Capital Structure and Financing Choices : An Australian Study

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Abstract

This thesis uses a modified pecking order framework to analyse financing choices for Australian firms. The traditional pecking order model has been extended to allow a non-linear relationship between a firm's requirements for external capital (the financial deficit) and the amount of external debt used to meet these requirements. The pecking order theory predicts that firms will follow a defined hierarchy of financing choices with internal funds being used first, followed by external debt and as a last resort the issuance of external equity. The sample used includes ASX listed industrial firms from 1995-2009 and includes a total of 702 unique firms and 3,852 individual firm year observations.

My main finding is that Australian firms do not follow the pecking order as closely as in other markets as the model explains less of the variation in debt issuance. Importantly I find that this is not related to debt capacity constraints, which has been hypothesized by other authors as a legitimate reason why firms, small firms in particular, would not appear to be following the pecking order theory. I use Altman's Z-Score, which is a commonly used measure of financial distress, to identify firms that are relatively unconstrained in terms of debt capacity. I find that while controlling for debt capacity does improve the explanatory power of the model, the improvement is only marginal. However I do find evidence against the static trade-off theory of capital structure. In particular firms that are unconstrained in terms of debt capacity and not facing significant capital expenditure do not increase leverage towards an optimal capital structure in the manner predicted by the static trade-off theory. In many cases they actually decrease leverage further.

I hypothesize that at least part of the reason for these findings is due to taxation differences, with the imputation credit system in Australia effectively removing the tax advantage of debt for domestic investors. Another important factor that could explain the lower explanatory power of the pecking order model could be the more accepted use of warrants and rights issues to raise equity, which have been argued to have lower asymmetric information costs than issuing straight equity.

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Contents

1. Introduction

This thesis is about capital structure theory and how it relates to a firm's financing choices. There are many different theories about capital structure and despite a substantial amount of effort on the part of academics; there is no clear and persuasive evidence that supports one theory over another. More recent research has focused on combining elements from multiple theories to gain a better understanding on what is driving financing choices. The main goal of this thesis is to extend this progress both from a theoretical standpoint but also by offering new evidence using Australian firms. There has been remarkably little research done on capital structure in Australia so I hope this research will be able to provide new insights not only for those interested in the Australian market, but also as a point of comparison for international research.

The traditional thinking on capital structure has been that firms should target an optimal capital structure where the costs and benefits of debt financing are balanced, in the sense that shareholder wealth is maximised. The problem with this approach is that these costs and benefits are not always easy to quantify and vary widely across different firms due to unique firm specific operating characteristics. In addition there are a multitude of external factors to consider such as market sentiment, macroeconomic conditions as well the transaction costs of different forms of financing. The end result is wide cross-sectional variation in observed capital structures which is difficult to capture with a theoretical model. What is particularly difficult to understand from an academics point of view is the existence of comparable companies with similar operational characteristics that have made very different financing choices. Are these companies all maximising shareholder value?

The actual answer is that generally we don't know. It is relatively easy to understand the costs of debt financing, which is primarily the risk of financial distress or bankruptcy. Understanding credit risk is an established area of research and practitioners and academics alike have a good understanding of what factors are important for the risk profile of a firm, and how much debt a firm can support. What is far less clear are the benefits of debt financing. A large part of the early literature on capital structure has focused on tax, with the key benefit of debt financing being the tax deductibility of interest payments. However there is disagreement on the importance of the taxation benefits which is complicated by different marginal tax rates for individuals and corporations, different rates for different sources of income as well as the existence of taxation exempt investments and investors. There is little persuasive evidence that supports the argument that the tax advantage of debt drives capital structure decisions. The other major hypothesized benefit of debt relates to agency theory, with the idea that debt reduces agency problems by leaving fewer resources under management's control. While this argument is plausible, it is virtually impossible to prove because there is no way to measure the extent of agency problems for a particular firm. There are also other ways to mitigate agency problems. One observation that can be made is that there are a large number of companies that are very conservatively geared and/or have no debt at all. If the benefits to debt are substantial and the market is efficient then there is no reason for this to occur, which is probably the strongest evidence against the notion of an 'optimal' capital structure. However there is evidence that shareholders react positively to leverage increasing transactions, such as share buybacks. This would suggest that the market does value debt at the firm level.

There are two competing theories to the optimal capital structure idea. The first is that capital structure is irrelevant as investors can use leverage to achieve the same results. This argument is only plausible if the tax and agency benefits of firm level debt are small (which they may well be). The other theory is based on transaction costs, which will drive firms to choose the lowest cost instrument to raise finance as it is needed for capital expenditure. This is the pecking order theory which defines a hierarchy of financing preferences where firms will use internal funds first (which has no explicit costs), followed by external debt and then external equity only as a last resort. External equity ranks last under this theory because new equity investors generally will not be prepared to pay full value for the new equity as they are at an informational disadvantage to managers and existing investors. New equity is always issued at a discount to its true value, and thus is dilutive and expensive for existing shareholders. Under the pecking order theory observed capital structures are simply a byproduct of past investment decisions. Low leverage firms have had a combination of high cash flows and/or low capital expenditure requirements while high leverage firms have had low cash flows and/or high capital expenditure requirements.

A key focus of the recent research into capital structure has been on understanding how dominant asymmetric information costs are for capital structure. If firms have a clear preference for external debt funding over external equity funding this would suggest that the optimal capital structure argument is relatively weak. Firms following this financing strategy will likely deviate for extended periods from their value maximising optimal capital structure. The catalyst for the renewed focus on pecking order theory came from (Shyam-Sunder & Myers, 1999) who tested for the preference of external debt over external equity by using a regression of a firm's financing requirements (the financial deficit) against the change in long term debt. Their results were strongly supportive of the pecking order theory but later shown by (Frank & Goyal, 2003) to be a function of the sample and only applicable to large firms, with the results deteriorating with firm size. The latest papers have focused on why small firms appeared to favour external equity to external debt, the hypothesis being that small firms have more constraints in accessing debt so are forced to turn to equity financing sooner than large firms. This thesis is an extension of this strand of research and focuses on the role of debt capacity, deficit size and firm size on a firm's preference for external funding sources. Specifically I extend the models of (Lemmon & Zender, 2008) and (De Jong, Verbeek, & Verwijmeren, 2009) to a specification that includes a quadratic term to allow for a non-linear relationship between the financial deficit and change in debt as well as using dummy variables to differentiate between firms facing a financial deficit or a financial surplus.

However the key contribution of this research is to apply existing pecking order models and the extensions to Australian data. There are several characteristics of the Australian market that provide an interesting comparison to the US market, where most of the research has been done. The first obvious difference between the two markets is the existence of a full dividend imputation system for domestic Australian investors. This prevents double taxation of dividend payments at the firm and investor level which effectively removes the taxation advantage of debt financing. Instead of theorising about the relevance of the taxation advantages of debt we can observe a market where we know that the taxation advantage of debt is minimal. The other major difference is that Australian firms make more extensive use of rights issues and warrants as a source of raising equity whereas in the US this is usually done with a seasoned equity offering. There are arguments that not only are rights issues more 'fair' for existing shareholders (as they are allocated on a pro-rata basis and are often renounceable which means that existing shareholders can sell their rights if they choose not to exercise) but that they have lower asymmetric information costs. To the extent that rights issues are more accepted by the market and less dilutive for existing shareholders then they are less likely to be subject to the same discount to true value as for seasoned equity issuance.

Warrants have lower information costs because of the option embedded in the equity issue that gives new investors additional flexibility to evaluate outcomes after the issue date i.e. their informational disadvantage for new investors relative to existing investors and management is lower.

2. Literature Review

2.1 Static Trade-off Theory

The foundation of capital structure theory is undoubtedly the seminal work of Modigliani and Miller in 1958 (to be referred to as MM for the remainder of this thesis). They showed that under certain assumptions the value of a firm could be viewed as independent of capital structure, and developed three specific propositions about capital structure.

1) The market value of any firm is independent of its capital structure.
2) The expected yield on a share of stock is a linear relationship with the level of debt financing.
3) The cost of capital used to evaluate investment decisions by the firm is the same for different capital structures.

The key thrust behind their argument was that in an efficient market investors can achieve financial leverage by borrowing themselves and thus replicate any firm's capital structure. Therefore from an investor's perspective no one capital structure is better than any other, and ultimately the value of the firm is determined by the same capitalisation rate on expected return i.e. the same cost of capital. They built their theory in a world with no taxes, no transaction costs, efficient markets and the assumption that investors and firms can borrow and lend at the same risk free rate. Their findings were contrary to the dominant view in the literature of an U shaped cost of capital curve. The traditional view was that debt was always 'cheaper' than equity meaning that a firm could minimise its cost of capital by using leverage, up until the point where extra debt would impact the operating risk of the firm and cause cost of equity to rise. The MM propositions changed the way people thought about capital structure as their framework implied a flat cost of capital curve, and at its extreme interpretation, no incentive to use debt at all.

MM did simple empirical tests with regressions of the cost of capital against the debt to equity ratio and the cost of equity against the debt to equity ratio[1]. Their samples were relatively small[2] but did show results that supported their theory. Specifically they found no evidence of a relationship between the cost of capital and leverage i.e. not a declining relationship as was suggested by the literature[3]. However MM were quick to point out that while their model was good starting point, the existence of real world dynamics did not imply that the capital structure of the firm was irrelevant. In particular the tax deductibility of interest payments was identified as one way that capital structure could impact the value of the firm. This is because the face value of debt is valued on the pre-tax (at the firm level) interest payments whereas equity is valued by equity holders after tax; therefore any reductions in tax payments accrue directly to equity holders.

However the MM view was that the impact of the interest rate 'tax shield' on cost of capital was relatively small. This was mainly because the starting point in their model was the pure cost of equity, which was considerably higher than the cost of debt i.e. the relative reduction in cost of capital was from a higher base. Interestingly in their model the value of the tax shield was highest when both tax rates and interest rates were high and lowest when interest rates were low. "In the extreme case where the firm could borrow for practically nothing, the advantage of debt financing would also be practically nothing" (Modigliani & Miller, 1958). In the MM framework differences in personal taxation rates for different types of income also had an impact on the valuation of the tax shield. They showed that the cost of capital was considerably lower when an investment was funded out of retained earnings compared to the issue of new equity, which was due to capital gains being taxed at a lower rate than dividend income. In their original paper they showed that under certain assumptions investments financed out of retained earnings can have a lower cost of capital than investments financed purely by debt.

[1] The cost of capital was approximated by using actual returns on equity as expected returns on equity were not directly observable.

[2] They used the data from a previous study by F. B. Allen which included data on 43 large electric utilities in 1947 & 1948 as well an unpublished study by Robert Smith on 42 oil companies for the single year 1953.

[3] They also found a positive linear and a negative quadratic relationship between the cost of equity and leverage i.e. cost of equity rose with leverage in a linear relationship up to a point where it started to increase at a decreasing rate. This result was also at odds with preceding literature where the prediction was for a relatively flat cost of equity followed by an ever accelerating cost of equity i.e. a positive quadratic relationship.

Following the work by MM the focus of the literature was on understanding the impact of tax on the cost of capital and the value of the interest rate tax shield[4]. The ability of firms to increase their value by using debt to create tax shields should have resulted in firms having much higher levels of debt than what was actually being observed. Researchers have attempted to explain this "puzzle" with the increased risk of financial distress that came with higher levels of debt. The argument was that there are substantial deadweight financial distress costs that act as significant disincentive to increase debt beyond a certain level. If these costs were sufficiently large then this could be a valid reason why firms would not pursue the maximum tax shield available to them. The theory therefore was that firms attempt to balance the benefits of the tax shields against the deadweight costs involved with financial distress, of which the probability increases with increased use of debt. This is known as the static trade-off theory of capital structure and has become one of the dominant theories of capital structure.

The deadweight costs that are associated with financial distress are hard to define and were not explicitly modeled in the MM framework, which assumed that the firm had a perpetual stream of cash flows. Other authors have attempted to quantify these and have come up figures anywhere from 5-20% of firm value[5]. It is important to note that most research can only include the explicit legal and administrative costs involved with financial distress. There are a host of other indirect and intangible costs for a firm that is in financial distress including; the loss of customers and/or suppliers, the potential loss of operational control to debt holders, staff turnover and increased incentives for risk taking by management. However it is worth noting that not all firms that are in financial distress will be liquidated; reorganisation or an injection of equity (by way of takeover) can reduce the deadweight costs substantially. Another component of the cost of financial distress is the impact it has on the valuation of the tax shield. An important correction was made to original MM paper in (Modigliani & Miller, 1963) where they show that the value of the tax shield was greater than originally assumed due to the tax shield being risk free. They modified their framework to incorporate the capitalisation of this income stream at the risk free rate rather than at the cost

[4] See (Brennan & Schwartz, 1978; Deangelo & Masulis, 1980; Farrar & Selwyn, 1967; Kane, Marcus, & McDonald, 1984; Miller, 1977) for examples.

[5] (Baxter, 1967) estimated bankruptcy costs at 20% of the value of the estate, although his sample was based on individuals and small companies. (Warner, 1976) used a sample of 11 railroads that filed petitions for bankruptcy between 1930 & 1955 and found the average explicit costs to be 5.3% of the company's market value before filing.

of capital. However as pointed out by (Brennan & Schwartz, 1978), even without explicit bankruptcy costs firm value does decrease when leverage gets to a certain point as the tax shield is no longer certain in perpetuity. Therefore the assumption of tax shield being risk free may not be a good one; if a firm does enter into financial distress then the value of future tax shields is worth very little.

Understanding the value of tax shields is also complicated by differences in marginal tax rates for both firms and investors. At the firm level, the benefit of the tax shield is greatest when the firm is paying the full statutory tax rate and is expected to do so in perpetuity, in fact this is the maximum benefit. However in reality there are many firms that are not paying the full statutory tax rate, for example firms that are either making losses or have accumulated loss carry forwards. Other examples are firms with investment or research tax credits and depreciation tax shields. The value of the tax shield to these firms depends on how far forward tax losses can be carried and if the firm is expected to be profitable enough in the future to be able to use these tax deductions as well as the tax shield generated by current interest payments. The expectation of perpetual tax shields is also not applicable to all firms, bankruptcies do occur and any firm that is close to this point will not be rewarded by investors for the full value of their tax shields. Taken together there are good reasons why many firms will not be able to recognise the maximum value of their tax shields and therefore the aggregate value of tax shields may be less than predicted by the theory.

The existence of different marginal tax rates for different investors can also significantly impact the value of the tax shield. The first complication is when there are differences between tax on capital gains and that on dividend income. In many developed countries capital gains taxes are very low or non-existent and in some cases can be deferred until capital gains are realised. This is a good reason for firms to use retained earnings to finance investment and not pay out dividends. For example a firm paying out a significant amount of dividends and financing new investment by equity issuance will likely have a higher cost of equity because its investors will be paying a higher tax rate on mostly dividend income. However a firm that doesn’t pay out dividends and uses retained earnings to finance new investment will likely have a lower cost of equity as its investors are only subject to capital gains tax. Using debt financing reduces the firm’s available earnings to distribute and assuming investors require some dividend yield all other things being equal will increase the effective tax rate for their equity holders, which will offset the value of the tax shield gained by using increased debt financing.

The value of the tax shield may also be impacted by differential tax rates between equity income and debt income. An argument put forward by (Miller, 1977) was that if the tax rate for bondholders was higher than that of equity holders then a higher rate of pre-tax return would be demanded by bondholders, pushing up interest costs and decreasing returns for equity holders.

> "If therefore, the personal tax on income from common stocks is less than that on income from bonds, then the before-tax return on taxable bonds has to be high enough, other things equal, to offset this tax handicap. Otherwise, no taxable investor would want to hold bonds." (p. 267)

Miller (1977) developed an equilibrium model where the aggregate level of corporate debt is determined by the point where personal tax rates for bondholders matched the corporate tax rate. At this point the benefits of the tax shield were exactly offset by the increased return required by bondholders[6]. His conclusion was that while there is a market equilibrium aggregate debt level there is no optimal leverage ratio for any individual firm. In his view firms with different leverage ratios would attract different types of investors depending on their marginal tax rate, a clientele effect. In short he argued that the tax advantage of debt is not anywhere near as large as originally thought. (Deangelo & Masulis, 1980) extended the work of (Miller, 1977) to show that the leverage irrelevance theorem holds in market equilibrium and is robust to alternative assumptions about the personal tax code with regards to the differences between marginal tax rates on capital gains and dividend income. In essence the literature had come full circle back to the original MM assumptions of capital structure irrelevance. However this does not mean that the static trade-off theory is dead. Despite the arguments that extend the work of (Miller, 1977) there is no real evidence to prove that debt related tax shields are not valuable. There are only arguments for why they may not be as valuable as originally thought.

[6] The basic model is based on a zero tax rate for equity income, riskless bonds and no transaction costs. However the conclusions do not require a zero tax rate for equity income, only that the tax rate for equity income be substantially lower than bondholder income, which is a plausible situation given that capital gains taxes are generally very low.

Having explained the theoretical background of the static trade-off theory I now turn to the empirical findings. As a point of reference I summarise the key predictions of the theory below;

1) **Leverage should be positively related to factors that increase the relative size of the tax advantage of debt and the certainty of the perpetuity of future tax shields**. This means that firm profitability and prospects for earnings growth should be positively related to leverage while the relative importance of other tax shields (such as R&D credits, investment tax credits and depreciation) should be negatively related to leverage.

2) **Leverage should be negatively related to factors that increase the probability of bankruptcy**. The commonly used proxies for a firm ability to support debt include; the size of the firm (measured by either total assets or sales), diversification (also measured by firm size) and stability of cash flows, which should all be positively related to leverage.

3) **Leverage should be negatively related to factors that increase bankruptcy costs**. These factors are related to the marketability of the firm's assets which is usually measured by asset tangibility, which should be positively related to leverage. The more unique or specialized the nature of the assets the lower the level of leverage.

These predictions have generally been tested by examining observed capital structures relative to firm specific attributes using a cross-sectional regression. (Bradley, Jarrell, & Kim, 1984) was one of the first studies to use this approach. They used three factors; variation in firm value, the level of non-debt tax shields and the magnitude of the costs of financial distress. The found firm volatility to be significantly and negatively related to leverage as well as a negative and significant relationship with non-debt tax shields (as measured by R&D and advertising expenses). What was surprising from their results was the finding of a significant and positive relationship with their other measure of a non-debt tax shield, which was depreciation and investment tax credits. The interpretation was that this finding casted doubt on the validity of the (Deangelo & Masulis, 1980) argument that non-debt tax shields were substitutes for the tax advantage of debt. However in their conclusion they highlight some of the empirical weakness of their model, including the high chance of misspecification and also that depreciation could be an instrument variable for the type of assets held by the firm (with higher fixed assets likely to have higher depreciation charges). The other main contribution from their study was to show the importance of industry influences on capital structure. They found that industry dummy variables can explain 54% of the variation in firm leverage ratios (based on 25 two-digit SIC industry classifications).

(Titman & Wessels, 1988) extended the work of (Bradley, et al., 1984) by using more advanced empirical techniques and including more factors. The firm specific attributes they were interested in were; asset tangibility, non-debt tax shields, growth, uniqueness, industry classification, size, earnings volatility and profitability. The selection of these attributes designed to mimic the factors determined important by several different theories, not just the static trade-off theory. They used a variety of instruments to measure these attributes and a factor analytic technique[7] to estimate the impact of unobservable attributes on leverage ratios. Their conclusions were; firms with unique or specialised products had lower debt ratios, smaller firms used more short term debt, and that there was little support for non-debt tax shields, growth, volatility and asset tangibility having an impact on leverage ratios. Interpretation of these results is difficult but the finding that non-debt tax shields were unimportant for capital structure was contradictory to static trade-off theory[8]. They also made the observation that the use of short term debt by smaller firms could be an indication of the importance of transaction costs, which were assumed to be higher for long term financial instruments.

Another important study was that of (Rajan & Zingales, 1995) who provided one of the most in-depth international comparisons of which factors were important for capital structure. They also used a cross-sectional regression approach and tested the following factors; asset tangibility, size, growth and profitability across USA, Canada, Japan, Germany, France, Italy and the UK. In terms of comparative statistics they found that after adjusting for different

[7] The method is somewhat similar in concept to that of the Arbitrage Pricing Theory (APT), where a number of observable indicator variables are assumed to be linear functions of one or more unobservable factors that are relevant.

[8] The argument put forward by (Deangelo & Masulis, 1980) was that firms with large non-debt tax shields relative to expected cash flows would have less taxable income to shield with debt and thus have lower leverage ratios.

accounting standards that leverage levels were broadly consistent across their sample, with only the UK and Germany being relatively less levered. The results of the regressions for US firms were quite different from that of (Titman & Wessels, 1988) in that they found that growth and asset tangibility were significant determinants of observed capital structures. Asset tangibility was positively correlated with leverage as was size, while both profitability and growth were negatively related to leverage. When making comparisons across countries they concluded that the factors found to be correlated with leverage in the United States appeared to be similarly correlated in other countries as well. However they were quick to point out the low explanatory power of their regressions with R^2 values ranging from 5-30%, and also that the relationship between the capital structure theory and the empirical proxies that they used were at best, weak.

Several other researchers[9] have used cross-sectional regression techniques to examine the determinants of capital structure using a variety of different proxy variables. A recent paper by (Frank & Goyal, 2009) is good example of the conclusions that have emerged from this branch of the literature. This particular study had a very large sample size with over 270,000 firm year observations from 1950 to 2003. They used a variety of factors and different robustness tests but their core findings were as follows[10];

1) Firms that competed in industries in which the median firm had high leverage tended to have high leverage.
2) Firms that had a high market-to-book ratio tended to have low levels of leverage.
3) Firms that had more tangible assets tended to have more leverage.
4) Firms that had higher profits tended to have less leverage.
5) Larger firms (as measured by book assets) tended to have higher leverage.
6) When inflation was expected to be high, firms tended to have high leverage.

The interpretation of (Frank & Goyal, 2009) was that the evidence "points to weaknesses in each theory – some more damaging than others" however they also stated that "five out of the

[9] Two good recent examples are (Fama & French, 2002) and (Frank & Goyal, 2003).

