of investors by increasing their ability to achieve various benefits that are fulfilled by the various market sectors.

More importantly, in the case of banking institutions, the results will help them to understand which factors are more likely to enhance credit growth. This should create increased competition in the marketplace. Economically, this would help keep prices low on the supply side of credit and in the meantime, may increase the businesses, which will be reflected in job creation. Therefore this might provide advantages with respect to demand-side factors, even they are out of control.

## 7.5 Recommendations for Future Research

The findings of this study suggest that the explanatory variables did not capture very well the changes in the credit growth of Australian banking institutions, thus possible options for future research are to include other internal (supply-side/bank-specific characteristics) and external (demand-side/ macroeconomic factors) determinants of credit growth. Using other variables in future research might better explain determinants of the credit growth of banking institutions.

Further research might extend or expand the sample to include the banking institutions of other countries such as New Zealand to allow comparisons of the determinants of credit growth. This may help identify the possible differences with respect to Australian banking institutions. Another

option is to use the existing sample and exclude securitisation and crisis variables to examine the traditional effects on credit growth.

Due to data availability and other limitations, the models in this study did not include market variables such as industrial concentration ratio. One suggestion arising from this study is to introduce additional supply and demand factors to extend these results. Research could also use other factors not used in this study, such as ROA, ROE, taxation and regulatory indicators and exchange rate, which may affect credit growth—particularly of foreign banking institutions operating in Australia—as indicators of the quality of the offered services. Another suggestion is the examination of credit growth determinants in all banking institutions operating in Australia, whether domestic or foreign, or a comparison between domestic and foreign banking institutions excluding the asset securitisation variable.

Future research could also use operational performance measures other than credit growth, for example profitability measures through using Tobin's q, NIM, ROA and ROE indicators. Another potential line of future research might be to consider synthetic non-cash motivation driven by factors other than funding needs, such as the need to transfer the credit risk out of the banking institution. Finally, due to the nature of banking institutions and their surrounding circumstances, all of these factors should take into account risk. Including the effect of the crisis in this sample, future research could measure credit risk using risk indicators such as the distance to default (*Z*-score) and risk-weighted assets indicators.

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# Appendix

**Table 1 Banks' List of the study sample**

| | |
|---|---|
| **Australian-owned Banks** | |
| 1 | Commonwealth Bank of Australia |
| 2 | Australia and New Zealand Banking Group Limited |
| 3 | Westpac Banking Corporation |
| 4 | National Australia Bank Limited |
| 5 | Bendigo and Adelaide Bank Limited |
| 6 | Macquarie Bank Limited |
| 7 | Bank of Queensland Limited |
| 8 | AMP Bank Ltd |
| 9 | Suncorp-Met way Limited |
| 10 | Members Equity Bank Pty Limited |
| **Foreign Subsidiary Banks** and **Branches of Foreign Banks** | |
| 1 | Arab Bank Australia Limited |
| 2 | Bank of America, National Association |
| 3 | Bank of China |
| 4 | Barclays Bank Plc |
| 5 | BNP Paribas |
| 6 | Citibank N.A. |
| 7 | Credit Suisse First Boston |
| 8 | Deutsche Bank AG |
| 9 | HSBC Bank Australia Limited |
| 10 | ING Bank (Australia) Limited |
| 11 | ING Bank NV |
| 12 | Investec Bank (Australia) Limited |
| 13 | JPMorgan Chase Bank |
| 14 | Mizuho Corporate Bank, Ltd |
| 15 | Oversea-Chinese Banking Corporation Limited |
| 16 | Royal Bank of Canada |
| 17 | Standard Chartered Bank |
| 18 | State Street Bank and Trust Company |
| 19 | Taiwan Business Bank |
| 20 | United Overseas Bank Limited |
| 21 | Rabobank Australia Limited |
| 22 | Societe Generale |
| 23 | State Bank of India |
| 24 | The Royal Bank of Scotland Plc |
| 25 | UBS AG |

# Appendix A: Domestic Banks

## Business loans growth activities

### Table A.1: Pooled OLS Regression Estimates of the Effect of Asset Securitisation on Credit Growth

| Dependent variable | Credit growth | | | | | |
|---|---|---|---|---|---|---|
| CG | Securitised | | | Non-securitised | | |
| | Pre-GFC | GFC | Post-GFC | Pre-GFC | GFC | Post-GFC |
| Model | (1) | (2) | (3) | (4) | (5) | (6) |
| Supply factors | | | | | | |
| SIZE | 0.058 | -0.112 | -0.075 | -0.014** | -0.049*** | -0.026 |
| | (0.65) | (-0.77) | (-0.68) | (-2.46) | (-2.92) | (-1.42) |
| TD | -0.034 | 0.040 | 0.026 | 0.006* | 0.007 | 0.007 |
| | (-0.76) | (0.74) | (0.58) | (1.83) | (0.89) | (1.00) |
| LQ | 0.055 | -1.210 | 1.241* | 0.025 | -0.035 | -0.018 |
| | (0.11) | (-1.47) | (1.93) | (0.90) | (-0.74) | (-0.16) |
| SECTA | -0.020 | 0.019 | -0.026 | | | |
| | (-1.33) | (0.21) | (-0.17) | | | |
| Demand factors | | | | | | |
| GDP | -0.828* | -0.042 | -0.301 | -0.454* | -0.403* | 0.072 |
| | (-1.94) | (-0.18) | (-1.52) | (-1.88) | (-1.69) | (0.48) |
| INFL | -2.323 | 0.286 | 0.417 | -1.279 | 2.204* | 0.416 |
| | (-0.98) | (0.13) | (0.51) | (-1.42) | (1.70) | (0.72) |
| IR | 0.795 | -0.829 | -3.304 | 1.101 | -1.609 | -2.049 |
| | (0.16) | (-0.38) | (-1.50) | (0.47) | (-1.18) | (-1.64) |
| UNEMP | -8.261* | -4.950 | 0.877 | -2.551 | -3.777 | 4.224 |
| | (-1.84) | (-1.08) | (0.41) | (-1.04) | (-1.30) | (1.46) |
| Constant | 0.613 | 0.475 | 0.196 | 0.198 | 0.486** | -0.033 |
| | (1.23) | (1.13) | (0.77) | (0.75) | (2.37) | (-0.20) |
| Observations | 48 | 48 | 48 | 120 | 120 | 120 |
| R-squared | 0.269 | 0.202 | 0.228 | 0.147 | 0.184 | 0.167 |
| Adjusted R-squared | 0.119 | 0.038 | 0.070 | 0.085 | 0.125 | 0.107 |
| F-statistic | 3.139 | 1.459 | 1.894 | 2.793 | 1.691 | 1.554 |
| Prob. (F-stat) | 0.008 | 0.204 | 0.089 | 0.007 | 0.108 | 0.147 |

Notes:

Dependent variables were measured as a percentage of the change of total variables for each bank in relation to the same variable in the previous quarter. Business credit growth activities: CG, which was measured as a percentage of the change of total loans of a banking institution in relation to the same variable in the previous quarter; BLG and CCLG. Housing credit growth activities: HLG, HLOG, HLIG and HLOTG.

Independent variables are divided into supply and demand factors. Supply factors: SIZE: bank size, which can be calculated using the national logarithm of total assets, TD; LQ: bank liquidity (cash and securities over total assets); SECTA: asset securitisation, which is the ratio of total securitised assets to total assets. Demand factors: GDP-G: domestic product growth (real annual GDP growth rate); IR, INFL: inflation rate (annual consumer price inflation as a percentage); UNEMP: unemployment rate. Dummy variables: GFC: Global Financial Crisis (Pre-GFC, GFC and Post-GFC), which is (1=financial crisis, 0=otherwise) and SECDUM securitisation (1=securitised bank, 0=non-securitised bank).

