The Firm-Specific Determinants of Capital Structure in Public Sector and Private Sector Banks in India

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Abstract

The banking industry in India has undergone many phases in its history; evolving from a regulated, decentralised system in the early 1800's, to a regulated, centralised system during British rule, to a nationalised system following India's independence, and finally a combination of a nationalised and private system adopting global standards as it currently stands.

This study has two main aims. Firstly, it will assess the relationship between the firm-specific determinants of capital structure, based on the prevailing literature, and the capital structure of public and private sector banks in India. Secondly, it will determine whether there is a difference in the firm-specific factors that contribute to the determination of the capital structure of public sector banks and private sector banks.

This study adopts quantitative methods, similar to previous studies on the relationship between capital structure and its firm-specific determinants. The dependent variable, being total leverage, is regressed against multiple independent variables, being profitability, growth, firm size and credit risk (hereinafter referred to as "risk" unless otherwise indicated) in a multivariate linear regression model.

This study adds to the current literature by applying the same firm-specific independent variables to the case of private and public sector banks and then to evaluate and compare the similarities and differences between the regression outputs.

The results show that for private sector banks, all independent variables are statistically significant in explaining total leverage, where all the independent variables conform to the current literature on capital structure – profitability (-), firm size (-), growth (+) and credit risk (-). Conversely, for public sector banks, all independent variables were considered to be statistically significant, except for credit risk – profitability (-), firm size (+) and growth (+).

These results imply that credit risk is not an important determination in a nationalised banks' capital structure; thus, providing evidence for the moral hazard theory of public sector banks.

Keywords: capital structure, financial firms, public sector banks, India, credit risk, capital regulations, panel data, multivariate regression modelling

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List of terms and acronyms

1 Crore	₹10 000 000
BCBS	Basel Committee on Banking Supervision
CCB	Capital conservation buffer
CET 1	Common Equity Tier 1
G-10	Group of Ten countries
IRBA	Internal rating-based approach
NPAs	Non-performing assets
RBI	Reserve Bank of India

1 Introduction

The banking industry in India has undergone many phases in its history; evolving from a regulated, decentralised system in the early 1800's, to a regulated, centralised system during British rule, to a nationalised system following India's independence, and finally a combination of a nationalised and private system adopting global standards as it currently stands. India's decision to nationalise its banking industry, which arose after its independence from the colonial British rule, intended to uplift the rural areas, distribute wealth to the less developed industries and prevent a monopolistic trend and concentration of economic power (Alladi, 2013).

Similarly, the context in South Africa is one of vast social and economic inequality, exacerbated by the Apartheid regime. Most recently, the Portfolio Committee on Finance is considering the Banks Amendment Bill [B12-2018] which aims to amend the Banks Act of 1990 to insert definitions which would allow a state-owned company to conduct the business of a bank (Molafo, 2018). Current Finance Minister of South Africa, Tito Mboweni stated that the formation of the state-owned bank is a response to the fact that South Africans have complained for years that commercial banks have discriminated against them when offering long-term loans (Magubane, 2019). The Economic Freedom Fighters (EFF) stated that while the financial services sector was one of the largest sectors in the South African economy, it was also the lease transformed, in that no single bank had meaningful black ownership (Phakathi, 2019).

There are, however, dissenting views on the efficacy of state-owned banks in South Africa. The Standing Committee of Finance warned of previous banking failures in South Africa, such as VBS Mutual Bank and South African Post Office, which used depositors' finds to financial postal operational losses. The Committee stated that "international experience suggests that state ownership of banks has the potential to undermine prompt corrective action by prudential regulators" (BusinessTech, 2019). Regardless, one can draw lessons from similar experiences in the Indian banking industry, as they navigate the benefits and pitfalls of nationalisation.

There is currently a wealth of literature on the social and economic impact of nationalised banks in India, taking different perspectives such as the efficiency and efficacy of the nationalised banks, both before and after the financial reforms in the early 1990s. There are two prevailing views on the efficacy of nationalised banks; being the developmental view and the political view. The developmental view, which is pro-nationalisation, states that public sector banks contribute to financial stability and promote economic growth (Arora and Wondemu, 2018). Credit offered by state banks is less pro-cyclical and less responsive to macroeconomic shocks than credit through private banks (Coleman and Feler, 2015). In

contrast, the political view argues that government ownership hinders financial development and is often politically motivated; leading to a misallocation of resources.

Oliver Wyman (2017) shows two concerning trends; firstly, public sector banks held the majority of the total loans and advances in India – 71.2% compared to private sector banks of 24.2% and secondly gross non-performing assets ("NPAs") as a ratio of total advances are 14.6% for public sector banks and 5.1% for private sector banks. Furthermore, public sector bank gross NPAs have grown from 1 trillion rupees in 2012 to 6.2 trillion rupees in 2017; almost six times increase in as many years.

There is little literature which evaluates the impact of nationalisation on the capital structure of financial firms. This study has two main aims. Firstly, it will assess the relationship between the firm-specific determinants of capital structure, based on the prevailing literature, and the capital structure of public and private sector banks in India. Secondly, it will determine whether there is a difference in a given set of firm-specific factors that contribute to the determination of the capital structure of public sector banks and the capital structure of private sector banks.

Capital structure impacts firm valuation; in balancing the costs and benefits that are associated with debt financing (Modigliani and Miller, 1963). Excessive leverage increases the risk of financial distress, bankruptcy and in the case of financial firms, destabilisation of the economy in which it operates (Allen et al., 2015). Therefore, understanding what drives capital structure is important in understanding how to manage capital structure and the risks associated thereon.

Aremu et al. (2013) stated that there is little literature on banks and the capital structure decision given the special nature of the deposit contracts, the degree of leverage within banks and the regulatory constraints imposed on banks. However, the fact that a bank's capital structure affects its stability, liquidity and its ability to provide credit efficiently, makes this study noteworthy.

This study adopts quantitative methods, similar to previous studies on the relationship between capital structure and its firm-specific determinants. As a starting point, this study aimed to determine if the status as a public sector bank or private sector bank is statistically significant in identifying a difference in the firm-specific factors that determine the capital structure of a bank. Once the difference between private sector banks and public sector banks was determined to be statistically significant; separate regression models were performed for each of the public sector and private sector banks. The dependent variable, being total leverage, is regressed against multiple independent variables, being profitability, growth, firm size and risk in a multivariate linear regression model.

The independent variables are similar to those used in previous studies on capital structure and were chosen based on an evaluation of the current literature that exists on the capital structure for financial and non-financial firms, firms operating in developed and developing markets and lastly on the existing literature on public sector banks. This study adds to the current literature by applying the same firm-specific independent variables to private sector banks and public sector banks and evaluate and compare the similarities and differences between the regression outputs.

This study is broken up as follows; Chapter 2 explores the current literature on capital structure and develops a hypothesis for testing, Chapter 3 focusses on the research methodology, in which the quantitative methods, model formation and variables are discussed, Chapter 4 unpacks the empirical results using a statistical lens, Chapter 5 discusses the results in light of the prevailing theories on capital structure and Chapter 6 provides a conclusion and recommendations for further study.

2 Literature review

This literature review begins by discussing the importance of financial institutions in a functioning economy and provides an overview of the modern history of banking in India. Thereafter, the remainder of this section will explore and contextualise the prevailing knowledge and literature to arrive at a hypothesis for testing.

2.1 Importance of financial institutions

The notion of financial services and banking has been around for centuries, evolving from storage and trading of grain and gold to holding modern-day cash deposits, facilitating loans and marketing complex derivative structures. As the banking industry has evolved, its role in facilitating smooth business transactions has evolved and pervaded through the economy. The result is that the banking industry is widely considered to be one of the most integral components to a functioning economy, so much so that these economies mirror the successes and failures of the banks that operate within them.

There are numerous examples of this relationship, the most noteworthy being the Great Depression of the 1930s, argued by some to be caused by the lack of liquidity in the banking industry, and the 2007/08 financial crisis and the ensuing Great Recession (Radde, 2014). As such, banking institutions suffer from moral hazard given the historical evidence of government intervention in the banking industry in times of crisis – most recently the 2008 global financial crisis saw the collapse of the subprime mortgage market, which had a knock-on effect on declines in equity markets, large asset write-offs and a lack of investor confidence. To restore confidence in the markets, governments and central banks were forced to take extraordinary measures, which included recapitalisation, issuing loans, and implicit and explicit guarantees by governments (Allen et al., 2015).

At its core, a bank's mandate is fairly simple. It offers a secure vault to store its customers' cash deposits and allows the depositor to withdraw their funds with relative ease. In exchange for this, the bank will charge banking fees and compensate the depositor for the time value of money and other risks (including credit risk, liquidity risk, financial risk etc.) via interest income to the depositor. These funds would be stored for safe-keeping until the depositor decides to draw on them which may occur in the future. Until then, the bank has a resource which it can use to lend to other participants within the economy via loans and similar facilities. The bank will reserve a percentage of the deposited funds to service the needs of their depositors and the rest of the funds will be loaned out to economic participants looking to purchase assets or fund their businesses. In this way, the banking industry can facilitate economic growth through responsible lending practices. In exchange for facilitating these transactions, the bank will charge interest and transaction fees.

There is little literature on banks and the capital structure decision given the special nature of the deposit contracts, the degree of leverage within banks and the regulatory constraints imposed on banks. However, the fact that a bank's capital structure affects its stability, liquidity and its ability to provide credit efficiently, makes this study noteworthy (Aremu et al., 2013).

2.2 The modern history of the banking industry in India

Among the earliest formalised banks in India were the General Bank of India and the Bank of Hindustan, established in 1786 and 1790 respectively. These banks were established by the British agency houses to facilitate trade among the agency houses. Shortly after, three Presidency banks were established; the Bank of Calcutta (1806), the Bank of Bombay (1840) and the Bank of Madras (1843), each whose role was to institute deposit savings accounts and investment services. These banks were named as such as they were individually given the right to issue its notes which then became the legal currency in that region and these banks were governed by royal charters, set forth by the provincial government of that region (Gajdhane, 2012). The passing of the Paper Currency Act in 1861 saw the Presidency banks lose their right to issue currency in favour of the British government in India. Instead, the Presidency banks were conferred the right to manage the circulation of the new currency notes and the British India government undertook to transfer Treasury balances to the places where the Presidency banks would open branches; thereby facilitating the expansion of these banks (Khatumbra, 2015).

The Presidency Banks Act, which became effective in 1876, united the Presidency banks under common legislation and limited government participation in their operations. The government envisioned that the main function of the Presidency banks was to help the government raise loans and provide stability to the pricing of government securities (Khatumbra, 2015). To mitigate the general risk exposure of these banks, the Presidency Banks Act prohibited the banks from conducting foreign exchange business, lending money for periods longer than six months or lending on a mortgage unless the asset held as security or title deed thereon was deposited in the bank as security. To compensate the Presidency banks for these restrictions, the Act also allowed the banks to hold a specified portion of the Government balances, free of interest. Any balances above the specified minimum reserves promised to the Presidency banks, were held as *Treasury Reserves* under the control of the government which could be loaned to the banks from time to time (Howard, 1921). The three Presidency banks amalgamated under legislation passed by the Indian Legislative Council in 1920, to form the Imperial Bank of India; which performed all the normal functions of a commercial bank, and, until the Reserve Bank of India was established in 1935, the functions of a central banking institution (Khatumbra, 2015).

India's independence from British rule was the catalyst for the next step in the progression of India's banking system. On April 1955, in a bid to gain more control over the Imperial Bank of India, the Reserve Bank of India acquired a controlling stake in the Imperial Bank of India in terms of the State Bank of India Act (1955) and was subsequently renamed the State Bank of India, with a primary mandate to go to the rural areas by opening at least 400 branches immediately (Chaudhary and Sharma, 2011). The government of India envisioned a socialistic pattern of society and was instrumental in plotting the social and economic development of the country; which was primarily focussed on uplifting the rural areas. However, commercial banks were still directing their advances to the large and medium scale industries, and priority sectors such as agriculture and exports were neglected. To correct these oversights, the Banking Laws Amendment Act was passed in 1968 and was seen as the "*social control*" over banks at the time. Then Deputy Prime Minister, Morarji Desai, stated that *social control* was aimed at regulating the social and economic life to attain an optimum growth rate for the economy and prevent a monopolistic trend, concentration of economic power and misdirection of resources (Alladi, 2013).

The general aim of the amendments was to involve experts in the fields of agriculture, rural economy, economics and finance in the board of directors of these large commercial banks to ensure the government's vision would be realised (Alladi, 2013). *Social control* did not seem to be effective in achieving the government's vision and therefore in July 1969, the government of India obtained 100% of the equity of and thereby nationalised, fourteen Indian banks, each having deposits above Rs 50 crores (Rs 500 million), and in April 1980, the government purchased a further six banks, each with deposits above Rs 200 crores (Rs 2 billion) (Alladi, 2013). Following the second dose of nationalisation, the Indian government controlled approximately 91% of the banking business in India (Gajdhane, 2012). The banks operated within an environment of administered interest rates, mandatory loan syndication and high statutory liquidity ratios that required banks to invest a significant portion of their assets into government bonds. The focus on social banking led to a large-scale expansion of the banking industry in India, with the nationalised banks adding over 55 000 branches between 1969 and 1990 (Bhaumik, Kutan and Majumdar, 2018).

While the social agenda of nationalised banks may have been a success, the banking industry was in distress by the early 1990s. Compared to data from the 1970s, pre-nationalisation, net profits had declined sharply and there was grave concern about the accumulation of NPAs among nationalised banks, which accounted for approximately 88% of assets in the banking industry (Bhaumik, Kutan and Majumdar, 2018). In the early 1990s, then prime minister of India, Narasimha Rao, embarked on a policy of economic liberalisation, by licencing a small number of private banks (Goyal and Joshi, 2012) as a means to resolve the distressed Indian

banking industry (Bhaumik, Kutan and Majumdar, 2018). Auerbach and Siddiki (2004) define financial liberalisation as the elimination of a series of impediments in the financial sector to bring it in line with that of the developed economies. In the context of India's financial liberalisation; this term may be used to describe domestic financial sector reforms, including interest rate liberalisation, reduction in reserve requirements, entry deregulation, which allowed the entry of foreign and private sector banks, credit policies and prudential supervision (Koeva, 2003).