[10] Which is based on regressions of both book and market leverage (which is total debt over the book value and market value of assets respectively) against; the four digit Security Industry Classification (SIC) code, market-to-book ratio, log of total assets, EBITDA / total assets, fixed assets / total assets and expected inflation.

six core factors have the sign predicted by the static trade-off theory". Their overall conclusion was that the empirical evidence seemed reasonably consistent with some versions of the trade-off theory of capital structure. The main piece of evidence against the static trade-off theory was the negative relationship between profitability and leverage, which is the same conclusion that has been reached by numerous other researchers. As in (Titman & Wessels, 1988) industry structure was the most important explanatory variable, which while being a useful finding is not very informative towards capital structure theory. It is hard to know whether industry dummy variables are simply capturing omitted firm characteristics or firms are actually targeting industry leverage ratios. An interesting finding from (Frank & Goyal, 2009) was that it does make a difference whether market or book leverage ratios are used. When using book leverage ratios the impact of growth, firm size and expected inflation were not consistently significant factors. The explanatory power of their model as measured by adjusted R^2 fell from 27% to 19% when using book leverage ratios. Most research on capital structure has used market leverage ratio which should be a more forward looking indicator of asset value and therefore capital structure. However the evidence is that firms manage their capital structures with reference to book values and do not adjust their capital structure based on share price movements[11]. The use of market leverage, while providing more explanatory power, also has empirical problems. This is due to the possibility of a spurious correlation with the market-to-book ratio (which is a dependent variable used to proxy for firm growth opportunities) due to share price movements. In summary, as in other cross-sectional regressions, the explanatory power is relatively weak (R^2 value of 0.27) and interpretation is a problem. In the words of the authors themselves on the state of the literature on capital structure

"The amount of evidence is large, and so it is often all too easy to provide some empirical support for almost any idea. This is fine for a given paper but more problematic for the overall development of our understanding of capital structure decisions. As a result, in recent decades the literature has not had a solid empirical basis to distinguish the strengths and the weaknesses of the main theories (pg. 1)"

Unfortunately this paper did not contribute in any way to solving this problem.

[11] Survey evidence from (Graham & Harvey, 2001) shows that a large number of managers do not rebalance their capital structure in response to equity market movements. (Myers, 1977) argue that managers focus on book leverage because debt is better supported by assets-in-place rather than by growth opportunities.

The good news is that other approaches have been taken that offer more insight into capital structure decisions. As pointed out by (Myers, 1984) any empirical work on the static trade-off theory needs to be able to distinguish between factors that are important for optimal capital structure targets from those that are important for observed capital structures. The assumption that firms are always at their optimal target capital structure is not a good one, and if there are reasons why firms would depart from their targeted capital structure then this will introduce extra variation in observed capital structures. In his words;

> "Any cross sectional test of financing behaviour should specify whether firms' debt ratios differ because they have different optimal ratios or because their actual ratios diverge from optimal ones (p.578)."

In an attempt to solve this problem, dynamic models of capital structure have been developed. Probably the most significant was that of (Fischer, Heinkel, & Zechner, 1989) who built on earlier work done by (Kane, et al., 1984) and (Brennan & Schwartz, 1978). Their theory was that in the presence of frictions such as transaction costs the actual capital structure of most firms are likely to deviate from their optimal capital structure. Firms will tend to adjust capital structure relatively infrequently and only when the benefits of refinancing exceed the costs. They showed that even small transaction costs for recapitalisation can lead to wide swings in observed leverage ratios, when the firm is behaving optimally. Their model was theoretical in nature and was based on option pricing methods where the value of the levered firm can be expressed as function of the unlevered firm. They used numerical methods to generate closed form solutions for optimal financing policies given random fluctuations in underlying asset values, subject to specified constraints. For example a firm will not choose to refinance if the incremental increase in firm value does not exceed the transaction costs of doing so. Their overall conclusion was that further work needed to be done to understand the dynamics of capital structure adjustments and they highlighted the dangers of viewing observed capital structures as optimal. Their work also provided a prediction that smaller, riskier, lower-tax, lower-bankruptcy cost firms will exhibit wider swings in their debt ratios over time.

A more recent paper by (Strebulaev, 2007) used a similar numerical procedure method and simulated multiple capital structure paths, he then applied cross-sectional regression techniques to the simulated data. The results showed that;

1) Cross-sectional tests performed on data generated by dynamic models can produce results that are profoundly different from the model's predictions for corporate finance behaviour at refinancing points.
2) Some results may lead to rejection of precisely the model on which the tests were based, if the null hypothesis is formed on the basis of the relationship at the refinancing point.
3) Even a stylised trade-off model of dynamic capital structure with adjustment costs can produce results that are numerically consistent with some of those observed empirically.

One of the major contributions of this paper was the resolution of one of the puzzles that has been observed in previous studies on the static trade-off theory, the negative relationship between profitability and leverage. The intuition is actually relatively simple, if a firm does not refinance frequently then leverage decreases naturally due to retained earnings and higher equity market values. This paper is one of many that is based on simulated results from a theoretical model[12], but is probably one of the better illustrations of the limitations of earlier empirical work examining capital structure.

In summary, the empirical work that has been done on the static trade-off theory to date is inconclusive. Generally speaking the evidence supports that firm characteristics which reduce the probability of bankruptcy (size, asset tangibility and earnings stability) are positively related to leverage. However the evidence does not conclusively support the prediction that factors which increase the relative size of the tax advantage to debt (profitability and non-debt tax shields) are positively related to leverage. Note that this does not mean that these factors are unimportant, only that the variables that have been used to proxy them are not consistently correlated in the way that they would be expected to be. It is very difficult to prove that the firm specific characteristics which are correlated with observed capital

[12] For example (Goldstein, Nengjiu, & Leland, 2001; Hennessy & Whited, 2005; Leland, 1994; Nengjiu, Parrino, Poteshman, & Weisbach, 2005)

structures are so because firms are trading off the tax advantages of debt with the costs of bankruptcy, or that the factors are correlated for some other reason. Interpretation of empirical results is a major problem. Empirical work based on theoretical models offer more interesting insights. From this strand of research we know that transaction costs are important and can lead to infrequent adjustments to capital structure. The key point is that even if the static trade-off model is the 'correct' model of capital structure, the presence of frictions can result in substantial variation in observed capital structures, which cannot be explained using a static cross-sectional regression approach, which can lead to incorrect conclusions being made.

2.2 Agency Theories of Capital Structure

The static trade-off theory was developed from the MM capital structure irrelevance argument, with the introduction of taxes and bankruptcy costs. However there are other imperfections to the MM model that could result in capital structure having an impact on firm value. The MM model implicitly assumed that there are no agency conflicts i.e. manager and shareholder interests are perfectly aligned. We know that this is not the case, and the seminal work of (Jensen & Meckling, 1976) highlighted the importance of agency considerations to the capital structure literature. While agency theory is hardly a new area of research[13], it had not explicitly been presented as a theory of capital structure before.

> "While the introduction of bankruptcy costs in the presence of tax subsidies leads to a theory which defines an optimal capital structure, we argue that this theory is seriously incomplete since it applies that no debt should ever be used in the absence of tax subsidies if bankruptcy costs are positive" (Jensen & Meckling, 1976)

(Jensen & Meckling, 1976) argued that there are good reasons for shareholders to prefer the use of debt over equity. For example issuing debt does not dilute the equity ownership for an owner operator, or introduce extra agency issues that would occur with introducing new equity holders. Also the use of debt can allow firms to invest in projects that they would not be able to if they were limited by the equity resources of the owners.

[13] Adam Smith (1776) compared managers to "the stewards of a rich man" who cannot be expected to watch over other people's money with the same vigilance as that of the owners themselves. He stated that "negligence and profusion" would always more or less prevail in the management of a company where the managers are not the owners.

However (Jensen & Meckling, 1976) also highlighted additional agency costs of debt that had not been explicitly recognised in the literature to date, or thought of as second order effects. Their main argument was that debt can cause incentive problems related to the evaluation of new investment opportunities. With high debt, managers are incentivised to undertake more risky projects, as the benefits of a successful project accrue to themselves (and equity holders) while the costs of a failed project are borne by creditors. This problem becomes more acute as leverage increases and also if the firm is in financial distress. Debt holders are not unaware or naïve of this problem and will take steps to monitor the firms operations. These monitoring activities incur costs that are ultimately borne by the firm, whether indirectly via higher interest rate costs or directly in terms of the costs of providing additional information and managing the relationship with debt holders. The debt contract will also usually include covenants that restrict the operations of the firm to some extent. In extreme cases where there are high agency problems covenants can be so restrictive that the debt holders become the de facto managers of the firm. It is in the firm's interests to reduce the monitoring costs of debt as much as possible.

In a later paper (Jensen, 1986) extended the agency theory debate further by arguing that debt can reduce agency conflicts. The traditional agency problem of managers maximising their own wealth relative to shareholders can be improved by reducing the discretionary wealth under control of the managers. Agency problems are the greatest when firms generate large amounts of free cash flow (cash flow in excess of available positive NPV projects) but have limited growth opportunities. In this situation managers are more likely to invest in low return projects that increase the size of the firm and the resources under their control. (Jensen, 1986) put forward the proposition that debt can be an effective control mechanism for firms that have agency cost problems. This is because the threat caused by failure to make debt service payments serves as an effective motivational force to improve operational efficiency. Debt can also be viewed a substitute for dividends because managers are bound to make interest payments whereas dividend payments can be reduced at the managers discretion.

Other research that has focused on agency theory and capital structure includes the work of (Harris & Raviv, 1990) who concentrated on the informational advantages of debt for equity holders. This is particularly relevant when a firm is close to bankruptcy as if the firm defaults on an interest payment then debt holders have the power to force liquidation. Their argument was that this power provides investors with additional information which would be hard to extract from managers otherwise (who will avoid liquidation at all costs). Under their framework the cost of debt increases with additional debt due to the increased probability of incurring investigation costs involved with liquidation or reorganization (even though this decision is more likely to be the optimal decision). Their prediction was that firms which had a higher liquidation value and/or firms that faced lower investigation costs would have more debt in their capital structure. Liquidation is more likely to be the optimal outcome in the face of financial distress for these firms and this is more likely to be realised with higher levels of debt. (Stulz, 1990) used a similar argument to (Jensen, 1986) in that higher levels of debt could reduce problems with management overinvestment in NPV negative projects. However she also argued that firms would be more likely to hold debt as a takeover defense, which could incentivise managers to reach optimal debt levels. Firms with existing deterrents to takeovers would be more likely to hold less debt.

In summary the agency theories introduce additional costs and benefits of debt to the static trade-off framework, they still generally fit with the theory that firms are striving to reach on optimal capital structure, but the motivations are different. The key implications of the agency theories of capital structure are summarized below;

1) **Firms with high free cash flow and few investment opportunities have the highest agency problems**. Therefore these firms should have more leverage which will be demanded by shareholders as an additional control mechanism. Large, stable and profitable firms should have a positive relationship with leverage and transactions which increase leverage should be reacted to positively by the market.

2) **Agency costs of debt are significant and additional to bankruptcy costs**. This means that firms most likely to have high agency costs will incur high monitoring costs and have more restrictive debt covenants and therefore should use less debt. Small firms with high earnings risk, low transparency and short histories will be subject to the highest agency costs of debt.

Unfortunately, while agency theories and their relation to capital structure are intuitive and undeniably important, they are very difficult to test empirically. The extent of agency problems facing a firm cannot be measured from financial data and agency theories are conditional on the existence of agency problems. Agency theories do provide another reason why firm size is an important determinant of capital structure, as large firms are more likely to have; smaller ownership stakes by management, higher free cash flow, lower growth, and lower monitoring costs for debt. Therefore they should use more debt under the agency theories, although this will be driven by shareholders demanding more debt rather than managers voluntarily seeking to maximise shareholder wealth. Empirical evidence supports a positive relationship between firm size and leverage which has been presented in the previous section.

There have been extensive studies on market reactions to the announcement of different types of security issuance. However, as before, it is almost impossible to isolate the effect of agency problems on market reactions. In their survey on capital structure theories (Harris & Raviv, 1991) state that "generally, equity increasing transactions result in stock price decreases while leverage increasing transactions result in stock price increases." (Jensen, 1986) used the same argument in support of his free cash flow theory with particular reference to the US oil industry. In the late 70's and early 80's the oil industry was awash with cash due to rapid increases in the oil price. Instead of returning more cash to shareholders, managers continued to spend heavily on E&D activity and diversifying acquisitions, both of which resulted in suboptimal returns for shareholders. In the mid 80's there was a wave of consolidation and restructuring in the industry which involved, amongst other things, transactions that increased debt levels for these companies. He described the positive market reactions to this debt creation as being consistent with "the notion that additional debt increases efficiency by forcing organisations with large cash flows but few high-return investment projects to disgorge cash to investors" (Jensen, 1986). The issuance of debt to repurchase equity has been found by other authors to result in a positive stock market reaction. For example (Masulis, 1983) found that debt issued in exchange for common stock resulted in a 14% abnormal stock return while common stock issued in exchange for debt resulted in a -10% abnormal stock return.

In summary the empirical evidence is generally supportive of agency theories being important for capital structure decisions. However the evidence is far from conclusive as it is difficult if not impossible to empirically isolate the impact of agency theories. These theories are not complete theories of capital structure, only theories conditional on the presence of agency problems. There are also other ways to reduce agency problems that lie completely outside capital structure decisions. For example the alignment of management and shareholder interests can be improved by basing part of management remuneration on shareholder return.

2.3 Pecking Order Theory

The pecking order theory is quite different from the static trade-off theory and agency theories in that there is no optimal targeted capital structure. The theory predicts a hierarchy of financing preferences for different forms of financing. Under this theory firms will use internally generated cash flow and retained earnings before using external funding for new investment. If the firm requires external funds then the least risky sources of finance are used first. Firms will use external debt before issuing external equity which is the least preferred financing option and the can be thought of as an option of last resort. The predictions of this theory are that firms make financing choices not based on maximising shareholder wealth but on the lost cost form of financing for incremental investment decisions.

The theory has its foundations in the writings of (Donaldson, 1961) but it was the work of (Myers & Majluf, 1984) that led to its widespread acceptance as an alternative theory of capital structure. They provided an explanation for why firms would have a reluctance to issue external equity. Managers were assumed to have an informational advantage over investors and a better idea of the value of their firm, while investors, and particularly new investors, had less knowledge on the firm. If this was true then new investors would apply an additional risk premium to new equity, which would result in equity issuances having to be undervalued to induce new investment in the firm. This so called asymmetric information problem explained why firms would prefer to use the least risky form of financing first, if risk is interpreted as the degree of difference of opinion in valuation between the investors and management. External debt is clearly less ‘risky’ than external equity because debt investors have the ability to secure their investment over the firm’s assets and also receive additional information on the firm’s ability to make interest payments. The ‘risk’ of external equity depends on a variety of factors and firm specific characteristics but ultimately relates to management credibility and transparency of the firms operations. The more information that equity investors have, the lower the asymmetric information problem, and the greater the probability of 'correct' pricing of equity securities by investors.

If investors know that firms will follow the pecking order then there is also a signaling impact from issuing equity. The issuance of equity will either be perceived as a signal that the firm is unable to access debt financing, or that the current market value of the firm's equity securities is higher than management's perception of the underlying value of these securities. In this way the pecking order theory can become a self-fulfilling prophecy in that investors will always undervalue new equity issuance because they believe that managers will only issue new equity if they perceive it to be overvalued. Depending on the strength of the asymmetric information problem this introduces a new cost of issuing equity in that firms could be passing up positive NPV opportunities, in the words of (Myers, 1984)

> "Asymmetric information creates the possibility of a different sort of cost: the possibility that the firm will choose not to issue, and will therefore pass up a positive-NPV investment. This cost is avoided if the firm can retain enough internally generated cash to cover its positive-NPV opportunities." (p 584)

This type of argument is difficult to reconcile with the static trade-off theory of capital structure as it implies that firms will 'store' debt capacity for future investment opportunities. Or put another way, the theory implies that firms are willing to pass up the tax shield benefits from debt in order to reduce future asymmetric information costs. The pecking order theory is also hard to reconcile with efficient market theory, as it implies that investors persistently undervalue equity securities.

In summary the implications of the pecking order theory are very different from other theories in terms of the motivation for different financing choices. The theory that firms do not target an optimal capital structure implies that firms are not maximising shareholder wealth, unless the asymmetric information costs are so large that they overwhelm the valuation benefits from being optimally capitalised. Specifically the pecking order theory makes the following predictions;

1) **Capital expenditure will be financed first by retained earnings, followed by debt and lastly by equity.** If external funding is required the lowest risk securities are issued first.

2) **Firms will preserve debt capacity if they have future investment needs that cannot be financed from forecast internal cash flows**. This means that firms will be willing to depart from their optimal capital structures.

3) **Equity issuance signals that either the firm cannot access debt funding or that the firm's equity securities are overvalued**.

The pecking order theory has received considerable attention in recent research on capital structure. This is partly because of the work of (Shyam-Sunder & Myers, 1999) who introduced a new and relatively simple model for testing the theory. The pecking order theory is basically a theory about the order of preference for different sources of funds, so their model examines how much debt is used to fulfill financing requirements. This was done with a regression of the change in long term debt against the firm's external financing requirements, which was termed the financial deficit[14]. Under the extreme interpretation of pecking order theory the financial deficit coefficient from such a regression should be equal to 1. This means that every dollar of external financing required would be filled by debt rather than issuing new equity. Their results were supportive of the theory with a coefficient of 0.75 and an R^2 of 0.68, implying that for every dollar of external funds required firms would use 75c of debt financing[15]. Their interpretation of this finding was that considering the simplicity of the financial deficit model the pecking order theory does very well as a first order explanation of financing choices, and was more relevant than one based on firms targeting an optimal capital structure.

However the key limitation of the work of (Shyam-Sunder & Myers, 1999) was that they required continuous data over the whole sample period (1971-1989) so their conclusions

[14] Their definition of the Financial Deficit was; capital expenditure + change in working capital + current portion of long term debt + cash dividend payments – operating cash flow. This is explained in more detail later.

[15] This result is for the model $\Delta D = a + b_{po} DEF + e$, where ΔD is the change in long term debt and DEF represents the financial deficit. This model is explained in more detail later.

suffered from survivorship bias. The demographic of their sample was skewed towards large and stable firms with relatively low growth profiles. This is important because these types of firms should be less likely to suffer from asymmetric information problems, which is the theoretical driver of pecking order behavior. Therefore while there was relatively strong support for pecking order behavior in their sample it was left to later research to determine whether the results could be generalised across a more representative sample and whether asymmetric information costs were driving financing choices. (Shyam-Sunder & Myers, 1999) also showed how traditional empirical models developed to test static trade-off theory did not have the statistical power to reject data generated by firms following pecking order behavior[16]. This was because capital expenditure and operating cash flows display serial correlation, which can give the appearance of mean reversion i.e. several years of financial deficits followed by several years of financial surpluses. Their findings casted considerable doubt on the conclusions reached in previous research.

As mentioned, the main problem with the work of (Shyam-Sunder & Myers, 1999) was that the results did not generalise. (Frank & Goyal, 2003) expanded their sample to include all firms and not just those that had been in existence from the whole sample period. The results were strikingly different with a regression coefficient of only 0.28 and a R^2 value of 0.27. The sample demographics were very different with firms being roughly half the size (measured by book value of total assets) and relying on equity financing considerably more frequently. To further illustrate the impact of firm size they split the data into quartiles with regression coefficients as follows (from smallest firm size quartile to largest); 0.16, 0.43, 0.62 and 0.75 and concluded that firm size is "critical" to the performance of the pecking order model. This was contrary to the predictions of the pecking order theory because smaller firms should face higher asymmetric information costs, and be more inclined to use debt financing. A similar conclusion was reached by different means[17] by (Fama & French, 2002) who described the tendency of small firms to issue more equity as a deep wound to the pecking

[16] This was done by using simulations to generate datasets based on different financing behaviour which were then tested using both their pecking order model and a target adjustment static trade-off model. Their results showed that the target adjustment model had similar results even for firms following pecking order behaviour. The pecking order model on the other hand had very different results, with a coefficient of 0.02 and R^2 of 0.02 for firms following static tradeoff behaviour. Their pecking order model has the power to differentiate between different types of financing behavior while the static trade-off model did not.

[17]In this paper the main focus was to compare the predictions of pecking order theory versus static trade-off theory which was done by using various models from the literature but not the (Shyam-Sunder & Myers, 1999) model. The conclusion that smaller firms issued more equity was based on descriptive statistics, not regression results i.e. average equity issuance grouped by size criteria.

order theory. In a later paper (Fama & French, 2005) specifically analysed the issuance of different types of equity that can reduce asymmetric information costs[18]. Their conclusion was similar in that evidence of frequent equity issuance suggests that equity is not a last resort as a choice of financing.

Part of the solution to understanding why smaller firms issue more equity was to control for the size of the financial deficit. (Chirinko & Singha, 2000) were the first to point out what should have been a relatively obvious problem with the specification of the pecking order tests of (Shyam-Sunder & Myers, 1999) in that if there are constraints on debt capacity then firms cannot meet their financing requirements with debt alone[19]. Therefore for large financial deficits the financial deficit coefficient will be less than 1 even if firms are following the pecking order theory. (Lemmon & Zender, 2008) used the observations of (Chirinko & Singha, 2000) to extend the financial deficit model to include a quadratic term to allow a non-linear relationship between debt issuance and the financial deficit[20]. In addition to including a quadratic term they specifically modeled debt capacity by whether the firm has access to public debt markets or not. This was done by using a logit model with the firm having a credit rating as the dependent variable and firm specific factors as the independent variables[21]. They showed clear differences in the power of the financial deficit model amongst groups formed by their debt capacity model with lower coefficients for more constrained firms. The quadratic term was significant for all groups but larger in size for more constrained firms. They concluded that after controlling for debt capacity the pecking order theory was a "good descriptor of observed financing behavior of a broad cross-section of firms". A similar conclusion was reached by (Agca & Mozumdar, 2007) who used a piecewise linear specification which allowed two linear slopes to be fitted the data. They then

[18] Specifically the issuance of equity to employees, rights issues and dividend reinvestment plans were significant in frequency and seemed to have lower transaction and asymmetric information costs. Mergers financed by stock were another category both significant in size and likely to suffer less from asymmetric information problems.

[19] They also pointed out that the pecking order model used by (Shyam-Sunder & Myers, 1999) did not have the power to differentiate between the order of financing hierarchy. In particular it is not possible to differentiate between a) firms the prefer to issue debt before equity b) firms that prefer to issue equity before debt and c) firms that issue equity and debt in equal proportions. A high pecking order coefficient could be a result of a high leverage target in a static trade-off framework.

[20] Their model was $\Delta D = a + b\ DEF + c\ DEF^2 + e$, where ΔD is the change in long term debt and DEF represents the financial deficit. This model is explained in more detail later.

[21] These factors are; firm size, profitability, asset tangibility, market-to-book ratio, leverage, firm age, standard deviation of stock returns (using at least 2 years of data). These factors were thought important to determine whether the firm has a credit rating or not.

estimated the amount of debt that a firm could support (the breakpoint in the model) from traditional static trade-off firm specific factors. The results were similar in magnitude and showed a clear improvement in explanatory power versus the original financial deficit model. Their approach had the added benefit of being one of the first to combine elements of the literature used in testing both the static trade-off and pecking order theories of capital structure.

