Relating to the determinants of capital structure finance essay

Finance

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Abstract

This empirical study uses three different models to find the key determinants of gearing of 90 firms from the manufacturing industry in the UK over a seven year time period from 2005 to 2011. The findings support both the trade-off theory and the pecking order theory. This study then goes one step further by comparing the determinants of capital structure before and after the financial crises of 2008. The results of this study show significant findings which imply that after the recession; debt becomes highly undesirable as almost all of the determinants have a negative effect on gearing. In particular the distance to bankruptcy becomes highly significant after the recession. To the best of the researchers knowledge, analysis of the determinants of capital in such large macroeconomic fluctuation time periods has not been researched before, and this makes this study very unique.

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Chapter 1 – Introduction

1. 1 Introduction

The financing decision is vital for every firm that aims to maximise its value. Generally, the role of a financial manager is to make financing decisions that will maximise the firm's value (Fatemi et al., 1983). Though, this is not an easy task as each form of finance has its benefits and its costs and these will need to be taken into account when making the financing decisions (Titman and Wessels, 1988). A firm's capital structure is generally made up of two general categories of financial claims that can be issued against its assets, (1) debt and (2) equity. Debt is defined as money borrowed by firms, from third parties, in exchange for issuing bonds. The firm, in turn, is contractually obliged to pay the principal amount (initial amount borrowed) at a future date as well as fixed interest/coupon payments annually until the maturity/redemption date. Equity holders are entitled to a variable claim coming from the profits of companies in the form of dividends; equity can be issued in the form of ordinary or preference shares. In contrast to debt holders, equity holders are considered as owners of the firm. In the UK the debt to equity ratio is known as the gearing ratio. Clearly, the higher the gearing ratio, the more dominant debt is in a firm's capital structure. This ratio is particularly important to the investors because this indicates the financial risk to shareholders. In terms of the hierarchy of claims on a firm' cash flows, the firm prioritises interest payment to debt holders, then other

interest and tax payments; and if there is any excess profits left over, it can be used pay out dividends to shareholders. Therefore, as the level of debt grows, equity holders will demand a higher return because their financial risk is increasing (Modigliani and Miller, 1958). Note that business risk is not the same as financial risk. Business risk is the risk associated with a firm's ability to generate cash flows from operations and is borne by both equity and debt holders. Whereas, financial risk is borne only by equity holders; it is the risk of not receiving a dividend which rises as more debt is issued by the firm (Baker and Gabriel, 1980). Ultimately, the decision to invest or not depends on the type of investor. A risk-seeker is likely to invest in a highly geared firm because it will have higher risk and therefore offer higher return. The opposite is true for a risk-averse investor, and a risk-indifferent investor will be unconcerned. A breakthrough in the development of modern capital structure theory was when Modigliani and Miller (1958) published the irrelevancy theory; they proposed that in a perfect market, where there are no taxes or transactions costs, the market value of a firm is independent from its capital structure. So the value of a firm cannot be altered by the financial managers financing decision. After relaxing the ' no tax' assumption, they discover that, in a world of corporation tax, firms should issue as much debt as possible, due to tax deductible interest payments. The tax deductible feature makes debt a cheaper and more desirable source of finance and therefore a geared firm should have a higher value than an ungeared firm by an amount equal to the present value of the tax savings that arise from the use of debt. Nevertheless, the capital structure of a firm should affect its value because in reality markets are not perfect as there are

transaction costs, agency costs, and bankruptcy costs and so on. Also, Miller (1977) developed an equilibrium model which incorporated three different taxes (corporate tax, personal tax on equity income and personal tax on interest income), in which he finds that the advantages of debt are considerably lower. In addition, DeAngelo and Masulis (1980) suggest that firms can substitute the tax benefits from the use of debt, with other tax shields such as depreciation and investment tax credits.

1. 2 Aims

The aims of this study are to find the key determinants of capital structure and their relation with the gearing ratio of firms in the manufacturing industry. The results should be robust and compared to the theories of capital structure to see whether the firms in this study follow the pecking order-theory, trade-off theory or both. Another major aim is to assess the determinants of capital structure before and after the financial crisis of 2008. The results of this study will be interesting as the behaviour of firms towards their debt level before and after the recession has not been assessed before, and therefore the researcher is very motivated to conduct this study.