Bhaumik, Kutan and Majumdar (2018) summarise the financial sector reforms into three main pillars; firstly, the banking industry was opened up to private sector and foreign-owned banks thus increasing the level of competition in the market. Secondly, banks were granted a greater degree of autonomy in the granting and pricing of credit and thirdly; the banks were subjected to prudential regulations that were modelled on the recommendations of the Basel committee. The financial reforms were followed by the adoption of international banking regulations through the Basel Accords. The adoption was phased in over a period of three years over which time, many public sector banks required to be recapitalised either via capital injections from the government or through public equity offerings; the result being that most nationalised banks were now majority held by the government with some degree of minority private sector ownership.

Oliver Wyman (2017) states that one generation after the Indian banking sector was liberalised, the Indian banking sector is close to collapse, primarily due to the poor governance and risk management capabilities of public sector banks which are collapsing under the weight of an ever-growing base of NPAs. There are two concerning trends that are evident from the report based on data in 2017; firstly, public sector banks held the majority of the total loans and advances in India – 71.2% compared to private sector banks of 24.2% and secondly, gross NPAs as a ratio of total advances are 14.6% for public sector banks and 5.1% for private sector banks. Furthermore, public sector bank gross NPAs have grown from 1 trillion rupees in 2012 to 6.2 trillion rupees in 2017; almost six times increase in as many years. The result of these high NPAs, poor lending practices and risk management policies is that all public sector banks, except for the State Bank of India and IDBI Bank have price to book ratios of less than 1 and the majority of the banks have a price to book ratio of less than 0.5. India ranks the highest in the proportion of bank assets that have at least 50% government ownership, however, it also ranks in the bottom quartile of the transparency, accountability and corruption in the public sector index (Gopalakrishnan, Jacob and Pandey, 2018). These statistics provide evidence that state-ownership of banks expose these banks to a greater degree of moral hazard and a lack of accountability, therefore leading to a greater degree of instability in the financial markets.

2.3 Importance of capital structure

The impact of the capital structure decision on a firm's value is a widely debated topic. The capital structure decision is rooted in finding the optimal mix of debt financing – issuing corporate bonds or taking on bank loans, and equity financing – via internally-generated funds or issuing shares. Modigliani and Miller (1958) hypothesized that capital structure did not affect firm value. This stemmed from the theory that firm value is generated by the resources employed within that firm and not from how those resources were funded. However, this theory was based on simplifying assumptions; namely a "perfect" market which did not contain taxes and bankruptcy costs.

In subsequent propositions by Modigliani and Miller (1963), the simplifying assumptions were relaxed, first by including the impact of taxation into the model and secondly by including the risk of bankruptcy. In the second proposition with the addition of tax, it was found that the tax deductibility of the cost of debt provided a tax benefit and therefore firm value would be maximised by deriving the maximum tax benefit possible (i.e. issuing 100% debt financing). This model, however, did not consider the risk of default of debt on firm value – generally speaking, the more debt a firm takes on, the greater the uncertainty is that the firm will be able to settle that debt. The third proposition included the risk of bankruptcy and it was subsequently concluded that a firm's optimal capital structure is one in which the benefits of the tax shield on debt financing are balanced with the risks of bankruptcy.

Miller (1995) discuss whether the Modigliani and Miller propositions apply to banks; concluding that there is no reason why the propositions shouldn't apply to banks. Two arguments are apparent from this paper; firstly, in a free capital market with no restrictions, there is nothing different about demand securities which would rule out the application of the Modigliani and Miller propositions to the banking industry. However, banking markets are not left to their own devices as a result of implicit or explicit government guarantees and capital requirements. Secondly, the substance of these implicit/explicit guarantees and imposed capital requirements is that the government and regulators are effectively standing in as a creditor, imposing implicit costs on the financial firm in exchange for providing their guarantees and therefore these guarantees shouldn't, in theory, undermine the Modigliani and Miller propositions.

Since the introduction of the Modigliani and Miller propositions on capital structure, numerous theories on what determines capital structure have emerged. A formative study performed by Harris and Raviv (1991) aimed to consolidate the majority of the types of capital structure theories that existed at the time. These theories were summarised into four categories; namely the agency approach, the asymmetrical information approach, the product-based approach and

the control-based approach. A fifth category, being the tax-based approach was specifically excluded from this study. Briefly; the product-based approach states that there is a relationship between a firm's capital structure and the nature of its products (Harris and Raviv, 1991). This type of theory is not relevant in the banking industry as the nature of the product provided by banks are similar and therefore would not allow this paper to derive useful information by analysing this approach. The control-based approach states that there is a relationship between capital structure and the propensity for the firm to be taken over in a corporate acquisition. Since this paper includes public sector banks, which by definition are majority-owned by the government, these banks have minimal risk of being taken over and therefore the control-based approach is not relevant for this study.

This paper will explore theories based on the asymmetrical information approach and the agency approach. Theories such as the pecking order theory and the signalling theory are based on the informational asymmetry between internal management and market participants. The greater the informational asymmetry, the more distinct is the evidence of the capital structure theory. The following theories will be explored in this paper; the trade-off theory, the pecking order theory, the signalling theory, the market timing theory and the free cash flow theory.

2.3.1 Trade-off theory

A firm can choose to finance their operations with either debt or equity. Given this choice, the trade-off theory postulates that; there must be a trade-off between debt and equity-based on the costs and benefits of each. Kraus and Litzenberger (1973) describe the taxation of corporate profits, the existence of bankruptcy penalties as "market imperfections" and the presence of these market imperfections imply that debt financing in capital structure does influence firm value. The third proposition by Modigliani and Miller (1958) suggests that the most pronounced cost and benefit of debt financing are the risk of bankruptcy and the tax benefit respectively. Firms with a higher risk of financial distress, and therefore a higher risk of bankruptcy, will tend to borrow less debt than firms with a lower risk of financial distress (Oolderink, 2013).

The trade-off theory is predicated on a firm striving towards a target capital structure by balancing tax benefits with the costs of financial distress (Oolderink, 2013). Two iterations of the trade-off theory exist; being the static trade-off theory and the dynamic trade-off theory. The static trade-off theory assumes there are no costs in issuing and repurchasing securities and therefore a firm can adjust to its target debt-equity ratio on a regular basis without incurring significant transaction costs. The dynamic trade-off theory recognises the transaction costs associated with issuing or repurchasing securities and therefore the firm cannot change their capital structure with agility. The dynamic trade-off theory suggests that an entity can

have an optimal range of debt-equity ratios and that the debt-equity ratio will change from period to period as the entity accumulates earnings and/or losses. The entity will not intervene to correct the debt-equity ratio as long as the costs of adjusting the debt ratio exceed the costs of having a sub-optimal capital structure (Hovakimian, Hovakimian and Tehranian, 2004).

In theory, firms with the ability to utilise a large tax shield will take on more debt than those firms who cannot. Following from this, highly profitable firms are expected to employ a higher ratio of debt because interest tax shields are more valuable to highly profitable firms. Equally, highly profitable firms are expected to have a lower risk of financial distress and therefore lower bankruptcy costs (Miglo, 2011). However, empirical evidence has pointed to the contrary; studies performed by Titman and Wessels (1988) in the United States, Fama and French (2002) and Frank and Goyal (2009) show that profitability is negatively correlated with leverage. This negative correlation makes sense within the context of the dynamic trade-off model; as a firm earns profits and accumulates retained earnings, the ratio of equity to debt increases, ceteris paribus (Chen and Zhao, 2005). Additionally, Frank and Goyal (2009) observed that the sensitivity of leverage to a change in profits has decreased over time, despite profitability still being considered statistically significant. The implication being that potential creditors have placed increasingly more reliance on other factors such as size, growth, dividend-paying potential and less reliance on profitability. Firms that have high non-debt tax shields, such as depreciation allowances and tax credits, are assumed to use these tax shields in place of the interest tax shield on debt and therefore these firms are expected to use less leverage in their capital structure (Oolderink, 2013).

Bankruptcy costs are one of the biggest reasons why a firm's capital structure is not debt intensive; these costs curtail the amount of debt that a firm will take on. It stands to reason, then, that the higher the perceived costs of bankruptcy, the less debt a firm will take on. Larger firms are presumed to be more stable and therefore have a lower risk of going bankrupt (Frank and Goyal, 2009). Furthermore, due to lower information asymmetry, larger firms are able to access the debt markets with greater ease and are able to borrow at a lower cost, compared to smaller firms (Sibindi, 2017). Similarly, firms with a high tangible asset base are able to use these tangible assets as collateral in exchange for cheaper debt and therefore firms with a higher proportion of tangible assets to total assets are expected to be more highly leveraged compared to firms with a lower proportion of tangible assets to total assets.

2.3.2 Pecking order theory

The pecking order theory focuses on asymmetrical information costs. If external investors are not as well informed regarding firm value compared to the firm's management; there is a propensity for the equity value to be under-priced in the market. This under-pricing may be so

severe that issuing equity shares to finance future investment projects would result in the new investors earning more than the net present value of the future projects and existing shareholders losing value on their existing shareholding. Therefore, in situations where firm information is highly asymmetrical, firms would prefer to use internal funds, and external debt to finance future projects than external equity (Harris and Raviv, 1991). The pecking order theory is not based on a theoretical target capital structure. Where the trade-off theory postulates that a firm moves towards a target capital structure, the pecking order theory states that there is no optimal capital structure and a firm simply applies the pecking order hierarchy to determine what financing to use when the financing is required (Sibindi, 2017).

Shyam-Sunder and Myers (1999) describes a financing deficit/surplus as the difference between cash dividends, investment, changes in working capital and cash flows from operations – a positive number indicates a deficit which should be supplemented by debt or equity financing. Following from this, the pecking order theory suggests that if investment requirements exceed the cash inflows from operations, it makes sense that this would be funded by debt, and therefore debt typically grows when investment exceeds the growth in internal funds and vice versa (Cotei and Farhat, 2009). The extension of this theory would indicate that firms with high growth prospects need funding, and to the extent internal funding is insufficient, these firms will make relatively greater use of debt financing.

Larger, listed firms have more transparent reporting processes and potential investors have more avenues from which to access information regarding the firm, therefore firm information is not as asymmetrical compared to smaller, unlisted firms. A greater alignment of the information to which internal management and external investors are privy indicates that equity is less likely to be mispriced by the market and therefore these firms would not be opposed to issuing equity shares to fund future capital projects (Miglo, 2011). Conversely, smaller, high growth firms were found to rely on internal financing as much as possible, and if additional funds are required, then firms wish to avoid dilution of control by issuing equity instruments and therefore are more likely to issue debt (Norton, 1991). The implication is that smaller firms would issue debt before equity and would use internal funding as opposed to external funding, thus providing support for the pecking order theory.

Since the ability to retain profits is dependent on profitability, there is expected to be a negative relationship between profitability and debt in terms of the pecking order theory. Higher profitability indicates higher levels of internal funding sources and therefore a firm with higher profitability would have a lesser need for debt financing (Antoniou et al, 2008). This theory speaks to the same principle as the dynamic trade-off theory above, which states that

profitability increases retained earnings, thus increasing the equity-debt ratio, ceteris paribus, however, the pecking order theory provides different reasoning for this phenomenon.

2.3.3 Signalling theory

The signalling theory, like the pecking order theory, arises from asymmetrical information costs; wherein internal management know the quality of their firm and use the capital structure decision to communicate this quality to the market (Ross, 1977). In an environment with high informational asymmetry, a signal has the effect of communicating internal information about the firm's prospects, based on actions taken by management. Barclay and Smith (2005) argue that management could simply tell the market that they are confident in the firm's future prospects by issuing forecasts or disseminating the firm's strategic decisions but given the biased nature of the source of this information, the market may not fully buy into this approach. A corollary to this argument is that management can use the capital structure decision to communicate firm value; therefore, if management are of the opinion that their firm is undervalued in the market, it is likely that future projects will be funded with debt funding as opposed to equity funding and vice versa (Sibindi, 2017).

The crux of the signalling theory revolves around whether internal management are of the opinion that their firm is over-/undervalued in the market. This issue is, however, coming up with a reliable proxy for quality that can be readily observed. Barclay, Smith and Watts (1995) posit that the best predictor of a company's next year earnings is the current year's earnings and therefore a high quality (and therefore undervalued) firm is one in which earnings increased in the following year and vice versa.

2.3.4 Market timing theory

The market timing theory is borne out of the informational asymmetry that exists between internal management and external investors, much like the signalling theory discussed above. Barclay and Smith (2005) state that stock prices are more price sensitive to proprietary information than bond prices, given the residual claim in net assets that are inherent in equity stocks. Therefore, if management are aware of favourable information which is not yet priced into the stock, the stock will appear undervalued to management; in which case, management are more inclined to issue debt than equity. Where a firm is perceived to be undervalued (or high quality), debt is expected to be issued as a source of financing, thereby resulting in a positive relationship between quality and leverage (Barclay and Smith, 2005). Flannery and Rangan (2006) also concluded that there is a negative relationship between leverage and the market-to-book ratio.

2.3.5 Free cash flow theory

Jensen and Meckling (1976) suggested that agency costs could have an impact on a firm's capital structure, which arise out of an inherent conflict between management and shareholders. The divergence between ownership and operational control results in management prioritising their own interests above those of the shareholder and thereby potentially failing to maximise shareholder value (Berger and di Patti, 2006). Specifically, as it relates to the capital structure decision, Jensen (1986) developed the free cash flow theory, which states that firms which have large free cash flows are subjected to a greater degree of divergence in terms of the agency theory. When firms have larger free cash flows, managers are incentivised to spend this money on perquisites and riskier investments and therefore debt financing can be used to constrain this needless spending as management are wary of their debt repayment requirements (Rasiah and Kim, 2011).

2.4 Capital structure in developing and developed markets

It is believed that there is a difference in how the capital structure is determined in a firm operating in a developed market and one operating in a developing market. These differences arise out of the fact that firms in either market face different challenges when raising finance. For example, developing capital markets may not be highly liquid, in which case, debt and equity mispricing is more likely to occur. Furthermore, in smaller, less developed, capital markets, there may be a higher degree of informational asymmetry thus contributing to the existence of the pecking order, signalling and market timing theories discussed above. The implication of this is that firms operating in developing markets would follow the signalling and market timing theories on capital structure; in that high quality, undervalued firms would issue debt first over equity. Since modern capital structure theories are based on Western or developed environments (Chen,2003), it is worth noting that for the most part, the current literature on developed markets is synonymous with the literature on the modern theory of capital structure.