T-statistics are in parentheses below coefficient estimates. ***, ** and * denote significance at the 1, 5 and 10 per cent levels respectively.

## Table A.2: Pooled OLS Regression Estimates of the Effect of Asset Securitisation on Business Loans Growth

| **Dependent variable** | **Business loan growth** | | | | | |
|---|---|---|---|---|---|---|
| | **Securitised** | | | **Non-securitised** | | |
| **BLG** | **Pre-GFC** | **GFC** | **Post-GFC** | **Pre-GFC** | **GFC** | **Post-GFC** |
| **Model** | **(1)** | **(2)** | **(3)** | **(4)** | **(5)** | **(6)** |
| Supply factors | | | | | | |
| SIZE | 0.025 | -0.227** | 0.104 | 0.014*** | 0.008* | -0.092*** |
| | (0.28) | (-2.31) | (0.76) | (5.65) | (1.95) | (-3.92) |
| TD | -0.016 | 0.090** | -0.006 | 0.000 | 0.000 | 0.030*** |
| | (-0.35) | (2.50) | (-0.10) | (0.09) | (0.00) | (3.55) |
| LQ | 0.249 | -0.521 | 1.453 | -0.018 | -0.007 | 0.222** |
| | (0.49) | (-0.94) | (1.10) | (-0.63) | (-0.16) | (2.37) |
| SECTA | -0.033 | -0.044 | 0.410* | | | |
| | (-1.54) | (-0.98) | (1.75) | | | |
| Demand factors | | | | | | |
| GDP | -0.374 | 0.347 | -0.532 | -0.438** | 0.036 | -0.040 |
| | (-0.74) | (1.35) | (-1.58) | (-2.22) | (0.19) | (-0.16) |
| INFL | -4.597 | -3.906** | 1.232 | -2.019* | -2.005*** | 0.435 |
| | (-1.52) | (-2.57) | (0.83) | (-1.67) | (-3.03) | (0.40) |
| IR | -0.978 | 2.241 | -0.016 | -0.381 | 1.424* | -1.866 |
| | (-0.15) | (1.16) | (-0.01) | (-0.14) | (1.89) | (-1.10) |
| UNEMP | -7.489* | 0.955 | 0.249 | -3.880** | -1.348 | 1.621 |
| | (-1.97) | (0.30) | (0.06) | (-2.22) | (-1.01) | (0.51) |
| Constant | 0.676 | 0.125 | -0.527 | 0.276 | 0.031 | 0.218 |
| | (1.21) | (0.57) | (-1.18) | (1.19) | (0.32) | (1.15) |
| Observations | 48 | 48 | 48 | 120 | 120 | 120 |
| R-squared | 0.202 | 0.246 | 0.265 | 0.145 | 0.110 | 0.318 |
| Adjusted R-squared | 0.039 | 0.091 | 0.115 | 0.084 | 0.046 | 0.269 |
| F-statistic | 2.649 | 2.648 | 7.354 | 6.560 | 4.603 | 2.521 |
| Prob. (F-stat) | 0.020 | 0.020 | 0.000 | 0.000 | 0.000 | 0.015 |

Notes: See Table A.1 for descriptions of variables. T-statistics are in parentheses below coefficient estimates. ***, ** and * denote significance at the 1, 5 and 10 per cent levels respectively.

## Table A.3: Pooled OLS Regression Estimates of the Effect of Asset Securitisation on Credit Card Loan Growth

| **Dependent variable** | **Credit card loan growth** | | | | | |
|---|---|---|---|---|---|---|
| | **Securitised** | | | **Non-securitised** | | |
| **CCLG** | **Pre-GFC** | **GFC** | **Post-GFC** | **Pre-GFC** | **GFC** | **Post-GFC** |
| **Model** | **(1)** | **(2)** | **(3)** | **(4)** | **(5)** | **(6)** |
| Supply factors | | | | | | |
| SIZE | -0.178*** | 0.017 | 0.010 | -0.007*** | 0.002 | 0.001 |
| | (-5.89) | (0.29) | (0.20) | (-3.04) | (0.89) | (0.25) |
| TD | 0.079*** | -0.006 | 0.010 | 0.006*** | 0.005*** | 0.003* |
| | (6.37) | (-0.29) | (0.50) | (3.84) | (3.19) | (1.85) |
| LQ | 0.088 | 0.039 | 0.105 | 0.047* | -0.024 | 0.012 |
| | (0.62) | (0.23) | (0.38) | (1.90) | (-1.06) | (0.39) |
| SECTA | -0.037*** | -0.013 | 0.126** | | | |
| | (-4.40) | (-0.69) | (2.44) | | | |
| Demand factors | | | | | | |
| GDP | -0.186 | 0.028 | 0.071 | -0.238** | 0.063 | 0.041 |
| | (-1.28) | (0.31) | (0.64) | (-2.02) | (1.20) | (0.73) |
| INFL | -1.600*** | 0.257 | 0.114 | -1.512*** | -0.143 | 0.218 |
| | (-3.00) | (0.34) | (0.37) | (-3.12) | (-0.36) | (1.05) |
| IR | 0.316 | -0.633 | -0.859 | -0.848 | -0.409 | -0.807* |
| | (0.19) | (-0.75) | (-1.10) | (-0.62) | (-0.93) | (-1.88) |
| UNEMP | -2.110* | -1.633 | 0.253 | -3.041*** | -1.329 | -0.846 |
| | (-1.85) | (-1.15) | (0.21) | (-3.43) | (-1.55) | (-1.08) |
| Constant | 0.221 | 0.113 | -0.145 | 0.274** | 0.050 | 0.046 |
| | (1.61) | (1.02) | (-1.63) | (2.54) | (0.81) | (0.99) |
| Observations | 48 | 48 | 48 | 120 | 120 | 120 |
| R-squared | 0.656 | 0.140 | 0.234 | 0.349 | 0.147 | 0.086 |
| Adjusted R-squared | 0.585 | -0.037 | 0.077 | 0.302 | 0.085 | 0.020 |
| F-statistic | 11.748 | 1.553 | 1.694 | 12.906 | 3.011 | 1.959 |
| Prob. (F-stat) | 0.000 | 0.171 | 0.131 | 0.000 | 0.004 | 0.058 |

Notes: See Table A.1 for descriptions of variables. T-statistics are in parentheses below coefficient estimates. ***, ** and * denote significance at the 1, 5 and 10 per cent levels respectively.