1. 3 Overview

The next few chapters are organised such that a literature review will continue on from this chapter, in which some fundamental background theory about capital structure will be discussed. Also, journal articles related to the traditional determinants of capital structure (profitability, size, tangibility and growth) as well as other determinants (distance from bankruptcy, liquidity and non-debt tax shields) will be reviewed and the

findings in the journal articles will be discussed. The third chapter is the methodology chapter and it will outline what data and how it has been collected. Also, the regression models that are chosen and their suitability will be discussed as well as the description of how each variable is calculated and a hypothesis for each variable will be made. The fourth chapter will describe some preliminary findings and explain the implications of the results of the regression models used; they will also be compared to results obtained from previous researches into the determinants of capital structure. The final chapter will conclude this paper with a summary of the major findings in this paper and outline further research possibilities on this subject.

Chapter 2 – Literature Review

This chapter summarises some theories of capital structure; moreover the firm-level factors that determine the capital structure are discussed in detail. Each determinant might have a positive or negative effect on gearing depending on different implications from different theories.

2. 1 Background Theory

Three theories that lead the capital structure debate are the trade-off theory, pecking order theory and the agency theory. Myers (2001) clarifies that the theories only differ by the factors they pay importance to, for instance, the trade-off theory emphasizes taxes whereas the pecking order theory and agency theory pay particular importance to asymmetric information. The pecking order theory was suggested by Donaldson (1961) and further developed by Myers and Majluf (1984); it states that there is no optimal debt

ratio. Firms show a hierarchy of preferences when raising finance, due to the existence of asymmetric information between management and potential investors (Allen, 1993). Donaldson (1961) observed that:" Management strongly favoured internal generation as a source of new funds even to the exclusion of external funds except for occasional unavoidance ' bulges' in need for funds" Firms predominantly rely on internal sources of finance since firms can decrease their out-of-pocket costs (such as underwriting fees) if they decide to use internal funds which may have been higher if they raised finance externally (Smith, 1977). Retained earnings are an internal form of finance, clearly using retained earnings to invest in positive net present value (NPV) projects seems like a much cheaper form of finance than any form of external finance. If internal financing is inadequate then the managers will seek additional sources of finance through external financing. Furthermore, managers will seek debt financing, as this is the next cheapest form of finance. If the managers are still not able to fund these profitable investments and debt is already high then they will resort to equity financing as a last resort (Myers, 1984). A limitation in the pecking order theory is that this source of capital is costless, it ignores that the retained earnings belong to shareholders (as owners of the firm). Therefore, in order to keep the shareholders content the projects that the firm invests in should at least return what the shareholders can earn by investing elsewhere (Lumby, 1994). In contrast, the trade-off theory predicts an optimal gearing ratio for each firm, where firms balance the value of interest tax shields against various costs of bankruptcy. The optimum can be obtained by substituting debt for equity, or equity for debt, and at the optimum point the marginal

value of tax shields on additional debt is equally counterbalance by the increase in the present value of possible costs of bankruptcy and financial distress (Myers, 2001). The optimum point is illustrated by Figure 1. The agency theory is all about the agent (managers) and the principle (shareholders), the agent is given authority by the principal to makes decisions and performs services on behalf of the principals. Jensen and Meckling (1972) argue that if both parties (agents and principals) are utility maximizers, then there is an incentive for the agent to diverge from the principals interest's and maximise his own utility. When the firm generates free cash flow, how can the shareholders motivate managers to distribute the free cash among shareholders rather than investing it in very risky investments or using it to consume excessive perquisites? Jensen and Meckling (1972) then state that debt can be used as a controlling device so that the agents don't deviate from their objective. Therefore, Myers (2001) states that the agency theory suggests that high levels of debt will increase firm value despite the possibility of financial distress increasing only when the firm's operating cash flow considerably exceeds its profitable investment opportunities. Much research has been conducted to study the capital structure puzzle; however, the findings do not result to an agreement with regard to a particular capital structure theory. However, these theories help in understanding the financial behaviour of firms. Certainly, the financing decision will determine what a firms capital structure is, as the researcher, interest arises particularly in the determinants of capital structure.