More recently there has been recognition not only of the importance of debt capacity but also of differences in financing behavior for financial deficits and surpluses. (Byoun, 2008) expanded both the target adjustment model and financial deficit model to investigate firstly whether there are different capital structure adjustment speeds when the firm is facing a financial deficit or surplus and based on whether the firm is above or below their target leverage ratio[22]. Secondly they investigate whether pecking order adjustments are different based on the same factors. Dummy variables were used to differentiate between deficits and surpluses and whether the firm is above or below target. They found that the most adjustment occurs when firm have above target (below target) debt with a financial surplus (deficit) which they interpreted as being evidence that firms move towards a target leverage ratio, but not in the manner predicted by the pecking order theory i.e. the distance away from the target capital structure is important. However this conclusion is subjective as the findings are not inconsistent with the pecking order theory taking into account debt capacity, it is simply a matter of interpretation. What was interesting was the difference between financial surpluses and deficits. He found financial surpluses tended to be smaller than financial deficits and the adjustment speed for financial surpluses to be faster than for deficits, or put another way firms are more likely to use financial surpluses fully to retire debt than to fill financial deficits fully with debt issuance.

(De Jong, et al., 2009) also differentiated between financial deficits and surpluses by using a dummy variable approach. They found that like (Agca & Mozumdar, 2007) and (Lemmon & Zender, 2008), after controlling for debt capacity the pecking order theory is a good first order description of financing behavior. Their findings also agreed with (Byoun, 2008) in that

[22] To estimate the target capital structure which a cross sectional regression is used based on factors considered important in the static tradeoff literature. Specifically the use; industry mean debt ratio, marginal tax rate, operating income, market-to-book ratio, total assets, depreciation, asset tangibility, research and development, dividends and Altman's Z score.

there is strong asymmetry in financing behavior depending on whether the firm is facing a financial deficit or surplus. For their sample and unadjusted for debt capacity they found a pecking order coefficient of 0.9 for surpluses and 0.2 for deficits. What was interesting is that while the coefficient for deficits varied substantially depending on the size of the deficit and debt capacity, the same behavior was not observed for coefficient for surpluses. This coefficient was always high, suggesting that when a firm generates a financial surplus this is nearly always used fully to retire debt, regardless of the size of the surplus[23].

In summary there is persuasive evidence in support of pecking order behavior. Subject to capacity constraints firms will prefer use debt to raise external funds. The frameworks used for testing pecking order theory have been a major focus of the recent literature, particularly in recognising capacity constraints and differential financing behavior for deficits and surpluses. However despite the progress that has been made the motivation for pecking order behavior is still an open question. The evidence does not imply that asymmetric information costs are the driver of pecking order behavior. Like the agency theories of capital structure, pecking order theory is only a conditional theory. The key insight is that in the presence of asymmetric information costs, firms will be reluctant to issue external equity. However an argument can be made under a dynamic trade-off model such as that of (Fischer, et al., 1989) where physical transaction costs can result in a preference for debt over equity. The assumption of additional asymmetric information costs may not be necessary to generate pecking order behaviour.

2.4 Survey Evidence

The survey evidence on capital structure theory offers several important insights into how managers view their capital structure decisions and is arguably more relevant than a lot of the empirical work that has been done to date. The results show that financial flexibility, credit ratings and earnings volatility are the most important factors for managers making capital structure decisions. The importance of financial flexibility is supportive of the pecking order theory, but not necessarily due to concerns over asymmetric information. The support for static trade off theory is moderate; having a target capital structure appears to be

[23] Specifically they group the size of the deficit/surplus into quartiles and find the following coefficients for deficit (from smallest size group to largest); 0.60, 0.74, 0.43 & 0.09 whereas for surpluses they find coefficients of; 0.79, 0.88, 0.82 & 0.92.

relatively important but also flexible, with a smaller proportion of firms having a strict target or target range. Other important factors that don't really fit with either theory are the importance of interest rates and concerns over EPS dilution. The importance of credit ratings also has only indirect links to the theory. For example this could be interpreted as being related to firms concerns over bankruptcy costs or as being important for financial flexibility if further capital is required.

One of the most significant and relatively recent contributions is from (Graham & Harvey, 2001) whose survey included 392 US companies and focused on capital budgeting, the cost of capital and capital structure. Their results indicated that financial flexibility, credit ratings and earnings volatility are the most important factors influencing capital structure decisions. When asked about target debt ratios only 44% of the respondents had a 'tight target range' or 'strict target' with the remainder having flexible targets or no target at all. They also found that interest rate shields and bankruptcy costs were only moderately important as a factor determining capital structure. When issuing debt, firms were most concerned about relative interest rates and cash flow requirements, with maintaining a target debt-equity ratio ranking as less important. When issuing equity the most important factors were avoiding EPS dilution for existing shareholders and recent stock price appreciation. Inability to obtain other funds (from debt or other sources) was not very important. They also found little evidence that firms were concerned about asset substitution, asymmetric information, transaction costs, free cash flows or personal taxes. The authors concluded that while the importance of financial flexibility is supportive of the pecking order theory they found that this is not more prominent for firms that are more likely to suffer asymmetric information problems[24].

The results of (Graham & Harvey, 2001) were generally consistent with an earlier survey done by (Pinegar & Wilbricht, 1989) whose sample included 176 unregulated, nonfinancial Fortune 500 firms. The most important factor affecting financing decisions was financial flexibility, while bankruptcy costs and personal tax considerations were amongst the least important. Their approach was slightly different as they focused on the hierarchy of

[24] They tested this by segregating the responses by size and whether the firms were dividend paying or not. Large dividend paying firms should theoretically have less asymmetric information problems and are less likely to follow pecking order behaviour. However the results from this survey show the opposite, small non-dividend payment firms value financial flexibility less and also are less likely to say that equity undervaluation affects their debt policy.

financing choices and not so much on specific reasons for issuing different types of securities. They found that 69% of the sample had a determined hierarchy of funding preference; with 84% ranking internal equity as their first choice and 72% having debt as the second choice (87% had debt as the first or second choice). External equity was a less preferred option, and for a large proportion of the sample (40%) was the 6^{th} and last choice. Additionally only 28% of the firms indicated that they had a target capital structure. These findings are all supportive of pecking order behavior. Another key insight from their work was to highlight the flexibility of capital structure targets and the financing hierarchy. The overwhelming majority of their sample (82%) stated that they would deviate from their target capital structure or financing hierarchy to finance an investment opportunity. However only 3% said they would forgo the investment opportunity and a mere 2% said that they would cut their dividend. The capital structure decision is less binding than either the investment or dividend decision of the firm.

(Brounen, De Jong, & Koedijk, 2004) undertook a directly comparable survey to (Graham & Harvey, 2001) for European firms from the UK, France, the Netherlands and Germany. Their sample included 313 firms and they asked the same questions as (Graham & Harvey, 2001) but included additional questions on firm goals and stakeholders. What was surprising about their results was that despite the clear taxation and institutional differences between their sample countries and from the US, the results for capital structure decisions were very similar. Financial flexibility was the most important consideration driving capital structure followed by earnings volatility and credit ratings. Taxes and bankruptcy costs were not very important. They also concluded that while the responses were supportive of pecking order behavior this choice is not being driven by asymmetric information. Levels of leverage were broadly comparable with the US with the exception of France that had slightly lower levels of leverage. However European countries were even less likely to have a strict target level of debt, with 28% of the respondents for the UK, 25% for the Netherlands, 26% in Germany and 18% in France.

In summary the survey evidence is supportive of pecking order behavior and highlights the importance of financial flexibility and the desire to preserve future funding capacity. The other important insights are the importance of credit ratings and the finding that managers do take into account market conditions when issuing new securities. This is mostly relevant for debt issuance, where managers will look to take advantage of funding ‘windows’ of opportunity.

2.5 Australian Evidence

The capital structure literature has focused mainly on US data and there have been relatively few studies done on the Australian market. I have only found one paper that tests the pecking order theory explicitly and the recent focus of the literature on debt capacity and differential financing patterns for surpluses and deficits has not been applied to Australia yet. There are a number of differences in the Australian market that need to be taken into account when examining the literature. These will be discussed in more detail but in summary they are; increased reliance on bank debt versus publicly traded debt, higher institutional participation in the market, a different tax regime, the relative importance of resource based firms and a preference for rights issues as a form of raising equity.

(Allen, 1993) did a study on pecking order theory in Australia by focusing on the relationship between profitability and leverage. He ran regressions of the leverage ratio against profitability lagged up to 3 periods and balance sheet growth. Like the bulk of the static trade-off literature he found a negative relationship between profitability and leverage and concluded that this finding was contrary to the static trade-off theory and could be consistent with companies following pecking order behavior. He also tested the stickiness of dividend policy with relation to leverage levels, the argument being that companies that have high dividend payout ratios should have to use more debt to fund new investment because it is difficult to reduce dividend policies once investors are conditioned to a certain level of dividend payments. The finding was the opposite of what was expected and past dividend payments were negatively related to subsequent leverage ratios. However he was quick to point out that dividends and profitability are highly correlated making the results difficult to interpret. On balance he concluded that the results were encouraging in support of the pecking order theory but that there were empirical problems with his work and further research needed to be done. The data used was from 89 industrial firms from the period 1954 to 1982 that had continuous data over the whole period

(Gatward & Sharpe, 1996) focused on developing a dynamic model of capital structure but also tested the long run determinants of capital structure in Australia. Their dynamic model highlighted the interrelated nature of investment and capital structure decisions and the slow speed of adjustment towards target capital structure. The evidence on the determinants of capital structure was relatively similar to other studies in that profitability was negatively related to leverage and that firm size was positively related. They also found no evidence to support that tax shield variables were significant for leverage ratios. Their dataset was from 1967 to 1985 and included 164 companies with continuous data over the whole period.

An interesting study by (Pattenden, 2006) looked at the impact of the imputation credit tax system on capital structure. This is a very important concept with respect to the static trade-off theory of capital structure as the entire theory is based on the tax shield benefits of debt. Under an imputation credit tax system like that of Australia the tax advantage of debt is removed because both interest payments and dividend payments are made from pretax income, there is no double taxation of dividends. For example if a firm makes \$1 of pretax profit and the corporate tax rate is 30% they will have 70c of income to distribute. Under the imputation credit system the investor will receive the 70c as a dividend payment plus a 30c tax credit that can be applied against their taxable income. Therefore it makes no difference to the investor if the firm uses debt to reduce the 30c tax paid as whatever tax is paid at the firm level gets distributed to the investor as an imputation credit[25]. The relatively recent introduction of the imputation tax system in Australia provided a unique way to test the importance of the tax shield advantage of debt by analyzing data from before and after the change. Pattenden used a sample of 67 industrial firms from 1982 to 1998 (1987 was the year of the tax change). He used a Bayesian variable selection process rather than a cross-sectional regression and used change in debt rather than leverage ratio as the dependent variable. The explanatory variables used were; the marginal tax rate, change in free cash flow, lagged growth opportunities, change in tangible assets, Altman's Z-score, asset beta, change in firm size, interaction between free cash flow and growth options, dividend yield and an industry dummy variable. The key finding was that taxation is an important determinant of capital structure as there was a positive and significant tax coefficient for the pre 1986 period and

[25] Obviously there are a number of factors that influence the value of the imputation tax credit to investors. Firstly they have to have taxable income in order to apply the imputation credit, secondly they have to be Australian residents, thirdly not all income is distributed so while imputation credits are carried forward it may be years before they can be effectively distributed to shareholders and finally investors do not receive a tax credit for tax paid in other jurisdictions. Or put another way, the imputation credit has full value for an Australian firm with Australian investors that have positive income (greater than the gross amount of the dividend) that pays out 100% of earnings in dividends and only operates in Australia.

insignificant coefficient post 1986. This finding is supportive for the static trade-off theory as it shows the relevance of the tax shield of debt to capital structure decisions.

(Deesomsak, Paudyal, & Pescetto, 2004) studied the determinants of capital structure in the Asia-Pacific region using data from Australia, Thailand, Malaysia and Singapore. The focus of their research was on the impact of institutional differences between the regions as well as the impact of the Asian financial crisis. They used a standard cross-sectional regression approach with the explanatory variables being; asset tangibility, profitability, firm size, growth opportunities, non-debt tax shields, liquidity, earnings volatility and share price performance. The data was from 1993 to 2001 and was a continuous data set including 294 Thai, 669 Malaysian, 345 Singaporean and 219 Australian firms. They found that leverage was the highest in Thailand and lowest in Australia, with relatively little variation in Australia's average leverage over the sample period. The determinants for capital structure were similar to other findings in the literature with the exception of profitability, where they found an insignificant relationship between profitability and leverage. There were significant differences between countries and also pre and post the Asian financial crisis. They concluded that "the capital structure decision is not only the product of the firm's own characteristics but also the result of corporate governance, legal framework and institutional environment of the countries in which the firm operates." This conclusion was somewhat different from (Rajan & Zingales, 1995) in their international study including USA, Canada, Japan, UK, France, Germany and Italy where they found similarities in capital structures. However the (Rajan & Zingales, 1995) sample was probably a more homogenous group of developed countries.

(Suchard & Singh, 2006) studied the use of hybrid debt and equity securities in Australia and capital structure theory. There are a number of theoretical reasons why hybrid securities can resolve some of the issues involved with using straight debt or equity. For example convertible debt can be viewed as an indirect way of raising equity that has lower transaction costs and less asymmetric information problems. The use of warrants (which are options on the issuance of new equity) can be useful when the firm has real options, such as for exploration projects when the firm will require additional capital to develop the project as well as initial capital for the exploration phase. They analysed the firm specific factors that influence the probability of issuing convertible debt, warrants and preference shares using

ASX data on the issuance of these securities. Their sample included; 158 convertible debt issues, 377 warrant issues and 78 preference share issues from 1980 to 2002. A logit model was used to determine with factors influenced the choice to issue these types of securities. They found that firms with high operating and financial risk, firms in the resource sector and firms using the proceeds for working capital were more likely to use warrants. The use of convertible debt was influenced by the issue size, profitability and the amount of tax paid. While it is hard to make direct comparisons with other studies on capital structure the authors viewed this evidence as supportive of the pecking order theory in the sense that convertible debt can be viewed as a substitute for straight debt and warrants as a substitute for equity.

There is also survey evidence from a study by (Allen, 1991) who used a relatively small sample of 48 firms conducted in 1987 & 1988. The results were consistent with other surveys with respect to financial flexibility. He found 93% of the sample liked to maintain spare debt capacity and that 80% could borrow significantly greater amounts without affecting their cost of funds in the form of the interest rate paid. Interestingly all of the firms that were not in a position to borrow more without increasing interest costs indicated that they expected to reduce their leverage. Consistent with other surveys, firms exhibited pecking order type behavior with no respondents indicating that external sources of financing were the first preference and 52% of his respondents had an “unreserved preference” for internal funding. He noted reasons given against issuing external equity were; concerns over dilution of majority shareholders, information disclosure requirements and the lengthy time process involved with issuing external equity. His summary of the responses were that equity issues were viewed costly and time-consuming, and that once in existence the shareholders had to be provided with satisfactory performance. In terms of debt targets the results were a bit different from other surveys in that 75% of the respondents had a target debt ratio, also tax considerations emerged as a significant influence on capital structure. However his interpretation was that this was more a desire to issue new forms of capital in the most tax-efficient manner rather than a deliberate effort to pursue the benefits of tax shields. When asked about the reason for issuing equity the most popular response was to reduce leverage (53%) and there was evidence that market conditions were important with only 13% of those using equity to reduce leverage were willing to do so regardless of market conditions. Only 29% of the respondents indicated that they would use equity to make an acquisition or to fund a major expansion, which compares to 53% of respondents being willing to use debt financing for this purpose. Also interesting was evidence that 30% of respondents were willing to issue debt if the market conditions were right regardless of capital requirements. He commented that this decision was usually expressed as related to the levels of interest rates and the desire to make use of a "window" to lock in rates for a considerable future period. The finding is consistent with that of (Graham & Harvey, 2001) and highlights the importance of relative interest rate costs for capital structure, something that has not been a focus of the literature. The conclusions reached by (Allen, 1991) were that his results were consistent with (Donaldson, 1961) who came to the conclusion that companies appeared to be trying to maximise corporate wealth as opposed to shareholder wealth. (Allen, 1991) also noted that "it did not appear that managers were consciously trading off the tax shields on interest payments against the potential costs of bankruptcy when setting debt levels, as much of the contemporary theory suggests."

In summary the evidence from Australia is generally consistent with the rest of the literature. Those studies that have focused on the determinants of capital structure have found a significant negative relationship between profitability and leverage, which is generally interpreted as evidence in favour of the pecking order theory. However the finding of (Pattenden, 2006) on the importance of tax shields is evidence for the static trade-off theory. The survey evidence is similar to the experience of other authors in that firms' value financial flexibility and that the level of interest rates is important for debt issuance decisions.

2.6 Summary

There is a substantial body of literature that has focused on capital structure, of which a large portion suffers from empirical problems that have resulted in questionable interpretations. This does not mean that progress has not been made; the theoretical agreements on optimal capital structure have been well and truly debated and refined. More recent research has recognized that the dynamics of financing decisions, transaction costs and capacity constraints need to be understood and applied to the theoretical models. The key points that I have drawn from this literature review I have summarized below;

1) Firms will use internal funds as a first source of capital.
2) Transaction costs, asymmetric information, market timing, dilution of existing shareholders and information disclosure requirements are reasons why firms are

reluctant to issue external equity. If a firm needs capital these are good reasons why they will prefer debt.

3) Leverage ratios are correlated with a firm's ability to support debt.
4) Excess cash flow does create agency problems, which can be reduced through the use of debt or increased dividends.
5) There is little evidence to support the theory that tax benefits of debt are a dominant driver of capital structure decisions. Although firms will make sure specific issues of securities are 'tax efficient'.
6) Relative costs of debt and equity vary with economic cycles and managers will time issues to take advantage of favorable market conditions.

These observations do not completely support any one theory. The key evidence against the static trade-off theory is the apparent unimportance of the tax advantage of debt while the key evidence against the pecking order theory is that asymmetric information does not appear to be the driver of pecking order behavior. There appears to be universal support that firms face constraints on the amount of debt they can support, whether this a bankruptcy cost (static trade-off theory), monitoring cost (agency theory) or debt capacity (pecking order theory) argument. However there is less consensus on whether there are benefits to debt that can increase the value of the firm. The mere existence of average leverage ratios that are greater than zero imply that there are. Whether this is simply a transaction cost argument and observed debt ratios are function of past investment decisions (as in the pecking order theory) or whether firms are targeting a (somewhat flexible) optimal capital structure is still an open question and not necessarily a mutually exclusive one.

3. Methodology

The main goal of this research is to compare the financing behavior of Australian firms with other studies that have focused primarily on the US market. To do this I have used a pecking order framework based on the model of (Shyam-Sunder & Myers, 1999). The pecking order theory defines a clear hierarchy for financing preferences whereby when a firm requires external capital they will issue debt before equity. (Shyam-Sunder & Myers, 1999) tested this theory by comparing the amount of debt issued by firms relative to their capital requirements. The firm's requirement for external capital was termed the financial deficit, which is equal to capital expenditure plus investment in working capital plus cash dividend payments plus short term debt payable at the start of the period less operating cash flow[26]. A positive deficit implies that external capital is required while a negative deficit implies a surplus of internally generated cash flows.

$$FD_{SSMt} = I_t + DIV_t + \Delta W_t + SD_{t-1} - CF_t \qquad (1)$$

FD_{SSMt} = Financial Deficit ((Shyam-Sunder & Myers, 1999) definition)

I_t = Capital Expenditures

DIV_t = Cash Dividend Payments

ΔW_t = Change in Working Capital

SD_{t-1} = Short Term Debt at the start of the period

CF_t = Cash Flow after Interest and Taxes

To test the predictions of the pecking order theory (Shyam-Sunder & Myers, 1999) regressed the change in long term debt ΔD_t against the financial deficit (2). This is the simplest form of testing the pecking order theory and has been used extensively in the literature. The general interpretation has been that the closer the value of β_1 is to 1 the stronger the support for the pecking order theory. A β_1 of 1 implies that all requirements for external capital will be met purely with debt.

$$\Delta D_t = \alpha + \beta_1 FD_t + e_t \qquad (2)$$

The (Shyam-Sunder & Myers, 1999) specification was modified slightly in (Frank & Goyal, 2003) who argued that short term debt should not be included on the right hand side of the equation because it is already included in the change in working capital.

$$FD_{FGt} = I_t + DIV_t + \Delta W_t - CF_t \qquad (3)$$

FD_{FGt} = Financial Deficit ((Frank & Goyal, 2003) definition)

I have made the same modification for my model but also have made an additional modification to the definition of the financial deficit by removing changes in short term debt

[26] In this case the operating cash flow measure excludes changes in working capital so the change in working capital is not being counted twice. They use the indirect method of calculating operating cash flows by starting with net operating income and then adding back noncash items.

from the change in working capital. There are two main reasons for this; firstly the pecking order theory is not a theory on the term structure of debt that will be used to finance the financial deficit. It seems wrong to view only long term debt as a source of external debt financing. There are many firms that rely almost exclusively on short term debt which can be continuously refinanced. Firms may also use short term finance now to take advantage of favorable interest rates and then change the term structure later. Under the specification in (3) a financial deficit that is financed by short term debt causes no change in FD_{FGt}, because the change in ΔW_t and I_t cancel each other out. The second problem with (3) is that the timing of debt refinancing can result in large swings in working capital. For example when long term debt has less than 12 months before expiry it has to be reclassified as short term debt on the balance sheet. In this situation when the debt is refinanced it would appear that there was a large financial deficit as working capital would increase by the reduction in short term debt. In my definition of the financial deficit I have separated working capital into operating working capital, short term debt and cash. This allows short term debt to be removed from the right hand side of the equation as in (5). I have also changed (2) to use changes in total debt rather than just changes in long term debt i.e. adding short term debt to the left hand side of the equation.

$$W_t = OW_t + SD_t + C_t \qquad (4)$$

OW_t = Operating Working Capital (essentially inventory + debtors – creditors)
SD_t = Short Term Debt
C_t = Cash and Cash Equivalents

$$FD_t = I_t + DIV_t + \Delta OW_t + \Delta Ct - CF_t \qquad (5)$$

The final important difference in the specification used in this thesis is due to the differences in data sources and the definition of operating cash flows. My sample is relatively recent which means that I have cash flow statement data whereas US studies using data prior to 1988 had a variety of different cash flow reporting statements[27]. This means that I can use cash flow from operating activities directly from the cash flow statement which already

[27] For companies reporting under Compustat codes 1,2 & 3 these were; Working Capital Statement, Cash Statement by Source & Use of Funds and Cash Statement by Activity. While for Compustat code 7 (which was required post 1988) this was the Statement of Cash Flow.

includes changes in operating working capital. My definition of the financial deficit is (6) and the financial deficit model specification is (7). Note that despite the definitional differences the only real difference between my specification and that of (Frank & Goyal, 2003) is that short term debt is removed from the right hand side of (6) and included in the left hand side of (7).

$$FD_t = I_t + DIV_t + \Delta C_t - CFO_t \tag{6}$$

$$\Delta TD_t = \alpha + \beta_1 FD_t + e_t \tag{7}$$

CFO_t = Operating Cash Flow (direct from cash flow statement)

ΔTD_t = Change in Long Term Debt + Change in Short Term Debt

However there are still several problems with this specification that are common to the literature. The first is the issue of endogeneity of the financial deficit with regards to capital expenditure and dividend payments, obviously these variables can be used to adjust to expected shortfalls or surpluses in operating cash flows. In order to use the model developed here one has to assume that dividend policy and capital expenditure decisions are relatively sticky which means that surprises in operating cash flows are absorbed by changes in financing rather than changes in investment policy or dividend payments.