Gwatidzo and Ojah (2009) suggest that capital markets in developing countries are inefficient, small and thinly traded, and governments in these countries have a higher propensity to intervene in the market. Aremu et al. (2013) argue that developing markets are more likely to experience banking problems resulting from weak banking supervision and inadequate capital. Glen and Singh (2003) show that in financing growth, emerging market firms use more external equity finance than that of developed market firms; where the latter use higher levels of liabilities and the use of internal finance is similar between the two groups of countries.

Booth et al. (2001) provide a different outlook on the difference between the capital structures of firms in developed and developing markets. The study covered ten developing countries,

including India, over the period 1980-1991. The empirical model of this study, which included factors on profitability, tangibility, size and growth and risk, yielded results which looked similar to results in similar studies on developed economies, therefore indicating that there is no significant difference between the determinants of capital structure in developed and developing countries. It was noted, however, that capital structures do differ systemically across countries and therefore country-specific factors do play a role in influencing a firm's capital structure.

Demirguc-Kunt and Maksimovic (1999) and Booth et al. (2001) show that one significant difference between developing and developed countries is that developing countries have substantially lower amounts of long-term debt. Similarly, Gwatidzo and Ojah (2009) show that total leverage, measured by way of the debt ratio, and long-term debts in developing economies are lower than those in the developed economies. To arrive at this conclusion, Gwatidzo and Ojah (2009) compared their sample to that of the sample employed in the study performed by Rajan and Zingales (1995). Mean leverage, as shown by the ratio of total debt to total assets, of developed economies such as Germany (0.73), France (0.71), Canada (0.56), USA (0.58) and UK (0.54) (Rajan and Zingales, 1995) were higher than the mean leverage of leverage in developing economies such as South Africa (0.52), Kenya (0.49), Zimbabwe (0.51), Ghana (0.59) and Nigeria (0.25) (Gwatidzo and Ojah, 2009).

2.4.1 Evidence of capital structure decisions in developed markets

Rajan and Zingales (1995) performed a study on public firms in the G7 countries over the period 1987-1991; the results showed that profitability and growth are negatively correlated to the amount of leverage employed, whereas asset tangibility and firm size has a positive impact. Frank and Goyal (2003) performed a study on publicly traded firms in the US over the period 1971-1988, in an attempt to find empirical results for the pecking order theory. Contrary to the pecking order theory, the findings showed that net equity issues more accurately tracked the financing deficit than do net debt issues. One possibility for this is that being a more liquid market, there is less risk of equity mispricing in the US equity markets and therefore US-listed firms are not opposed to issuing equity as a source of financing. This study, therefore, provides conflicting evidence to the pecking order theory for publicly traded firms in a developed economy.

Frank and Goyal (2009) performed a study on publicly listed US firms over the period 1950-2003 and the results showed that the most significant determinants in explaining market leverage are median industry leverage, market-to-book ratio (as a proxy for growth), profits, log of assets (as a proxy for size) and expected inflation. Growth and profitability were found to be negatively related to leverage, whereas tangibility, industry leverage size and inflation

were found to be positively related to leverage, some relationships of which are consistent with the trade-off theory.

Li and Stathis (2017) examined the capital structure decisions for publicly listed Australian firms, excluding financial firms, over the period 1984 – 2007. The results of the study showed indications of both the pecking order theory and the trade-off theory in periods of increased corporate taxes. Profitability, firm size (pecking order theory) and industry growth (trade-off theory) were all found to be negatively correlated to leverage.

Abdou et al. (2012) performed a study on the determinants of capital structure in the UK retail industry, employing both multiple regression and generalised regression neural network models. The findings of this study are that profitability and the depreciation-to-sales ratio are key determinants of capital structure based on the generalised regression neural network models, whereas using the multiple regression model, two additional variables; being the size and liquidity variables are considered to be significant. The results show strong support for both the pecking order theory and the trade-off theory; in that profitability was seen to be negatively associated with leverage (pecking order theory), whereas size was observed to be positively associated with leverage (trade-off theory).

2.4.2 Evidence of capital structure decisions in developing markets

Within the context of Indian manufacturing firms, over the period 1993/94-2007/08, it was found that firm-specific variables such as size, tangibility, profitability and market-to-book ratio were the most important variables in determining the firm's target capital structure and that the findings of this study were consistent with the dynamic trade-off theory (Mukherjee and Mahakud, 2010). Bhayani (2005) performed a similar study on 504 Indian companies listed on any stock exchange in India during 1994/95-2003/04. The empirical results show that the debt ratio of the Indian companies is positively related to its asset structure and its growth rate, and negatively related to its profitability, business risk and non-debt tax shield.

Ramjee and Gwatidzo (2012) investigated the capital structure determinants for 178 firms listed on the Johannesburg Stock Exchange (JSE) for the period 1998–2008. Two results from that paper are discussed here. Firstly, South African firms do have a target capital structure and secondly, firms with a higher tangible asset base (tangibility), larger firms (size) and high growth firms tend to borrow more, whereas profitable firms tend to borrow less and therefore rely more on equity financing. This suggests that there is evidence of both the pecking order and trade-off theories in the South African market.

A study performed by Gwatidzo and Ojah (2009) investigated the capital structure of non-financial firms in African countries over the period 1990-2005, where data was available. The

results show that firms in the aforementioned countries are about as leveraged as firms in other emerging economies, such as Mexico, Thailand, Brazil, South Korea, Malaysia and Turkey. Firms in these African countries tend to rely on internal finance, and where external finance is used, they rely heavily on short-term debt; thus, supporting the pecking order theory.

Chen (2003) performed a study on the determinants of capital structure on firms operating in the People's Republic of China, which was cited as the largest developing and transitional economy in the world. The findings showed that neither the trade-off theory nor the pecking order theory provides convincing explanations for the capital choices of Chinese firms. Instead, a new pecking order was proposed – being retained profits, followed by issuing equity and lastly by issuing debt. The study further elaborates that the trade-off theory has limited explanatory power in China because the effects of the costs of financial distress are not significant because the Chinese environment stills retains some features of a centrally planned economy in that the state retains a controlling role in the management of firms, banks and the economy. This draws an interesting parallel to the government control of public sector banks in India – given the integral role that government plays, as a majority shareholder, the effects of the costs of financial distress are not expected to be as prominent in public sector banks as they are expected to be in private sector banks.

Ukaegbu and Oino (2014) performed a study on financial and manufacturing firms that are listed on the Nigerian Stock Exchange over the period 2004 to 2008. The results indicated that across both industries; size is positively correlated to leverage; thus, supporting the agency theory; in that as firm size grows, owners become devoid of control and hence will prefer issuing debt so that firm managers can be committed to interest payment obligations. A surprising result from this study showed that tangibility was negatively associated with leverage in manufacturing firms; which is a contradiction to the literature on the relationship between asset tangibility and leverage. The study cites the fact that manufacturing firms tend to have highly specialised machinery which cannot be sold in a secondary market and therefore cannot be used as security for debt obligations.

2.5 Capital structure in financial and non-financial firms

The capital structure decisions of financial and non-financial firms are expected to be different for a variety of reasons. Firstly, financial firms are subject to banking regulations and minimum capital requirements; which are implemented to maintain the financial soundness of the bank, and by extension the economy as a whole (Gropp and Heider, 2009). Secondly, the extent of bankruptcy differs between financial and non-financial firms due to government intervention in the event that a financial firm goes into financial distress. This intervention is inevitable given the crucial role that financial firms play in a functioning economy; such that

a bank in financial distress could cause a credit contraction within the economy and have a significant impact on other industries (Ukaegbu and Oino, 2014). Thirdly, non-financial firms have a greater ratio of tangible assets to total assets, which makes sourcing cheaper debt possible by using tangible assets as collateral.

Mishkin (2016) suggests that banking managers would opt to hold as little capital as possible due to the high costs of holding capital. Therefore; bank capital is determined by the bank capital requirements; being the minimum capital required to be maintained by financial firms. The banking industry is regulated both on a sovereign and global level. The reserve bank or central bank is tasked with issuing and enforcing banking regulations on financial firms within a specific country. However, where there are inconsistencies in the sovereign regulations, an arbitrage opportunity exists for banks to operate in different jurisdictions (Nkopane, 2017). Prior to the implementation of the Basel Accords, banks in the G-10 were subject to leverage requirements which mandated banks to hold a flat percentage of their assets as capital, irrespective of the level of risk in their portfolio (Ghosh et al., 2003).

The Basel Committee on Banking Supervision (BCBS) was established in 1974 to reduce the risk of regulatory arbitrage and provide a consistent international regulatory framework. Three separate iterations of the Basel Capital Accords were issued to provide a regulatory framework to which banks are required to abide, with the objective of enhancing local country and international regulation. While the first Accord was introduced in 1988, India only adopted the Basel Accords from April 1992. Prior to that, the Reserve Bank of India had introduced measures for managing liquidity, foreign exchange and credit risk in the Indian banking system, through the implementation of the Health Code Systems (1985-1986). All commercial banks, except for foreign banks, were required to report on the health of their advances according to eight categories, each with informational value on the health and collectability of the bank's asset base (Ghosh, Kohli and Khatkale, 2013).

The first iteration; The Basel 1988 Capital Accord, focussed on regulating a bank's credit risk by defining capital requirements as a function of a bank's on- and off-balance sheet positions. The rules of the Accord were designed to prescribe a minimum capital level which financial firms were required to maintain; which required a minimum capital requirement of 8% of total risk-weighted assets, also known as the capital adequacy ratio (Balthazar, 2006). The capital adequacy ratio is calculated as follows:

$$\frac{(Tier\ 1\ capital + Tier\ 2\ capital)}{Total\ risk\ weighted\ assets}\ x\ 100\%$$

To understand the capital adequacy ratio, one has to understand two principles; firstly, how to calculate total risk-weighted assets and secondly, how to define capital for the purposes of the

calculation. In determining whether to use risk-weighted assets or another variable for determining capital requirements, the BCBS opted for a risk-weighted measure as this would provide a fairer comparative measure of asset base across banks from different jurisdictions and of various structures. Riskier assets are awarded higher weightings, which intuitively makes sense as the riskier the asset the higher the probability that the asset will default and therefore the more capital the bank is required to maintain to cover losses on those assets.

The Basel Accords define capital in two tiers; Tier 1 capital consists of shareholders equity and retained earnings and Tier 2 capital consists of other equity reserves, both disclosed and undisclosed, hybrid capital instruments, subordinated term debt and general loan-loss reserves. Tier 1 capital is afforded a greater deal of reliability because its constituents are more readily determinable, easier to liquidate and subject to the least estimation uncertainty. On the other hand, Tier 2 capital, while still technically capital, cannot be easily liquidated in the event of cash flow constraints nor are the values objectively observable. The distinction between Tier 1 and Tier 2 capital is important because the amount of Tier 2 capital used in the calculation of the capital adequacy ratio is limited to the amount of the Tier 1 capital used in the capital adequacy ratio as defined. (Basel 1 Capital Accord, 1988).

According to a study performed by Ghosh, Kohli and Khatkale (2013); while the Reserve Bank of India implemented Basel 1 from April 1992, this was phased in over 4 years with most banks, excluding foreign banks, being required to meet the capital adequacy norm by March 1996. By March 1997, only 2 nationalised banks and 4 private banks had not met the minimum regulatory requirements, and despite a slump in banking performance during 2000-2002, all banks had met the minimum regulatory requirements by 2006. However, for public banks, the government was required to contribute considerable capital after the introduction of these international standards as the public sector banks sustained losses in adopting international standards on income recognition and asset classification. This act of government intervention is a key piece of evidence to support the fact that public sector banks are exposed to a greater degree of moral hazard compared to private banks.

In June 2004, the BCBS released the “International Convergence of Capital Measurement and Capital Standards: A Revised Framework”, which is commonly referred to as the Basel II Accord, which was created to enhance the original Basel Capital Accords, by promoting the adoption of more stringent practices in the risk management field. The intention was to move away from a ratio-based regulation, in terms of the 1988 Basel Capital Accord and move towards a regulation that relies on more internal data, practices and models (Balthazar, 2006). The Basel II Accord was structured in 3 main pillars, of which the first pillar regarding the calculation of the minimum capital requirements, is relevant to this paper. The significant

difference between this iteration of the Accord and the original Accords lies in the calculation of the risk-weighted assets, where Basel II permitted a financial firm to calculate its risk-weighted assets, either by using credit risk, operational risk or market risk as a metric for risk, whereas Basel I only permitted firms to use credit risk as an appropriate risk for weighting assets. Within the credit risk assessment, Basel II allowed for two different measurements of credit risk; being the standardised method, which follows the Basel 1 approach of measuring the riskiness of an asset based on external credit ratings, and the internal rating-based approach (IRBA); wherein assets are assigned risk ratings based on the banks' internal assessment of the credit riskiness of the asset (Balthazar, 2006).

By this stage, the financial system in India was accustomed to the Basel banking regulations and the Reserve Bank of India had set a deadline to implement Basel II by March 2008 for internationally active banks in India and March 2009 for all other commercial banks. Where Basel II had prescribed a minimum total capital adequacy ratio of 8% and Tier 1 capital adequacy ratio of 4.5%, the Reserve Bank of India had prescribed minimum rates of 9% and 6% respectively, thus taking a more conservative position. However, the government of India found that they had to still inject further capital of Rs. 200 billion into public sector banks such as the Central Bank of India, UCO Bank and Vijaya Bank to maintain minimum capital requirements as well as a 51% stake in these banks (Ghosh, Kohli and Khatkale, 2013).