2. 2 Literature Relating to the Determinants of Capital Structure

Profitability

The impact of profitability on a firm's capital structure is debatable since its effect on gearing can be positive or negative, and therefore leads to no general agreement on a particular theory. If we assume the pecking order theory holds then, profitable firms, with all other things being equal, will have higher retained earnings and will not need outside funding. This is because internal financing gives the managers more flexibility because they can quickly raise money and implement investment projects. While profitability is often treated as a determinant of capital structure, Remolona (1990) undertakes a more direct method to test the pecking order hypothesis on a sample including American, British, German and Japanese firms. His findings supports the pecking order theory in all four samples, moreover the disaggregated data revealed that firms were behaving as if internal funds were considerably cheaper than external funds, thus supporting the pecking order theory which suggests that profitable firms have a negative relation to gearing. On the other hand, Shyam-Sunder and Myers (1999) also directly test the pecking order theory, but they found opposing results. According to the trade-off theory a firm with higher earnings would prefer to operate at a higher gearing level since they will be able to take advantage of the tax benefits associated with debt interest payments. Furthermore, this will improve firm performance (Margaritis and Psillaki, 2010) due to the disciplinary role of debt (Williamson, 1988). Remolona (1990) found that some US companies in their sample that were

very profitable yet they had higher leverage ratios and the main reason for that was equity buybacks. This result supports the trade-off theory which predicts that extremely profitable firms will have higher gearing ratios, and therefore hold more debt in comparison to equity.

Distance from bankruptcy

This determinant implicitly tests for the trade-off hypothesis, because bankruptcy costs and possible financial distress is a fundamental concept in this theory. The tax benefits from issuing debt will only last up to a certain point (the highest point in figure 1.), after that point the costs of possible financial distress are greater than the benefits of issuing debt; i. e. after the optimum point, as the firm get closer to bankruptcy, debt level in the firm's capital structure should decrease. Therefore, the trade of theory predicts a negative relation between gearing and distance from bankruptcy, since firms that are performing well financially are in turn associated with low bankruptcy likelihood and tend to have lower levels of debt (Kayo and Kimura, 2011). Byoun (2008) find's that the greater the Altman Z score (proxy for distance to bankruptcy) the lower the gearing ratio. Kayo and Kimura (2011) also use the Altman Z score as a proxy for distance from bankruptcy; they find that this distance from bankruptcy has no effect on gearing, although their results for this factor are not significant.

Size

The size of a firm is also frequently used as a determinant of capital structure; however the relationship between firm size and gearing in many studies has been conflicting, there is no general consensus on the particular

effect of size on capital structure. Smith (1977) reports a negative correlation between firm size and gearing and states that smaller firms pay much more than larger firms when issuing new equity, which will discourage them from issuing debt. Rajan and Zingales (1995) also suggest a negative relation because larger firms have lower asymmetric information problems as well as having better access to capital market and will therefore issue equity. On the other hand, Titman and Wessels (1998) suggest that larger firms are generally more diversified than smaller firms and so are less likely to go bankrupt; if this is true then size should have a positive impact on the level of debt (Rajan and Zingales, 1995). Larger firms also have greater debt capacity (Kayo and Kimura, 2011) as they are likely to have more fixed assets than smaller firms which can be used as collateral for debt. In addition, larger firms tend to have higher gearing ratio as they can issue debt in large bulks to spread the issuing cost (Byoun, 2008). This suggests a positive relation between firm size and gearing.

Tangibility

Tangibility is an important factor to investors when lending money to firms, because tangible assets can be used as collateral for debt, this is known as secured debt. Higher tangibility means a lower risk for the lending (De Jong et al., 2008), if the risk associated with lending is low then the investor is likely to demand a lower rate of return, thus the cost to the firm will be lower, which implies that the firm will issue more debt. Kayo and Kimura (2011) report a positive relation between tangibility and gearing and De Jong et al. test firms from 42 countries and find a positive relation between tangibility and gearing ratio in almost all of the countries in their sample.

Non-debt tax shields

As mentioned before, DeAngelo and Madulis (1980) suggested that tax shields on debt can be substituted by non-debt tax shields, such as depreciation and investment tax credits. Therefore, to expect a negative relation of non-debt tax shields with gearing is reasonable. Wald (1999) reports a positive negative relation for non-debt tax shields and gearing.