The second flaw with this specification is the assumption of a linear relationship between debt issued and the financial deficit. This problem was identified by (Chirinko & Singha, 2000) who argued that most firms have constraints on the amount of debt they can issue which implies that the size of the financial deficit does matter. In this case firms that are following the pecking order theory still have to issue external equity for sufficiently large financial deficits. A focus of recent research on capital structure has been to control for debt capacity in testing the pecking order theory. With debt capacity being modeled by a combination of the deficit size and firm specific characteristics[28]. I have used a quadratic model following (Lemmon & Zender, 2008) to capture the likely concave nature of debt issuance with financial deficit size. I scale the variables by total assets in order to obtain a meaningful coefficient for the quadratic term. This is done on the book value of total assets

[28](Agco & Mozumdar, 2007) use a piecewise linear specification, (De Jong, et al., 2009) use subsamples based on deficit size and firm characteristics while (Lemmon & Zender, 2008) use a quadratic model.

(TA) at the start of the period where $FDA_t = FDt/TA_{t-1}$ and TDA_t as TD_t/TA_{t-1}. I use TA_{t-1} because constraints on debt financing are more logically compared to the assets at the start of the period. Large investments can distort the actual relative size of new investment if compared with ending asset values.

$$\Delta TDA_t = \alpha + \beta_1 FDA_t + \beta_2 FDA_t^2 + e_t \qquad (8)$$

The problem with the specification above is that interpretation of the quadratic term is difficult as FDA_t is both positive and negative. If the same relationship is expected for surplus and deficits (decreasing issuance (retirement) of debt with the absolute size of the size of the financial surplus (deficit)) then β_2 will be meaningless because the sign will just depend on the relative proportion and absolute size of deficits to surpluses[29]. The solution is to use dummy variables to distinguish between surpluses and deficits. This also recognises that financing behavior may not be the same when firms are faced with a surplus versus a deficit. In (9) the dummy variable S_t takes a value of 1 when there is a financial surplus (negative FDA_t) and a value of zero when there is a financial deficit (positive FDA_t).

$$\Delta TDA_t = (\alpha + \alpha_1 S_t) + (\beta_1 + \beta_2 S_t)\, FDA_t + (\beta_3 + \beta_4 S_t)\, FDA_t^2 + e_t \qquad (9)$$

Equation (9) is a test of the pecking order theory that allows a non-linear relationship between the financial deficit and the change in total debt. It also allows for differences in financing behaviour between financial deficits and surpluses. The closer that β_1 and $(\beta_1 + \beta_2)$ are to the 1 the stronger the support for pecking order theory. The significance and size of β_3 and $(\beta_3 + \beta_4)$ show the nature of constraints on financial deficits and financial surpluses respectively. The significance and size of β_2 and β_4 represent the differences in behavior between financial surpluses and deficits.

In summary while the model developed here draws on previous work, it is new to the literature. The most significant change I have made is in the definition of the financial deficit by using total debt rather than long term debt. The use of dummy variables with the quadratic financial deficit is also new and should overcome some of the interpretation problems in

[29] (De Jong, et al., 2009) point out the same problem stating that "a quadratic term of the financing deficit seems inappropriate as a negative deficit becomes positive when squared"

(Lemmon & Zender, 2008). For ease of comparison I have also used the models of (Frank & Goyal, 2003) and that of (De Jong, et al., 2009) for my sample.

4. Data

This section is a detailed analysis of the summary statistics of the sample, with particular reference to differences between financial deficits and surpluses and firm size. All data has been sourced from the Worldscope Database and includes all companies listed on the ASX over the time period 1995-2009[30]. Consistent with previous studies, firms with an industry classification of Financials and Utilities have been excluded. I have also imposed a minimum asset size of $50m and excluded those firms whose primary listing is not in Australia. Firms are required to have values for each data item and I have excluded extreme values in top and bottom 1% of the distribution for certain variables[31]. The data is all sourced from fiscal year end accounts and consists of 3,852 firm year observations, including 702 unique firms. A full list of data items and corresponding Worldscope codes is available in Appendix 1.

A summary of the firm size data is shown in Table 1. As can be seen by comparing the means and medians the data heavily skewed towards smaller firms and that this trend has become more pronounced over time. This is not an unusual feature as the cost of equity listings has decreased over time which has allowed smaller firms to access public equity markets. The overall skew towards smaller companies is also not unusual but is important for interpretation. For example many researchers have shown that firm size is one of the most consistent variables to be correlated with leverage. The distribution of firm size is shown in Figure 1.

[30] The original intention was to have data from the introduction of the dividend imputation scheme in 1987, however the data availability was not sufficient to have a diverse range of companies necessary for this analysis. 1995 was chosen as the starting year as this was the first to have over 100 companies which I set as a minimum number of companies.

[31] Specifically for FDA_t and CDA_t I removed the top 1% of the sample on both sides of the distribution. Other authors have taken a similar approach with (Frank & Goyal, 2003) using a 0.5% cut-off, (Agca & Mozumdar, 2007) imposing an absolute limit of 400% for all ratios divided by total assets and (Lemmon & Zender, 2008) use 200%.

Table 1. Firm Size Statistics

The sample period is 1995-2009 with financial and utility firms removed and a minimum total asset size of $50m imposed. Figures are in AUD $000's.

Year	Companies	Total Assets (Average)	Market Cap (Average)	Total Assets (Median)	Market Cap (Median)
1995	122	1,530,379	1,417,787	415,486	382,425
1996	145	1,426,420	1,390,318	380,640	385,320
1997	160	1,476,544	1,404,309	420,468	379,055
1998	160	1,562,788	1,199,751	449,543	295,295
1999	174	1,465,389	1,393,083	436,609	302,010
2000	199	1,380,900	1,284,939	331,755	263,098
2001	224	1,369,690	1,356,419	276,357	211,581
2002	283	1,180,448	1,206,368	208,367	171,375
2003	285	1,138,608	1,134,512	216,614	169,964
2004	289	1,254,147	1,468,677	239,816	240,325
2005	313	1,319,015	1,849,540	244,369	238,992
2006	344	1,403,173	2,094,162	242,997	261,168
2007	366	1,744,684	2,689,975	272,707	365,325
2008	388	1,805,072	2,000,709	242,445	205,226
2009	400	1,790,077	1,968,259	238,654	175,586
Total	**3,852**	**1,476,618**	**1,695,157**	**273,541**	**248,859**
Kurtosis		**226.42**	**358.99**		
Skewness		**12.85**	**17.18**		

Figure 1. Firm Size Distribution

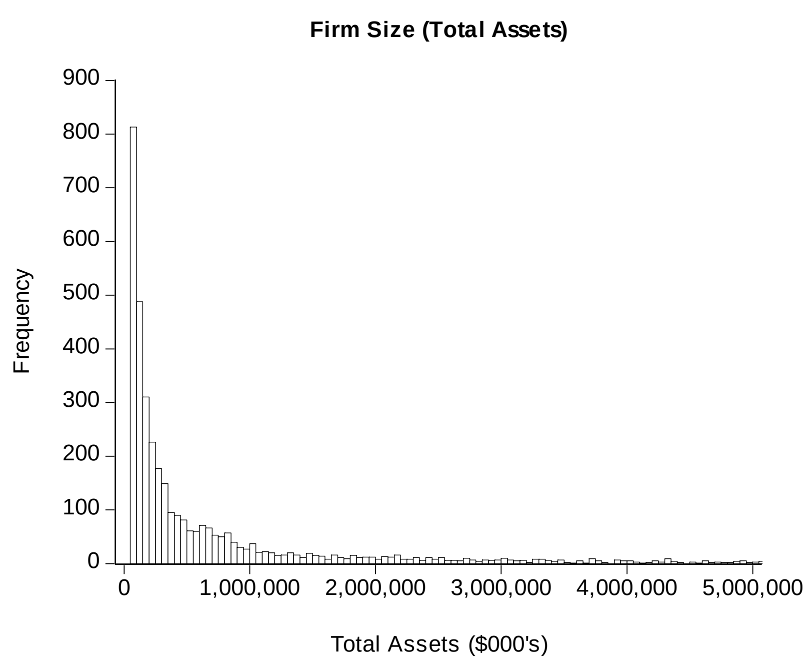


Table 2 shows the average gearing levels for the sample. There are a variety of different measures of leverage that have been used in the literature depending on the nature of the analysis. In this analysis I am not using the leverage ratio directly so this table is more for illustrative purposes. As expected the market leverage ratios are lower than book leverage ratios (which implies that market to book ratios are greater than 1). Long term debt makes up the majority of debt financing..

Table 2. Average Gearing Levels

The sample period is 1995-2009 with financial and utility firms removed and a minimum total asset size of $50m imposed. The market value of total assets is calculated by taking the book value of total assets, subtracting the book value of equity and adding the market capitalisation of the firm.

Year	Total Debt / Total Assets	Long Term Debt / Total Assets	Total Debt / Total Assets (Market)	Long Term Debt / Total Assets (Market)
1995	20.80%	16.37%	16.42%	12.85%
1996	21.63%	16.67%	15.89%	12.30%
1997	23.31%	18.43%	16.66%	13.09%
1998	24.76%	20.03%	20.95%	16.89%
1999	24.77%	19.79%	20.76%	16.61%
2000	23.56%	18.58%	20.54%	15.98%
2001	25.57%	18.88%	21.66%	15.54%
2002	25.59%	17.36%	21.61%	14.50%
2003	24.78%	16.89%	20.82%	13.98%
2004	23.45%	16.51%	18.05%	12.34%
2005	23.42%	17.23%	17.19%	12.23%
2006	25.00%	17.95%	17.99%	12.43%
2007	24.68%	17.86%	16.33%	11.51%
2008	25.01%	18.50%	21.53%	15.38%
2009	24.56%	16.58%	23.92%	15.41%
Total	**24.32%**	**17.74%**	**19.63%**	**13.97%**

Figure 2. Gearing Levels over Time (Book vs. Market Value)

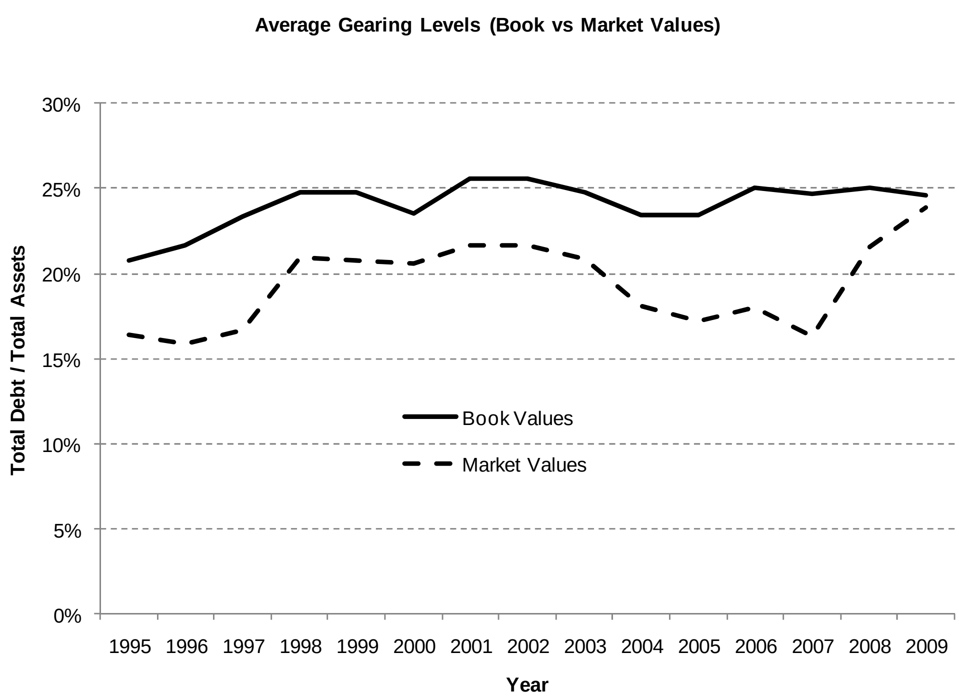


Figure 2 shows average gearing levels over time which are actually relatively stable, although the market leverage ratio exhibits more volatility. This is not surprising but it is interesting to see the recent increase in market leverage ratios that can probably be attributed to the Global Financial Crisis

As mentioned previously the sample is skewed towards smaller firms, which has an important impact on leverage ratios. Table 3 shows the differences in gearing levels for different firm sizes. I have split the sample based on intuitive firm size categories as follows; small firms (total assets < $500m), medium firms (total assets $500m - $2b) and large firms (total assets > $2b)[32]. The firm characteristics are considerably different across these chosen firm size categories. Large firms have considerably more debt (29% vs. 22%) and there are very few firms with no debt at all (<1%). By contrast a reasonable proportion (7%) of small companies have no debt and more than one quarter of the firms are net cash, which means that their cash balances exceed their total amount of debt. This is also quite important for interpretation as it implies that actual leverage ratios are less than the headline numbers would suggest, to the extent that firms are holding excess cash balances.

Table 3. Firm Size and Leverage

The sample period is 1995-2009 with financial and utility firms removed and a minimum total asset size of $50m imposed. Firms are categorised as being small (total assets < $500m), medium (total assets $500m - $2b) and large (total assets > $2b). The No Debt column is the % of firms in that category that have no short or long term debt while the Net Cash column is the % of firms that have cash balances which exceed the value of total debt.

Size	Firm Years	Total Debt / Total Assets	Total Debt / Total Assets (Market)	No Debt	Net Cash
Small	2,429	22.42%	18.61%	7.16%	25.98%
Medium	835	26.39%	21.02%	2.40%	12.81%
Large	588	29.19%	21.85%	0.85%	5.61%
Total	**3,852**	**24.32%**	**19.63%**	**5.17%**	**20.02%**

Table 4 shows the summary statistics for the relative size of the financial deficit across the sample split into two groups, those that with financial deficits (Panel A) and those with financial surpluses (Panel B). Turning to financial deficits first the data shows that more firms have a financial deficit than a surplus, with 60% of firm years having a deficit. Also the average size of financial deficits is actually quite large, representing 20% of the preceding

[32] While this categorisation is ad-hoc I prefer this approach to an equal sized quintile method to get clear differentiation between the categories

year's total assets. There is considerable variation and cyclicality in the size of financial deficits over time which can be clearly seen in Figure 3, the peak in 2007 was 31% with the trough in 1999 of 13%. It is also apparent that the proportion of firms with a financial deficit follows a similar cyclical pattern, for example from 2006-08 the average proportion of firm years having a deficit was 67% while in 1998-2000 the average proportion was 56%. The change in total debt appears to track the financial deficit reasonably closely and averages 61% of the financial deficit. However the variation in the average change in total debt appears to be much less and spikes in the financial deficit are not matched by increasing use of debt. For example in 2007 the average change in debt was 16% compared to the average financial deficit of 31%, which implies that there was a considerable amount of equity financing used in this year. It is also interesting to note that firms with a financial deficit have more leverage compared to the average (26% vs. 24%) and are smaller with the average total asset size being $1.3b compared to the sample average of $1.5b.

Table 4. The Financial Deficit and Change in Total Debt

The sample period is 1995-2009 with financial and utility firms removed and a minimum total asset size of $50m imposed. FDA is the financial deficit (which is defined as $FD_t = I_t + DIV_t + \Delta C_t - CFO_t$) divided by the preceding years total assets. A positive FDA is a financial deficit while a negative FDA is a financial surplus. TDA is the change in total debt divided by the preceding year's total assets. Total Assets are measured in AUD $000's

Panel A – Financial Deficits

Year	Firm Years	FDA	TDA	Total Debt / Total Assets	Total Assets
1995	59.84%	11.98%	7.52%	21.88%	1,897,691
1996	66.21%	12.24%	9.18%	24.57%	1,694,769
1997	61.25%	16.34%	12.08%	24.19%	1,350,824
1998	51.88%	18.24%	13.42%	27.33%	1,384,006
1999	56.32%	13.07%	6.94%	25.86%	1,154,528
2000	60.30%	18.01%	12.12%	25.05%	1,102,997
2001	58.48%	17.92%	15.10%	26.85%	1,252,755
2002	50.18%	16.99%	10.35%	26.15%	1,092,926
2003	50.18%	16.71%	12.58%	29.83%	1,057,637
2004	55.71%	19.20%	9.36%	25.29%	746,371
2005	65.18%	23.22%	15.05%	25.58%	1,293,188
2006	64.24%	22.69%	12.91%	25.46%	1,079,495
2007	68.58%	31.08%	16.33%	25.65%	1,512,831
2008	69.33%	23.97%	14.93%	27.93%	1,217,748
2009	54.00%	13.92%	6.46%	26.85%	1,884,550
Total	**59.87%**	**19.88%**	**12.16%**	**26.15%**	**1,301,577**

Panel B – Financial Surpluses

Year	Firm Years	FDA	TDA	Total Debt / Total Assets	Total Assets
1995	40.16%	-5.29%	-3.11%	19.20%	983,158
1996	33.79%	-4.63%	-3.50%	15.86%	900,675
1997	38.75%	-6.18%	-3.89%	21.92%	1,675,263
1998	48.13%	-5.31%	-2.76%	21.99%	1,755,502
1999	43.68%	-5.26%	-4.03%	23.37%	1,866,236
2000	39.70%	-5.94%	-4.78%	21.29%	1,803,030
2001	41.52%	-6.00%	-3.93%	23.76%	1,534,404
2002	49.82%	-6.90%	-4.57%	25.02%	1,268,591
2003	49.82%	-6.16%	-3.93%	19.70%	1,220,149
2004	44.29%	-4.84%	-2.38%	21.13%	1,892,834
2005	34.82%	-5.59%	-3.14%	19.37%	1,367,352
2006	35.76%	-4.84%	0.26%	24.18%	1,984,740
2007	31.42%	-5.71%	-1.12%	22.58%	2,250,729
2008	30.67%	-5.56%	-4.20%	18.39%	3,132,722
2009	46.00%	-5.38%	-5.33%	21.88%	1,679,174
Grand Total	**40.13%**	**-5.62%**	**-3.40%**	**21.58%**	**1,737,708**

For financial surpluses (Panel B) the size of the surplus is smaller and variation seems to be less than for financial deficits. The average surplus size is 6% of the preceding year's total assets. There does not appear to be a great deal of cyclicality in the average size of the financial surplus. The change in debt for firms with a financial surplus is considerably lower than those with a financial deficit, with the average reduction in debt being 3% of the preceding year's total assets. The average change in debt also appears to track the financial surplus reasonably closely as can be seen in Figure 4, however there is a notable deviation in 2006/07 where less of the surplus was used to repay debt (in 2006 the average change in debt was actually slightly positive). On average the amount of financial surplus used to repay debt is the same as for financial deficits at 61%. The average size of firms with a financial surplus is larger than the sample average ($1.7b vs. $1.5b) and they are less levered with the average leverage ratio being 22% compared to the sample average of 24%.

Figure 3. Average FDA vs. TDA for Firms With a Financial Deficit

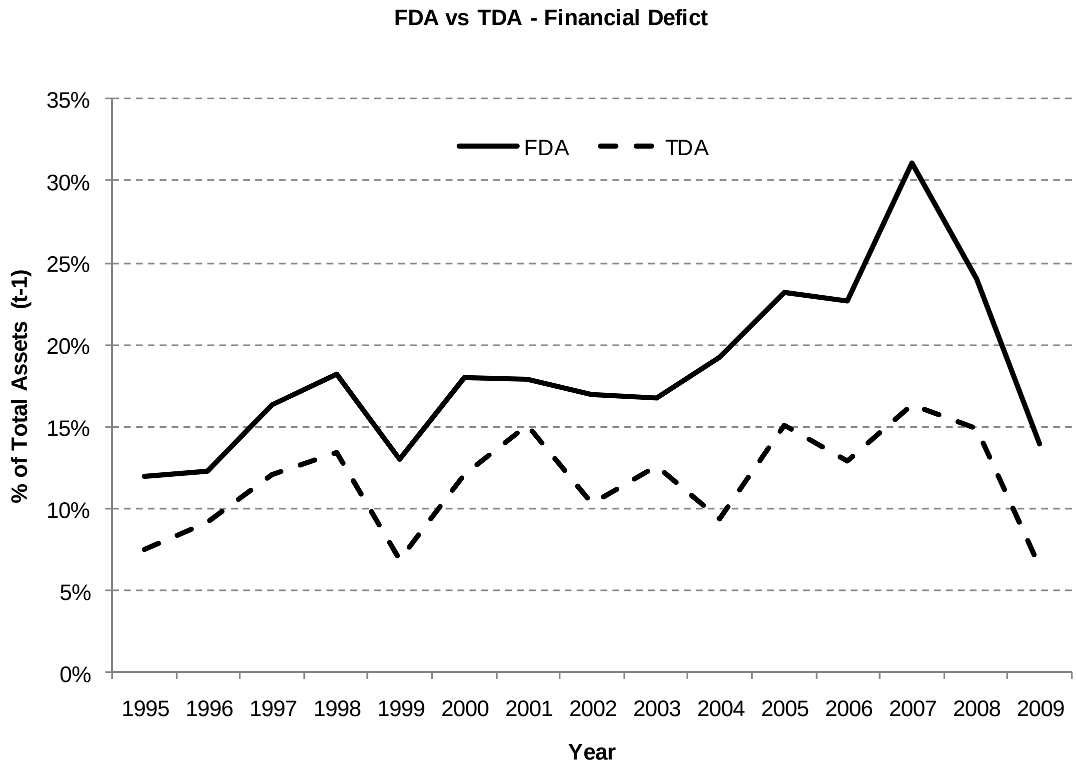
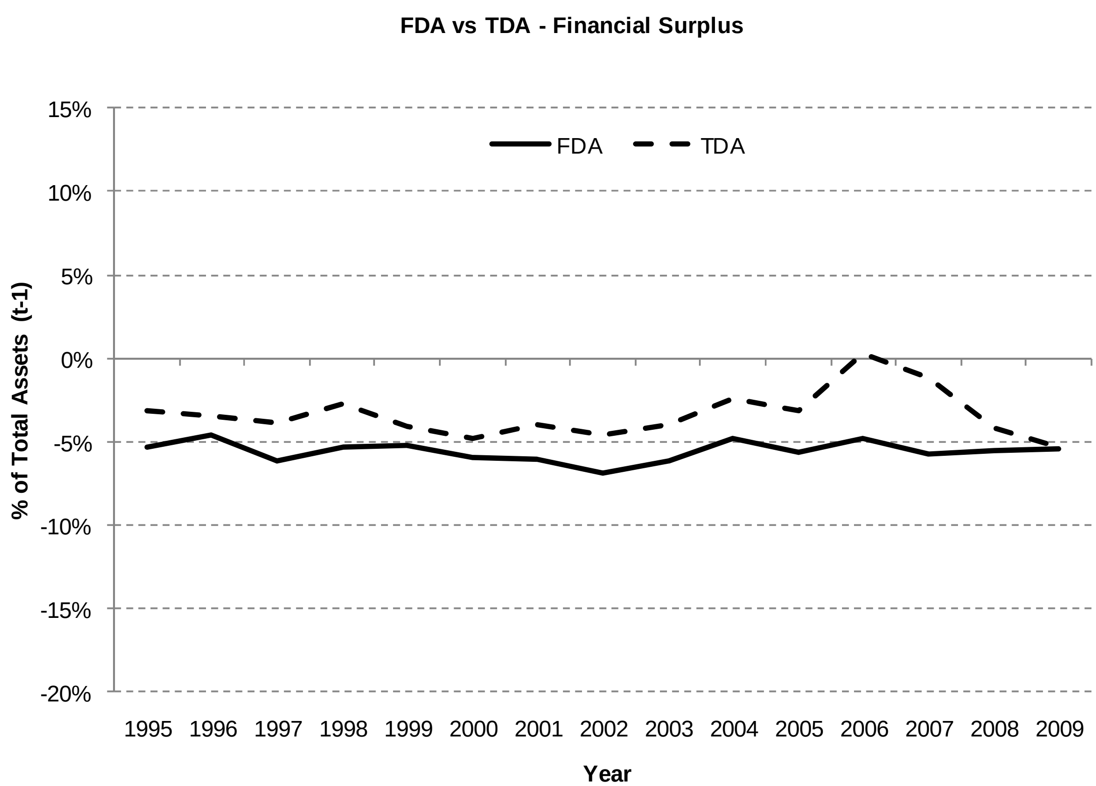


Figure 4. Average FDA vs. TDA for Firms With a Financial Surplus



To further decompose the differences between financial deficits and surpluses Table 5 shows the cash flows that make up the financial deficit and also how this varies across firm size. Firms with a financial deficit are shown in Panel A with the most important component of the financial deficit being capital expenditure, which averages 20% of the preceding year’s total assets. Operating cash flows on average are 11% while investment in working capital is 3%, investment in cash balances -4% (which represents an increase in cash balances) and dividend payments 4%. The average change in total debt of 12% is predominantly made up of long term debt at 8% with short term debt making up 4%. What is interesting from this table is that operating cash flows are relatively consistent across firm size at 11% but the size of the financial deficit varies considerably from 22% down to 14%. The ratio of the deficit that is financed by changes in debt also varies considerably across firm size. On average small firms’ finance 54% of the financial deficit with debt while large firm finance 83% of the financial deficit with debt. This trend is consistent with leverage ratios being lower for smaller firms. Also interesting is that the proportion of short term debt used for smaller firms is higher than for larger firms, small firms use 33% compared to large firm using 29%. In summary small firms that have a financial deficit appear to be investing relatively more than large firms and financing less of this investment with debt.