The current global regulatory framework is the third iteration of the Basel Accords; being Basel III. Much like Basel II, this version is composed of three pillars; the first pillar addresses capital and liquidity adequacy and provides minimum requirements, the second pillar outlines supervisory monitoring and review standards and the third pillar promotes market discipline through prescribed public disclosures (Basel Committee on Banking Supervision, 2011). Regarding the capital adequacy ratio, Basel III has expanded on the definition of capital for the purposes of the solvency ratio; where Tier 1 capital is now broken down into Common Equity Tier 1 (CET 1) capital and additional Tier 1 capital. The capital adequacy ratio has therefore been revised such that CET 1 must be 4.5% of risk-weighted assets, Tier 1 capital must be 6% of risk-weighted assets and the total capital adequacy ratio remains at 8%.

Additionally, two buffers, being a capital conservation buffer and a countercyclical buffer were introduced into the framework. The capital conservation buffer of 2.5% was introduced to promote the build-up of adequate buffers above the minimum requirements that can be drawn down in times of stress. The countercyclical buffer is a variable buffer of between 0% - 2.5% was introduced in times of increased systematic risk to ensure that financial firms are well-capitalised in turbulent economic times (Basel Committee on Banking Supervision, 2011).

Following the release of Basel III Accords, the Reserve Bank of India released guidelines on the implementation of Basel III in India. In line with the international transitional arrangements, the Reserve Bank of India prescribed the updated minimum common equity Tier 1 capital ratio would be phased in from 1 January 2013 for a transitional period of three years, and the additional capital conservation buffer would be phased in from 1 January 2016 for a transitional period of four years. This timeline has important implications for the regression analysis – as data obtained prior to 2012 would implicitly include the impact of previous iterations of the Basel Accords. While this in itself is not incorrect; it would necessitate controlling for these external factors by way of introducing a dummy variable in the regression model to prevent the changes from Basel II to Basel III being captured in the error term. Table 2.1 shows the proposed transitional arrangements for the full implementation of Basel III minimum capital ratios which will inform the time period that will be used in testing the hypotheses in this paper.

Table 2-1: Transitional arrangements - Scheduled Commercial Banks

Minimum capital ratios	**01-Jan-2013**	**31-Mar-2014**	**31-Mar-2015**	**31-Mar-2016**	**31-Mar-2017**	**31-Mar-2018**
	% of RWAs					
CET 1[1]	4.5	5	5.5	5.5	5.5	5.5
CCB[2]	-	-	0.625	1.25	1.875	2.5
CET 1 + CCB	4.5	5	6.125	6.75	7.375	8
Tier 1 capital	6	6.5	7	7	7	7
Total capital	9	9	9	9	9	9
Total capital + CCB	9	9	9.625	10.25	10.875	11.5

Source: RBI Guidelines on Implementation of Basel III Capital Regulations in India

Gropp and Heider (2009) performed a seminal study on whether capital requirements are a first-order determinant of a financial firm's capital structure in a sample of large, listed financial firms in the US and Europe. In these developed markets, it was found that the cross-sectional determinants of a firm's capital structure are no different between financial and non-financial firms, except for those financial firms which are close to the minimum capital requirements. The study also shows that banks tend to hold discretionary capital over and above the minimum capital requirements. One reason for this is that raising equity on short notice in order to avoid violating the minimum capital requirement is expensive. Therefore,

[1] Common Equity Tier 1 ratio
[2] Capital conservation buffer

banks that are able to obtain relatively cheaper equity in the short-term – i.e. profitable banks with high growth prospects opt to hold significantly more equity capital. Lastly, the consistency between financial and non-financial firms does not extend to the components of leverage. Banks were observed to finance balance sheet growth by using non-deposit leverage; therefore, implying that the composition of a bank's leverage shifts away from deposit leverage over time.

A study conducted on the Nigerian banking sector over the period 2006-2010 by Aremu et al. (2013) show that the main determinants of capital structure in Nigerian banks were size, dividend payout, profitability, growth and risk, with all factors conforming to sign expectations based on theoretical findings. This study essentially confirms that in the circumstances of a financial firm in a developing market, there is empirical evidence that supports the hypothesis that there is no difference between the determinants of capital structure for financial and non-financial firms.

Allen et al. (2015) argue that debt financing is used to reduce bank moral hazard[3]; where a bank is able to hold a low level of capital, there is an incentive for them to take on excessive risk. Since equity funding is widely thought to be a more expensive source of financing, it stands to reason that a financial firm, much like any other firm, would hold as little equity as possible and therefore stay close to the minimum capital requirements as possible. However, Allen et al. (2008) and Gropp and Heider (2009) both show that banks hold capital reserves in excess of the minimum capital requirements and that profitable, dividend-paying firms with access to cheaper equity financing, tend to hold significantly more capital. According to Ukaegbu and Oino (2014), most banks are known to borrow in the short term and lend in the long term, therefore they are more susceptible to liquidity and interest rate shocks, and therefore hold more than the minimum capital requirements to protect against these short-term shocks.

2.6 Capital structure in public and private sector banks

A public sector bank (or nationalised bank) is classified as one in which the government owns more than 50% of the equity shares of the bank, contrasted to a private sector bank which is majority-owned by individuals or private corporations (Alladi, 2013). In 1969, India embarked on a process to nationalise its largest banks, which arose from a need to apportion credit to different sectors of the economy to promote overall economic growth and to prioritise public lending to smaller firms (Sen, 2017). However, the governance of the public sector banks is challenged by the conflicts of dual regulation by Ministry of Finance and Reserve Bank of

[3] Moral hazard can be explained where a party is incentivised to take on additional risk, because ultimately they will not bear the cost of that risk.

India (RBI), difficulties in the appointment of independent directors, lower executive compensation relative to the private sector counterparts, and the weak enforcement of external vigilance by government agencies (Gopalakrishnan, Jacob and Pandey, 2018).

The debate around the effectiveness of public sector banks revolves around two juxtaposed views; being the developmental view and the political view. The developmental view, which is pro-nationalisation, states that public sector banks contribute to financial stability and promote economic growth (Arora and Wondemu, 2018). Credit offered by state banks is less pro-cyclical and less responsive to macroeconomic shocks than credit through private banks (Coleman and Feler, 2015). In contrast, the political view argues that government ownership hinders financial development and is often politically motivated; leading to a misallocation of resources.

To understand what drives the capital structure decision for public sector and private sector banks, one needs to understand the objectives and incentives for each type of bank. Private sector banks, naturally, have more profit-orientated objectives and therefore lending processes and risk-management policies will be focussed on risk mitigation and return maximisation. Profitability and risk, then, are big drivers of private banking success. Conversely, public sector banks have a social responsibility to provide lending to weaker sectors of the economy and encourage small-scale economic growth and therefore do not perform as favourably compared to private sector banks when evaluated against traditional measures of performance, such as profitability (Singh, 2002).

Chaudhary and Sharma (2011) show that stock price performance of public sector banks compares favourably with private sector and foreign banks also listed on the Sensex. This undermines the proposition of disinvestment, that is; government control must cease altogether to contribute any meaningful improvement in performance of public sector banks. Furthermore, this suggests that listing on an exchange and a measure of autonomy is sufficient to produce an improvement in performance and that a transfer of ownership is not a pre-condition for such improvement. These results have an interesting implication for this paper as the results would suggest that there is no difference between the performance of a private sector bank and a public sector bank with some private sector influence.

One theory suggests that public sector banks suffer from moral hazard. Gopalakrishnan, Jacob and Pandey (2018) studied the impact of lender moral hazard in state-owned banks in India. The study states that state-owned banks make inefficient risk choices compared to private sector banks. These choices can be explained either by political theory (Shleifer and Vishny, 1997), market discipline theory of firms under implicit guarantees (Flannery and Nikolova, 2004) or a lack of incentive to innovate (Shleifer, 1998). The key results of the study were that

firms with observably low credit ratings had a greater chance of obtaining a loan from public sector banks than from their private sector counterparts.

In theory, private firms might compromise on quality and short-change other stakeholders in their pursuit of profit maximisation. In contrast, state-owned firms with a single-minded pursuit of social welfare would be able to address the issues of quality and improve efficiency by controlling the decisions of the firm to benefit all stakeholders. However, political theory as discussed by Shleifer and Vishny (1997) in their paper on corporate governance postulates that state-owned entities are ultimately controlled by bureaucrats who have goals that are typically different from social welfare and are rather dictated by their own political interests. Following from this, the paper states "state ownership is then an example of concentrated control with no cash flow rights and socially harmful objectives. Viewed from this perspective, the inefficiency of state firms is not at all surprising" (Shleifer and Vishny, 1997).

Dinç (2005) performed an insightful study on the behaviour of public sector banks in government election years. The study was performed on emerging and developed markets with free or partially free elections over the sample period 1994 – 2000. The final sample included the 10 largest banks from 21 emerging markets and 22 developed markets. The study concluded that government-owned banks increase their lending in election years relative to their private section counterparts, therefore providing evidence of the political view that government-controlled banks are often politically motivated and not necessarily motivated to contribute to economic development.

Flannery and Nikolova (2004) discuss the impact of market discipline in the context of US financial firms. Market discipline, as the term is used in financial regulation, refers to the prevention or remediation of excessive risk-taking by banks by regulators (Bliss et al., 2015). The importance of market discipline is emphasized by the fact that the BCBS identified market discipline as one of the three pillars on which regulatory oversight should be based. Market discipline requires management and shareholders of the bank to bear the costs of their banks' increased risk of financial distress. However, when the supervisory system provides implicit guarantees against credit losses, less onus is placed on management and shareholders of the bank and therefore market discipline loses its effectiveness (Flannery and Nikolova, 2004). This argument draws parallels to the ownership structure of a public sector bank, which is majority-owned by the government. In accordance with Flannery and Nikolova (2004), the management team of a public sector bank are not burdened by the cost of financial distress as the government are expected to intervene in times of immense financial stress.

Koeva (2003) performed a seminal study on the performance of Indian banks during the financial liberalisation period between 1991/2- 2000/1. The paper looked to answer a number

of questions, including whether the costs of intermediation and profitability had changed in the period following financial liberalisation, whether public banks underperform relative to private banks and the impact of entry deregulation on market concentration and overall profitability. The main findings of the study showed that industry concentration declined during the decade after financial liberalisation, which makes sense as private and foreign banks entered the market. However, in spite of this, the study shows that the three largest banks still accounted for one-third of the total assets in the banking system. Furthermore, increased competition resulted in lower intermediation costs and profitability for the industry. Lastly, and more importantly, nationalised banks were found to be less profitable than their state, private and foreign counterparts.

2.7 Summary of firm-level determinants and hypothesis development

Public sector and private sector capital structure

The first test to be performed looks at the total population of public sector and private sector banks to determine if there is a difference in the determinants of capital structure of public sector and private sector banks. This test is conducted by including the status of the bank as a dummy variable, where public sector banks would be assigned a value of one (1) and private sector banks would be assigned a value of zero (0). If the coefficient of the dummy variable is statistically significant, this would indicate that for the given firm-specific determinants, there is a significant difference between the effects on public sector bank capital structure as opposed to private sector bank capital structure.

Singh (2002) noted that public sector banks have a social responsibility to provide lending to weaker sectors of the economy and therefore do not perform as favourably compared to private sector banks when evaluated profitability and other traditional measures of performance. Therefore, it is expected that there will be a significant difference between the determinants of capital structure of public sector and private sector banks.

H_0: *There is no significant difference in the determinants of capital structure for public sector and private sector banks*

H_1: *There is a significant difference in the determinants of capital structure for public sector and private sector banks*

Profitability

Currently, the two dominating theories on capital structure, being the static trade-off theory and the pecking order theory have contesting views on the effect of profitability on leverage. The static trade-off theory postulates a positive relationship between profitability and leverage,

as more profitable firms will have greater tax shield benefits. Hovakimian (2004) and Myers (2001) have provided evidence to support this theory.

Conversely, Rajan and Zingales (1995) and Frank and Goyal (2009) provide evidence of the pecking order theory, and therefore postulate a negative relationship between leverage and profitability. This is consistent with the dynamic trade-off theory model which suggests that firms will let their debt/equity ratio fluctuate within a target range, provided the costs of issuing new debt or equity capital exceeds the costs of having a sub-optimal capital structure.

Since the population in this study is based on firms in a developing market, transaction costs are expected to be higher in illiquid, developing markets and therefore firms are more likely to have a greater inertia in adjusting their debt/equity ratio on a regular basis, thus providing support for the dynamic trade-off and pecking order theories. Bhayani (2005), Gwatidzo and Ojah (2009), and Ramjee and Gwatidzo (2012) provide evidence that supports this negative relationship between profitability and leverage in developing countries.

Therefore; it is hypothesized that profitability and leverage will exhibit a negative linear relationship. Furthermore, since a public sector bank's primary objective is not to maximise profits, the relationship between profitability and leverage is not expected to be significant.

H_0: *There is no significant relationship between profitability and total leverage*

H_2: *There is a significant relationship between profitability and total leverage*

Size

The trade-off theory suggests that large firms should make greater use of debt financing to make maximum benefit of the large tax shields. Similarly, the free cash flow theory suggests that larger firms will use a greater amount of debt to mitigate the agency costs which arise as a result of holding large free cash flows. Additionally, as shown by Antoniou et al. (2008), Frank and Goyal (2009) and Rajan and Zingales (1995); firm size is expected to be inversely proportionate to the probability of bankruptcy and therefore larger firms are able to take on additional debt without taking on a commensurate risk of financial distress.

The pecking order theory postulates that as a firm grows in size, profitability and cash reserves grow equally and therefore firms will place a greater deal of reliance on internally generated funds and less on external debt financing. Titman and Wessels (1988) provide evidence of this inverse relationship, however, their reasoning is that small firms pay comparatively more than large firms in issuing equity and therefore default to debt, and more specifically short-term debt to fund operations.

While the empirical evidence is mixed, this study hypothesizes that there is a positive relationship between size and leverage, simply because the nature of a bank's operations is that it accepts deposit liabilities and therefore larger banks are expected to take on larger deposit liabilities.

H_0: *There is no significant relationship between firm size and total leverage*

H_3: *There is a significant relationship between firm size and total leverage*

Growth

Frank and Goyal (2009) state that in accordance with the trade-off theory, high growth firms are expected to employ less leverage as high growth firms generally have higher costs of financial distress. Antoniou et al. (2008) provides a similar conclusion as above and adds further that, in the presence of informational asymmetries, firms issue equity instead of debt in situations where firms are overvalued due to high growth expectations. It, therefore, stands to reason that in firms with a greater degree of informational asymmetry, such as a public sector bank, these firms are more likely to issue equity to grow than debt.