Liquidity

The trade-off theory suggests a positive relation between gearing and liquidity, firms with higher liquidity may be more geared than less liquid firms because they are able to meet the short-term contractual obligations when they are due. Whereas, the pecking order theory suggests a negative relation, because higher liquidity means that the selling of liquid assets may be used to finance new investments, i. e. internal sources are preferred to external finance. This would imply a negative relation of gearing with liquidity. Ozkan (2001) finds results supporting the pecking order theory.

Growth

Titman and Wessels (1988) state that growth opportunities cannot be collateralized nor does it generate any income this definition of growth supports the trade-off theory which predicts growth should be negatively correlated with gearing. According to the agency theory, assets-substitution and underinvestment are major reasons for agency conflicts between equity holders and debt holders, and in order to minimise these conflicts firms with high growth opportunities go for a lower gearing ratio and issue shares instead of debt (De Jong et al., 2008). On the other hand, the pecking order

theory predicts a positive relation because Myers and Majluf (1984) assumed that managers act in the best interest of existing shareholders, therefore they will refuse to issue undervalued shares (Myers, 2001) and will only issue new shares when they are overvalued and will benefit ' old' shareholders. However, it is possible that the investors will be aware of this, in that case they will ask for a discount on the shares (Kayo and Kimura, 2011). Growth opportunities tend to be high in undervalued firms, since managers will be reluctant to issue undervalued new equity; the pecking order theory predicts a positive relation between growth and gearing. Yet again, the empirical findings are mixed, however majority of the findings report negative correlations (Kayo and Kimura, 2011; Rajan and Zingales, 1995; De Jong et al., 2008) and a few researchers report positive correlations (Adedeji, 1998 and Wald, 1999) of growth with gearing.

2. 3 Summary

In this chapter, key theories of capital structure have been discussed as well as literature relating to the determinants of capital structure that will be used in this study to find the key determinants of capital structure. Some determinants show similar results in previous studies, however, others show mixed results. Perhaps, these mixed results may occur because of different models, i. e. some researchers uses firms from different countries in their sample whereas some use firms from different industries, and so on. The determinants discussed in this chapter will be the backbone of this study.

Chapter 3 – Methodology

3. 1 Data

This study analyses the determinants of capital structure among publicly listed UK firms within the manufacturing industry over a 7 year time period from 2005 to 2011. The data has been collected from FAME (Financial Analysis Made Easy), all firms and financial data were found through this source. However, the market to book value and equity market value figures were not given by FAME and therefore DataStream was used to get the data for those 2 variables. FAME provides useful financial information of large listed firms in the UK. Initially there were more than 100 UK firms from the manufacturing industry, however, only firms with at least 7 years of observations for the relevant variables were included in the sample, all other firms that had data missing were eliminated; this is known as a balanced panel sample. After the elimination, the sample contains 90 firms from the manufacturing industry including chemicals, construction, metals, transport, food and beverages. Panel data is when there are a number of cross-sections who are observed over a time period. In this study the cross-sections are the 90 firms and they are observed over 7 years, thus making this panel data. Panel data will better measure the effects of the firm-specific factors affecting gearing and will give us a better understanding since it will not just see the variation in the factor for a number of firms but it will also take into account the variation for the same number of firms over a number of years which will give it a wider variation and give us better estimates.

3. 2 Limitations of the Data

Since FAME only selects large firms from the manufacturing industry in the UK, there may be some bias in the sample and therefore the findings in this paper may not apply to smaller firms. The sample may do well in capturing the key determinants of gearing for large UK manufacturing industries, however since the industry will have smaller firms too, the results may not be applicable for the average firm in the manufacturing industry or, in fact, in any other industry. Gauss-Markov states (among other assumptions) when the variance of errors is constant, the estimated coefficients will have the smallest variance than any other estimated coefficients, they are the Best Linear Unbiased Estimators (BLUE). If the variance is not constant then heteroskedasticity exists, and this means the Gauss-Markov Theorem will be violated and the estimated coefficients will not be BLUE anymore. Cross-sectional data is usually exposed to heteroskedasticity, and therefore panel data is also likely to have heteroskedasticity. Although panel data may not be a method to prevent heteroskedasticity, Hsiao (1984) and Ozkan (2001) mention that due to the large number of observations caused by the cross-sectional and time-series data, panel data makes the coefficients of the variables more efficient.