Turning to financial surpluses in Panel B the obvious difference is the amount of capital expenditure, which is much lower at 3% of the preceding year’s total assets. However operating cash flows are reasonably similar at 12% as are dividend payments at 4%. Investment in cash balances and working capital are negative for surpluses at -1% & -2% respectively. The similarities in operating cash flow suggest that the main reason for firms facing financial surpluses is due to lower capital expenditure as opposed to variations in operating cash flow. The differences across firm size for firms with financial surpluses are not as dramatic as for those with financial deficits. Small firms with financial surpluses have higher capital expenditure but also higher profitability, the size of the financial surplus is not that different across firm size groups. Large firms on average will use more of the surplus to retire debt, with small firms only using 51% while large firms will use 69%. Leverage levels are lower for firms facing financial surpluses and the same pattern emerges with smaller firms having less debt than large firms. Consistent with the data from firms with financial deficits, small firms retire relatively more short term debt than long term debt than large firms (36% vs. 29%) when facing a financial surplus.

Table 5. Cash Flow Breakdown

The sample period is 1995-2009 with financial and utility firms removed and a minimum total asset size of $50m imposed. Firms are categorised as being small (total assets < $500m), medium (total assets between $500m and $2b) and large (total assets > $2b). All items are divided by total assets from the preceding year except for the leverage ratio which is total debt divided by the current year's total assets.

Panel A – Financial Deficits

Firm Size	Total	Small (<$500m)	Medium ($500m - 2b)	Large (>$2b)
CAPEX	20.04%	20.63%	20.33%	16.96%
Operating Workng Capital	2.56%	2.95%	2.37%	1.11%
Capital Requirements	**22.60%**	**23.59%**	**22.69%**	**18.08%**
Operating Cash Flows	11.09%	11.13%	11.05%	10.97%
Cash Dividends	-4.07%	-4.22%	-3.93%	-3.60%
Change in Cash	-4.30%	-4.91%	-2.89%	-3.70%
Internal Funding	**2.72%**	**1.99%**	**4.23%**	**3.67%**
Financial Deficit	**19.88%**	**21.60%**	**18.46%**	**14.41%**
Change in Short Term Debt	3.88%	3.87%	4.19%	3.41%
Change in Long Term Debt	8.29%	7.73%	9.75%	8.55%
Change in Total Debt	**12.16%**	**11.60%**	**13.94%**	**11.96%**
Firm Years	2,306	1,473	503	330
Firm Years / Total		63.88%	21.81%	14.31%
Total Debt / Total Assets	26.15%	24.06%	28.82%	31.40%
% Defict filled by Debt	61.17%	53.72%	75.51%	82.97%

Panel B – Financial Surpluses

Firm Size	Total	Small (<$500m)	Medium ($500m - 2b)	Large (>$2b)
CAPEX	3.22%	3.86%	2.56%	1.65%
Operating Workng Capital	-1.84%	-1.52%	-1.33%	-3.70%
Capital Requirements	**1.37%**	**2.34%**	**1.23%**	**-2.04%**
Operating Cash Flows	11.95%	13.17%	10.15%	9.73%
Cash Dividends	-3.83%	-4.02%	-3.47%	-3.60%
Change in Cash	-1.13%	-0.86%	-0.56%	-2.85%
Internal Funding	**6.99%**	**8.29%**	**6.13%**	**3.27%**
Financial Deficit	**-5.62%**	**-5.95%**	**-4.90%**	**-5.32%**
Change in Short Term Debt	-1.14%	-1.09%	-1.33%	-1.06%
Change in Long Term Debt	-2.26%	-1.94%	-2.90%	-2.62%
Change in Total Debt	**-3.40%**	**-3.04%**	**-4.23%**	**-3.68%**
Firm Years	1,546	956	332	258
Firm Years / Total		61.84%	21.47%	16.69%
Total Debt / Total Assets	21.58%	19.90%	22.70%	26.38%
% Defict filled by Debt	60.51%	51.03%	86.30%	69.29%

I have also grouped firms by the size of the financial deficit and examined the differences across firms with financial surpluses and deficits. To do this I take a similar approach to the firm size categories and group the data based on intuitive size limits rather than quintiles. This is because the distribution for financial deficits is skewed towards smaller observations and there is considerable asymmetry between financial deficits and surpluses. Figure 5 & 6 depict the distribution for firms with financial surpluses and deficits respectively. The obvious feature of both charts is that most of the observations are close to zero. More than half of the entire sample has a financial deficit +/- 5% of the preceding year's total assets. The asymmetry is strongly visible as well with the maximum financial surplus at 34% while the maximum deficit is 278%[33]. Bearing the shape of the distribution in mind I have chosen size categories as follows; small deficits (<5%), medium deficits (5-15%), large deficits (15-50%) and very large deficits (>50%), these are all based on absolute values. I think it is important to realise that small deficits are probably not that relevant for capital structure decisions as no matter how they are financed it will not change gearing levels by that much. The fact that more than 50% of the data can be classified as either a small deficit or small surplus is probably indicative of capital expenditure planning by firms to match capital requirements with internal funding sources that are available.

Table 6 shows the summary statistics based on these deficit size categories. What is interesting is that for the small and medium deficit size categories and for firms with a financial deficit the average financial deficit is very close to the average change in total debt. However as the size of the financial deficit increases the relationship appears to break down. For firms with a very large financial deficit the average deficit size is 96% compared to the average increase in total debt of 43%. It is also interesting that for firms with large and very large deficits the average firm size is considerably smaller than the sample average firm size ($1.5b) and also the average firm size for firms with a financial deficit ($1.3b (from Table 4)). For firms with a financial surplus there does not seem to be a relationship with the deficit size and the ratio of the average financial surplus and change in total debt, which is consistent across the categories. What is interesting is that the average firm size for those firms with a small financial surplus is almost identical to those firms with a small financial deficit.

[33] As mentioned previously the FDA series has had the top/bottom 1% of the distribution excluded, the truncation point of 34% is clearly visible in Figure 5. The scale for both Figure 5 & 6 has been set identical for ease of comparison although there are observations outside the maximum 200% for Figure 5.

However for firms with a medium size surplus the average firm size is considerably higher at \$2.4b.

Table 6. Financial Deficit Size

The sample period is 1995-2009 with financial and utility firms removed and a minimum total asset size of \$50m imposed. The deficit size is categorised as being small (FDA < 5%), medium (FDA 5-15%), large (FDA 15-50%) and very large (FDA >50%). The categories are based on the absolute value (abs) of FDA. FDA is the financial deficit (which is defined as $FD_t = I_t + DIV_t + \Delta C_t - CFO_t$) divided by the preceding years total assets. A positive FDA is a financial deficit while a negative FDA is a financial surplus. TDA is the change in total debt divided by the preceding year's total assets. Total Assets are measured in AUD \$000's

Deficit Size	Small (<5% abs)	Medium (5-15% abs)	Large (15-50% abs)	Very Large (>50% abs)
Deficits				
Firm Years	828	664	591	223
Total Assets	1,550,415	1,287,103	1,044,102	1,103,104
FDA	2.10%	9.36%	27.86%	96.13%
TDA	2.28%	7.71%	19.38%	43.00%
Surpluses				
Firm Years	921	497	128	
Total Assets	1,547,430	2,351,252	724,536	
FDA	-2.01%	-8.48%	-20.46%	
TDA	-1.21%	-5.04%	-12.76%	

Figure 5. Financial Surpluses

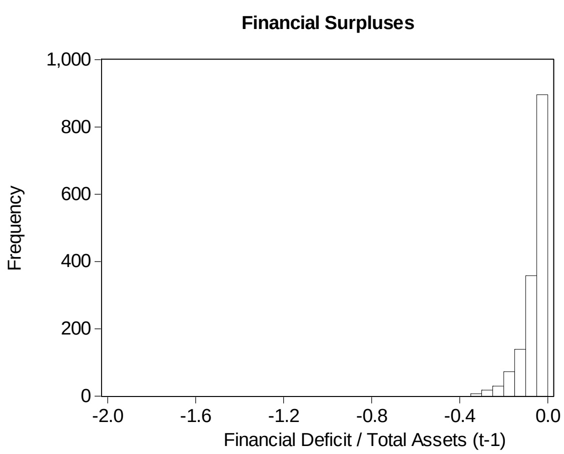
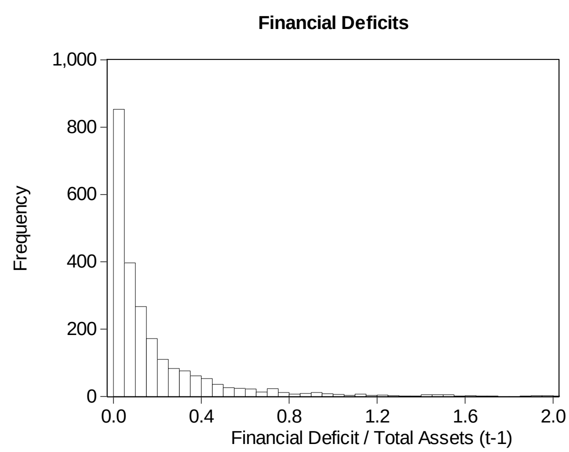


Figure 6. Financial Deficits



In summary the analysis of this sample shows clear differences between firms with financial surpluses and those with financial deficits, the distribution for both is skewed with most observations relatively close to zero. Average gearing levels are reasonably stable over time (when using book value of total assets) and a considerable proportion (approximately 1/5) of the sample are in a net cash position. Smaller firms have higher financial deficits which are mainly driven by higher capital expenditure requirements, however they use relatively less debt to finance this expenditure and some use no debt at all, leverage ratios are lower.

Profitability is reasonably consistent across the firm size categories as are dividend payments. There are clear differences in financing behavior based on the size of the financial deficit and it appears that large deficits are funded less by debt than small and medium sized deficits. Overall this analysis appears to be supportive of pecking order behavior with constraints as evidenced by lower use of debt by small firms (most likely to face financial constraints) and less use of debt with increasing size of financial deficits. The next section investigates these relationships empirically.

5. Results

This first part of this section is an application of the models developed by (Frank & Goyal, 2003), (De Jong, et al., 2009) and (Lemmon & Zender, 2008) to my sample. I will refer to these models as FG, DVV and LZ respectively. As outlined in the literature review there has been relatively little research into capital structure in Australia and to my knowledge these models have not been tested with Australian data. One of the main goals of this thesis was to allow a meaningful comparison to be made with these studies, so I have replicated their work as closely as possible with my sample.

The work of (Frank & Goyal, 2003) was an extension of the seminal paper by (Shyam-Sunder & Myers, 1999) who first introduced the financial deficit model as a method for testing the pecking order theory. As discussed in the literature review they found strong support for the pecking order theory but their results were later shown to be specific to the sample they used, which required continuous data for the entire sample period. (Frank & Goyal, 2003) was the first major study to extend the financial deficit model to a larger unrestricted sample and they found that the explanatory power of the model reduced substantially. For the period 1971-1989 the financial deficit coefficient for the restricted sample (requiring continuous data) was 0.75, while for the unrestricted sample this was only 0.28. Or put another way for the unrestricted sample firms on average used more equity than debt to fund their financial deficit, which was entirely the opposite prediction of the pecking order theory. The explanatory power of the model reduced from having an adjusted R^2 of 0.70 to just 0.27 for the unrestricted sample. (Frank & Goyal, 2003) also found that the pecking order model performed worse over a more recent time period. For the period 1990-1998 the financial deficit coefficients were much lower and the explanatory power greatly reduced. These results were interpreted as being strong evidence against the pecking order theory.

Table 7. FG Model (Results Reproduced from (Frank & Goyal, 2003))

Their sample was US firms from the time period 1971-1998 and has been broken into two subsamples. Financial and utility firms were removed as were firms with missing data values. The restricted sample required each firm to have complete data for each year of the sample period. All variables were scaled by total assets. The model estimated was $\Delta D_t = \alpha + \beta_1 FD_{FGt} + e_t$ where FD_{FGt} is the FG definition of the financial deficit; $FD_{FGt} = I_t + DIV_t + \Delta W_t - CF_t$. Numbers in parentheses are the standard errors

	Period 1971-1989		**Period 1990-1998**	
	Unrestricted Sample	**Restricted Sample**	**Unrestricted Sample**	**Restricted Sample**
α_0	-0.005***	0.001*	-0.007***	-0.004***
	(<0.001)	(<0.001)	(0.001)	(0.001)
β_1	0.283***	0.748***	0.148***	0.325***
	(0.002)	(0.004)	(0.002)	(0.004)
Adjusted R^2	0.265	0.708	0.120	0.283
N	89,883	14,952	57.687	18,225

*** Significant at the 0.01 level
* Significant at the 0.1 level

Table 8. FG Model (My Sample)

The sample period is 1995-2009 with financial and utility firms removed and a minimum total asset size of \$50m imposed, firms with missing data values are removed as well as the top and bottom 1% of observations. The restricted sample requires each firm to have complete data for each year of the sample period. All variables are scaled by total assets. The model estimated was $\Delta D_t = \alpha + \beta_1 FD_{FGt} + e_t$ where FD_{FGt} is the FG definition of the financial deficit; $FD_{FGt} = I_t + DIV_t + \Delta W_t - CF_t$. Numbers in parentheses are the standard errors

	Unrestricted Sample	**Restricted Sample**
α_0	0.001	0.002
	(0.001)	(0.003)
β_1	0.450***	0.553***
	(0.010)	(0.024)
Adjusted R^2	0.364	0.402
N	3,852	773

*** Significant at the 0.01 level

Table 8 shows the results of the FG model for my sample .These results show more support for the pecking order model for the unrestricted sample with a coefficient of 0.45 and R^2 of 0.36. There is also less divergence between the restricted and unrestricted samples but the same pattern is observed with a higher coefficient and explanatory power for the restricted sample. However the results for the restricted sample are well below the (Frank & Goyal, 2003) results for 1971-1989, where they estimated a coefficient of 0.75 and R^2 value of 0.70. So while the results for my sample would not necessarily be considered strong support for the pecking order theory they are certainly stronger than what was reported by (Frank & Goyal, 2003) for the unrestricted sample, particularly in comparison to the period 1990-1998 which has the most overlap with my sample.

However as pointed out by (Frank & Goyal, 2003) the key difference in firm characteristics between the restricted and unrestricted samples is that of firm size. They showed that firm size was critical to the performance of the pecking order model with smaller firms less likely to follow the pecking order theory relative to larger firms. Their interpretation was that this finding was even stronger evidence against the pecking order theory as small firms would be expected to face higher asymmetric information costs and exhibit a greater reluctance to issue equity. Therefore they should have a higher preference for debt financing. Table 9 shows the results for the FG model with the sample grouped by the firm size categories from the previous section

Table 9. FG Model and Firm Size

The sample period is 1995-2009 with financial and utility firms removed and a minimum total asset size of \$50m imposed, firms with missing data values are removed as well as the top and bottom 1% of observations. The model estimated was $\Delta D_t = \alpha + \beta_1 FD_{FGt} + e_t$ where FD_{FGt} is the FG definition of the financial deficit; $FD_{FGt} = I_t + DIV_t + \Delta W_t - CF_t$. Firms are categorised as being small (total assets < \$500m), medium (total assets \$500m - \$2b) and large (total assets > \$2b), total assets are measured in \$AUD. Numbers in parentheses are the standard errors

	Unrestricted Sample	**Small Firm Size (<\$500m)**	**Medium Firm Size (\$500m - \$2b)**	**Large Firm Size (>\$2b)**
α_0	0.001	-0.001	0.001	0.005
	(0.001)	(0.002)	(0.003)	(0.003)
β_1	0.450***	0.413***	0.560***	0.510***
	(0.010)	(0.011)	(0.021)	(0.029)
Adjusted R^2	0.364	0.348	0.455	0.342
N	3,852	2,431	832	589

*** Significant at the 0.01 level

Like (Frank & Goyal, 2003) I also have found differences in the explanatory power of the model across firm size, but to a much smaller and less consistent degree. Small firms show less support with a lower estimated coefficient of 0.41 compared to 0.56 and 0.51 for medium and large firms respectively. (Frank & Goyal, 2003) split their sample into quartiles based on firm size and estimate coefficients of 0.16, 0.43, 0.62 and 0.75 from the smallest to largest firm size quartile. So while the criteria I use for firm size is different, it does not appear that the estimated coefficient increases with firm size to the same extent as for the FG sample. This could be related to my earlier finding of less divergence between the unrestricted and restricted sample in Table 8.

The second model I have applied to my sample is the DVV model, which is an extension of the FG model in that it allows differences in financing behavior between financial deficits and surpluses. I have already shown the differences in the distribution characteristics for financial deficits and surpluses in the previous section which would support the idea that they need to be analysed differently. The DVV model uses a dummy variable to allow different intercepts and slope coefficients for deficits and surpluses. Table 10 shows the results of DVV model applied to my sample in comparison with their reported results.

Table 10. DVV Model

My sample was Australian firms over the time period 1995-2009 with financial and utility firms removed and a minimum total asset size of $50m imposed, firms with missing data values were removed as well as the top and bottom 1% of observations. All variables are scaled by total assets. The DVV sample was US companies over the time period 1971-2005 which excludes financial and utility firms and those with missing data values. The model estimated is $\Delta D_t = (\alpha_0 + \alpha_1 S_t) + (\beta_1 + \beta_2 S_t)\ FD_{FGt} + e_t$ where FD_{FGt} is the FG definition of the financial deficit; $FD_{FGt} = I_t + DIV_t + \Delta W_t - CF_t$. S_t is a dummy variable that takes the value of 1 if $FD_t<0$ or 0 if $FD_t>=0$. Numbers in parentheses are the standard errors.

	My Sample	**DVV Sample**
α_0	0.020***	0.029***
	(0.002)	(0.001)
α_1	-0.020***	-0.027***
	(0.003)	(0.001)
β_1	0.332***	0.155***
	(0.014)	(0.005)
β_2	0.255***	0.746***
	(0.029)	(0.013)
Adjusted R^2	0.386	0.390
N	3,852	233,909

*** Significant at the 0.01 level

My results have very different coefficients but like (De Jong, et al., 2009) show differences between financial deficits and surpluses with both the intercept and coefficient on the dummy variable being statistically significant. I find a coefficient of 0.33 (β_1) for financial deficits and 0.59 for financial surpluses ($\beta_1 + \beta_2$) while they found a coefficient of 0.15 for financial deficits and 0.90 for financial surpluses. The explanatory power of the model is similar with an R^2 value of 0.39 for both studies. However the improvement in explanatory power for my sample is negligible between the DVV and FG model as it increases from 0.36 to 0.39, in contrast the explanatory power for (De Jong, et al., 2009) increased from 0.23 (not shown in the table) to 0.39. Therefore the difference in coefficients between financial deficits and surpluses did not have much of an impact on the explanatory power of the FG model in my sample but did for the sample used by (De Jong, et al., 2009).

Another important feature of the (De Jong, et al., 2009) results was the high and significant intercept term for financial deficits. This is economically significant as it implies that a firm with a zero financial deficit will be increasing debt by 2.9% of the preceding year's total assets. In the previous section I showed that the distribution of financial deficits is strongly skewed towards zero (more than 50% of the observations are +/- 5%). To illustrate the importance of the intercept term let's take an example of a firm with a 5% financial deficit. Using the estimated coefficients from the DVV model for the (De Jong, et al., 2009) sample this firm would fund the financial deficit by increasing debt by 3.7% (2.9% + 0.155 x 5%) of the preceding years total assets, or put another way, the firm would cover 74% of the deficit with debt. Using the estimated DVV model from my sample yields an identical result with total debt increasing by 3.7% (2.0% + 0.332 x 5%). Therefore despite the very different estimated coefficients for the two samples using the DVV model the differences in the intercept actually result in a similar magnitude of debt financing for a large part of the sample distribution. This highlights the danger of making an incorrect interpretation that the low financial deficit coefficient of 0.155 implies weak support for the pecking order theory. However for financial surpluses the negative intercept on the dummy variable almost cancels out the positive intercept term for deficits so the estimated increase in total debt for firms with a surplus close to zero is also close to zero. The (De Jong, et al., 2009) results therefore show stronger support for the pecking order theory as it applies to surpluses (due to the higher coefficient on both dummy variable) than in my sample but not necessarily weaker support for financial deficits due to the magnitude of the intercept term.