Growth is measured as the annual growth in total assets per bank. Since loans and investments made by the bank form part of the majority of the bank's assets, growth in the asset base must be funded by some form of growth in deposit liabilities and therefore this could imply that there could be a positive relationship between growth and leverage. However, on balance, it is expected that there will be a negative relationship between growth and leverage.

H_0: *There is no significant relationship between growth and total leverage*

H_4: *There is a significant relationship between growth and total leverage*

Risk

Within the context of the banking industry, risk is defined more specifically as credit risk, which is the risk that the counterparty will not meet their obligations in a timely manner. Firms with a high level of credit risk are more likely to avoid additional risks that would contribute to their overall risk of bankruptcy and therefore would use less debt financing than less risky firms. It stands to reason then, that public sector banks who issue loans to riskier clientele would rather fund their operations by equity rather than debt. Private sector banks, on the other hand, hold comparatively less risk and therefore would be more inclined to take on additional debt funding as opposed to equity funding.

H_0: *There is no significant relationship between risk and total leverage*

H_5: *There is a significant relationship between risk and total leverage*

3 Data and research methodology

The research methodology section will first describe the data that will be used in this study and cite the source of the data. It will then discuss the variables that are employed in the study, first defining the dependent variable, multiple independent variables to be used in each regression and describe the dummy variable that will be used to differentiate between public sector banks and private sector banks. Lastly, this section will discuss the methodology design, which is focussed around quantitative method, the type of dataset that the data will assume and the formal tests of specification to be applied in performing panel data analysis.

3.1 Sample description and data sources

The population for this study comprised of public sector and private sector banks in India, both listed and unlisted. Since the Basel III regulations were announced in India in 2011, the study opted to choose data points occurring after this point, to minimise the impact on external factors, such as Basel capital requirements, on the regression analysis. Therefore, the population was framed to include all banks which had a complete dataset for the period between 2012 and 2018; wherein the independent variables at time *t* would be compared to the dependent variables at time *t*, which allows for 7 complete observations per bank. After framing the raw data, 20 public sector banks and 15 private sector banks met the criteria, thus resulting in 140 observations and 105 observations for public and private sector banks respectively.

The data was obtained from Bloomberg, and while this is a secondary source of data, there are benefits to using Bloomberg, the most notable being that the data has already been standardised, thereby making it comparable across banks. The risk with using a primary source of data, being the financial statements of each of the banks in the population, is that classification of assets, liabilities, impairment provisions and profit might result in data that is not comparable across different banks.

It was noted that one data point was missing; namely the non-performing loans value for Andhra Bank (public sector) for the 2017 period. This has important implications for considering whether a balanced or unbalanced panel will be constructed. If certain data points are missing, the statistical software will ignore the entire observation in the regression analysis, thus resulting in an unbalanced panel for that regression. Therefore, to maintain the robustness of a balanced panel data, this data point was obtained from the primary data source, being the 2017 annual report for Andhra Bank (Andhra Bank, 2017:47). Since this data point was obtained from a different source to the remaining data points, this study deemed it necessary to corroborate the consistency and accuracy of this data point with the rest of the population. The corresponding data point for the 2016 year in the dataset was compared to the previous

comparative data value in Andhra Bank's financial statements, for the same 2016 period, and it was determined that the data point was the same value. This provides sufficient evidence that the data point obtained from the Andhra Bank financial statements is reliable and accurate.

3.2 Variables employed in this study

Previous studies have used regression analysis to examine the relationship between firm-specific determinants and a firm's capital structure and therefore this study will also use regression analysis to test the hypotheses developed in the literature review. The purpose of this study is to consider the effects of a fixed set of firm-specific determinants on the capital structure of public sector banks and private sector banks, therefore external, macro-economic variables have not been considered in this study. It is suggested in the conclusion and further recommendations for research that macro-economic variables be included in the regression analysis. The proxies used for the dependent and independent variables are considered below.

3.2.1 Dependent variables

The dependent variable, being a measure for leverage, can be described in a number of different ways. Antoniou et al. (2008) define the measure for leverage to be the debt ratio, which is calculated as a measure of debt divided by a measure of total assets, either by using book values, market values or some combination of the two.

The dependent variable can also be defined as the debt/equity ratio, where the debt/equity ratio can either be calculated based on book values or market values. The major consideration here is whether to use book values or market values, even though previous studies have used both methods and have shown both proxies to be robust (Sibindi, 2017). There are two reasons that this study opted to use book value leverage as the dependent variable. Firstly, the Basel Accords calculation of capital ratios is based on book values and not market values (Sibindi, 2017). Secondly, public sector firms are majority help by the government, there is a risk that the market values might be skewed and would encapsulate other factors such as the effect of an illiquid market and therefore book values are considered to be more comparable.

Previous studies, such as Gropp and Heider (2009), have also shown that the dependent variable can also be further sub-divided into deposit leverage and non-deposit leverage, calculated as the ratio of deposit liabilities to total assets and non-deposit liabilities to total assets. The dependent variable was decomposed as such because banks utilise deposit liabilities as a source of funding. While Gropp and Heider (2009) provided evidence that a bank's capital structure steers away from deposit leverage over time, this study opted to focus on the impact on total leverage only, seeing as the primary focus of this study is comparing

public sector and private sector bank leverage as a whole, and not the components of each banks' leverage.

3.2.2 Independent variables

Profitability (PRF)

The proxy for this variable, being the return on assets, has two parts; being a profit number and total assets. Profitability can be defined in several ways; either by using earnings before interest and tax (EBIT), earnings before interest, tax, depreciation and amortisation (EBITDA), net profit after tax (NPAT) or net profit before tax (NPBT). This study opted to use net profit before tax as the profit number as this would take into account all possible profit measures and accounting policy choices for each firm except for the tax effects, thus making the numerator comparable across different banks. The tax effects were specifically excluded as the profit before tax show the maximum tax benefit that a firm would be able to derive from the interest deduction shield by taking on additional debt. While this study acknowledges that both the NPAT and NPBT figures may be used as a proxy for the numerator for profitability, this study opted to choose NPBT as it represents the maximum tax shield available to the entity in question. The denominator for the return on assets ratio was simply used as the total assets figure which was also used to define the size proxy, as discussed below.

Firm size (SZE)

A number of variables have been employed in previous studies to measure size. Antoniou et al (2008), Frank and Goyal (2009) and Mukherjee and Mahakud (2010) all used the natural logarithm of total assets as the proxy for size. Alternatively, Barclay and Smith (2005), Rajan and Zingales (1995) and Titman and Wessels (1988) used the natural logarithm of net sales to capture the size effect.

This study has opted to use the natural logarithm of total assets as the proxy for the size variable for two reasons. Firstly, as pointed out by Sibindi (2017) total assets gives a clearer picture on the lending operations of a bank and secondly, larger companies are expected to employ more assets. This holds true in the banking industry where larger banks are expected to issue more loans and therefore have a greater asset base.

Growth (GRW)

There are potentially two proxies that can be used to describe the growth variable. In accordance with Titman and Wessels (1988), the growth variable can be defined as the annual growth rate in total assets. The alternative proxy, as used by Booth et al. (2001), and Frank and Goyal (2009), is the market-to-book ratio of each bank. The higher the market-to-book ratio, the greater the perceived growth prospects that the market sees in the firm. However, given that the public sector banks are majority-owned by the government, the percentage of

shares that are privately held will not have the same liquidity in the market as private sector banks. To avoid the influence of ownership structure on any variable except the dummy variable discussed below, this study opted to use the annual growth in total assets.

Risk (RSK)

Risk had to be specifically defined within the context of this study on financial firms. Since the population of this study is financial firms, the appropriate risk to consider would be credit risk (Sibindi, 2017). The proxy for credit risk is calculated as the ratio of non-performing assets to total loans. Non-performing assets for each bank was extracted from the Bloomberg terminal and is calculated in terms of the Basel Accords. This allows for consistency across all banks, irrespective of each banks write-off accounting policy.

3.2.3 Dummy variable

A dummy variable was employed in this study to differentiate between public sector banks and private sector banks. The reason for including a dummy variable is to first check whether there is a difference between the capital structure of public sector banks and private sector banks in the population. Therefore; one regression was performed using a total population of both public sector banks and private sector banks, using the dummy variable to differentiate the two. Where the dummy variable was determined to be statistically significant, this implies that there is a difference in the determinants of the capital structure of public sector and private sector banks, and further work is warranted on public and private sector banks individually. Therefore, a dummy variable of 1 was allocated to public sector banks and 0 to private sector banks.

3.3 Methodology and dataset analysis

This study will adopt quantitative methods, which will examine the relationship between variables based on a hypothesis/theory and then perform tests to accept or reject the hypothesis. This study will adopt a variety of multiple regression models; the first of which will combine all complete public sector bank observations (140), private sector bank observations (105) and the dummy variable. Thereafter, individual multiple regressions will be performed on public and private sector banks respectively. This is discussed in detail below.

Gujarati (2003:320) describe three types of data; time-series, cross-section and pooled data. Time-series data is a set of observations on the values that a variable takes at different times and is measured at regular, consistent intervals. Cross-section data are data on one or more variables collected at the same point in time, such as the census of population conducted every 10 years. Pooled data has elements of both time-series and cross-sectional data. This study makes use of panel data, which is a special type of pooled data, in which the same cross-

sectional unit (i.e. a bank) is surveyed over time; therefore, the panel data has space and time dimensions (Gujarati, 2003:636). This study has aimed to construct a balanced panel, in which each cross-sectional unit has the same number of time-series observations.

Baltagi (2005) discusses the benefits and limitations of using panel data, some of which are applicable to this study. Firstly, panel data is able to control for individual heterogeneity, as time-series and cross-section studies that do not control for this heterogeneity run the risk of obtaining biased results. Secondly, panel data give more informative data, more variability, less collinearity among the variables, more degrees of freedom and more efficiency. Thirdly, biases that result from aggregation over firms or individuals may be reduced or eliminated entirely. Pooling data can be used to compensate for a lack of time-series depth and in doing so, it can increase degrees of freedom and potentially lower standard errors of the coefficients of a regression (De Jager, 2008).

Some of the limitations to using panel data, such as design and collection problems, distortion of measurement errors and selectivity problems do not apply to this study as the data that was obtained did not rely on interviews, surveys or self-selectivity and all data was obtained objectively from a single source. On the balance, a panel data analysis is considered appropriate for this study.

3.4 Model formation

Regressions will be performed initially in combing the public sector and private sector banks and then for each of the private sector and public sector banks separately. Each regression will be run using total leverage as the dependent variable.

The regression model, which is based on total leverage, is structured as follows:

$$LEV_{bjt} = c_{bjt} + \beta_{b1}PRF_{bjt} + \beta_{b2}SZE_{bjt} + \beta_{b3}GRW_{bjt} + \beta_{b4}RSK_{bjt} + \varepsilon_{bjt},$$

where: $b \in \{combined, private\ sector, public\ sector\}$ respectively,

j refers to the cross-sectional unit of an individual observation,

t refers to the time period unit of an individual observation,

c is the constant, which is allowed to vary per cross-sectional unit, based on the fixed effects specification, which is discussed below,

$\beta_{1,2,3,4}$ is the appropriate coefficient for each independent variable,

ε is the error term.

3.5 Preliminary variable analysis

There are certain assumptions made about the variables employed in a multivariate regression analysis which need to be assessed before the regression analysis is conducted; assumptions such as multicollinearity between independent variables and linearity of variables. As a starting point, for each of the private sector and public sector population of variables, a summary of descriptive statistics, correlation and covariance matrices have been included in the Appendix. The process of *winsorization* was used on the independent variables to limit the extreme values at the 5% level to reduce the effect of outliers on the regression analysis.

Multicollinearity

Multicollinearity refers to whether independent variables are highly correlated with each other resulting in a high standard error of the coefficients; that is the independent variables are not just correlated to the dependent variable but to each other (Blalock, 1963). This is an important consideration in this study given that multiple independent variables are regressed against the dependent variable in each of the models specified above. Gujarati (2003:359) states that multicollinearity is a question of degree, not of kind and therefore one cannot "test for multicollinearity" but one can measure its degree in any particular sample.

The regression equations for measuring multicollinearity in this study are as follows:

$$PRF = \beta_0 + \beta_1 SZE + \beta_2 GRW + \beta_3 RSK + \mu$$

$$SZE = \beta_0 + \beta_1 PRF + \beta_2 GRW + \beta_3 RSK + \mu$$

$$GRW = \beta_0 + \beta_1 SZE + \beta_2 PRF + \beta_3 RSK + \mu$$

$$RSK = \beta_0 + \beta_1 SZE + \beta_2 GRW + \beta_3 PRF + \mu$$

Multicollinearity can be assessed by examining tolerance and the Variance Inflation Factor (VIF) of the regressions above. Tolerance is a measure of collinearity; where the variable's tolerance is $1 - R^2$. A small tolerance value indicates that the variable under consideration is almost a perfect linear combination of the independent variables already in the equation and therefore it should not be added to the regression equation. The Variance Inflation Factor (VIF) measures the impact of collinearity among the variables in a regression model. The Variance Inflation Factor (VIF) is calculated as: $\frac{1}{Tolerance}$ and it is always greater than or equal to 1. There is no formal VIF value for determining presence of multicollinearity however, values of VIF that exceed 10 are often regarded as indicating multicollinearity (Hair et al., 2014). Where multicollinearity is found amongst any of the variables, these variables will be removed from the regression and the test for multicollinearity will be re-run to ensure the remaining independent variables are not correlated.

Linearity

The multiple regression analysis employed in this study assumes that the independent variables are linearly related to the dependent variable. If this is not the case, there is a risk that a linear relationship can be inferred from results where no linear relationship actually exists. Linearity of each independent variable to the dependent variable shall be checked graphically with scatterplots.