## Housing loans growth activities

### Table A.4: Pooled OLS Regression Estimates of the Effect of Asset Securitisation on Housing Loans Growth

| Dependent variable | Housing loan growth | | | | | |
|---|---|---|---|---|---|---|
| | Securitised | | | Non-securitised | | |
| HLG | Pre-GFC | GFC | Post-GFC | Pre-GFC | GFC | Post-GFC |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Supply factors | | | | | | |
| SIZE | 0.137* | 0.011 | -0.221* | -0.011*** | -0.014** | -0.022** |
| | (1.86) | (0.11) | (-1.92) | (-2.89) | (-2.00) | (-2.18) |
| TD | -0.077** | -0.002 | 0.067 | 0.003 | -0.004 | 0.006 |
| | (-2.37) | (-0.05) | (1.52) | (1.15) | (-1.13) | (1.37) |
| LQ | -0.080 | -0.814 | 1.237** | 0.023 | 0.016 | 0.046 |
| | (-0.14) | (-1.37) | (2.22) | (0.85) | (0.44) | (0.91) |
| SECTA | -0.023 | 0.047 | -0.224* | | | |
| | (-1.25) | (0.73) | (-1.77) | | | |
| Demand factors | | | | | | |
| GDP | -0.947** | -0.249 | -0.013 | -0.492** | -0.179* | 0.075 |
| | (-2.47) | (-1.28) | (-0.09) | (-2.21) | (-1.69) | (0.79) |
| INFL | -0.684 | 3.165** | -0.053 | -0.580 | 2.154*** | -0.155 |
| | (-0.31) | (2.11) | (-0.09) | (-0.64) | (2.94) | (-0.37) |
| IR | 1.747 | -3.326** | -4.153** | 1.517 | -1.754** | -1.617 |
| | (0.40) | (-2.22) | (-2.24) | (0.66) | (-2.27) | (-1.65) |
| UNEMP | -6.896** | -7.006** | -0.079 | -2.088 | -3.089* | 1.770 |
| | (-2.17) | (-2.23) | (-0.05) | (-1.22) | (-1.91) | (1.15) |
| Constant | 0.526 | 0.473 | 0.585** | 0.139 | 0.337*** | 0.072 |
| | (1.37) | (1.53) | (2.64) | (0.67) | (2.85) | (0.69) |
| Observations | 48 | 48 | 48 | 120 | 120 | 120 |
| R-squared | 0.425 | 0.205 | 0.289 | 0.119 | 0.117 | 0.140 |
| Adjusted R-squared | 0.307 | 0.042 | 0.143 | 0.055 | 0.053 | 0.078 |
| F-statistic | 5.443 | 2.245 | 1.468 | 2.463 | 2.244 | 2.388 |
| Prob. (F-stat) | 0.000 | 0.045 | 0.201 | 0.017 | 0.029 | 0.021 |

Notes: See Table A.1 for descriptions of variables. T-statistics are in parentheses below coefficient estimates. ***, ** and * denote significance at the 1, 5 and 10 per cent levels respectively.

## Table A.5: Pooled OLS Regression Estimates of the Effect of Asset Securitisation on Housing Loan Owned Growth

| Dependent variable | Housing loan owned growth | | | | | |
|---|---|---|---|---|---|---|
| | Securitised | | | Non-securitised | | |
| HLOG | Pre-GFC | GFC | Post-GFC | Pre-GFC | GFC | Post-GFC |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Supply factors | | | | | | |
| SIZE | 0.050 | -0.075 | -0.348*** | 0.007*** | -0.009 | -0.022** |
| | (0.61) | (-0.68) | (-2.80) | (2.69) | (-1.57) | (-2.52) |
| TD | -0.025 | 0.030 | 0.139*** | -0.004 | -0.003 | 0.007* |
| | (-0.68) | (0.68) | (2.77) | (-1.40) | (-0.99) | (1.98) |
| LQ | -0.236 | -0.019 | 0.341 | -0.036 | 0.040 | 0.074 |
| | (-0.43) | (-0.04) | (0.53) | (-1.39) | (1.03) | (1.60) |
| SECTA | 0.003 | 0.001 | 0.012 | | | |
| | (0.15) | (0.03) | (0.08) | | | |
| Demand factors | | | | | | |
| GDP | -0.949** | -0.501*** | -0.046 | -0.335* | -0.309*** | 0.019 |
| | (-2.43) | (-3.96) | (-0.30) | (-1.66) | (-3.29) | (0.20) |
| INFL | -1.315 | 4.347*** | 0.074 | -0.456 | 2.642*** | -0.277 |
| | (-0.55) | (3.01) | (0.09) | (-0.51) | (3.74) | (-0.51) |
| IR | 8.711* | -3.182** | -2.066 | 4.706** | -1.786** | -0.639 |
| | (1.89) | (-2.46) | (-1.20) | (2.29) | (-2.31) | (-0.72) |
| UNEMP | -4.476 | -5.455* | 1.459 | -0.775 | -2.529 | 1.596 |
| | (-1.53) | (-1.98) | (0.72) | (-0.48) | (-1.55) | (1.01) |
| Constant | -0.089 | 0.460** | 0.262 | -0.158 | 0.268** | 0.023 |
| | (-0.22) | (2.27) | (1.15) | (-0.86) | (2.32) | (0.22) |
| Observations | 48 | 48 | 48 | 120 | 120 | 120 |
| R-squared | 0.257 | 0.268 | 0.279 | 0.113 | 0.170 | 0.101 |
| Adjusted R-squared | 0.104 | 0.118 | 0.131 | 0.050 | 0.111 | 0.036 |
| F-statistic | 3.778 | 3.654 | 2.877 | 3.785 | 3.764 | 1.773 |
| Prob. (F-stat) | 0.002 | 0.003 | 0.013 | 0.001 | 0.001 | 0.090 |

Notes: See Table A.1 for descriptions of variables. T-statistics are in parentheses below coefficient estimates. ***, ** and * denote significance at the 1, 5 and 10 per cent levels respectively.

## Table A.6: Pooled OLS Regression Estimates of the Effect of Asset Securitisation on Housing Loan Investment Growth

| Dependent variable | Housing loan investment growth | | | | | |
|---|---|---|---|---|---|---|
| | Securitised | | | Non-securitised | | |
| HLIG | Pre-GFC | GFC | Post-GFC | Pre-GFC | GFC | Post-GFC |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Supply factors | | | | | | |
| SIZE | 0.024 | -0.094 | -0.302*** | 0.005 | -0.008* | -0.023*** |
| | (0.32) | (-0.96) | (-2.85) | (1.60) | (-1.70) | (-3.40) |
| TD | -0.011 | 0.036 | 0.126*** | 0.002 | -0.004 | 0.004 |
| | (-0.30) | (0.95) | (3.01) | (0.72) | (-1.34) | (1.29) |
| LQ | -0.105 | 0.009 | 0.515 | 0.035 | 0.028 | -0.004 |
| | (-0.18) | (0.02) | (0.83) | (1.09) | (0.75) | (-0.11) |
| SECTA | -0.005 | -0.010 | 0.104 | | | |
| | (-0.21) | (-0.21) | (0.73) | | | |
| Demand factors | | | | | | |
| GDP | -0.525 | -0.242 | -0.133 | -0.402* | -0.204** | 0.012 |
| | (-1.28) | (-1.31) | (-0.74) | (-1.96) | (-2.18) | (0.15) |
| INFL | -0.010 | 2.743** | -0.075 | -0.011 | 1.643** | -0.317 |
| | (-0.00) | (2.15) | (-0.10) | (-0.01) | (2.48) | (-0.65) |
| IR | 9.798** | -1.179 | -2.320 | 4.319* | -0.745 | -0.745 |
| | (2.21) | (-0.93) | (-1.58) | (1.92) | (-1.04) | (-0.88) |
| UNEMP | -0.673 | -1.770 | 1.532 | -0.927 | -1.541 | 2.137* |
| | (-0.20) | (-0.63) | (0.85) | (-0.62) | (-1.00) | (1.71) |
| Constant | -0.442 | 0.205 | 0.171 | -0.173 | 0.186* | 0.048 |
| | (-1.04) | (0.90) | (0.86) | (-0.92) | (1.78) | (0.53) |
| Observations | 48 | 48 | 48 | 120 | 120 | 120 |
| R-squared | 0.183 | 0.187 | 0.307 | 0.102 | 0.120 | 0.171 |
| Adjusted R-squared | 0.015 | 0.020 | 0.165 | 0.038 | 0.056 | 0.111 |
| F-statistic | 2.033 | 1.840 | 3.809 | 1.603 | 2.416 | 4.140 |
| Prob. (F-stat) | 0.068 | 0.099 | 0.002 | 0.132 | 0.019 | 0.000 |

Notes: See Table A.1 for descriptions of variables. T-statistics are in parentheses below coefficient estimates. ***, ** and * denote significance at the 1, 5 and 10 per cent levels respectively.