3. 3 Regression Models

3. 31 Model 1

Since the each individual company (a single cross-section) is observed over 7 years in the panel data, we may expect cross-sectional effects on an individual firm or a group of firms. If there are such effects then OLS (ordinary least squares) is not appropriate with this type of data. However,

on the assumption that no such effects exist we can use OLS to estimate the firm-specific effects on the capital structure of firms and this will give us the best linear unbiased estimators (BLUE). The OLS model will be estimated by: Where: $\beta 0$ = common y-intercept of all cross-sections, $\beta 1 - \beta 7$ = coefficients of the explanatory variables and ϵ is the error term. GR, PROF, Z, SIZE, TANG, NDTS, LIQ, GROW are the gearing ratio, profitability, distance from bankruptcy, size, tangibility, non-debt tax shields, liquidity and growth, respectively. (Defined clearly in the next section)

3. 32 Variables and Hypotheses

This section shows how each explanatory variable is calculated followed by a hypothesis of its expected sign. The 7 hypotheses will be tested using the OLS method in Model 1 and the OLS FE method in Model 2. VariableDescriptionDependent variableGearing RatioThe gearing ratio is calculated by the fraction of long-term debt over the total value of the firm. Where the total value of the firm is given by the total amount of long term debt plus total equity market valueIndependent variablesProfitabilityEarnings before interest and tax over Total assets will be used as a measure for firm profitability, EBIT/TADistance from BankruptcyThe Altman Z score modified by MacKie-Mason (1990) will be used as a proxy for distance from bankruptcy. It is calculated as follows: S = sales, RE = retained earnings, WC = working capital and TA = total assets. SizeThe natural logarithm of sales will be used as a proxy for the size of a firm, ln(sales). TangibilityThe ratio of fixed assets over total assets will be used as a measure of tangibility, FA/TA. Non-debt tax shieldsNon-debt tax shields will be approximated by the ratio of depreciation to total assets, DEP/TA. LiquidityThe ratio of current assets to

current liabilities will be an approximation of the liquidity, CA/CL. GrowthGrowth is defined as market to book ratio of assets, MTBV. Hypothesis 1: A positive relation between profitability and gearing level would support the trade-off theory whereas a negative relation would support the pecking order theory. Hypothesis 2: The longer the distance to bankruptcy, the lower the gearing ratio. Hypothesis 3: A positive relation between size and gearing level would support the trade-off theory whereas a negative relation would support the pecking order theory. Hypothesis 4: Tangibility has a positive effect on the gearing ratio. Hypothesis 5: Non-debt tax shields have a negative effect on the gearing ratio. Hypothesis 6: A positive relation between liquidity and gearing would support trade off theory whereas a negative relation would support the pecking order theory. Hypothesis 7: A negative correlation will support the trade-off theory whereas a positive correlation will support the pecking order theory.

3. 33 Model 2

Ignoring the assumption of no cross-sectional effects, an OLS FE (ordinary least squares fixed effects) model will be used. This method if very flexible, and allows the constant (the y-intercept) to change for each cross-sectional unit, i. e. each firm has a separate constant. If these cross-sectional effects are present then the OLS FE will be a better estimator of the coefficients of the explanatory variable. The OLS FE model will be estimated by: Where: β_{0i} = y-intercept of firm i and v_{it} = error term of firm i at time t.

3. 34 Model 3

The recession hit the UK in the end of 2007 but the full effects of the recession weren't felt until 2008. The data is collected for 2005-2011; clearly the recession would have had a major effect on each determinant of capital structure because in a recession firms are generally less profitable, have lower growth opportunities and are more vulnerable to bankruptcy which are some of the key determinants discussed in the previous chapter. The OLS model, same as Model 1, is used to examine the effect of the recession on the behaviour of firms towards capital structure. The reason for using the OLS model and not OLS Fixed Effects is that, in this study we are more interested in the coefficients of the explanatory variables rather than the individual intercept parameters of the cross-sections (firms). Model 3 will be estimated by: The above equation will be estimated for 2 time periods, firstly pre-recession determinants of capital structure will be examined, which will include data from the 90 firms over 3 years (2005 – 2007). Then the post-recession determinants of capital structure will be studied, which will include the data from the 90 firms over 4 years (2008 – 2011). Heteroskedasticity is generally associated with cross sectional data, but it is not restricted to this type of data. This can also be encountered when using time-series data. Since panel has cross-sectional and time-series data, it is likely that we may encounter heteroskedasticity. When heteroskedasticity exists, the standard errors become incorrect and biased which will give wrong t-values for the t-test. Therefore, White's heteroskedastic consistent standard errors will be used in this model to avoid computing incorrect standard errors in the presence of heteroskedasticity. Therefore, when heteroskedasticity exists,

these white's standard errors will be more appropriate than simply using OLS alone.