3.6 Panel data modelling and formal tests of specification

Pooled regressions based on panel data make an inherent simplifying assumption that the cross-sectional data is homogenous, and the regression output provides a singular intercept coefficient and a single slope coefficient for each independent variable. Any cross-sectional specific (or firm-specific) effects and any potential omitted variable bias are captured in the error term (De Jager, 2008). As a result of its simplicity, pooled regressions may distort the picture of the actual relationship between the dependent and independent variables across different firms (Gujarati, 2003:641). It is important to acknowledge that the firms used in this study are different and therefore there could be firm-specific factors that impact the regression outputs. The use of panel data techniques allows the regression model to assign a different intercept coefficient to each cross-section or time period input, as appropriate (De Jager, 2008).

Fixed effects and random effects specification

There are two techniques used to explain the possible unobserved firm effects, namely; the random effects and fixed effects model. Broadly speaking, in choosing between the random effects and fixed effects model, one must consider whether there is a likely correlation between the cross-sectional specific error component and the independent variables. In a regression model endogeneity refers to the risk that the independent variable is correlated to the error term, implying that there is either an omitted or unobserved variable in the model. Where endogeneity is present, there is a risk that the regression coefficient in the regression model is biased (Gujarati, 2003:754).

Where the error component is assumed to be correlated to the independent variables, the fixed effects model is appropriate, otherwise the random effects model may be appropriate (Gujarati, 2003:642). De Jager (2008) and Baltagi (2005) state that where one is focussing on a specific set of firms and the inference is limited to that set of firms, as is the case in this study, the fixed effects approach is considered an appropriate specification form. Formally, the Hausman (1978) test will be performed to determine whether the fixed effects or random effects model is most appropriate, which is discussed in more detail below.

In this study, two tests will be employed to determine between the fixed effects and random effects model specifications, namely; the test for redundant fixed effects and the Hausman

(1978) test. The test for redundant fixed effects will be employed first, wherein the initial regression models will include both cross-sectional and time period specific fixed effects specifications. The point of the tests for redundant fixed effects is to test whether employing a fixed effects specification on either the cross-sectional, time period, or both types of observations is superfluous to the regression output, wherein the null hypothesis is that either the cross-sectional effects, time period effects or both effects are redundant. Where the p-value is less than 0.05, the null hypothesis is rejected, and the fixed effects specification is retained in the model. Where the p-value is greater than 0.05, the null hypothesis is not rejected, and the fixed effects specification is removed from the model.

The second test to be performed is the Hausman (1978) test which tests the assumption that the random effects are uncorrelated to the dependant variables. The null hypothesis is that there is exogeneity (i.e. there is no correlation) between the independent variables and the error term, in which case the random effects testing is considered appropriate. Where the p-value is greater than 0.05, the null hypothesis is accepted, and random effects specifications should be used, and where the p-value is less than 0.05, the null hypothesis is rejected, and the fixed effects specifications will be used instead.

Autocorrelation

Gujarati (2003:442) defines autocorrelation as "correlation between members of series of observations ordered in time or space", in other words; where there is a correlation of observations across cross-sections or across time periods, where a correlation across time periods is generally more prevalent in panel data. The presence of autocorrelation may imply that a dynamic panel data model is required in the regression analysis.

Autocorrelation of residuals is measured using the Durbin-Watson (1951) test, wherein a score of 2 represents no autocorrelation, a score between 0 and 2 represents positive autocorrelation and a score between 2 and 4 represents negative autocorrelation. The Durbin-Watson (1951) score is dependent on the error terms generated in the regression, which are in turn dependent on the number of independent variables and observations in the regression model. This fact makes it difficult to determine a critical value which results in the acceptance/rejection of the null hypothesis (Gujarati, 2003:468). Durbin and Watson were able to derive a theoretical upper and lower bound score, depending on the number of observations ("*n*") and independent variables ("*k*"), thereby providing a range of acceptable values and a "zone of indecision" for the Durbin-Watson (1951) test. The following table extracted and adapted from Gujarati (2003:468), illustrates the lower and upper bounds for the range of acceptable Durbin-Watson (1951) values and the "zone of indecision" at the 95% confidence interval, based on the approximate number of observations and independent variables (4) employed in this study.

Table 3-1 Range of acceptable Durbin-Watson d statistic values

n	Positive auto-correlation	"Zone of indecision"	Acceptable d-statistic values	"Zone of indecision"	Negative auto-correlation
100	0 – 1.591	1.592 – 1.757	1.758 – 2.242	2.243 – 2.408	2.409 – 4
150	0 – 1.678	1.679 – 1.787	1.788 – 2.212	2.213 – 2.321	2.322 – 4

Heteroscedasticity

Scedasticity refers to the distribution of errors, where error terms are distributed both randomly and with a constant variance (i.e. homoscedasticity) or with some kind of pattern (heteroscedasticity). The presence of heteroscedasticity is important because it implies that the independent variables do not fully explain the dependent variables and other factors which are omitted from the regression model, may be required to better explain the dependant variable, and instead the effect of these other factors are being trapped in the error terms.

Guajarati (2003) states that in panel datasets with cross-sectional data involving heterogeneous units (i.e. different firms, as is the case in this study), heteroscedasticity may be the rule, rather than the exception. It is expected that controlling for fixed effects specification in the regression models should account for any heteroscedasticity present in the regression models.

The presence of heteroscedasticity will be assessed by plotting the residuals from the various regressions employed and determining if the residuals are normally distributed by virtue of a Jarque-Bera test. The null hypothesis for the Jarque-Bera test is that the residuals are normally distributed. Where the associated p-value is less than 0.05, the null hypothesis is rejected, meaning the residuals are not normally distributed and therefore heteroscedasticity is present. Where the p-value is greater than 0.05, the null hypothesis is accepted, and the residuals are normally distributed.

4 Empirical results

4.1 Descriptive statistics

Table 8.1 and 8.2 in the Appendix show unscaled descriptive statistics, for both dependent and independent variables, for private sector and public sector banks respectively. Table 8.3 and 8.4 show the scaled descriptive statistics, for both dependent and independent variables, for private sector and public sector banks respectively after the scaled variables were *winsorized* at the 95% level.

One of the most important insights in comparing public sector and private sector banks is that on average, public sector banks are much larger than private sector banks, when using total assets as a measurement basis. This size differential is mirrored when comparing the total loans in issue by public sector banks and private sector banks. The scaled variables show that on average, public sector banks are more leveraged, less profitable, risker and larger than their private sector counterparts.

As it relates to total leverage, public sector firms are more leveraged than private sector banks. One possible reason for this is that public sector banks are able to take on more debt without worrying about the resultant costs of financial distress as there is an expectation that the government would inject additional capital in the case of a public sector bank breaching the minimum capital requirements. Public sector banks also appear to take on more credit risk than private sector banks, based on the fact that risk variable for public sector banks, measured as non-performing assets to total loans, is, on average, almost 3 times as large as private sector banks.

In comparison, private sector banks have experienced a higher average growth as expressed by a growth in total assets compared to public sector banks. This is possibly due to the fact that private sector banks were only allowed to operate in India after the financial liberalisation in 1991 and therefore are smaller and are expected to grow aggressively off a smaller base compared to public sector banks. Additionally, private sector banks are significantly more profitable; due to the fact that private shareholders and management are driven by profit-maximisation.

4.2 Combined regression

As discussed above, the primary purpose of running a regression which combines the public sector and private sector banks is to determine if there is a significant difference in the determinants of capital structure between the two types of banks. The regression output is included in Table 8.11; however, the key statistic has been summarised below.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DUMMY	0.023627	0.002470	9.566684	0.0000

The dummy variable, which distinguishes between public sector and private sector banks is statistically significant at the 95% confidence level, indicating that there is merit in investigating the determinants in capital structure of public and private sector banks separately.

4.3 Private sector banks

4.3.1 Formal tests of specification

As a first step, the redundant fixed effects test was performed to determine whether the use of fixed effects specification on either the cross-sectional or time period units would be superfluous to the respective regression models. The results in Table 8.12 indicate that the p-value associated with the cross-sectional F-stat and the Chi-square statistic strongly reject the null hypothesis and therefore the fixed effects is not considered to be redundant. However, the p-value associated with the time period F-stat (0.3614) and the Chi-square statistic (0.2083) are above the 5% confidence level, thereby implying that the use of fixed effects for time period units would be redundant to the regression model.

The Hausman test for cross-sectional random effects was performed on the regression, wherein the null hypothesis is that there is no correlation between the independent variables and the error term. The results in Table 8.14 show that the cross-sectional random effects Chi-square statistic had an associated p-value of 0.0062, which strongly rejects the null hypothesis, thereby inferring that the fixed effects specification is preferred in the regression model.

4.3.2 Summary of results

	Regression output (dependent variable: total leverage)		
	coefficient	**t-stat**	**p-value**
GRW	0.013260	2.040731	0.0443
PRF	-0.489315	-8.559576	0.0000
RSK	-0.119153	-5.090721	0.0000
SZE	-0.011573	-3.795581	0.0003
R^2	0.981420		
Adjusted R^2	0.977531		
Durbin-Watson	1.841205		

The adjusted R^2 value of 97% is high which indicates that the regression model has a goodness of fit. All of the independent variables in the study are statistically significant at the 95% confidence level; with profitability, credit risk and firm size having a negative relationship with leverage. Conversely, growth displays a positive relationship with leverage, indicating that as firm growth increases, the proportion of debt to total capital structure increases. The Durbin-Watson value of 1.84 is within the acceptable range and therefore the determinants of capital structure do not appear to be of a dynamic nature.

Figure 9 in the Appendix shows a distribution of the standardised residuals from the above regression as a means to test the heteroscedasticity of the residuals. Since the distributions are normally distributed, as evidenced by the Jarque-Bera test with a corresponding p-value of 0.2536, the residuals are assessed to be homoscedastic and therefore heteroscedasticity is not seen to be present in the model.

4.4 Public sector banks

4.4.1 Formal tests of specification

The first test that was performed was the redundant fixed effects test. The results in Table 8.13 show that the associated p-value for the F-statistic for both the cross-sectional (0.0000) and time period (0.0035) fixed effects specification are below the 5% confidence interval; this indicates that the use of the fixed effects specification is necessary in both the case of cross-sectional and time period units. This test yielded a different result to the redundant fixed effects test for private sector banks; in that the time period fixed effects specification is also statistically significant. Gujarati (2003:643) state that time effects capture shifts in factors that occur over time, such as "technological changes, changes in government regulatory and/or tax policies and external effects".

The second test that was performed was the Hausman test for cross-sectional random effects; wherein the null hypothesis is that there is no correlation between the independent variables and the error term. The results in Table 8.15 show that the cross-sectional random effects Chi-square statistic had an associated p-value of 0.0134 (i.e. below the 5% confidence level), which strongly reject the null hypothesis, thereby inferring that the fixed effects specification is preferred in the regression model.

4.4.2 Summary of results

The first regression was performed based on cross-sectional and time period fixed effects specifications; the results of which have been detailed in Table 8.17. However, as noted in Table 8.17, the Durbin-Watson statistic of 1.52 implies positive autocorrelation. This falls outside the lower bound of the range of acceptable values for the Durbin-Watson test (based

on Table 3.1), thereby indicating that the autocorrelation of the error terms in the model cannot be accepted. Presence of autocorrelation in the regression model implies that accurate conclusions cannot be inferred from the model. Therefore, to correct for this autocorrelation, the regression was run without the time period fixed effects specification and the residuals were analysed. It was noted that the largest deviations in the residuals occurred in the latter time periods of the regression, namely 2016 to 2018; this implies, statistically, that there is some factor that is present in 2016, 2017 and 2018 which was not captured in the model and therefore to capture this impact, a dummy variable was introduced into the regression model by assigning time periods 2012 – 2016 a dummy variable of 0 and 2017 – 2018 a dummy variable of 1. One possible explanation are factors that are external to the firm; such as changes in interest rates or the application of the countercyclical buffer in terms of Basel III Accords.

The results of a second regression are detailed in Table 8.18 and summarised below:

	Regression output (dependent variable: total leverage)		
	coefficient	**t-stat**	**p-value**
GRW	0.017813	4.868800	0.0000
PRF	-0.183847	-2.878478	0.0048
RSK	-0.009582	-0.757658	0.4502
SZE	0.017925	4.387263	0.0000
DUMMY	-0.002053	-2.658032	0.0090
R^2	0.899909		
Adjusted R^2	0.879021		
Durbin-Watson	2.095019		

The introduction of the dummy variable has greatly improved the Durbin-Watson statistic thus improving the regression model and the conclusions that will be drawn from it. The adjusted R^2 value of 88% is high which indicates that the regression model has a goodness of fit. Contrasted to the private sector bank regression model, the risk variable is not considered to be statistically significant; this implies that credit risk is not statistically significant in explaining the level of debt in a public sector banks' capital structure. Furthermore, size is positively related to leverage. Similar to the private sector banks regression, profitability has a negative relationship with leverage and growth has a positive relationship with leverage.

Figure 10 in the Appendix shows a distribution of the standardised residuals from the above regression as a means to test the heteroscedasticity of the residuals. The Jarque-Bera test has a corresponding p-value of 0.3046, indicating that the residuals are assessed to be homoscedastic and therefore heteroscedasticity is not seen to be present in the model.

5 Discussion of results

5.1 Profitability

Profitability was observed to be statistically significant determinant, and inversely related, to leverage for both public sector and private sector banks. These results speak to either the dynamic trade-off theory or the pecking order theory.

Frank and Goyal (2009) also observed a negative relationship between profits and leverage, and debate between the applicability of the pecking order theory and the trade-off theory. In the pursuit of finding a theory that explains all or most of the factors in the study, Frank and Goyal (2009) opted to apply the dynamic trade-off theory model, as it also provided an explanation for the industry leverage, firm size, tangibility, and growth variables in the study. Bhayani (2005) observed a similar result in a study on the Indian private corporate sector, citing further evidence for the pecking order theory; that firms which generate higher internal funds would prefer to use these internal funds instead of relying on leverage.

The magnitude of the sensitivity of the profitability variable; -0.489 for private sector banks and -0.184 for public sector banks, implies that profitability is less important for determining the leverage in public sector banks compared to private sector banks. There are two possible reasons for this observation. Firstly, if one considers the mandate of a public sector bank, which is to promote economic development, then profitability is not considered to be as important as an indicator of performance compared to private sector banks. Secondly, Frank and Goyal (2009) state that creditors are willing to overlook profitability in the case of larger, more stable companies. One inference from this is that the leverage of public sector banks, which are perceived to be more stable due to their government influence, is less influenced by their profitability.