## Table A.7: Pooled OLS Regression Estimates of the Effect of Asset Securitisation on Housing Loan Other Growth

| Dependent variable | Housing loan other growth | | | | | |
|---|---|---|---|---|---|---|
| | Securitised | | | Non-securitised | | |
| HLOTG | Pre-GFC | GFC | Post-GFC | Pre-GFC | GFC | Post-GFC |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Supply factors | | | | | | |
| SIZE | 0.024 | -0.013 | 0.145* | -0.004 | -0.002 | -0.012** |
| | (0.43) | (-0.17) | (1.79) | (-1.43) | (-0.33) | (-2.22) |
| TD | -0.021 | -0.007 | -0.082*** | 0.009*** | -0.001 | 0.003 |
| | (-0.85) | (-0.27) | (-2.71) | (3.59) | (-0.31) | (1.05) |
| LQ | -0.227 | -0.413 | 1.734*** | -0.019 | 0.057 | 0.083* |
| | (-0.59) | (-0.79) | (4.52) | (-0.64) | (1.32) | (1.93) |
| SECTA | -0.036** | -0.012 | -0.170* | | | |
| | (-2.54) | (-0.30) | (-1.99) | | | |
| Demand factors | | | | | | |
| GDP | -0.343 | 0.429* | 0.024 | -0.305* | 0.330*** | 0.135 |
| | (-1.04) | (2.02) | (0.17) | (-1.83) | (3.06) | (1.49) |
| INFL | 2.183** | -3.708*** | 0.691 | 0.786 | -2.708*** | 0.318 |
| | (2.36) | (-3.14) | (1.38) | (1.22) | (-4.07) | (0.54) |
| IR | -1.978 | 1.134 | -0.926 | -0.802 | 1.334** | -0.516 |
| | (-0.66) | (0.92) | (-0.68) | (-0.44) | (2.04) | (-0.57) |
| UNEMP | 0.853 | -0.130 | 4.022** | 0.360 | 0.956 | 3.181** |
| | (0.30) | (-0.06) | (2.52) | (0.27) | (0.74) | (2.41) |
| Constant | 0.192 | 0.172 | -0.059 | 0.014 | -0.050 | -0.138 |
| | (0.67) | (0.80) | (-0.43) | (0.09) | (-0.46) | (-1.51) |
| Observations | 48 | 48 | 48 | 120 | 120 | 120 |
| R-squared | 0.380 | 0.334 | 0.593 | 0.224 | 0.182 | 0.139 |
| Adjusted R-squared | 0.252 | 0.198 | 0.510 | 0.168 | 0.123 | 0.077 |
| F-statistic | 6.908 | 4.082 | 12.262 | 4.978 | 3.082 | 4.059 |
| Prob. (F-stat) | 0.000 | 0.001 | 0.000 | 0.000 | 0.004 | 0.000 |

Notes: See Table A.1 for descriptions of variables. T-statistics are in parentheses below coefficient estimates. ***, ** and * denote significance at the 1, 5 and 10 per cent levels respectively.

## Table A.8: Hausman Test: Credit Growth (CG)

| | Coefficients | | | |
|---|---|---|---|---|
| | (b) | (B) | (b-B) | sqrt (diag (V_b-V_B) ) |
| | fixed | random | difference | S.E. |
| Size | 0.08612 | -0.0069 | 0.09298 | 0.0441428 |
| TD | -.0273813 | 0.00757 | -0.034952 | 0.0281583 |
| LQ | -0.6571171 | 0.02068 | -0.677802 | 0.2445237 |
| SECTA | -0.004807 | -0.0018 | -0.002992 | 0.0096149 |
| GDP | 0.06345 | 0.09873 | -0.035282 | 0.0659263 |
| INFL | -1.024721 | -1.1912 | 0.166447 | 0.3715079 |
| IR | 1.38422 | 1.43731 | -0.053086 | 0.6123598 |
| UNEMP | -5.434616 | -4.9744 | -0.460168 | 0.9518395 |

(b) = consistent under Ho and Ha; obtained from xtreg

(B) = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients is not systematic

chi2 (8) = (b-B) '[ (V_b-V_B) ^ (-1) ] (b-B) = -17.36

chi2<0 ==> the model fitted on these data fails to meet the asymptotic assumptions of the Hausman test; see suest for a generalised test

## Table A.9: Hausman Test: Business Loans Growth (BLG)

| | Coefficients | | | |
|---|---|---|---|---|
| | (b) | (B) | (b-B) | sqrt (diag (V_b-V_B) ) |
| | fixed | random | difference | S.E. |
| Size | .0733631 | -0.0091 | 0.08244 | 0.0451539 |
| TD | -.0204841 | 0.01342 | -0.0339 | 0.0288018 |
| LQ | -.5918098 | 0.09331 | -0.6851 | 0.2505342 |
| SECTA | -.0026241 | 0.00074 | -0.0034 | 0.0098455 |
| GDP | 0.14476 | 0.18672 | -0.042 | 0.070462 |
| INFL | -1.545381 | -1.7574 | 0.21206 | 0.3986109 |
| IR | 1.48452 | 1.59739 | -0.1129 | 0.6353545 |
| UNEMP | -4.92357 | -4.3452 | -0.5784 | 0.9962607 |

(b) = consistent under Ho and Ha; obtained from xtreg

(B) = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients is not systematic

chi2 (8) = (b-B) '[ (V_b-V_B) ^ (-1) ] (b-B) = 24.22

Prob.>chi2 = 0.0021 (V_b-V_B is not positive definite)

## Table A.10: Hausman Test: Credit Card Loans Growth (CCLG)

| | Coefficients | | | |
|---|---|---|---|---|
| | (b) | (B) | (b-B) | sqrt (diag (V_b-V_B) ) |
| | fixed | random | difference | S.E. |
| Size | -.0001022 | 0.00737 | -0.0075 | 0.0038583 |
| TD | 0.00161 | -0.0004 | 0.00201 | 0.002467 |
| LQ | 0.01671 | -0.0138 | 0.03054 | 0.0189494 |
| SECTA | 0.00022 | 0.00037 | -0.0002 | 0.0007985 |
| GDP | 0.02911 | 0.02999 | -0.0009 | 0.0052957 |
| INFL | -0.1531044 | -0.1641 | 0.01095 | 0.0296783 |
| IR | 0.13894 | 0.15277 | -0.0138 | 0.052053 |
| UNEMP | 0.02028 | 0.04226 | -0.022 | 0.0794124 |

(b) = consistent under Ho and Ha; obtained from xtreg

(B) = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients is not systematic

chi2 (8) = (b-B) '[ (V_b-V_B) ^ (-1) ] (b-B) = 9.55

Prob.>chi2 = 0.2982 (V_b-V_B is not positive definite)