Table 11 shows the results from the DVV model applied to different firm size groups in my sample, which shows the same pattern as the results from the FG model. Smaller firms have a lower coefficient for financial deficits than medium and large firms. However for financial surpluses small firms have a higher coefficient than medium and large firms. This could indicate that small firms are more constrained so they will use more of their financial surpluses to reduce debt or alternatively that they expect to have higher capital expenditure requirements in the future so want to preserve more future debt capacity. In summary the direct comparisons of my sample with the (Frank & Goyal, 2003) and (De Jong, et al., 2009) studies show that the data in my sample is different to these two studies. There seems to be more support for the pecking order theory in my sample using the FG model and there does not seem to be the same degree of divergence between the restricted and unrestricted samples or across different firm sizes. Using the DVV model I find asymmetry between financial surpluses and deficits but this does not help to explain much more of the variation in changes in long term debt as it does for the results from (De Jong, et al., 2009).

Table 11. DVV Model and Firm Size

The sample is Australian firms over the time period 1995-2009 with financial and utility firms removed and a minimum total asset size of $50m imposed, firms with missing data values are removed as well as the top and bottom 1% of observations. The model estimated is $\Delta D_t = (\alpha_0 + \alpha_1 S_t) + (\beta_1 + \beta_2 S_t)\, FD_{FGt} + e_t$ where FD_{FGt} is the FG definition of the financial deficit; $FD_{FGt} = I_t + DIV_t + \Delta W_t - CF_t$. S_t is a dummy variable that takes the value of 1 if $FD_t<0$ or 0 if $FD_t>=0$. Firms are categorised as being small (total assets < $500m), medium (total assets $500m - $2b) and large (total assets > $2b), total assets are measured in $AUD. Numbers in parentheses are the standard errors.

	Unrestricted Sample	**Small Firm Size (<$500m)**	**Medium Firm Size ($500m - $2b)**	**Large Firm Size (>$2b)**
α_0	0.020***	0.019***	0.018***	0.024***
	(0.002)	(0.003)	(0.005)	(0.006)
α_1	-0.020***	-0.017***	-0.020***	-0.024***
	(0.003)	(0.004)	(0.007)	(0.009)
β_1	0.332***	0.302***	0.456***	0.359***
	(0.014)	(0.016)	(0.030)	(0.049)
B$_2$	0.255***	0.276***	0.206***	0.198**
	(0.029)	(0.036)	(0.067)	(0.081)
Adjusted R^2	0.386	0.372	0.468	0.355
N	3,852	2,431	832	589

*** Significant at the 0.01 level

** Significant at the 0.05 level

I now turn to the results from my alternative definition of the financial deficit which removes short term debt from the right hand side of the financial deficit equation and includes short term debt on the left hand side of the financial deficit models. The results are shown in Table 12 for both the FG and DVV model. The results are very similar under my definition with only marginal changes in the explanatory power of the two models and marginal changes in the magnitude of the coefficients. Therefore while my definition does not appear to add anything in terms of explanatory power, it does not appear to detract anything either. I find this definition more intuitively and theoretically appealing and have used it for the rest of the thesis.

Table 12. Alternative Financial Deficit Definition

The sample is Australian firms over the time period 1995-2009 with financial and utility firms removed and a minimum total asset size of $50m imposed, firms with missing data values are removed as well as the top and bottom 1% of observations. All variables are scaled by total assets at the start of the period. My amendment to the FG model is $\Delta TD_t = \alpha + \beta_1 FD_t + e_t$ and to the DDV model is $\Delta TD_t = (\alpha_0 + \alpha_1 S_t) + (\beta_1 + \beta_2 S_t) FD_t + e_t$ where ΔTD_t is change in total debt (as opposed to long term debt) and the financial deficit is defined as $FD_t = I_t + DIV_t + \Delta C_t - CFO_t$. S_t is a dummy variable that takes the value of 1 if $FD_t<0$ or 0 if $FD_t>=0$. Numbers in parentheses are the standard errors.

	Unrestricted Sample (FG Model)	**Restricted Sample (FG Model)**	**Unrestricted Sample (DVV Model)**
α_0	0.018***	0.007	0.047***
	(0.003)	(0.004)	(0.004)
α_1			-0.048***
			(0.007)
β_1	0.423***	0.566***	0.370***
	(0.009)	(0.024)	(0.010)
β_2			0.222***
			(0.070)
Adjusted R^2	0.349	0.418	0.368
N	3,852	775	3,852

*** Significant at the 0.01 level

Following the (Frank & Goyal, 2003) finding that the work of (Shyam-Sunder & Myers, 1999) did not generalize across a continuous sample and that their results were highly sensitive to firm size the focus of the literature has been on understanding why smaller firms use less debt. The obvious answer is that it is more difficult and expensive for these firms to access debt markets. If this is the case then the (Frank & Goyal, 2003) findings would not necessarily contradict the pecking order theory, so long as firms were unable to follow the pecking order financing hierarchy due to constraints on debt capacity. There have been several approaches taken to empirically examine the pecking order model with debt capacity constraints. As a first step I chose to follow (Lemmon & Zender, 2008) who added a quadratic term to the FG model, however I extend their model by including dummy variables to differentiate between financial deficits and surpluses which is equation (9) in the methodology section. I will term my model the RC model for the remainder of the thesis. Table 13 shows a comparison of the results of the RC model against the LZ model for my sample

Table 13. RC Model

The sample is Australian firms over the time period 1995-2009 with financial and utility firms removed and a minimum total asset size of $50m imposed, firms with missing data values are removed as well as the top and bottom 1% of observations. All variables are scaled by total assets at the start of the period. The RC model is $\Delta TD_t = (\alpha_0 + \alpha_1 S_t) + (\beta_1 + \beta_2 S_t)\ FD_t + (\beta_3 + \beta_4 S_t)\ FD^2_t + e_t$ where ΔTD_t is change in total debt and the financial deficit is defined as $FD_t = I_t + DIV_t + \Delta C_t - CFO_t$. S_t is a dummy variable that takes the value of 1 if $FD_t<0$ or 0 if $FD_t>=0$. The LZ model is $\Delta TD_t = \alpha_0 + \beta_1\ FD_t + \beta_3\ FD^2_t + e_t$. Numbers in parentheses are the standard errors.

	My Model	**LZ Model**
α_0	0.012***	0.010***
	(0.004)	(0.003)
α_1	-0.005	
	(0.008)	
β_1	0.698***	0.698***
	(0.022)	(0.016)
β_2	0.183	
	(0.177)	
β_3	-0.210***	-0.209***
	(0.013)	(0.011)
β_4	1.545**	
	(0.750)	
Adjusted R^2	0.410	0.409
N	3,852	3.852

*** Significant at the 0.01 level

** Significant at the 0.05 level

The first point to note is that explanatory power is marginally improved over the DVV model with an R^2 of 0.41 versus 0.37. What is interesting is the much higher magnitude of the financial deficit coefficient of 0.70; also the coefficient on the quadratic term for the financial deficit is negative and significant. This implies that the use of debt decreases with the size of the financial deficit, which is the expected result. The dummy variable for the quadratic term is positive and significant, which implies that the amount of the financial surplus applied to reduce total debt decreases with the size of the surplus. However the coefficients for the dummy variables for the intercept and slope are not significant. Both models estimate a very similar coefficient for β_1 and β_3 and have almost identical explanatory power. This suggests that after allowing for a non-linear relationship between the deficit and change in debt that there is no difference in the relationship between financial deficits and surpluses, which is the opposite interpretation that I made using the DVV model. This highlights the advantages of the RC model as it allows more precise interpretations to be made by allowing for a non-linear relationship between the financial deficit and change in debt as well as allowing for differences between financial deficits and surpluses. The LZ or DVV models by themselves would not be able to make this distinction.

Table 14 shows the differences across the firm size groupings using the RC model. There are strong differences across firm size, which are more noticeable than for the DVV model. The results at first glance seem quite counterintuitive as the significance of the quadratic term for the financial deficit increases with firm size. This is the opposite of what would be expected as large firms should theoretically vary their financing behavior less over the size the financial deficit. They should have fewer constraints on issuing debt, lower transaction costs for issuing equity and lower asymmetric information costs. All of these factors suggest that while large firms should exhibit different financing behavior to small firms, this should not be based on the deficit size, or at least not to the same degree as for small firms. However if I return to the statistics on deficit size in the previous section there was a notable difference in average firm size for large and very large sized deficits in comparison to small and medium sized deficits. The average firm size for small and medium sized deficits was larger and the average deficit size for large firms was lower. Therefore the quadratic term may not be so relevant for the bulk of the observations for the large firm category. As an illustration I have plotted the estimated equations from the RC model in Figures 7 and 8. For Figure 7 I have deliberately chosen the depicted range to exclude very large financial deficit size category, with the range for the financial deficit going from -50% to +50% which corresponds to the small, medium and large deficit size categories (and which contains 94% of the sample). As can be seen from the chart the estimated equation is pretty close to linear over this range with only slight curvature being observable.

Table 14. RC Model and Firm Size

The sample is Australian firms over the time period 1995-2009 with financial and utility firms removed and a minimum total asset size of \$50m imposed, firms with missing data values are removed as well as the top and bottom 1% of observations. All variables are scaled by total assets at the start of the period. The model is $\Delta TD_t = (\alpha_0 + \alpha_1 S_t) + (\beta_1 + \beta_2 S_t)\, FD_t + (\beta_3 + \beta_4 S_t)\, FD^2_t + e_t$ where ΔTD_t is change in total debt and the financial deficit is defined as $FD_t = I_t + DIV_t + \Delta C_t - CFO_t$. S_t is a dummy variable that takes the value of 1 if $FD_t<0$ or 0 if $FD_t>=0$. Firms are categorised as being small (total assets < \$500m), medium (total assets \$500m - \$2b) and large (total assets > \$2b), total assets are measured in \$AUD. Numbers in parentheses are the standard errors.

	Entire Sample	**Small Firm Size (<\$500m)**	**Medium Firm Size (\$500m - \$2b)**	**Large Firm Size (>\$2b)**
α_0	0.012***	0.014***	0.006	-0.013
	(0.004)	(0.005)	(0.008)	(0.011)
α_1	-0.005	-0.001	-0.009	0.017
	(0.008)	(0.011)	(0.015)	(0.020)
β_1	0.698***	0.609***	0.885***	1.180***
	(0.022)	(0.026)	(0.046)	(0.073)
β_2	0.183	0.284	0.053	-0.215
	(0.177)	(0.228)	(0.347)	(0.429)
β_3	-0.210***	-0.197***	-0.217***	-0.460***
	(0.013)	(0.015)	(0.025)	(0.045)
β_4	1.545**	1.596	1.478	2.238
	(0.750)	(0.989)	(1.417)	(1.701)
Adjusted R^2	0.410	0.363	0.589	0.467
N	3,852	2,429	835	588

*** Significant at the 0.01 level

** Significant at the 0.05 level

Figure 7. RC Model for Small, Medium and Large Deficits

This is a graph showing the estimated equation from the RC model across different financial deficit sizes for the different firm size categories. However I have only used the coefficients that are significantly different from zero (I used a 0.1 significance level as a cutoff), for those that were insignificant I used a zero value i.e. α_1, β_2 and β_4 were all set to zero. The range has been set to only plot financial deficits between -50% and 50% (which corresponds to the small, medium and large deficit size categories). Figure 8 is the same graph over a wider financial deficit range of -250% to 250%.

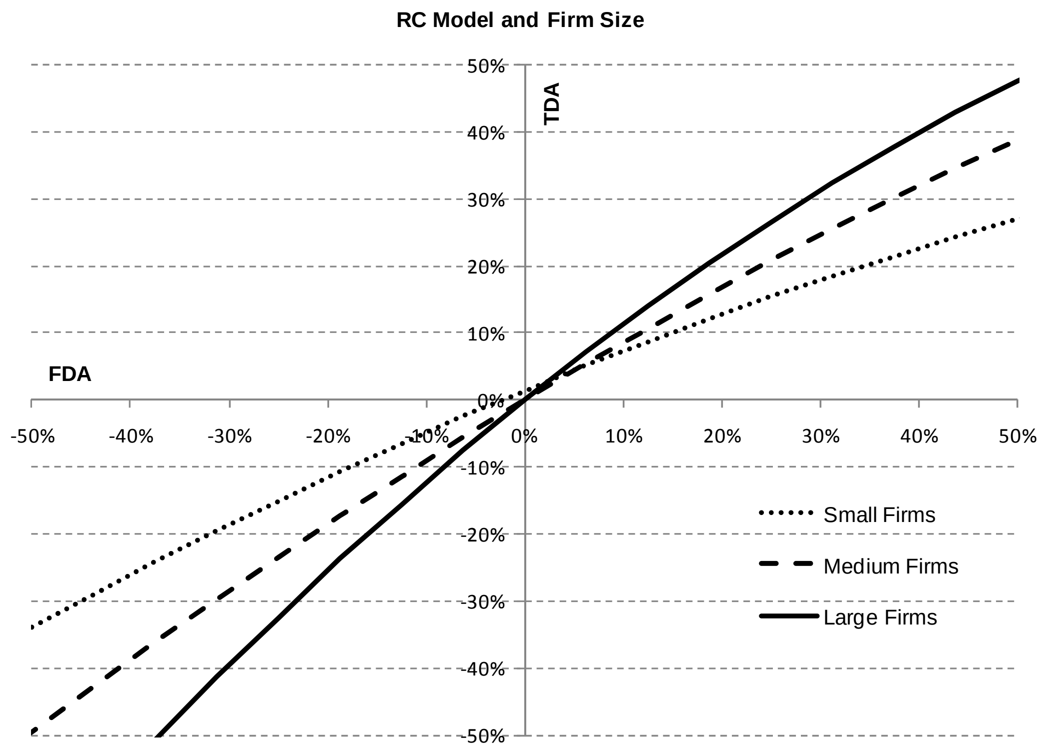


Figure 8. RC Model Including Very Large Deficits

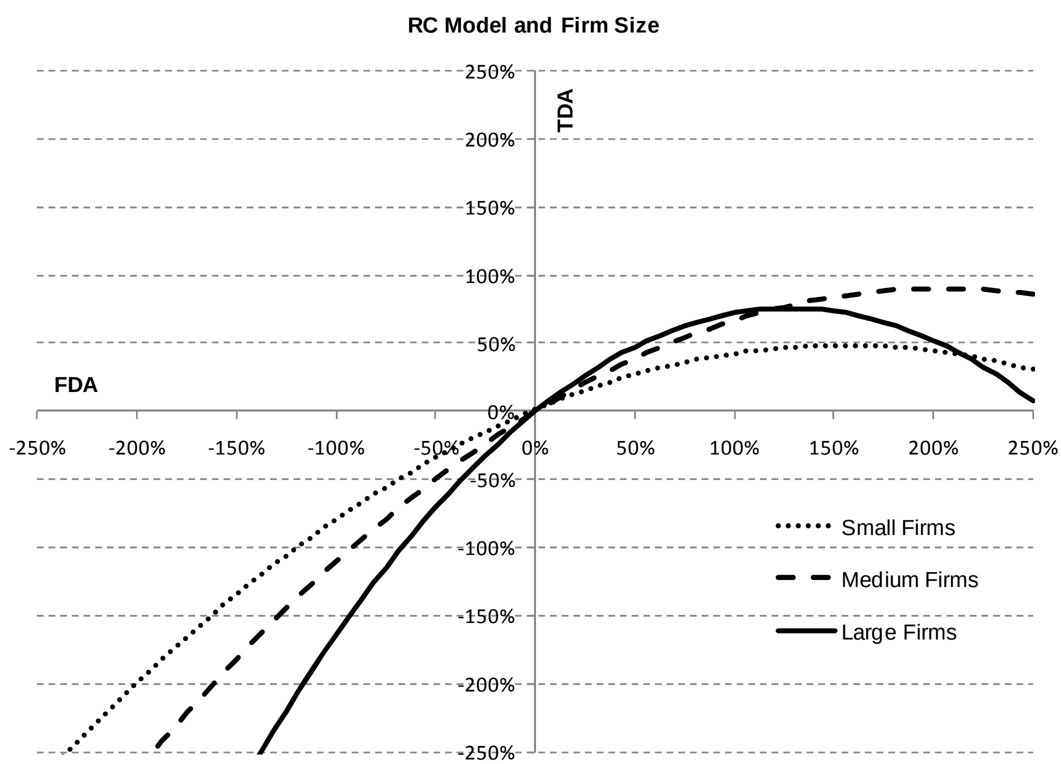


Figure 8 shows the same equations plotted over a larger financial deficit range of -250% to 250% which includes the very large deficit size category. It is easy to see from these two charts that the curvature in the quadratic model only starts to have a large impact for very large financial deficits. These charts highlight that while the quadratic model has improved explanatory power for the entire sample, for the vast majority of the observations the relationship is reasonably close to linear and not vastly different between financial surpluses and deficits. This is apparent by the insignificance of the dummy variables for the intercept (α_1) and slope (β_2) across all firm size categories.

The RC model highlights the weaknesses in interpretation when using the FG and DVV models, which are heavily influenced by the deficit size. For the majority of my sample which lies in the small, medium and large size financial deficit categories (94% of the sample) there is relatively strong support for pecking order behavior, particularly for larger firms. However as shown in Figure 8 this relationship falls away sharply for very large deficits. By allowing for a non-linear relationship between the financial deficit and change in total debt I no longer find differences between financial deficits and surpluses as the dummy variable are no longer significant. However the explanatory power of the RC model is still relatively low with an R^2 of 0.41 for the entire sample (although it is higher for medium and large firms).

The next step in my analysis is to examine the impact of debt capacity on my results. Debt capacity constraints have been a key focus of the recent literature on the pecking order theory of capital structure following the findings of (Frank & Goyal, 2003) who showed that firm size is critical to the performance of the theory. Debt capacity (or lack of debt capacity) could be a reason why small firms issue more equity than large firms, it could be that firms have a clear order of preference for debt financing over equity but have a higher risk profile that prevents them from accessing debt funding beyond a certain level.

The (Lemmon & Zender, 2008) approach to control for debt capacity was based on access to public debt markets. They used a logit model with firm specific characteristics as explanatory variables for the probability whether a firm had a credit rating, which controls for the problem of excluding credit worthy companies that had chosen not to access public debt markets. This approach is relatively simple but does suffer from the drawback that it heavily favors large firms (who are more likely to have a credit rating) over small firms. There is also the problem of differences across different credit ratings; for example there is a big difference in the debt capacity of firms that issue A graded debt versus firms that issue C graded debt. It is very simplistic to assume homogeneity across credit rating grades. This approach is also difficult to apply to the Australian market where there is a greater use of bank debt than in the US Market. (Agca & Mozumdar, 2007) use a piecewise linear model whereby they estimate a firms debt capacity from factors that have been shown to be important in cross sections regressions from the static trade-off theory literature[34]. A more simplistic approach is taken by (De Jong, et al., 2009) who use the same factors but split the sample into two groups based on whether they are above or below the median for each of the factors. For example they classify constrained firms as having below median sales, below median asset tangibility, below median profitability and above median market-to-book ratios. This suffers from the problem that each factor is assumed to be equally important and mutually exclusive. It is also immediately biases the results by using sales (which is good proxy for firm size) as a sorting factor i.e. it is not possible for a firm with above median sales to fall into the constrained category.

I have taken a different approach by controlling for debt capacity by using Altman's Z-Score as a measure of financial distress. This measure has been used for a long time to predict bankruptcy and despite being developed in 1968 has still shown to be remarkably accurate[35], and is also very easy to calculate. The score is based on 5 common accounting ratios that contain information about a firm's liquidity, leverage, profitability and productivity. The weighting of each ratio was determined using discriminant analysis based on a paired sample of bankrupt and non-bankrupt firms. I have decided to use the original coefficients in (Altman, 1968) which have become industry practice[36]. More importantly the original Z-score coefficients have also been shown to be effective at predicting bankruptcy in Australia[37]. The original coefficients and ratios are shown in (10).

[34] The factors used are profitability, market-to-book ratio, tangibility and sales.

[35] For example a recent study by (Russ, Achilles, & Greenfield Jr, 2009) found that the original Z-score model and coefficients still has a 72% accuracy rate in predicting bankruptcy.

[36] Compustat provides users with Z-score using the original coefficients without the user having to perform any calculations.

[37] See (Bishop, Crapp, Faff, & Twite, 1994)

Z-Score = 1.2 WCTA + 1.4 RETA + 3.3 EBITTA + 0.6 MVEBL + STA (10)

WCTA – Working Capital / Total Assets
RETA – Retained Earnings / Total Assets
EBITTA – EBIT / Total Assets
MVEBL – Market Value of Equity / Book Value of Liabilities
STA – Sales / Total Assets

The WCTA ratio is a measure of the net liquid assets of the firm relative to total assets and is defined as the difference between current assets and liabilities. Ordinarily a firm experiencing consistent operating losses will have shrinking current assets in relation to total assets. RETA is a representation of the total amount of reinvested earnings and losses over the firm's lifetime and as such is a measure of cumulative profitability over time. It is also an indirect measure of leverage and past financing decisions as firms with high retained earnings have financed their assets through the reinvestment of profits. The EBITTA ratio is a measure of current profitability and is independent of leverage so is the best measure of the earning power of the firm's assets. MVEBL is the inverse of the debt/equity ratio and simply a current leverage measure, in other versions of the Z-score (such as for unlisted companies) the book value of equity is substituted for the market value of equity. Finally STA is a reflection of the sales generating ability of the firm's assets.