5.2 Firm size

The results for the effect of firm size on leverage are significant for both public sector and private sector banks, however, the direction of the relationship is different for each; private sector banks, which are on average, smaller than their public sector counterparts, displayed a negative relationship between size and leverage whereas public sector banks displayed a positive relationship.

With regards to private sector banks; the negative relationship provides evidence of the pecking order theory. The pecking order theory is based on the notion of asymmetrical information which leads to potential equity mispricing and the greater the degree of asymmetry of information, the more pronounced the pecking order is expected to be. Smaller firms

generally have a higher degree of asymmetrical information and therefore, in light of their equity being mispriced, these smaller firms opt to issue debt rather than equity.

The same observation as above is not apparent for public sector banks; instead size is observed to be positively correlated to leverage, which speaks to either the trade-off theory or the agency theory. Frank and Goyal (2009) observed that in terms of the trade-off theory, larger firms are presumed to be more stable and therefore have a lower risk of going bankrupt. Ramjee and Gwatidzo (2012) and Mukherjee and Mahakud (2010) observed a similar relationship in their studies on the determinants of capital structure in developing markets, citing reasons that larger firms are less likely to default and tend to have larger asset bases and therefore may assume more debt without significantly increasing their costs of financial distress (Ramjee and Gwatidzo, 2012) and that larger firms may have better access to financial markets to raise debt at cheaper prices (Mukherjee and Mahakud, 2010).

Ukaegbu and Oino (2013) argue that the positive relationship between firm size and leverage is due to managing agency costs, i.e. the agency theory. As firms get larger, owners run the risk of becoming devoid of control and therefore would prefer to issue debt as a mechanism of managing cash flows by keeping management committed to interest payment obligations. This theory can also be applied to public sector banks, where the majority owners, being the government, are not willing to dilute their controlling interest in the banks and therefore are more willing to issue debt rather than equity.

5.3 Growth

The prevailing theory on the impact of growth on leverage suggests that there is a positive association between growth and leverage; in that high growth firms are more likely to use debt to fund their growth than equity; which is in line with the pecking order theory. This positive relationship is observed to be statistically significant for both public sector and private sector banks. Bhayani (2005) and Ramjee and Gwatidzo (2012) both observed similar results in their studies on firms in India and South Africa respectively. This could indicate that growth opportunities add value to the firm and hence increase their long-term debt taking capacity (Bhayani, 2005).

5.4 Credit risk

Interestingly, credit risk was found to be statistically significant in explaining the capital structure of private sector banks, however was found to be ineffective in explaining the capital structure of public sector banks. Based on the prevailing capital structure theories, an increase in risk is expected to increase the costs of financial distress and so as not to exacerbate the effect of risk on the firm, a decrease in leverage is expected. Therefore, in accordance with the

trade-off theory one would expect to observe an inverse relationship between risk and leverage. This inverse relationship is observed for private sector banks.

This inverse relationship can also be explained in the context of the minimum capital requirements that are imposed on financial firms. As the riskiness of the asset base increases, the risk-weighted assets, as calculated in terms of Basel Accords also increases. This necessitates the bank holding more capital, measured at book value, to maintain their minimum capital requirements and therefore their leverage is expected to decrease.

Conversely, credit risk was found to have no statistically significant effect on leverage. The current literature on public sector banks suggests that public sector banks suffer from moral hazard, in that public sector banks make inefficient risk choices compared to private sector banks, without any regard for the increase in cost of financial distress as the government is expected to intervene to prevent corporate failure. The fact that public sector banks are both more highly leveraged and riskier than their private sector counterparts, adds to credibility of the theory that credit risk doesn't feature in public sector management's decision regarding capital structure.

6 Conclusion and recommendations for further research

The results show that for private sector banks, all independent variables are statistically significant in explaining total leverage – profitability (-), firm size (-), growth (+) and credit risk (-). The profitability, growth and size variables point to evidence of the pecking order theory, whereas the risk variable points to evidence of the trade-off theory.

Conversely, for public sector banks, all independent variables were considered to be statistically significant, except for credit risk – profitability (-), firm size (+) and growth (+). The growth variable provides evidence of the pecking order theory, the size variable provides evidence of the trade-off theory or the agency theory and the profitability variable provides evidence of either the pecking order theory or the dynamic trade-off theory. There does not seem to be a theory that can universally explain all independent variables and the leverage of public sector banks.

One result is clear from the public sector regression; that credit risk is not statistically significant and implies that the riskiness of the bank is not linked to how leveraged the bank is. There are a number of important implications for this; firstly, it provides evidence that public sector banks suffer from moral hazard; in that they concede the responsibility to manage risk within the firm on the basis that their majority shareholder; the government, provide implicit guarantees to ensure the survival of the public sector banks.

Furthermore, the Basel III capital regulations are based on the relationship between the riskiness of the assets and the amount of capital the bank is required to hold. The fact that riskiness is not related to a public sector banks' leverage, implies that public sector banks do not monitor and manage their credit risk as well as private sector banks and therefore run the risk of breaching the Basel III minimum capital requirements and incurring the resulting regulatory penalties.

This study focussed specifically on internal, firm-specific determinants of capital structure and only focussed on total leverage as the dependent variable for the regression analysis and therefore there were naturally limitations to this study. This paper recommends the following as further areas of study in this subject matter. Firstly, Gropp and Heider (2009) provided insight on the divergence of deposit leverage and non-deposit leverage which was not extended to this study. It is recommended that a similar study to the one conducted in this paper is applied to deposit and non-deposit leverage as well as total leverage to determine if the variables that are statistically significant in explaining total leverage would also be statistically significant in explaining the components of leverage.

Secondly, the banking industry is considered to be integrated with the performance of the economy in which it operates and therefore it would be noteworthy to perform a study which assesses whether external factors, such as interest rates, GDP, unemployment rates, have any further value in explaining a bank's total leverage.

Thirdly, banks which are subject to the Basel Accords are required to monitor and manage their capital adequacy ratios, which can be calculated as the ratio of total capital to risk-weighted assets. This study was unable to perform a regression using the total capital adequacy ratio as the dependent variable, as there was insufficient data available on capital adequacy ratios over the period 2012 to 2018. However, it is recommended that this study is performed using the capital adequacy ratio as the dependent variable, as and when the data becomes available.

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8 Appendix

8.1 Preliminary variable analysis

8.1.1 Descriptive statistics

Table 8-1 Unscaled descriptive statistics: Private sector

	TOTAL LIABILITIES	TOTAL ASSETS	LOAN ASSETS	NPAs	NPAT
Mean	1 671 477	1 853 584	1 108 339	34 090	33 854
Median	588 960	634 749	397 630	7 490	5 659
Maximum	10 076 432	11 242 810	7 060 398	540 630	284 639
Minimum	60 621	72 053	41 570	51	-16 323
Std. Dev.	2 408 027	2 686 420	1 579 931	81 950	57 077
Skewness	1.941182	1.944706	1.936909	4.285643	2.128896
Kurtosis	5.790736	5.812264	5.846696	22.468890	7.337024
Observations	105	105	105	105	105

Table 8-2 Unscaled descriptive statistics: Public sector

	TOTAL LIABILITIES	TOTAL ASSETS	LOAN ASSETS	NPAs	NPAT
Mean	3 717 874	3 951 247	2 449 894	189 255	7 441
Median	2 231 968	2 364 147	1 492 776	89 405	6 491
Maximum	33 814 958	36 164 330	20 736 997	2 251 045	258 818
Minimum	686 563	729 053	145 504	7 634	-122 449
Std. Dev.	5 428 411	5 795 374	3 559 865	290 453	52 253
Skewness	4.021422	4.030717	3.872958	4.331917	2.627120
Kurtosis	19.423280	19.503910	17.760520	26.786930	14.173680
Observations	140	140	140	140	140

Table 8-3 Scaled descriptive statistics: Private sector

	LEV	GRW	PRF	RSK	SZE
Mean	0.914981	0.172714	0.012710	0.026640	5.891029
Median	0.917579	0.160493	0.012755	0.018586	5.802602
Maximum	0.947446	0.446820	0.026690	0.080497	6.925399
Minimum	0.858731	-0.005443	-0.010051	0.003821	5.094485
Std. Dev.	0.023293	0.106852	0.009079	0.020864	0.553520
Skewness	-0.750680	0.753738	-0.504772	1.286231	0.442163
Kurtosis	3.144523	3.616457	3.214510	3.784204	2.177144
Observations	105	105	105	105	105

Table 8-4 Scaled descriptive statistics: Public sector

	LEV	GRW	PRF	RSK	SZE
Mean	0.943075	0.087198	0.001069	0.079471	6.404561
Median	0.944392	0.090655	0.003393	0.056504	6.373665
Maximum	0.953379	0.225723	0.010194	0.214061	7.068115
Minimum	0.925763	-0.056594	-0.016969	0.019154	5.987652
Std. Dev.	0.007087	0.076820	0.007889	0.057409	0.274794
Skewness	-0.798050	-0.070706	-0.978080	0.962213	0.622730
Kurtosis	3.294846	2.240415	2.819561	2.803338	2.900274
Observations	140	140	140	140	140

8.1.2 Correlation and covariance analysis

Table 8-5 Covariance matrix: Private sector

	LEV	GRW	PRF	RSK	SZE
LEV	0.000537				
GRW	-0.000858	0.011309			
PRF	-0.000129	0.000382	0.000082		
RSK	0.000103	-0.001192	-0.000117	0.000431	
SZE	-0.005484	0.001380	0.002982	-0.000242	0.303466

Table 8-6 Correlation matrix: Private sector

	LEV	GRW	PRF	RSK	SZE
LEV	1.000000				
GRW	-0.348060	1.000000			
PRF	-0.616906	0.397181	1.000000		
RSK	0.214608	-0.539931	-0.624210	1.000000	
SZE	-0.429467	0.023554	0.599118	-0.021137	1.000000

Table 8-7 Covariance matrix: Public sector

	LEV	GRW	PRF	RSK	SZE
LEV	0.000050				
GRW	0.000061	0.005859			
PRF	-0.000004	0.000415	0.000062		
RSK	-0.000024	-0.003129	-0.000396	0.003272	
SZE	-0.000367	-0.000853	-0.000102	0.001067	0.074972

Table 8-8 Correlation matrix: Public sector

	LEV	GRW	PRF	RSK	SZE
LEV	1.000000				
GRW	0.112362	1.000000			
PRF	-0.078559	0.689460	1.000000		
RSK	-0.058786	-0.714531	-0.880984	1.000000	
SZE	-0.189881	-0.040706	-0.047535	0.068125	1.000000

8.1.3 Multicollinearity

Table 8-9 VIF output: Private sector regression

	R^2	Tolerance	VIF
GRW	0.302211	0.697789	1.433097
PRF	0.737069	0.262931	3.803281
RSK	0.623132	0.376868	2.653446
SZE	0.565871	0.434129	2.303463

Table 8-10 VIF output: Public sector regression

	R^2	Tolerance	VIF
GRW	0.525164	0.474836	2.105992
PRF	0.781373	0.218627	4.573999
RSK	0.795322	0.204678	4.885713
SZE	0.005238	0.994762	1.005266