3. 4 Summary

To summarise the sample consists of observations from 90 UK firms in the manufacturing industry that are observed over a 7 year period (2005 – 2011). Three different regression models have been put forward; the first two models will examine the determinants of capital structure using OLS and OLS FE, respectively, and the third model examines the determinants of capital structure pre-recession and post-recession using the OLS model taking heteroskedasticity into account. The third model sets this study apart from any other previous study.

Chapter 4 – Results

In this chapter the initial preliminary results will be analysed, then the three regression model results will be analysed. The relationship of the results with previous studies will be outlined; other major findings will also be pointed out. The robustness of the results will also be discussed.

4. 1 Fundamental Data Analysis

Before moving on to the results of the regression models, it is vital that any existence of multicollinearity is tested. If the explanatory variables in the research model exhibit any sign of correlated movement together in a systematic pattern, then the variables are considered collinear, this will have a huge impact on the quality of the data and the reliability of the results. Although, table 5 (in the appendix) shows that the majority of the correlations are statistically significant at the 5% and 10% level, however,

the cross-correlation coefficients are relatively small, hence there is no major problem of multicollinearity. The highest correlation is between the distance from bankruptcy variable and the profitability variable at 0. 59; though this can be justified by the fact that the calculation of the Altman Z-score includes the EBIT figure. Also, Figure 2 and Figure 3 (in the appendix) show that the residuals are clearly showing systematic pattern; as the long-term gearing ratio (actual and fitted, figure 2 and figure 3 respectively) increases the residuals tend to increase. So the residuals don't appear to be constant hence, there is some suspicion of heteroskedasticity. So the researcher is justified to use white's heteroskedastic-consistent standard errors in Model 3, which makes it a better model than if we were to use OLS (refer to chapter 3 section 3. 35 for more detail).

4. 2 Results of Model 1

Table 1 (below) shows the results of the OLS regression for Model 1 with the dependent variable being gearing ratio. The R-Squared shows how well the model fits the data, i. e. measures the goodness of fit. If the R-Squared is 1 then the model fits the data perfectly. The R-Square of the model is 0. 2056 which means that the almost 21% of the variation in the dependent variable (gearing) is explained by the explanatory variables used in the model. An R-Squared of 21% is low but is a reasonable result; however the reason for this might be caused by the cross-sectional effects (discussed in the previous chapter). The statistical significance of a single variable is generally obtained by conducting the t-test (although it can be tested using the F-test). However, the t-test cannot be used for joint testing (i. e. testing if 2 or more explanatory variables are significant) and in such cases the F-test becomes

more suitable. Testing at the 1% (or 5%) level, a variable is considered significant if its p-value is less than 0. 01 (or 0. 05). Therefore, from the results in Table 1 (below) it can be seen that profitability, distance from bankruptcy, size, liquidity and growth are significant at the 1% level, non-debt tax shields variable is significant at the 10% level, and tangibility is insignificant. The coefficient of the profitability variable is -0. 385816, this implies that a 1 unit increase in the profitability of a firm, holding all other variables constant, will decrease the gearing ratio by approximately 0. 39 units. This logic can also be applied to the coefficients of the remaining variables. Profitability is negatively correlated with the gearing ratio; this result settles hypothesis 1 by supporting the pecking order theory, showing that profitable firms tend to use retained earnings as a form of finance. The distance to bankruptcy coefficient is negatively correlated with gearing, as predicted by hypothesis 2, these results are consistent with Byoun (2008). The results also show that the size of a firm is positively correlated with gearing, settling hypothesis 3 by supporting the trade of theory that larger firms are more diversified (Titman and Wessels, 1988) and have a larger debt capacity (Kayo and Kimura, 2011) and therefore will have a higher debt level in their capital structure. Tangibility has a positive effect on gearing as predicted by hypothesis 4, because assets will be used as collateral for debt; however this result is insignificant, i. e. we can't reject the null hypothesis that tangibility will have no effect on the capital structure. Hypothesis 5 is supported by the negative correlation between non-debt tax shields and the gearing ratio, which supports the suggestion of DeAngelo and Madulis (1980) that firms can substitute the tax shield on debt with non-debt tax shields.