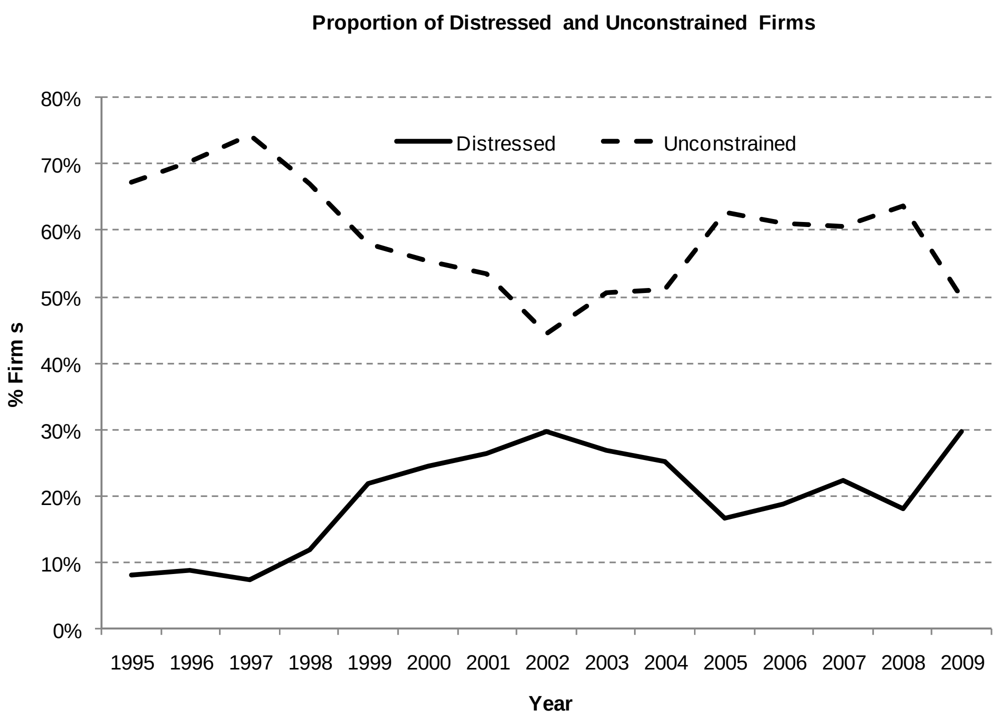
The Z-Score was intended as a measure of bankruptcy probability with the lower the score the more likely the firm would be in financial distress. The cutoff score traditionally used is 1.81 which meant that firms with a Z-score of below 1.81 are predicted to file for bankruptcy. A softer cutoff score of 2.67 is used a second measure of financial distress with these firms being likely to file for bankruptcy. I use the same cutoff scores in this analysis, so firms with a Z-score of under 1.81 I have classified as being in financial distress, firms with a Z-score between 1.81 and 2.67 are classified as being capacity constrained while firms with a Z-score above 2.67 are viewed as being unconstrained with respect to further debt issuance. Table 15 shows the proportion of firms in each category over time, which is also plotted in Figure 9 for distressed and unconstrained firms.

Table 15. Proportion of Firms in Z-Score Categories by Year

The sample period is 1995-2009 with financial and utility firms removed and a minimum total asset size of $50m imposed, firms with missing data values are removed. The data shown is the proportion of firms in each year for each Z-Score category. The categories are based on the preceding year's Z-score and are categorised as follows; distressed (Z-Score less than 1.81), constrained (Z-Score 1.81-2.67) and unconstrained (Z-Score over 2.67). The Z-scores are generated from Altman's original coefficients, with each ratio being winsorised at the 1% and 99% level.

Year	Distressed (<1.81)	Constrained (1.81-2.67)	Unconstrained (>2.67)
1995	8.20%	24.59%	67.21%
1996	8.97%	20.69%	70.34%
1997	7.50%	18.13%	74.38%
1998	11.88%	21.25%	66.88%
1999	21.84%	20.11%	58.05%
2000	24.62%	20.10%	55.28%
2001	26.34%	20.09%	53.57%
2002	29.68%	25.80%	44.52%
2003	27.02%	22.46%	50.53%
2004	25.26%	23.53%	51.21%
2005	16.61%	20.77%	62.62%
2006	18.90%	20.06%	61.05%
2007	22.40%	16.94%	60.66%
2008	18.04%	18.30%	63.66%
2009	29.75%	20.25%	50.00%
Total	**21.34%**	**20.66%**	**58.00%**

Figure 9. Proportion of Firms classified as Distressed and Unconstrained



As can be seen (and as expected) the scores are cyclical with firms in distressed category peaking in 2009 and also reaching elevated levels from 2001-03. The average proportion of firms in the distressed category is 21% while the proportion of firms in the unconstrained category is 58%.

One of the key advantages of using the Z-score to measure debt capacity is that the score is not unduly influenced by firm size. This is apparent in Table 16 which shows the proportion of firms in each firm size category in each Z-score category. The proportion of small, medium and large firms that are classified as being distressed is very consistent at 21% while the proportion of firms that are classified as being unconstrained is actually skewed towards smaller firms, with 62% of small firms being classified as unconstrained compared to 45% of large firms. The proportion of firms in the unconstrained category with a financial deficit is relatively high at 64%, which suggests that capacity impacts whether a firm has a deficit or surplus regardless of how it is financed. A similar trend emerges when looking at the number of firms with a financial deficit relative to Z-Score categories, 62% of these firms are in the unconstrained category while only 53% of the firms with a financial surplus are in the unconstrained category.

Table 16. Proportions of Firms in Z-Score Categories by Firm Size

The sample period is 1995-2009 with financial and utility firms removed and a minimum total asset size of \$50m imposed, firms with missing data values are removed. The data shown is the proportion of firms in each year for each Z-Score category. The categories are based on the preceding year's Z-score and are categorised as follows; distressed (Z-Score less than 1.81), constrained (Z-Score 1.81-2.67) and unconstrained (Z-Score over 2.67). The Z-Scores are generated from Altman's original coefficients, with each ratio being winsorised at the 1% and 99% level. Firms are categorised as being small (total assets < \$500m), medium (total assets \$500m - \$2b) and large (total assets > \$2b), total assets are measured in \$AUD. The financial deficit is defined as $FD_t = I_t + DIV_t + \Delta C_t - CFO_t$ with a positive FD representing a deficit while a negative FD represents a surplus.

Firm Size	Distressed (<1.81)	Constrained (1.81-2.67)	Unconstrained (>2.67)
Small (<\$500m)	21.37%	16.47%	62.17%
Medium (\$500m - \$2b)	21.20%	23.47%	55.33%
Large (>\$2b)	21.43%	34.01%	44.56%
Total	**21.34%**	**20.66%**	**58.00%**
Financial Deficits	19.38%	19.04%	61.58%
Financial Surplus	24.26%	23.09%	52.65%
Financial Deficits (of Category)	54.38%	55.15%	63.56%
Financial Surplus (of Category)	45.62%	44.85%	36.44%

Table 17 shows a breakdown of the characteristics of firms in each of the Z-Score categories and also split by whether they have a financial deficit or surplus. The purpose of this table is to examine how well the categories appear to differentiate firms in relation to capacity constraints.

Table 17. Z-Score Category Characteristics

The sample period is 1995-2009 with financial and utility firms removed and a minimum total asset size of $50m imposed, firms with missing data values are removed. The categories are based on the preceding year's Z-score and are categorised as follows; distressed (Z-Score less than 1.81), constrained (Z-Score 1.81-2.67) and unconstrained (Z-Score over 2.67). The Z-scores are generated from Altman's original coefficients, with each ratio being winsorised at the 1% and 99% level. Panel A shows statistics for firms with a financial deficit (FDA>0) while Panel B show is for firms with a financial surplus (FDA<0). FDA is the financial deficit (which is defined as $FD_t = I_t + DIV_t + \Delta C_t - CFO_t$) divided by the preceding years total assets. Total Assets are measured in AUD $000's

Panel A – Financial Deficits

Z-Scores	Distressed (<1.81)	Constrained (1.81-2.67)	Unconstrained (>2.67)
CAPEX	14.08%	17.73%	22.64%
Operating Cash Flow	5.76%	8.05%	13.71%
Dividend Payments	1.34%	2.77%	5.33%
Financial Deficit	15.58%	18.17%	21.77%
Change in Total Debt	9.41%	11.04%	13.38%
Total Debt / Total Assets	39.10%	31.15%	20.52%
EBIT / Interest Expense (median)	2.54	3.95	8.00
Total Debt / EBIT (median)	5.72	3.73	2.04
Total Assets	1,249,762	1,880,477	1,138,918
Firm Years	447	439	1,420
Firms Net Cash	38	25	333

Panel B – Financial Surpluses

Z-Scores	Distressed (<1.81)	Constrained (1.81-2.67)	Unconstrained (>2.67)
CAPEX	1.01%	2.00%	4.77%
Operating Cash Flow	8.41%	8.74%	14.98%
Dividend Payments	1.15%	2.42%	5.69%
Financial Deficit	-6.74%	-5.99%	-4.94%
Change in Total Debt	-4.50%	-3.64%	-2.79%
Total Debt / Total Assets	34.22%	26.62%	13.55%
EBIT / Interest Expense (median)	3.19	4.22	11.23
Total Debt / EBIT (median)	3.77	2.93	1.07
Total Assets	1,782,596	2,616,229	1,331,731
Firm Years	375	357	814
Firms Net Cash	46	40	289

Starting with Panel A which shows financial deficits, the characteristics of firms that are unconstrained is clearly different from those that are constrained or distressed. The size of the financial deficit is increasing over the constraint categories from 16% for distressed firms to 22% for unconstrained firms, which is being driven by CAPEX showing the same trend over the categories. Unconstrained firms are considerably more profitable and also have a greater ability to pay dividends. The gearing metrics show that the unconstrained firms have much lower debt levels, with total debt to total assets at 21% compared to 39% and 31% in the distressed and constrained categories. The other gearing metrics, EBIT interest coverage and total debt to EBIT, show the same trend across the categories. Panel B for financial surpluses shows the same underlying trends, unconstrained firms are considerably more profitable and also are able to make higher dividend payments. The absolute size of the financial surplus is lower as they are spending more in CAPEX. Like financial deficits the gearing metrics show that the unconstrained firms have considerably less leverage with total debt to total assets being 14% compared to 34% and 27% for the distressed and constrained categories. In summary it appears that the Z-Score categories do a reasonably good job at differentiating firms based on their ability to support further debt across a variety of metrics.

I now turn to the results from estimating my pecking order model for different subsamples based on the Z-Score debt capacity categories shown in Table 18. The first point to note is that the model performs better for the unconstrained category than for both the constrained and distressed categories in terms of explanatory power, with an R^2 of 0.45. The model performs poorly for the distressed firm category with an R^2 of just 0.31 and no evidence of statistical significance for the quadratic terms. This may seem counterintuitive as distressed firms could be expected to have the strongest theoretical justification for a non-linear relationship between FDA and TDA. However if we return to the characteristics of firms in the distressed category, there was a higher proportion of firms with a financial surplus and the average financial deficit was considerably lower than firms in the other two categories. The non-linear relationship was most relevant for very large financial deficits which may not be as applicable for these firms.

For all of the categories the dummy variables for financial surpluses are insignificant, suggesting no difference in financing behavior between financial deficits and surpluses after controlling for the size of the deficit. This is the same result as what was found earlier when I split the sample by firm size. The constrained firm category pecking order coefficient is relatively high at 0.91 and the quadratic term for financial deficits is also relatively large at -0.35 and significant. For the unconstrained firm category the intercept term is large (0.019) and statistically significant, which as mentioned previously in the discussion of the (De Jong, et al., 2009) results understate the true size of the pecking order coefficient. To use a numerical example, the estimated change in total debt for a firm in the unconstrained category with a 5% financial deficit would increase debt by 5.2% based on the estimated coefficients i.e. more than 100% of the deficit would be funded by debt. So while the coefficient is lower than that of the entire sample, the larger intercept term means that for smaller deficits firms in the unconstrained category actually use more debt financing. The intercept term is only significant for the unconstrained category.

Table 18 – RC Model and Debt Capacity

The sample is Australian firms over the time period 1995-2009 with financial and utility firms removed and a minimum total asset size of $50m imposed, firms with missing data values are removed as well as the top and bottom 1% of observations. All variables are scaled by total assets at the start of the period. The model is $\Delta TD_t = (\alpha_0 + \alpha_1 S_t) + (\beta_1 + \beta_2 S_t) FD_t + (\beta_3 + \beta_4 S_t) FD^2_t + e_t$ where ΔTD_t is change in total debt and the financial deficit is defined as $FD_t = I_t + DIV_t + \Delta C_t - CFO_t$. S_t is a dummy variable that takes the value of 1 if $FD_t<0$ or 0 if $FD_t>=0$. The categories are based on the preceding year's Z-score and are categorised as follows; distressed (Z-Score less than 1.81), constrained (Z-Score 1.81-2.67) and unconstrained (Z-Score over 2.67). The Z-Scores are generated from Altman's original coefficients, with each ratio being winsorised at the 1% and 99% level. Numbers in parentheses are the standard errors.

	Entire Sample	Distressed Firms (<1.81)	Constrained Firms (1.81-2.67)	Unconstrained Firms (>2.67)
α_0	0.012***	0.018	-0.009	0.019***
	(0.004)	(0.011)	(0.010)	(0.005)
α_1	-0.005	-0.008	0.005	-0.011
	(0.008)	(0.019)	(0.017)	(0.010)
β_1	0.698***	0.515***	0.913***	0.659***
	(0.022)	(0.083)	(0.055)	(0.026)
β_2	0.183	0.277	-0.145	0.202
	(0.177)	(0.401)	(0.358)	(0.243)
β_3	-0.210***	-0.058	-0.345***	-0.179***
	(0.013)	(0.090)	(0.028)	(0.015)
β_4	1.545**	-0.102	2.135	1.558
	(0.750)	(1.700)	(1.377)	(1.083)
Adjusted R^2	0.410	0.310	0.383	0.454
N	3,852	822	796	2,234

*** Significant at the 0.01 level

The next step is to examine how firm size impacts the results after controlling for debt capacity. Table 19 shows the results by firm size but only for firms in the unconstrained category.

Table 19 – Unconstrained Firms and Firm Size

The sample is Australian firms over the time period 1995-2009 with financial and utility firms removed and a minimum total asset size of $50m imposed, firms with missing data values are removed as well as the top and bottom 1% of observations. All variables are scaled by total assets at the start of the period. The regression model is $\Delta TD_t = (\alpha_0 + \alpha_1 S_t) + (\beta_1 + \beta_2 S_t)\, FD_t + (\beta_3 + \beta_4 S_t)\, FD^2_t + e_t$ where ΔTD_t is change in total debt and the financial deficit is defined as $FD_t = I_t + DIV_t + \Delta C_t - CFO_t$. S_t is a dummy variable that takes the value of 1 if $FD_t<0$ or 0 if $FD_t>=0$. The categories are based on the preceding year's Z-score and are categorised as follows; distressed (Z-Score less than 1.81), constrained (Z-Score 1.81-2.67) and unconstrained (Z-Score over 2.67). The Z-Scores are generated from Altman's original coefficients, with each ratio being winsorised at the 1% and 99% level. Firms are categorised as being small (total assets < $500m), medium (total assets $500m - $2b) and large (total assets > $2b), total assets are measured in $AUD. Numbers in parentheses are the standard errors.

	Unconstrained Firms (>2.67)	**Small Firms (<$500m)**	**Medium Firms ($500m - $2b)**	**Large Firms (>$2b)**
α_0	0.019***	0.021***	0.027**	-0.021
	(0.005)	(0.006)	(0.012)	(0.017)
α_1	-0.011	-0.015	-0.020	0.032
	(0.010)	(0.012)	(0.022)	(0.033)
β_1	0.659***	0.576***	0.717***	1.260***
	(0.026)	(0.028)	(0.065)	(0.102)
β_2	0.202	-0.014	0.844	-0.320
	(0.243)	(0.282)	(0.550)	(0.671)
β_3	-0.179***	-0.176***	-0.067*	-0.474***
	(0.015)	(0.016)	(0.037)	(0.058)
β_4	1.558	-0.368	5.217**	3.133
	(1.083)	(1.31)	(2.416)	(2.563)
Adjusted R^2	0.454	0.428	0.635	0.501
N	2,234	1,510	462	262

*** Significant at the 0.01 level

** Significant at the 0.05 level

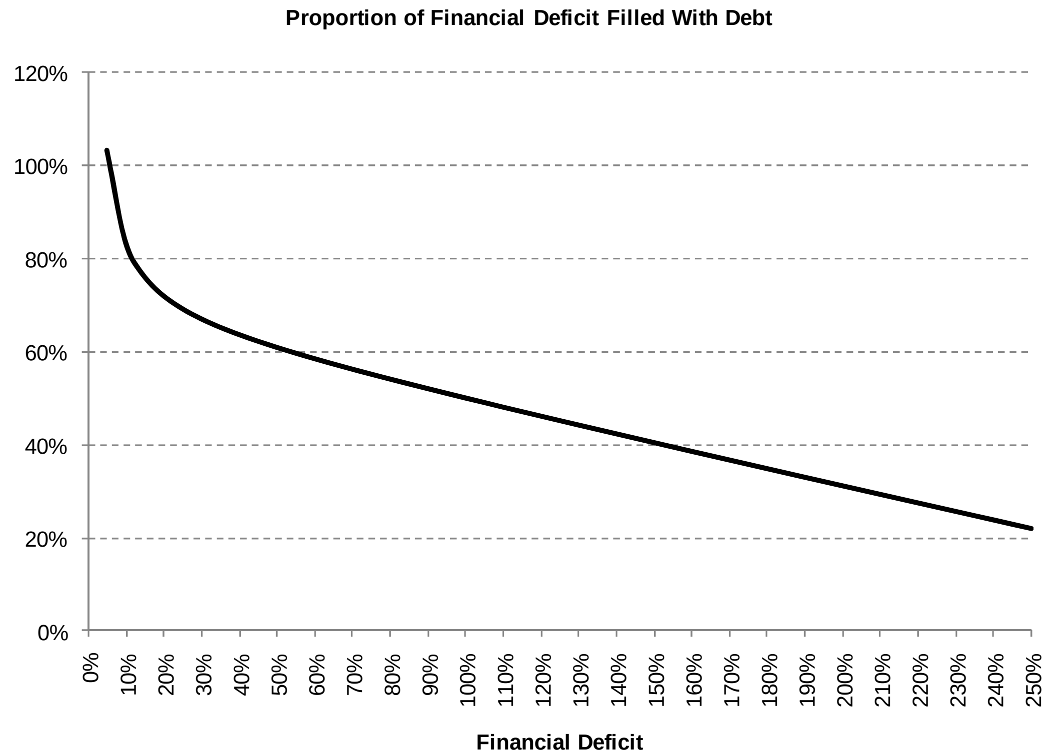
* Significant at the 0.1 level

The pattern of these results is similar to Table 14 which shows the entire sample split by size category. The explanatory power is worst for small firms (R^2 of 0.43), and the magnitude of the financial deficit coefficient increases with firm size. The intercept and slope dummies (α_1 and β_2) are insignificant across all size categories, however the quadratic term dummy variable (β_4) is strongly positive and significant for medium size firms. There are also differences in the magnitude and significance of the intercept terms and across the size categories. What is interesting is that the explanatory power increases for all size categories and by a similar magnitude. This is particularly true for medium size firms where the model actually fits the data quite well and is supportive of pecking order behavior. However the key conclusion from these results is that even when adjusting for debt capacity, the model does not explain much of the variation in changes in total debt by small firms, which make up the bulk of the sample. The reason for the RC model performing worse for small firms does not appear to be due to debt capacity.

In summary while the results presented here have similar patterns to what other researchers have found. I find that firm size is important and that that estimated pecking order equations for small firms have less explanatory power than for large firms. However unlike other researchers I cannot conclude that this is due to constraints on debt capacity. My analysis shows that controlling for debt capacity only results in a small improvement in the explanatory power of the model and the magnitude of improvement is consistent across the firm size categories. The results are still the weakest for small firms. The results from the RC model are generally supportive of pecking order behavior. Figure 10 is an illustration of the estimated pecking order behavior with the estimated coefficients from my sample (from Table 13) and shows clearly that small deficits are mostly filled with debt but that this ratio diminishes over the size of the financial deficit, due to negative coefficient on the quadratic term. However for the vast majority of observations my results indicate a high proportion of the deficit is filled with debt financing. To put these numbers into perspective the estimated equation implies that a firm with a 100% financial deficit (a firm that is doubling in size) would be financing this deficit with 50% debt and 50% equity, for any deficit less than 100% the proportion of debt used is higher.

Figure 10. Proportion of the Estimated Change in Debt relative to the Financial Deficit

This graph is based on the results from Table 13 and represents the ratio of estimated TDA values divided by the FDA value. The depiction is only for financial deficits and starting from an FDA value of 5%.



The RC model has shown reasonable improvements over the FG and DVV models and shows improved results after being adjusted for debt capacity, but the key problem is that explanatory power is still low with an R^2 value of 0.45 (for the unconstrained debt capacity category). By way of comparison (Lemmon & Zender, 2008) found a financial deficit coefficient of 0.79 and an R^2 value of 0.75 for their subsample that is the least constrained by debt capacity. Their results are similar in magnitude to (De Jong, et al., 2009) who found a financial deficit coefficient of 0.81 and an R^2 value of 0.78 for their unconstrained debt capacity subsample. The magnitude of these differences is also similar to the magnitude in differences between the unrestricted and the restricted sample as in Table 7 and the difference across size categories found by other researchers. (Frank & Goyal, 2003) estimated a coefficient of 0.16 and 0.75 for their smallest and largest firm size categories respectively while my estimates were 0.41 and 0.51 i.e. a relatively minor improvement for my sample.

The question now becomes whether the differences in my results can be attributed to the methods used or if they are a feature of the sample. While there are subtle differences in the approach that I have taken in several areas, the process is conceptually similar to previous work so it is more likely to be due to the sample. There has been very little research done on capital structure in the Australian market so it is hard to make comparisons based on other studies. However one commonly cited difference between the composition the Australian share market in comparison to other markets is the importance of the resources sector. For robustness I have analysed the results excluding resource companies, which are presented in Table 21. I also have the summary statistics of resource firms in my sample shown in Table 20.

Table 20 – Resources Firms Characteristics

The sample is Australian firms over the time period 1995-2009 with financial and utility firms removed and a minimum total asset size of $50m imposed, firms with missing data values are removed as well as the top and bottom 1% of observations. The financial deficit is defined as $FD_t = I_t + DIV_t + \Delta C_t - CFO_t$ and is scaled by total assets at the start of the period. A positive FD_t is a financial deficit while a negative FD_t is a financial surplus

Panel A – Financial Deficits

	Non-Resource Firms	Resource Firms	Entire Sample
CAPEX	17.41%	28.79%	20.04%
Operating Cash Flow	10.57%	12.81%	11.09%
Dividend Payments	4.51%	2.62%	4.07%
Financial Deficit	18.02%	26.10%	19.88%
Change in Total Debt	12.39%	11.42%	12.16%
Total Debt / Total Assets	27.59%	21.35%	26.15%
Total Assets	1,085,330	2,020,913	1,301,577
Cumulative Total Assets	1,924,290,111	1,077,146,416	3,001,436,527
Firm Years	1,773	533	2,306

Panel B – Financial Surpluses

	Non-Resource Firms	Resource Firms	Entire Sample
CAPEX	1.98%	7.41%	3.22%
Operating Cash Flow	10.38%	17.30%	11.95%
Dividend Payments	3.90%	3.59%	3.83%
Financial Deficit	-5.47%	-6.11%	-5.62%
Change in Total Debt	-3.05%	-4.60%	-3.40%
Total Debt / Total Assets	23.16%	16.19%	21.58%
Total Assets	1,152,094	3,731,465	1,737,708
Cumulative Total Assets	1,376,751,925	1,309,744,163	2,686,496,088
Firm Years	1,195	351	1,546

The first point to note is that while from a total assets perspective resource companies are very important to the sample the number of resource firms is not excessive. For example there are 884 resource firm year observations which represent 23% of the sample, however the cumulative total asset value of the resource firm year observations represent 42% of the sample. The pecking order models that are used in this thesis scale the financial deficit and change in total debt by the preceding years total assets so it is the number of resource companies that are important not the asset value. Another consideration is the relative size of the two largest Australian resource companies, BHP Billiton and RIO Tinto. These two companies alone account for 60% of the cumulative assets for resources firm year observations and 25% of the cumulative assets of the entire sample. This is important for interpretation of Table 20 as it is heavily influenced by the characteristics of these two firms. However the important characteristics of resources firms is that they have higher CAPEX regardless of whether they have a financial deficit or surplus and have lower gearing for both financial deficits and surpluses.