8.1.4 Linearity

Figure 1: Private sector: leverage vs. growth

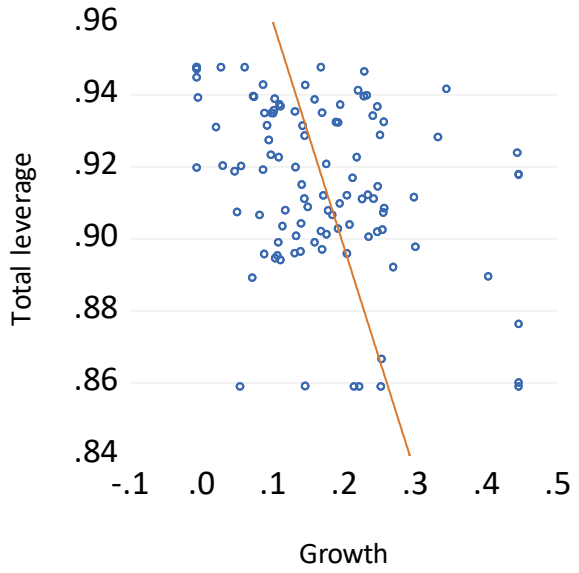


Figure 2: Private sector: leverage vs. profitability

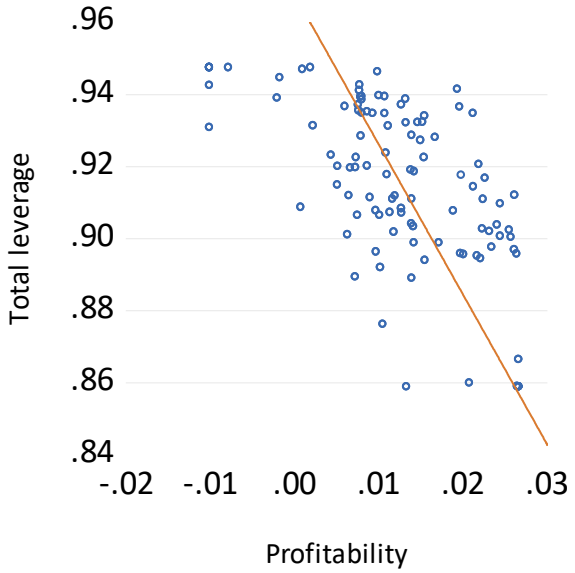


Figure 3: Private sector: leverage vs. risk

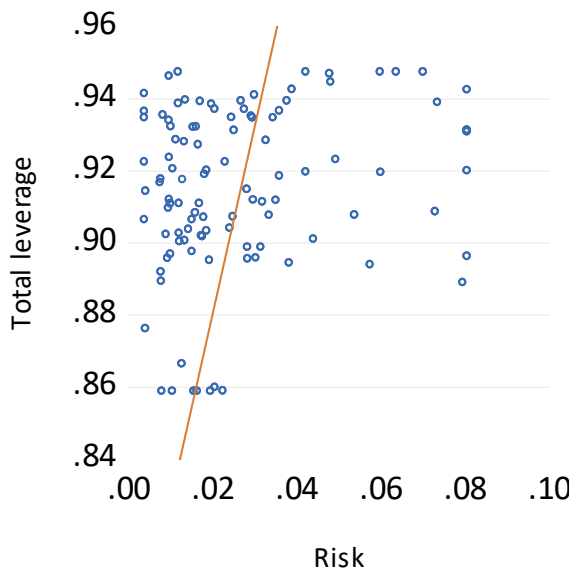


Figure 4: Private sector: leverage vs. firm size

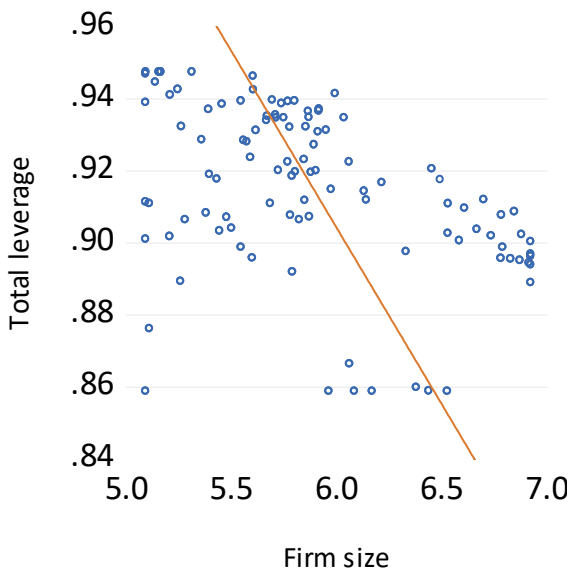


Figure 5: Public sector: leverage vs. growth

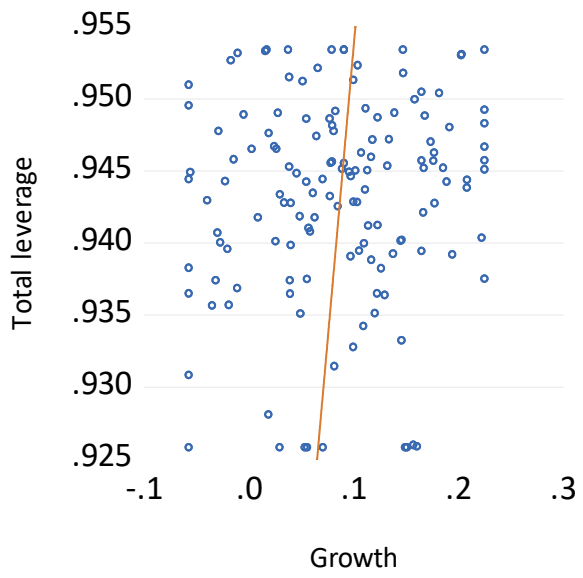


Figure 6: Public sector: leverage vs. profitability

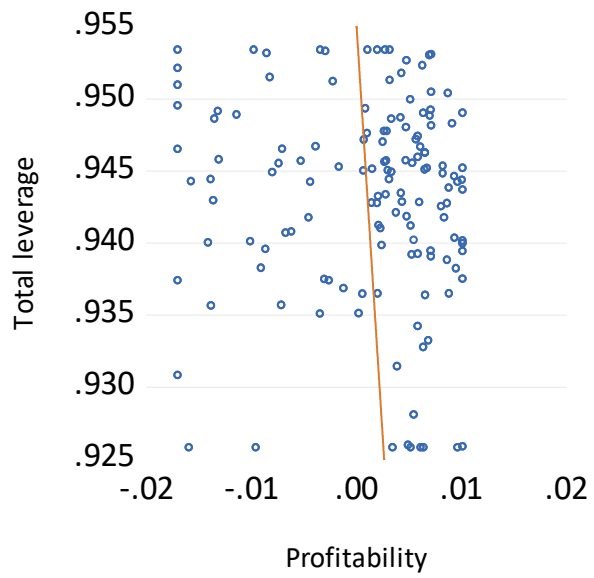


Figure 7: Public sector: leverage vs. risk

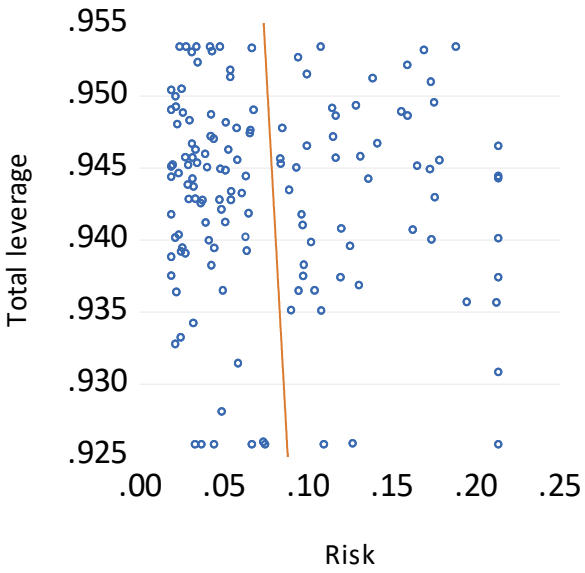
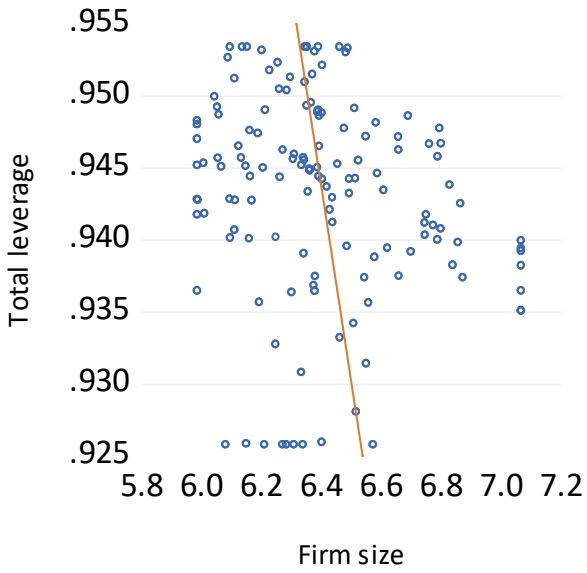


Figure 8: Public sector: leverage vs. firm size



8.2 Combined regression output

Table 8-11 Regression output: Combined

Regression: Combined

Dependent variable: Total leverage

Method: Panel Least Squares

Periods included: 7

Cross-sections included: 35

Total panel (balanced) observations: 245

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GRW	-0.044871	0.007876	-5.697561	0.0000
PRF	-1.222662	0.150115	-8.144853	0.0000
RSK	-0.205188	0.027373	-7.495895	0.0000
SZE	-0.005090	0.002214	-2.298541	0.0224
DUMMY	**0.023627**	**0.002470**	**9.566684**	**0.0000**
C	0.973656	0.012395	78.55063	0.0000

R-squared	0.652408	Mean dependent var	0.930890
Adjusted R-squared	0.645136	S.D. dependent var	0.022284
S.E. of regression	0.013275	Akaike info criterion	-5.781700
Sum squared resid	0.042117	Schwarz criterion	-5.695955
Log likelihood	714.2583	Hannan-Quinn criter.	-5.747171
F-statistic	89.71756	Durbin-Watson stat	0.636194
Prob(F-statistic)	0.000000		

8.3 Formal tests of specification

8.3.1 Redundant fixed effects test

Table 8-12 Redundant fixed effects test: Private sector

Regression: Private sector

Dependent variable: Total leverage

Test cross-section and period fixed effects

Effects Test	**Statistic**	**d.f.**	**Prob.**
Cross-section F	16.046602	(14,80)	0.0000
Cross-section Chi-square	140.400218	14	0.0000
Period F	1.114547	(6,80)	0.3614
Period Chi-square	8.429460	6	0.2083
Cross-Section/Period F	11.907168	(20,80)	0.0000
Cross-Section/Period Chi-square	144.949924	20	0.0000

Conclusion: For cross-sectional fixed effects; reject the null hypothesis (i.e. the impact of fixed effects specification is not redundant). For time period fixed effects; accept the null hypothesis (i.e. the impact of fixed effects specification is redundant).

Table 8-13 Redundant fixed effects test: Public sector

Regression: Public sector

Dependent variable: Total leverage

Test cross-section and period fixed effects

Effects Test	**Statistic**	**d.f.**	**Prob.**
Cross-section F	14.710970	(19,110)	0.0000
Cross-section Chi-square	177.016718	19	0.0000
Period F	3.468834	(6,110)	0.0035
Period Chi-square	24.260387	6	0.0005
Cross-Section/Period F	12.737494	(25,110)	0.0000
Cross-Section/Period Chi-square	190.352980	25	0.0000

Conclusion: For cross-sectional fixed effects; reject the null hypothesis (i.e. the impact of fixed effects specification is not redundant). For time period fixed effects; reject the null hypothesis (i.e. the impact of fixed effects specification is not redundant).

8.3.2 Hausman test

Table 8-14 Hausman test: Private sector

Regression: Private sector

Dependent variable: Total leverage

Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	14.377081	4	0.0062

Conclusion: reject null hypothesis (i.e. random effects specification is inappropriate)

Table 8-15 Hausman test: Public sector

Regression: Public sector

Dependent variable: Total leverage

Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	12.594897	4	0.0134

Conclusion: reject null hypothesis (i.e. random effects specification is inappropriate)

8.4 Regression model outputs

8.4.1 Final regression results

Table 8-16 Regression output: Private sector

Regression: Private sector

Dependent variable: Total leverage

Method: Panel EGLS (Cross-section weights)

Periods included: 7

Cross-sections included: 15

Total panel (balanced) observations: 105

Linear estimation after one-step weighting matrix

White cross-section standard errors & covariance (d.f. corrected)

Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
GRW	0.013260	0.006498	2.040731	0.0443
PRF	-0.489315	0.057166	-8.559576	0.0000
RSK	-0.119153	0.023406	-5.090721	0.0000
SZE	-0.011573	0.003049	-3.795581	0.0003
C	0.990261	0.018802	52.66822	0.0000

Effects Specification

Cross-section fixed (dummy variables)

Weighted Statistics

R-squared	0.981420	Mean dependent var	1.822311
Adjusted R-squared	0.977531	S.D. dependent var	1.101783
S.E. of regression	0.009247	Sum squared resid	0.007353
F-statistic	252.3697	Durbin-Watson stat	1.841205
Prob(F-statistic)	0.000000		

Table 8-17 Regression output: Public sector

Regression: Public sector

Dependent variable: Total leverage

Method: Panel Least Squares

Periods included: 7

Cross-sections included: 20

Total panel (balanced) observations: 140

Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
GRW	0.022292	0.007667	2.907400	0.0044
PRF	-0.499517	0.117946	-4.235136	0.0000
RSK	-0.019256	0.019862	-0.969496	0.3344
SZE	0.030403	0.011011	2.761104	0.0068
C	0.748478	0.070706	10.58583	0.0000

Effects Specification

Cross-section fixed (dummy variables)

Period fixed (dummy variables)

Weighted Statistics

R-squared	0.777967	Mean dependent var	0.943075
Adjusted R-squared	0.719431	S.D. dependent var	0.007087
S.E. of regression	0.003754	Akaike info criterion	-8.144684
Sum squared resid	0.001550	Schwarz criterion	-7.514332
Log likelihood	600.1279	Hannan-Quinn criter.	-7.888528
F-statistic	13.29043	Durbin-Watson stat	1.524284
Prob(F-statistic)	0.000000		

Table 8-18 Regression output: Public sector (with dummy variable)

Regression: Public sector

Dependent variable: Total leverage

Method: Panel EGLS (Cross-section weights)

Periods included: 7

Cross-sections included: 20

Total panel (balanced) observations: 140

Linear estimation after one-step weighting matrix

White cross-section standard errors & covariance (d.f. corrected)

Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
GRW	0.017813	0.003659	4.868800	0.0000
PRF	-0.183847	0.063870	-2.878478	0.0048
RSK	-0.009582	0.012646	-0.757658	0.4502
SZE	0.017925	0.004086	4.387263	0.0000
DUMMY	-0.002053	0.000772	-2.658032	0.0090
C	0.828263	0.026188	31.62704	0.0000

Effects Specification
Cross-section fixed (dummy variables)

Weighted Statistics			
R-squared	0.899909	Mean dependent var	1.393971
Adjusted R-squared	0.879021	S.D. dependent var	0.753188
S.E. of regression	0.003941	Sum squared resid	0.001786
F-statistic	43.08163	Durbin-Watson stat	2.095019
Prob(F-statistic)	0.000000		

8.4.2 Heteroscedasticity

Figure 9: Private sector: Heteroscedasticity

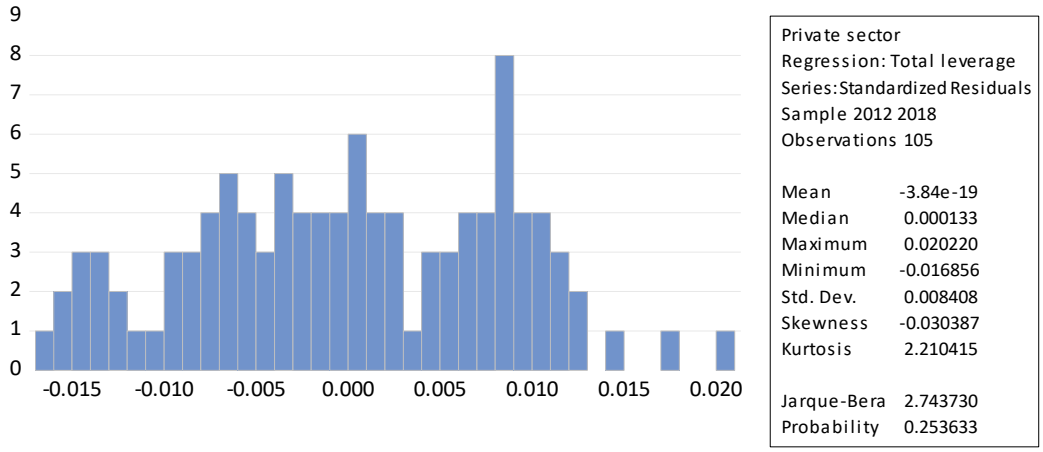


Figure 10: Public sector: Heteroscedasticity