Liquidity has a negative effect on gearing, settling hypothesis 6 by supporting the pecking order theory, Ozkan (2001) also a negative relation between liquidity and gearing. Settling hypothesis 7, growth is negatively correlated with gearing which supports the trade-off theory which can be justified by Titman and Wessels (1988) definition of growth opportunities; they cannot be collateralized and has no earning power which justifies the negative relation.

4. 3 Results of Model 2

Table 2 (on the next page) shows the results of the regression in Model 2, which is an OLS Fixed Effects model, and this allows each firms to have a different y-intercept, which in turn cancels out any cross-sectional effects. This, in theory, should provide more accurate findings. The R-Squared of this model is almost 3 times the R-Squared of Model 1. In this model, almost 65% of the variation in gearing is explained by the same explanatory variables used in model; this means that in terms of the goodness of fit Model 2 looks like a better model, as expected. Testing at the 5% level, this time only size, liquidity and growth are significant factors. Distance from bankruptcy and tangibility are significant at the 10% significance level. However, profitability and non-debt tax shields don't seem to have much effect on the gearing level. All variables display similar signs to the OLS regression. However, non-debt tax shields and liquidity seem to have a positive effect on gearing, which contradicts the results in the OLS. The results for the hypotheses for profitability, distance from bankruptcy, size, tangibility and growth are the same as the previous hypotheses results obtained in Model 1. Non-debt tax shields show a positive relation with gearing in this case, contradicting the

findings from Model 1, but since the probability is very high, this result is insignificant and there is insufficient evidence to accept hypothesis 5 that non-debt tax shields have a negative effect on gearing. Liquidity seems to have a positive effect on gearing in Model 2, again contradicting the Model 1 findings, which settles hypothesis 6 in this case by supporting the trade-off theory, which shows that, more liquid firms are generally more geared since they are able to meet short-term contractual obligations. De Jong et al. (2008) also finds mixed results for the effect of liquidity on leverage, they find 25 out of 42 countries showing a negative relation and the rest showing a positive or no relation on leverage. In particular, they find that the liquidity of UK firms has no effect on leverage. It is evident that some of the variables show conflicting results when compared in Model 1 and Model 2. One possible reason for this may be the fact that in Model 2 each firm has a separate intercept in order to avoid cross-sectional effects on the coefficients, refer to chapter 3 page 17 for more information.

4. 4 Results of Model 3

Table 3 (below) shows the results of the regression results of Model 3, of the determinants of capital before and after recession. The R-Squared of both time periods is approximately 21%, and in both time periods the explanatory variables pass the joint significance test at the 1% level. Column (A) shows the results of for pre-recession, Column (B) shows the results for post-recession and Column (C) uses the F-test to examine whether the coefficients before and after the recession are statistically different. The null hypothesis is that the pre-recession and post- recession coefficients are not different, i. e. equal, and this hypothesis is rejected at the 5% (or 10%) level

is the probability of the Chi-square is less than 0. 05 (or 0. 1). The F-test showed that only distance from bankruptcy, tangibility and liquidity were significantly different before and after the recession at the 5%, 10% and 1% significance level, respectively; for the remaining variables there is insignificant evidence that the coefficients are different before and after recession. In terms of the relations of the explanatory variables with the gearing level the pre-recession results are identical to the results obtained in the OLS regression results in Model 1. Before the recession profitability, size, tangibility, liquidity and growth were significant at the 1% level and distance from bankruptcy and non-debt tax shields were not significant. Showing that before the recession the distance from bankruptcy and non-debt tax shields were not major factor in determining the financial structure of firms. However, we are more interested in how the recession changed determinants of capital structure. After the recession, there were 5 major changes from the pre-recession results: Distance from bankruptcy (which was highly insignificant pre-recession) became significant at the 1% level). Moreover, the magnitude of the negative impact if distance from bankruptcy on gearing after the recession has considerably increased when compared to the pre-recession coefficient. Tangibility became weakly significant explanatory variable at the 10% level as well as having a negative impact on gearing after the recession whereas pre-recession it had a positive impact on gearing and was highly significant at the 1% level. The significance of the non-debt tax shields increased drastically to the 1% level, which was insignificant factor before recession. Growth (which was significant pre-recession at 1%) became weakly significant at the 10% level. Liquidity