The results for the RC model for non resource firms shown in Table 21 are fairly similar to the total sample. The explanatory power of the model does improve slightly and the financial deficit coefficient is higher (0.76 compared to 0.70), but the quadratic term is also more negative which offsets the higher pecking order coefficient to some extent. It is unlikely that the differences between my findings and other researchers can be attributed to the importance of resource firms to the Australian market.

Table 21. RC Model and Non Resource Firms

The sample is Australian firms over the time period 1995-2009 with financial, utility and resource firms removed and a minimum total asset size of $50m imposed, firms with missing data values are removed as well as the top and bottom 1% of observations. All variables are scaled by total assets at the start of the period. The model is $\Delta TD_t = (\alpha_0 + \alpha_1 S_t) + (\beta_1 + \beta_2 S_t)\ FD_t + (\beta_3 + \beta_4 S_t)\ FD^2_t + e_t$ where ΔTD_t is change in total and the financial deficit is defined as $FD_t = I_t + DIV_t + \Delta C_t - CFO_t$. S_t is a dummy variable that takes the value of 1 if $FD_t<0$ or 0 if $FD_t>=0$. The categories are based on the preceding year's Z-Score and are categorised as follows; distressed (Z-Score less than 1.81), constrained (Z-Score 1.81-2.67) and unconstrained (Z-Score over 2.67). The Z-scores are generated from Altman's original coefficients, with each ratio being winsorised at the 1% and 99% level. Numbers in parentheses are the standard errors.

	Non Resource Firms (All Categories)	**Distressed Non Resource Firms (<1.81)**	**Constrained Non Resource Firms (1.81-2.67)**	**Unconstrained Non Resource Firms (>2.67)**
α_0	0.014***	0.014	-0.010	0.024***
	(0.005)	(0.013)	(0.012)	(0.006)
α_1	-0.004	0.001	0.006	-0.012
	(0.009)	(0.023)	(0.021)	(0.011)

β_1	0.760***	0.662***	0.947***	0.691***
	(0.027)	(0.101)	(0.067)	(0.026)
β_2	0.198	0.123	-0.141	0.292
	(0.204)	(0.472)	(0.428)	(0.272)
β_3	-0.234***	-0.086	-0.379***	-0.178***
	(0.016)	(0.103)	(0.036)	(0.019)
β_4	2.147**	0.121	3.005	1.972
	(0.750)	(1.947)	(1.644)	(1.244)
Adjusted R^2	0.418	0.340	0.360	0.472
N	2,968	600	611	1,757

*** Significant at the 0.01 level
** Significant at the 0.05 level

6. A Note on Interpretation

One of the biggest challenges for research relating to capital structure theory is that of interpretation. As mentioned in the introduction and literature review there is substantial variation in observed capital structures, which is why it is so important to understand the statistical power of empirical tests when making conclusions. One of the key attractions of the financial deficit framework that has been used in this thesis is its simplicity and ease of interpretation. However the key drawback is that it is only a first order test and does not have the power to conclusively differentiate between the pecking order theory and other theories of capital structure. It is also does not have the ability to prove that asymmetric information is the dominant driver of financing choices. The literature has tended to focus on the size of the pecking order coefficient; with the general interpretation being that the closer this is to 1 then the stronger the support for the pecking order theory of capital structure. This is true of the original work of (Shyam-Sunder & Myers, 1999) but is a more difficult interpretation to make after adjusting for the size of the financial deficit and debt capacity. The line between the pecking order theory and the static trade-off theory becomes very blurred at this point. Other researchers have commented on this problem, for example (Lemmon & Zender, 2008) stated that "once consideration of debt capacity is taken explicitly into account in the pecking order it becomes more difficult to distinguish it from a dynamic version of the trade-off theory with adjustment costs".

To illustrate the interpretation problems for using a financial deficit model such as the RC model I have created a scenario analysis in Table 22. The point of this table is to show the similarity in the predictions for firms following the static trade-off theory and pecking order theory, particularly when firms are assumed to have debt constraints. As this table hopefully demonstrates, after controlling for debt capacity and deficit size there are only two of the scenarios where the financial deficit model has the power to distinguish between firms following the pecking order theory and those following the static trade-off theory. These are the scenarios where the firm has no debt capacity constraints and is facing a financial surplus (or a small financial deficit) which are scenarios B & C. Under the pecking order theory these firms would be predicted to use the surplus to either reduce debt or create future debt capacity (by building up cash balances) while under the static trade-off theory these firms would be predicted to increase leverage. If these firms choose not to increase leverage this is a violation of the static trade-off theory as these firms are not maximising shareholder value by taking advantage of the benefits of debt financing.

Table 22. Scenario Analysis of Different Financing Choices

The table is a analysis of six different scenarios (A-E) showing how firms are react to different investment requirements, given different starting levels of debt capacities. The predictions are my interpretations of the static trade-off theory and pecking order theory behaviour and my estimates of what coefficients would be estimated from financial deficit models.

Scenario A – Unconstrained Debt Capacity Facing a Large Financial Deficit. These firms have significant capital expenditure requirements well ahead of internally generated funds but low constraints on issuing debt.

Pecking Order Theory – These firms will use as much debt financing as possible but could exhaust available capacity and be forced to raise equity. How much equity will depend on the size of the deficit and current available debt capacity.

Static Trade-off Theory – The firm will use as much debt financing as possible to increase leverage to its target ratio. If the firm reaches its target a combination of debt and equity will be used after this point.

Financial deficit models **cannot differentiate between the theories,** both will result in a coefficient below but close to 1 as firms will use both external debt and external equity**.**

Scenario B – Unconstrained Debt Capacity Facing a Small Financial Deficit or Surplus These firms' capital expenditure requirements can be covered from internally generated funds and they will only run a small deficit or surplus.

Pecking Order Theory – The firm should be able to fully cover deficits with external debt and there is no reason to use external equity, financial surpluses will be used to retire debt.

Static Trade-off Theory – The firm will increase leverage regardless of whether it is facing a deficit or surplus. No reason to use surpluses to retire debt

Financial deficit models **can differentiate between the theories**; firms following the pecking order theory will have a coefficient close to 1 for both deficits and surpluses while trade-off firms will have a coefficient greater than 1 for deficits and less than 0 for surpluses.

Scenario C – Unconstrained Debt Capacity Facing a Large Financial Surplus. These firms have high cash flow in excess of its investment requirements, and may be divesting assets.

Pecking Order Theory – The firm will retire debt first with the surplus but in cases where it has no debt (or debt is fully repaid with the size of the surplus) the surplus will be applied to either building future debt capacity or possibly returned to shareholders.

Static Trade-off Theory – The firm will use the surplus to return capital to shareholders in a leverage increasing way. May issue debt simultaneously but will not retire debt.

Financial deficit models **can differentiate between the two theories**, firms following pecking order theory will have a coefficient less than 1 but greater than 0, while those following trade-off theory will have a coefficient less than 0.

Scenario D – Constrained Debt Capacity Facing a Large Financial Deficit. These firms have significant capital expenditure requirements well ahead of internally generated funds but face capacity constraints on further debt issuance.

Pecking Order Theory – These firms have debt capacity constraints so will most likely use significant amounts of equity financing.

Static Trade-off Theory – These firms will be unlikely to issue additional debt, equity financing will be used to reduce the leverage ratio back to target.

Financial deficit models **cannot differentiate between the two theories**, both will have a coefficient closer to 0 than 1.

Scenario E – Constrained Debt Capacity Facing a Small Financial Deficit or Surplus. These firms' capital expenditure requirements can be covered from internally generated funds and they will only run a small deficit or surplus. These firms face capacity constraints for further debt issuance.

Pecking Order Theory – These firms may not be able to fully cover deficits with external debt meaning that some external equity may be issued. Surpluses will be fully used to reduce debt.

Static Trade-off Theory – The firm will likely use external equity to finance deficits. Surpluses will be used to reduce debt.

Financial deficit models **cannot differentiate between the two theories**, the coefficient will be less than 1 for financial deficits but likely to be close to 1 for financial surpluses.

Firm F – Constrained Debt Capacity Facing a Large Financial Surplus. These firms have high cash flow in excess of its investment requirements, and may be divesting assets.

Pecking Order Theory – The firm will use the surplus to reduce debt.

Static Trade-off Theory – The firm will use the surplus to reduce debt.

Financial deficit models **cannot differentiate between the two theories**, both will have a coefficient close to 1.

Therefore the power of the financial deficit model is somewhat dependent on the makeup of the sample. A better test of the pecking order model versus the static trade-off model would be to create groups based on replicating scenarios B & C (as it is only by studying these firms that we can reject the static trade-off theory). In order to do this I have split the sample into groups based on whether the firm is constrained or unconstrained and the size of the financial deficit shown which is shown in Table 23.

Table 23. Firm Years by Scenario

This table shows the number of firm years for each of the 6 scenarios explained in Table 22. The constrained and unconstrained groups are based on Z-Scores where I have classified firms as being unconstrained if they have a Z-Score above 2.67, if the Z-score is below this they are classified as constrained. The large deficit category includes all deficits above 5%, the small deficits & small surplus category includes deficits below 5% and surpluses above -5% while the large surplus category includes all surpluses below -5%.

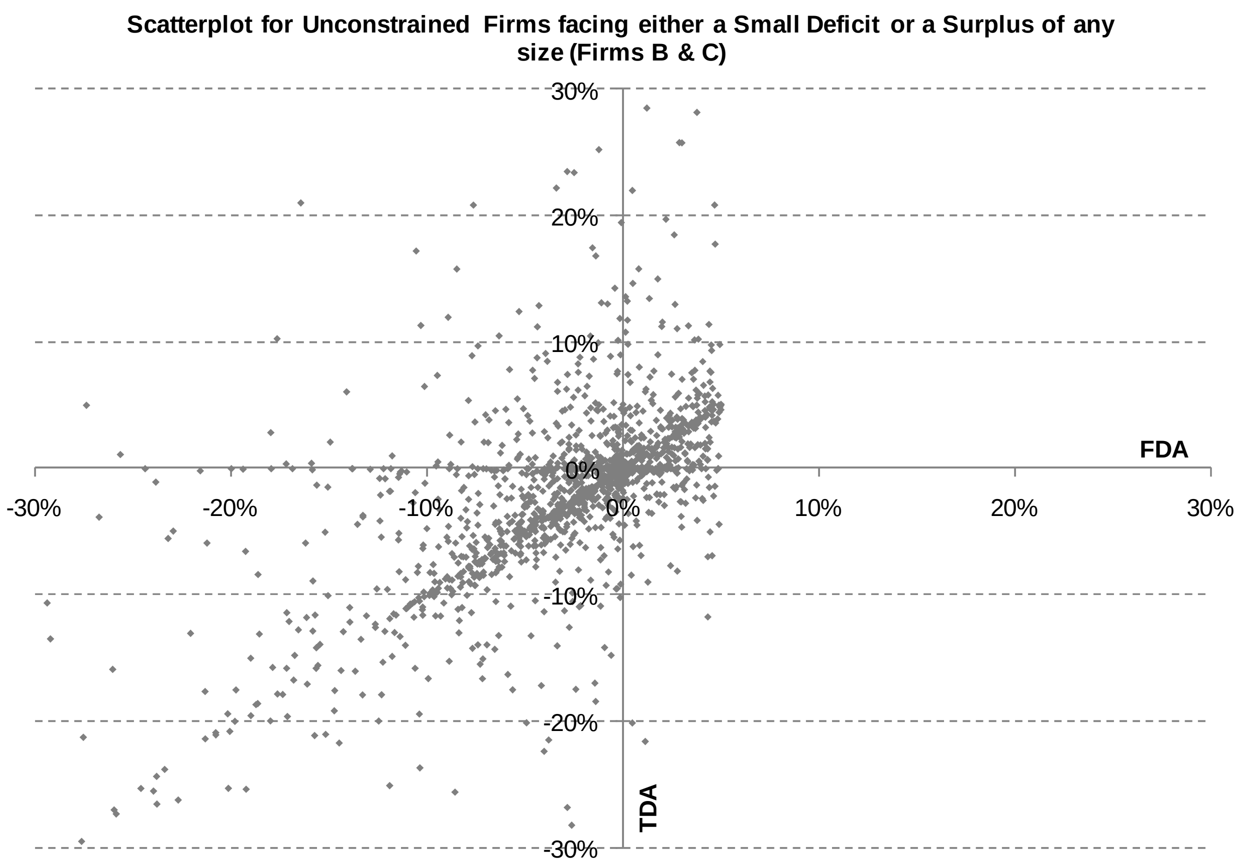
	Large Defict	Small Deficts & Surpluses	Large Surplus
Unconstrained Firms	946 (Scenario A)	993 (Scenario B)	295 (Scenario C)
Constrained Firms	532 (Scenario D)	756 (Scenario E)	330 (Scenario F)

This table demonstrates that for the majority of the sample the pecking order model cannot differentiate between firms following the pecking order theory and those following the static trade-off theory, 67% of the sample can be classified under scenarios A, D, E and F. However if I just focus just on scenarios B & C I should be able to provide evidence for or against the pecking order theory in comparison with the static trade-off theory.

However it is difficult to apply the RC model to a subsample based on firms under just scenarios B & C because these scenarios have severely truncated ranges for the independent variable. In this case I would be limiting the deficit size to a maximum of 5%. By imposing restrictions on the range of the independent variable and not on the dependent variable I severely reduce the ability of the model to explain variation in the dependent variable. To overcome this problem I have plotted the observations in Figure 11.

Figure 11. Relationship between TDA and FDA for Firms under Scenarios B & C

This graph shows a subsample chosen to replicate scenarios B & C (where we can differentiate between the pecking order and static trade-off theory). These are firms that have a Z-Score greater than 2.67 and have a financial deficit below 5%, which represents either a small financial deficit or a financial surplus of any size.



While there is substantial variation in changes in debt levels there does appear to be a linear relationship with coefficient close to 1 for a substantial proportion of the sample. While this is not a definitive statement and I cannot draw conclusions about the strength of the pecking order model from this graph, it does appear that they are many violations of what would be expected if firms were following the static trade-off theory. The graph shows firms that are unconstrained in terms of debt capacity facing either a small deficit or a financial surplus of any size. Under the static trade-off theory there is no reason why these firms would be reducing debt levels. There is no reason for any observations below the horizontal axis in Figure 11 but in this sub sample 52% of the observations are. This is evidence against the static trade-off theory as more than half of firms are choosing to decrease debt levels when they clearly have the ability to increase leverage and take advantage of the 'benefits' of debt financing.

7. Conclusion

This research has focused on applying and extending financial deficit models to Australian data with the goal being to gain a better understanding of how firms choose to finance their assets. This is particularly relevant for Australian firms as there has been relatively little research into capital structure in this market and the unique characteristics of the market make it an interesting comparison with the rest of the world.

The sample consisted of 3,852 firm year observations of ASX listed companies from 1995-2009 and showed that leverage levels are reasonably stable and conservative in the Australian market, with an average total debt to total assets ratio of 24%. Approximately 1/5 of the sample was net cash (which means that cash balances exceed total debt) and approximately 5% of the sample had no debt at all. Firm size had an important impact on leverage levels with small firms using relatively less debt, despite having a higher requirement for external capital. The deficit size did appear to have an impact on the use of debt, with the sample statistics showing that larger financial deficits required proportionately more equity financing than smaller deficits. Financial surpluses were smaller in absolute terms (average of -6% compared to 20%) and also less common with 60% of the firm years having a financial deficit.

My results differed from those of (Frank & Goyal, 2003) when using their model on my sample. I found a higher pecking order coefficient (0.45 compared to 0.28) and greater explanatory power with an adjusted R^2 value of 0.36 (compared to 0.27). However for the restricted sample, where the firms were required to have continuous data over the whole sample period, the results were not as strong for my sample. This is quite important as it was the strength of the financial deficit model for a restricted sample used by (Shyam-Sunder & Myers, 1999) that has provided the impetus for the recent literature on pecking order theory. I could not make the same conclusion that the pecking order theory is a good first order description of financing choices from my results.

Like (De Jong, et al., 2009) I found significant differences between financial deficits and surpluses when applying their model to my sample. However when I extended their model by using a quadratic term as in (Lemmon & Zender, 2008) to allow for a non-linear relationship between the financial deficit and changes in total debt, these differences were no longer significant. The model that I developed showed that differences between financial deficits and surpluses were being generated by a greater proportion of large and very large deficits in the sample. Over the majority of the sample (approximately 94%) the relationship between the financial deficit and changes in total debt appeared to be reasonably linear (as shown in Figure 7) and similar for financial deficits and surpluses. I did find a significant negative quadratic term for the financial deficit, which showed that for very large financial deficits firms will use relatively more equity. This is consistent with the findings of (Lemmon & Zender, 2008).

I used Altman's Z-Score to control for debt capacity which resulted in a small improvement in the strength of my model, increasing the adjusted R^2 from 0.41 to 0.45. However this improvement was nowhere near the magnitude of improvement found by other researchers who have concluded that after adjusting for debt capacity the pecking order model does quite well (Agca & Mozumdar, 2007; De Jong, et al., 2009; Lemmon & Zender, 2008). However I suspect that other methods used to control for debt capacity have resulted in an indirect firm size filter, with both credit ratings and static trade-off regressions being heavily influenced by firm size. The key advantage of using the Z-Score is that the calculations are not influenced directly by firm size. The means it is a better method to answer the key questions emerging from the work of (Frank & Goyal, 2003) and (Fama & French, 2002) as to the relevance of the pecking order model for small firms, who appear to rely heavily on equity financing. My results suggest that debt capacity is not the answer. I found that results for small firms that are relatively unconstrained are only marginally improved from small firms that are constrained, and small firms have weaker results relative to both medium and large firms regardless of debt capacity constraints.

However it is difficult to draw definitive conclusions from financial deficit models such as have been used in this thesis. Capital structure decisions are dynamic and long term in nature while the models are static and short term in nature. This could be one reason why the explanatory power is relatively low for my model as the variation in change in debt could be based on expectations of future financial deficits rather than the current one. There have been dynamic pecking order and trade-off models developed in the literature but these are largely theoretical in nature. The way forward for capital structure research could be to further examine the persistence and dynamics of financing decisions. Another problem with the results presented here is that of interpretation. I have shown how the financial deficit model that allows for a non-linear relationship between the financial deficit and changes in total debt, and controls for debt capacity cannot differentiate between the pecking order theory and the static trade-off theory. In my sample I estimate that there are only 33% of firm year observations where the model can differentiate between the two theories. This casts doubt on the interpretations of other researchers; a financial deficit coefficient close to one is not necessarily support for the pecking order theory.

In summary the contributions of this research are mostly theoretical in nature as it is difficult to draw definitive conclusions from my results. I did find that debt capacity is not the ‘silver bullet’ to understanding why small firms use more equity than larger firms. I also found that where my model could differentiate between pecking order and static trade-off theory, the support for the static trade-off theory was weak. However there is still substantial unexplained variation in changes in total debt from my model. It would be interesting to examine the differences between the results from my sample and US based studies in more depth. If the results that I have found for my sample are reproduced using the same methods in other markets it would cast considerable doubt on the conclusions reached by others, and would strengthen the criticisms of the validity of the pecking order model for small firms.

8. Appendices

Appendix 1. Worldscope Codes

Code	Name	Definition
06001	Company Name	Company Name represents the legal name of the company as reported in the 10-K for U.S. companies and the annual report for non-U.S. companies.
06010	General Industry Classification	This item represents the company's general industry classification. It is defined as follows: 01 Industrial 02 Utility 03 Transportation 04 Bank/Savings & Loan 05 Insurance 06 Other Financial
08001	Market Capitalisation	Market Price-Year End * Common Shares Outstanding If Common Shares Outstanding is not available for the current year or prior year, then Common Shares Outstanding-Current is used. For companies with more than one type of common/ordinary share, market capitalization represents the total market value of the company.
01001	Net Sales or Revenue	Net Sales or Revenue represent gross sales and other operating revenue less discounts, returns and allowances.
18191	Earnings Before Interest and Taxes (EBIT)	Earnings Before Interest and Taxes (EBIT)represent the earnings of a company before interest expense and income taxes. It is calculated by taking the pre-tax income and adding back interest expense on debt and subtracting interest capitalized.
04860	Net Cash Flow – Operating Activities	NET CASH FLOW - OPERATING ACTIVITIES represent the net cash receipts and disbursements resulting from the operations of the company. It is the sum of Funds from Operations, Funds From/Used for Other Operating Activities and Extraordinary Items.
04870	Net Cash Flow – Investing	NET CASH FLOW - INVESTING represents the net cash receipts and disbursements resulting from capital expenditures, decrease/increase from investments, disposal of fixed assets, increase in other assets and other investing activities.
04551	Cash Dividends Paid - Total	CASH DIVIDENDS PAID - TOTAL represent the total common and preferred dividends paid to shareholders of the company.
02001	Cash and Short Term Investments	CASH AND SHORT TERM INVESTMENTS represents the sum of cash and short term investments.
02999	Total Assets	TOTAL ASSETS represent the sum of total current assets, long term receivables, investment in unconsolidated subsidiaries, other investments, net property plant and equipment and other assets.
03051	Short Term Debt & Current Portion of Long Term Debt	SHORT TERM DEBT & CURRENT PORTION OF LONG TERM DEBT represents that portion of debt payable within one year including current portion of long term debt and sinking fund requirements of preferred stock or debentures.
03251	Long Term Debt	LONG TERM DEBT represents all interest bearing financial obligations, excluding amounts due within one year. It is shown net of premium or discount.

03151	Working Capital	WORKING CAPITAL represents the difference between current assets and current liabilities. It is a measure of liquidity and solvency.
03351	Total Liabilities	TOTAL LIABILITIES represent all short and long term obligations expected to be satisfied by the company.
03501	Common Equity	COMMON EQUITY represents common shareholders' investment in a company.
03480	Common Stock	COMMON STOCK represents the par or stated value of the issued common shares of the company. It includes the value of all multiple shares. Along with capital surplus it is the equity capital received from parties outside the company. It excludes excess involuntary liquidation value of preferred stock over stated value when common stock value and capital surplus are reported combined.

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