## Table A.11: Hausman Test: Housing Loans Growth (HLG)

| | Coefficients | | | |
|---|---|---|---|---|
| | (b) | (B) | (b-B) | sqrt (diag (V_b-V_B) ) |
| | fixed | random | difference | S.E. |
| Size | -.0012214 | 0.01592 | -0.0171 | 0.0109328 |
| TD | -0.0148395 | -0.0092 | -0.0056 | 0.0069836 |
| LQ | -0.0807372 | -0.1174 | 0.03669 | 0.057042 |
| SECTA | -0.0051607 | -0.0024 | -0.0028 | 0.0023135 |
| GDP | -0.0731903 | -0.0465 | -0.0267 | 0.0129373 |
| INFL | 0.36571 | 0.21376 | 0.15195 | 0.071019 |
| IR | -.0453529 | 0.15613 | -0.2015 | 0.1423343 |
| UNEMP | -0.731111 | -0.4454 | -0.2857 | 0.2115893 |

(b) = consistent under Ho and Ha; obtained from xtreg

(B) = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients is not systematic

chi2 (8) = (b-B) '[ (V_b-V_B) ^ (-1) ] (b-B) = 6.14

Prob.>chi2 = 0.6311 (V_b-V_B is not positive definite)

**Table A.12: Hausman Test: Housing Loans Owned Growth (HLOG)**

| | Coefficients | | | |
|---|---|---|---|---|
| | (b) fixed | (B) random | (b-B) difference | sqrt (diag (V_b-V_B) ) S.E. |
| Size | 0.002 | 0.01239 | -0.0104 | 0.0090107 |
| TD | 0.00515 | -0.003 | 0.00812 | 0.005794 |
| LQ | -0.0059917 | -0.0606 | 0.0546 | 0.0356442 |
| SECTA | 0.00092 | -0.0009 | 0.00185 | 0.0017822 |
| GDP | -0.0822002 | -0.0982 | 0.01604 | 0.01518 |
| INFL | 0.25901 | 0.33638 | -0.0774 | 0.0875577 |
| IR | 0.30125 | 0.20338 | 0.09787 | 0.1297288 |
| UNEMP | -0.2135188 | -0.4361 | 0.22256 | 0.2050859 |

(b) = consistent under Ho and Ha; obtained from xtreg

(B) = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients is not systematic

chi2 (8) = (b-B) '[ (V_b-V_B) ^ (-1) ] (b-B) = 5.10

Prob.>chi2 = 0.7472 (V_b-V_B is not positive definite)

**Table A.13: Hausman Test: Housing Loans Investment Growth (HLIG)**

| | Coefficients | | | |
|---|---|---|---|---|
| | (b) | (B) | (b-B) | sqrt (diag (V_b-V_B) ) |
| | fixed | random | difference | S.E. |
| Size | 0.00349 | 0.01723 | -0.0137 | 0.0093362 |
| TD | 0.00532 | -0.007 | 0.01235 | 0.0059567 |
| LQ | 0.00506 | -0.0696 | 0.07466 | 0.0513747 |
| SECTA | 0.00101 | -0.0007 | 0.00175 | 0.0020249 |
| GDP | -0.0563622 | -0.0841 | 0.02778 | 0.0110782 |
| INFL | 0.35557 | 0.49903 | -0.1435 | 0.060714 |
| IR | 0.12406 | -0.0904 | 0.21443 | 0.1217759 |
| UNEMP | 0.21276 | -0.1987 | 0.41142 | 0.181303 |

(b) = consistent under Ho and Ha; obtained from xtreg

(B) = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients is not systematic

chi2 (8) = (b-B) '[ (V_b-V_B) ^ (-1) ] (b-B) = 4.84

Prob.>chi2 = 0.7749 (V_b-V_B is not positive definite)

## Table A.14: Hausman Test: Housing Loans Others Growth (HLOTG)

| | Coefficients | | | |
|---|---|---|---|---|
| | (b) | (B) | (b-B) | sqrt (diag (V_b-V_B) ) |
| | fixed | random | difference | S.E. |
| Size | 0.00397 | 0.0054 | -0.0014 | 0.0092936 |
| TD | -0.0288 | -0.0058 | -0.0229 | 0.0059305 |
| LQ | -0.0911 | -0.0555 | -0.0356 | 0.0508803 |
| SECTA | -0.0097 | -0.002 | -0.0077 | 0.0020091 |
| GDP | 0.00527 | 0.06901 | -0.0637 | 0.0082254 |
| INFL | -0.007 | -0.3326 | 0.32565 | 0.0421961 |
| IR | 0.17166 | 0.59688 | -0.4252 | 0.1150261 |
| UNEMP | 0.3171 | 1.08138 | -0.7643 | 0.1637362 |

(b) = consistent under Ho and Ha; obtained from xtreg

(B) = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients is not systematic

chi2 (8) = (b-B) '[ (V_b-V_B) ^ (-1) ] (b-B) = 20.77

Prob.>chi2 = 0.0078 (V_b-V_B is not positive definite)

**Table A.15: Credit Growth VIF Test**

| **VIF** | | |
|---|---|---|
| Variable | VIF | 1/VIF |
| LQ | 1.77 | 0.564027 |
| TD | 1.63 | 0.612334 |
| INFL | 1.59 | 0.628358 |
| GDP | 1.47 | 0.679463 |
| SIZE | 1.47 | 0.679963 |
| IR | 1.21 | 0.829387 |
| UNEMP | 1.14 | 0.876096 |
| Mean VIF | 1.47 | |

# Appendix B: Foreign Banks

## Business loans growth activities

### Table B.1: Pooled OLS Regression Estimates for the Factors Affecting Credit Growth

| Dependent variable | Credit growth | | |
|---|---|---|---|
| CG | Pre-GFC | GFC | Post-GFC |
| | (1) | (2) | (3) |
| Supply factors | | | |
| SIZE | -0.003 | 0.004 | 0.044*** |
| | (-0.21) | (0.21) | (3.08) |
| TD | -0.004 | 0.013** | -0.003 |
| | (-0.65) | (2.25) | (-0.65) |
| LQ | 0.182 | -0.205 | -0.335*** |
| | (1.25) | (-1.36) | (-3.46) |
| Demand factors | | | |
| GDP | 0.938 | 0.344 | -0.256 |
| | (1.41) | (1.37) | (-1.09) |
| INFL | 4.301 | -3.978** | 0.990 |
| | (1.59) | (-2.03) | (0.70) |
| IR | 1.966 | 3.512* | 3.970* |
| | (0.24) | (1.70) | (1.90) |
| UNEMP | 4.011 | -1.747 | 3.387 |
| | (0.81) | (-0.42) | (1.04) |
| Constant | -0.445 | -0.103 | -0.476** |
| | (-0.69) | (-0.34) | (-2.14) |
| Observations | 280 | 284 | 276 |
| R-squared | 0.029 | 0.101 | 0.071 |
| Adjusted R-squared | 0.004 | 0.078 | 0.046 |
| F-statistic | 1.160 | 5.290 | 3.790 |
| Prob. (F-stat) | 0.326 | 0.000 | 0.001 |

Notes:

Dependent variables were measured as a percentage of the change of total variables for each bank in relation to the same variable in the previous quarter. Business credit growth activities: CG, which was measured as a percentage of the change of total loans of a banking institution in relation to the same variable in the previous quarter; BLG and CCLG. Housing credit growth activities: HLG, HLOG, HLIG and HLOTG.

Independent variables are divided into supply and demand factors. Supply factors: SIZE: bank size, which can be calculated using the national logarithm of total assets, TD; LQ: bank liquidity (cash and securities over total assets); SECTA: asset securitisation,

which is the ratio of total securitised assets to total assets. Demand factors: GDP-G: domestic product growth (real annual GDP growth rate); IR, INFL: inflation rate (annual consumer price inflation as a percentage); UNEMP: unemployment rate. Dummy variables: GFC: Global Financial Crisis (Pre-GFC, GFC and Post-GFC), which is (1=financial crisis, 0=otherwise).

T-statistics are in parentheses below coefficient estimates. ***, ** and * denote significance at the 1, 5 and 10 per cent levels respectively.

## Table B.2: Pooled OLS Regression Estimates for the Factors Affecting Business Loans Growth

| **Dependent variable** | **Business loans growth** | | |
|---|---|---|---|
| **BLG** | **Pre-GFC** | **GFC** | **Post-GFC** |
| | (1) | (2) | (3) |
| Supply factors | | | |
| SIZE | -0.002 | 0.001 | 0.042*** |
| | (-0.15) | (0.06) | (2.83) |
| TD | -0.004 | 0.013** | -0.003 |
| | (-0.62) | (2.35) | (-0.55) |
| LQ | 0.185 | -0.201 | -0.324*** |
| | (1.24) | (-1.32) | (-3.25) |
| Demand factors | | | |
| GDP | 0.927 | 0.371 | -0.171 |
| | (1.35) | (1.44) | (-0.70) |
| INFL | 4.402 | -4.002** | 0.619 |
| | (1.59) | (-2.00) | (0.41) |
| IR | 3.071 | 3.625* | 4.008* |
| | (0.37) | (1.72) | (1.86) |
| UNEMP | 4.650 | -1.607 | 3.232 |
| | (0.91) | (-0.38) | (0.96) |
| Constant | -0.542 | -0.114 | -0.466** |
| | (-0.82) | (-0.37) | (-2.04) |
| Observations | 280 | 284 | 276 |
| R-squared | 0.028 | 0.104 | 0.063 |
| Adjusted R-squared | 0.003 | 0.081 | 0.038 |
| F-statistic | 1.141 | 5.511 | 3.161 |
| Prob. (F-stat) | 0.337 | 0.000 | 0.003 |

Notes: See Table B.1 for descriptions of variables. T-statistics are in parentheses below coefficient estimates. ***, ** and * denote significance at the 1, 5 and 10 per cent levels respectively.

## Table B.3: Pooled OLS Regression Estimates for the Factors Affecting Business Loans Growth

| **Dependent variable** | **Business loan growth** | | |
|---|---|---|---|
| **BLG** | **Pre-GFC** | **GFC** | **Post-GFC** |
| | (1) | (2) | (3) |
| Supply factors | | | |
| SIZE | -0.002 | 0.001 | 0.042*** |
| | (-0.15) | (0.06) | (2.83) |
| TD | -0.004 | 0.013** | -0.003 |
| | (-0.62) | (2.35) | (-0.55) |
| LQ | 0.185 | -0.201 | -0.324*** |
| | (1.24) | (-1.32) | (-3.25) |
| Demand factors | | | |
| GDP | 0.927 | 0.371 | -0.171 |
| | (1.35) | (1.44) | (-0.70) |
| INFL | 4.402 | -4.002** | 0.619 |
| | (1.59) | (-2.00) | (0.41) |
| IR | 3.071 | 3.625* | 4.008* |
| | (0.37) | (1.72) | (1.86) |
| UNEMP | 4.650 | -1.607 | 3.232 |
| | (0.91) | (-0.38) | (0.96) |
| Constant | -0.542 | -0.114 | -0.466** |
| | (-0.82) | (-0.37) | (-2.04) |
| Observations | 280 | 284 | 276 |
| R-squared | 0.028 | 0.104 | 0.063 |
| Adjusted R-squared | 0.003 | 0.081 | 0.038 |
| F-statistic | 1.141 | 5.511 | 3.161 |
| Prob. (F-stat) | 0.337 | 0.000 | 0.003 |

Notes: See Table B.1 for descriptions of variables. T-statistics are in parentheses below coefficient estimates. ***, ** and * denote significance at the 1, 5 and 10 per cent levels respectively.

## Table B.4: Pooled OLS Regression Estimates for the Factors Affecting Credit Card Loans Growth

| **Dependent variable** | **Credit card loan growth** | | |
|---|---|---|---|
| **CCLG** | **Pre-GFC** | **GFC** | **Post-GFC** |
| | (1) | (2) | (3) |
| Supply factors | | | |
| SIZE | 0.004*** | 0.002*** | 0.003*** |
| | (3.41) | (2.65) | (2.91) |
| TD | -0.001*** | -0.000** | -0.000*** |
| | (-2.99) | (-2.56) | (-2.68) |
| LQ | 0.008** | -0.002 | -0.013*** |
| | (2.04) | (-0.60) | (-2.78) |
| Demand factors | | | |
| GDP | -0.018 | 0.014 | 0.006 |
| | (-0.59) | (0.92) | (0.37) |
| INFL | -0.078 | -0.109 | -0.023 |
| | (-0.49) | (-1.00) | (-0.33) |
| IR | -0.052 | 0.068 | -0.156 |
| | (-0.11) | (0.52) | (-0.89) |
| UNEMP | -0.123 | 0.040 | -0.181 |
| | (-0.48) | (0.16) | (-1.12) |
| Constant | 0.004 | -0.007 | 0.014 |
| | (0.13) | (-0.38) | (0.95) |
| Observations | 280 | 284 | 276 |
| R-squared | 0.080 | 0.039 | 0.052 |
| Adjusted R-squared | 0.056 | 0.015 | 0.027 |
| F-statistic | 1.753 | 1.096 | 1.408 |
| Prob. (F-stat) | 0.097 | 0.366 | 0.202 |

Notes: See Table B.1 for descriptions of variables. T-statistics are in parentheses below coefficient estimates. ***, ** and * denote significance at the 1, 5 and 10 per cent levels respectively.

## Housing loans growth activities

### Table B.5: Pooled OLS Regression Estimates for the Factors Affecting Housing Loans Growth

| Dependent variable | Housing loan growth | | |
|---|---|---|---|
| HLG | Pre-GFC | GFC | Post-GFC |
| | (1) | (2) | (3) |
| Supply factors | | | |
| SIZE | 0.013*** | 0.009** | 0.005*** |
| | (3.08) | (2.26) | (3.30) |
| TD | -0.002* | -0.003** | -0.003*** |
| | (-1.89) | (-2.46) | (-3.64) |
| LQ | -0.036** | -0.065** | -0.077*** |
| | (-2.11) | (-2.30) | (-3.97) |
| Demand factors | | | |
| GDP | 0.104 | -0.068 | 0.036 |
| | (0.88) | (-1.35) | (0.56) |
| INFL | -0.053 | 0.416 | -0.076 |
| | (-0.10) | (1.06) | (-0.22) |
| IR | -1.976 | -0.238 | 0.224 |
| | (-1.23) | (-0.58) | (0.47) |
| UNEMP | 0.500 | -0.566 | -0.733 |
| | (0.56) | (-0.67) | (-1.15) |
| Constant | 0.057 | 0.034 | 0.048 |
| | (0.48) | (0.58) | (1.06) |
| Observations | 280 | 284 | 276 |
| R-squared | 0.076 | 0.050 | 0.060 |
| Adjusted R-squared | 0.052 | 0.026 | 0.036 |
| F-statistic | 2.753 | 2.214 | 3.641 |
| Prob. (F-stat) | 0.009 | 0.033 | 0.001 |

Notes: See Table B.1 for descriptions of variables. T-statistics are in parentheses below coefficient estimates. ***, ** and * denote significance at the 1, 5 and 10 per cent levels respectively.

## Table B.6: Pooled OLS Regression Estimates for the Factors Affecting Housing Loan Owned Growth

| **Dependent variable** | **Housing loan owned growth** | | |
|---|---|---|---|
| **HLOG** | **Pre-GFC** | **GFC** | **Post-GFC** |
| | (1) | (2) | (3) |
| Supply factors | | | |
| SIZE | 0.012*** | 0.004* | 0.005*** |
| | (3.08) | (1.72) | (3.89) |
| TD | -0.003** | -0.002** | -0.002*** |
| | (-2.04) | (-2.22) | (-2.92) |
| LQ | -0.056*** | -0.066*** | -0.030** |
| | (-3.41) | (-4.10) | (-2.52) |
| Demand factors | | | |
| GDP | -0.024 | -0.011 | 0.028 |
| | (-0.22) | (-0.25) | (0.59) |
| INFL | -0.098 | 0.278 | -0.102 |
| | (-0.21) | (0.92) | (-0.41) |
| IR | -1.991 | -0.215 | 0.158 |
| | (-1.40) | (-0.62) | (0.48) |
| UNEMP | -0.618 | -0.385 | -0.282 |
| | (-0.67) | (-0.56) | (-0.62) |
| Constant | 0.140 | 0.038 | 0.012 |
| | (1.18) | (0.81) | (0.39) |
| Observations | 280 | 283 | 274 |
| R-squared | 0.081 | 0.055 | 0.044 |
| Adjusted R-squared | 0.057 | 0.031 | 0.019 |
| F-statistic | 3.067 | 4.004 | 2.916 |
| Prob. (F-stat) | 0.004 | 0.000 | 0.006 |

Notes: See Table B.1 for descriptions of variables. T-statistics are in parentheses below coefficient estimates. ***, ** and * denote significance at the 1, 5 and 10 per cent levels respectively.

## Table B.7: Pooled OLS Regression Estimates for the Factors Affecting Housing Loan Investment Growth

| **Dependent variable** | **Housing loan investment growth** | | |
|---|---|---|---|
| **HLIG** | **Pre-GFC** | **GFC** | **Post-GFC** |
| | (1) | (2) | (3) |
| Supply factors | | | |
| SIZE | 0.005* | 0.003 | 0.001 |
| | (1.94) | (1.19) | (0.68) |
| TD | -0.000 | -0.000 | 0.000 |
| | (-0.07) | (-0.21) | (0.07) |
| LQ | -0.021 | -0.014 | -0.049*** |
| | (-1.42) | (-0.81) | (-3.25) |
| Demand factors | | | |
| GDP | 0.011 | -0.013 | 0.051 |
| | (0.13) | (-0.40) | (1.01) |
| INFL | -0.283 | 0.150 | 0.193 |
| | (-0.71) | (0.55) | (0.70) |
| IR | -1.624 | -0.174 | -0.202 |
| | (-1.56) | (-0.62) | (-0.50) |
| UNEMP | -0.219 | -0.297 | -0.309 |
| | (-0.38) | (-0.49) | (-0.53) |
| Constant | 0.090 | 0.010 | 0.018 |
| | (1.21) | (0.25) | (0.45) |
| Observations | 280 | 284 | 276 |
| R-squared | 0.036 | 0.006 | 0.040 |
| Adjusted R-squared | 0.011 | -0.019 | 0.015 |
| F-statistic | 1.416 | 0.343 | 2.341 |
| Prob. (F-stat) | 0.199 | 0.934 | 0.025 |

Notes: See Table B.1 for descriptions of variables. T-statistics are in parentheses below coefficient estimates. ***, ** and * denote significance at the 1, 5 and 10 per cent levels respectively.

**Table B.8: Pooled OLS Regression Estimates for the Factors Affecting Housing Loan Other Growth**

| **Dependent variable** | **Housing loan other growth** | | |
|---|---|---|---|
| **HLOTG** | **Pre-GFC** | **GFC** | **Post-GFC** |
| | (1) | (2) | (3) |
| Supply factors | | | |
| SIZE | 0.003 | -0.001 | -0.002 |
| | (0.91) | (-0.45) | (-1.32) |
| TD | -0.001 | -0.001* | -0.001 |
| | (-1.14) | (-1.77) | (-1.52) |
| LQ | 0.023 | -0.018 | -0.011 |
| | (1.39) | (-0.92) | (-0.71) |
| Demand factors | | | |
| GDP | -0.078 | -0.083* | 0.011 |
| | (-0.87) | (-1.93) | (0.28) |
| INFL | 0.134 | 0.451* | -0.143 |
| | (0.46) | (1.80) | (-0.66) |
| IR | 1.183 | -0.099 | 0.242 |
| | (1.36) | (-0.31) | (0.60) |
| UNEMP | 0.933* | -0.447 | 0.057 |
| | (1.94) | (-0.75) | (0.10) |
| Constant | -0.118* | 0.032 | 0.004 |
| | (-1.90) | (0.75) | (0.10) |
| Observations | 280 | 284 | 276 |
| R-squared | 0.040 | 0.035 | 0.012 |
| Adjusted R-squared | 0.016 | 0.011 | -0.014 |
| F-statistic | 1.708 | 1.409 | 1.009 |
| Prob. (F-stat) | 0.107 | 0.201 | 0.425 |

Notes: See Table B.1 for descriptions of variables. T-statistics are in parentheses below coefficient estimates. ***, ** and * denote significance at the 1, 5 and 10 per cent levels respectively.

## Table B.9: Hausman Test: Credit Growth (CG)

| | Coefficients | | | |
|---|---|---|---|---|
| | (b) fixed | (B) random | (b-B) difference | sqrt (diag (V_b-V_B) ) S.E. |
| SIZE | 0.05777 | 0.00311 | 0.05466 | 0.0184566 |
| TD | 0.0044 | 0.00241 | 0.00199 | 0.0079389 |
| LQ | -0.175 | -0.0608 | -0.1143 | 0.0711612 |
| GDP | 0.17472 | 0.11211 | 0.06261 | 0.0162473 |
| INFL | -1.027 | -0.7375 | -0.2895 | 0.074204 |
| IR | 2.37392 | 1.92899 | 0.44493 | 0.1633717 |
| UNEMP | -0.1264 | -0.9733 | 0.84693 | 0.2532844 |

(b) = consistent under Ho and Ha; obtained from xtreg

(B) = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients is not systematic

chi2 (7) = (b-B) '[ (V_b-V_B) ^ (-1) ] (b-B) = 17.64

Prob.>chi2 = 0.0137 (V_b-V_B is not positive definite)

**Table B.10: Hausman Test: Business Loans Growth (BLG)**

| Coefficients | | | | |
|---|---|---|---|---|
| | (b) fixed | (B) random | (b-B) difference | sqrt (diag (V_b-V_B) ) S.E. |
| Size | .0733631 | -0.0091 | 0.08244 | 0.0451539 |
| TD | -.0204841 | 0.01342 | -0.0339 | 0.0288018 |
| LQ | -.5918098 | 0.09331 | -0.6851 | 0.2505342 |
| SECTA | -.0026241 | 0.00074 | -0.0034 | 0.0098455 |
| GDP | 0.14476 | 0.18672 | -0.042 | 0.070462 |
| INFL | -1.545381 | -1.7574 | 0.21206 | 0.3986109 |
| IR | 1.48452 | 1.59739 | -0.1129 | 0.6353545 |
| UNEMP | -4.92357 | -4.3452 | -0.5784 | 0.9962607 |

(b) = consistent under Ho and Ha; obtained from xtreg

(B) = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients is not systematic

chi2 (8) = (b-B) '[ (V_b-V_B) ^ (-1) ] (b-B) = 24.22

Prob.>chi2 = 0.0021 (V_b-V_B is not positive definite)

## Table B.11: Hausman Test: Credit Card Loans Growth (CCLG)

| | Coefficients | | | |
|---|---|---|---|---|
| | (b) | (B) | (b-B) | sqrt (diag (V_b-V_B) ) |
| | fixed | random | difference | S.E. |
| Size | -.0001022 | 0.00737 | -0.0075 | 0.0038583 |
| TD | 0.00161 | -0.0004 | 0.00201 | 0.002467 |
| LQ | 0.01671 | -0.0138 | 0.03054 | 0.0189494 |
| SECTA | 0.00022 | 0.00037 | -0.0002 | 0.0007985 |
| GDP | 0.02911 | 0.02999 | -0.0009 | 0.0052957 |
| INFL | -0.1531044 | -0.1641 | 0.01095 | 0.0296783 |
| IR | 0.13894 | 0.15277 | -0.0138 | 0.052053 |
| UNEMP | 0.02028 | 0.04226 | -0.022 | 0.0794124 |

(b) = consistent under Ho and Ha; obtained from xtreg

(B) = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients is not systematic

chi2 (8) = (b-B) '[ (V_b-V_B) ^ (-1) ] (b-B) = 9.55

Prob.>chi2 = 0.2982 (V_b-V_B is not positive definite)

## Table B.12: Hausman Test: Housing Loans Growth (HLG)

| | Coefficients | | | |
|---|---|---|---|---|
| | (b) | (B) | (b-B) | sqrt (diag (V_b-V_B) ) |
| | fixed | random | difference | S.E. |
| Size | -.0012214 | 0.01592 | -0.0171 | 0.0109328 |
| TD | -0.0148395 | -0.0092 | -0.0056 | 0.0069836 |
| LQ | -0.0807372 | -0.1174 | 0.03669 | 0.057042 |
| SECTA | -0.0051607 | -0.0024 | -0.0028 | 0.0023135 |
| GDP | -0.0731903 | -0.0465 | -0.0267 | 0.0129373 |
| INFL | 0.36571 | 0.21376 | 0.15195 | 0.071019 |
| IR | -.0453529 | 0.15613 | -0.2015 | 0.1423343 |
| UNEMP | -0.731111 | -0.4454 | -0.2857 | 0.2115893 |

(b) = consistent under Ho and Ha; obtained from xtreg

(B) = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients is not systematic

chi2 (8) = (b-B) '[ (V_b-V_B) ^ (-1) ] (b-B) = 6.14

Prob.>chi2 = 0.6311 (V_b-V_B is not positive definite)

**Table B.13: Hausman Test: Housing Loans Owned Growth (HLOG)**

| Coefficients | | | | |
|---|---|---|---|---|
| | (b) fixed | (B) random | (b-B) difference | sqrt (diag (V_b-V_B) ) S.E. |
| Size | 0.002 | 0.01239 | -0.0104 | 0.0090107 |
| TD | 0.00515 | -0.003 | 0.00812 | 0.005794 |
| LQ | -0.0059917 | -0.0606 | 0.0546 | 0.0356442 |
| SECTA | 0.00092 | -0.0009 | 0.00185 | 0.0017822 |
| GDP | -0.0822002 | -0.0982 | 0.01604 | 0.01518 |
| INFL | 0.25901 | 0.33638 | -0.0774 | 0.0875577 |
| IR | 0.30125 | 0.20338 | 0.09787 | 0.1297288 |
| UNEMP | -0.2135188 | -0.4361 | 0.22256 | 0.2050859 |

(b) = consistent under Ho and Ha; obtained from xtreg

(B) = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients is not systematic

chi2 (8) = (b-B) '[ (V_b-V_B) ^ (-1) ] (b-B) = 5.10

Prob.>chi2 = 0.7472 (V_b-V_B is not positive definite)

**Table B.14: Hausman Test: Housing Loans Investment Growth (BLG)**

| | Coefficients | | | |
|---|---|---|---|---|
| | (b) fixed | (B) random | (b-B) difference | Sqrt (diag (V_b-V_B) ) S.E. |
| Size | 0.00349 | 0.01723 | -0.0137 | 0.0093362 |
| TD | 0.00532 | -0.007 | 0.01235 | 0.0059567 |
| LQ | 0.00506 | -0.0696 | 0.07466 | 0.0513747 |
| SECTA | 0.00101 | -0.0007 | 0.00175 | 0.0020249 |
| GDP | -0.0563622 | -0.0841 | 0.02778 | 0.0110782 |
| INFL | 0.35557 | 0.49903 | -0.1435 | 0.060714 |
| IR | 0.12406 | -0.0904 | 0.21443 | 0.1217759 |
| UNEMP | 0.21276 | -0.1987 | 0.41142 | 0.181303 |

(b) = consistent under Ho and Ha; obtained from xtreg

(B) = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients is not systematic

chi2 (8) = (b-B) '[ (V_b-V_B) ^ (-1) ] (b-B) = 4.84

Prob.>chi2 = 0.7749 (V_b-V_B is not positive definite)

**Table B.15: Hausman Test: Housing Loans Others Growth (BLG)**

| | Coefficients | | | |
|---|---|---|---|---|
| | (b) fixed | (B) random | (b-B) difference | sqrt (diag (V_b-V_B) ) S.E. |
| Size | 0.00397 | 0.0054 | -0.0014 | 0.0092936 |
| TD | -0.0288 | -0.0058 | -0.0229 | 0.0059305 |
| LQ | -0.0911 | -0.0555 | -0.0356 | 0.0508803 |
| SECTA | -0.0097 | -0.002 | -0.0077 | 0.0020091 |
| GDP | 0.00527 | 0.06901 | -0.0637 | 0.0082254 |
| INFL | -0.007 | -0.3326 | 0.32565 | 0.0421961 |
| IR | 0.17166 | 0.59688 | -0.4252 | 0.1150261 |
| UNEMP | 0.3171 | 1.08138 | -0.7643 | 0.1637362 |

(b) = consistent under Ho and Ha; obtained from xtreg

(B) = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients is not systematic

chi2 (8) = (b-B) '[ (V_b-V_B) ^ (-1) ] (b-B) = 20.77

Prob.>chi2 = 0.0078 (V_b-V_B is not positive definite)

**Table B.16: Credit Growth VIF Test**

| Variable | VIF | 1/VIF |
|---|---|---|
| INFL | 1.59 | 0.62946 |
| GDP | 1.48 | 0.67723 |
| IR | 1.21 | 0.82871 |
| LQ | 1.17 | 0.85702 |
| UNEMP | 1.14 | 0.87362 |
| TD | 1.13 | 0.88564 |
| SIZE | 1.07 | 0.93236 |
| Mean VIF | 1.26 | |