seems to have a much larger negative impact on gearing after recession than before recession. The sharp rise in significance of the distance from bankruptcy variable can be seen as the direct impact of the recession on the firms' capital structure. In the recession the probability of default increases since firms are unable to meet current cash obligations and therefore are more likely to into bankruptcy (Bernanke, 1981), which is a major reason in making this variable more significant. Moreover, the null hypothesis that the pre-recession and post-recession coefficients of distance from bankruptcy are the same from the F-test is rejected at the 5% level since the p-value of the Chi-square is less than 0. 05, therefore it is reasonable to say that the negative coefficient for distance from bankruptcy post-recession is considerably larger (in absolute terms) than the pre-recession value. This shows that after the recession firms were targeting to lower their gearing ratio, thus more reluctant to issue debt since this would increase their financial distress even further. This result may supports the trade-off theory that firms are taking into account the possible financial distress associated with issuing debt, after the recession. Bernanke (1981) states that recessions create financial distress by narrowing the margin between cash flow and debt service. Therefore, firms are deciding not to issue debt hence having a negative impact on the gearing level, which indicates that firms may have an optimal gearing ratio which firms are adjusting to. However, it's not conclusive; this behaviour of firms may just be due to the direct impact of the recession. The tangibility of a firm has become insignificant at the 5 % level; also the F-test shows that there is significant evidence at the 10% level that the coefficients for tangibility pre and post-recession are unequal. So it's

reasonable to say that tangibility has a negative impact on gearing after recession. One reason for this may be the that financial managers have realised that losses can be made by hasty liquidation of assets (Bernanke, 1981) in order to meet short term contractual obligations and therefore making secured debt undesirable, which in turn has a negative impact on gearing. The non-debt tax shields coefficient has also become highly significant at the 1% level post-recession. The magnitude of the negative impact of non-debt tax shields on gearing appears to have increased drastically, showing that more firms are in the sample (after the recession) were using non-debt tax shields, such as depreciation, as a substitute to the tax benefits of debt. However, after conducting the F-test it appear that there is insignificant evidence, since the p-value of the Chi-square is more than 10%, that the before and after recession coefficients of non-debt tax shields are different. These results imply that debt financing is highly undesirable after a recessionary period. The growth variable has also become insignificant post-recession. Kangasharju (2000) finds in his research that firms' growth probability declined from 17. 1% to 7. 1% during the recession period. Therefore, the relation of growth with gearing may have become insignificant because in a recession the growth opportunities of firms decrease. So if there are no growth opportunities then they cannot affect (either positively or negatively) the financial structure of a firm, which makes it an insignificant variable post-recession. The final finding is that the liquidity variable has considerably increased, supported by the F-test which rejects the hypothesis that the pre and post-recession coefficients are the

same at the 1% level. This means that more firms are using internal funds to raise finance, since firms can sell the liquid assets to raise finance.

4. 5 Robustness of results

Table 4 (below) shows the results of the White test proposed by Halbert White (1980), which is a test for heteroskedasticity based on the variance function; this is an alternative to the Breusch-Pagan test for heteroskedasticity. The Breusch-Pagan test assumes that we have knowledge of the variables that will appear in the variance function if heteroskedasticity exists however, in reality we may not know the relevant variables. The Breusch-Pagan test also assumes that the residuals are normally distributed, Figure 4 in the appendix shows that the errors are clearly positively skewed also the Jarque-Bera statistic is significant at the 1% level therefore, the residuals are not normally distributed; for these reasons a White test is more appropriate. The hypothesis we are trying to prove is the null hypothesis which hypothesises that the error terms are homoskedastic, (i. e. the variance of the error terms is constant) against the alternative hypothesis that we have heteroskedasticity. This test consists of a model, where the square of the residuals from Model 1 are regressed against the independent variables and the square of the independent variables as well as the cross-products of the independent variables. Testing at the 1% significance level, the null hypothesis will be rejected if the probability of the Chi-Squared statistic is less than 0. 01; since the probability is 0 we can conclude that there is significant evidence that heteroskedasticity exists. One way to get around this heteroskedasticity problem, also proposed by White (1980), is to use heteroskedastic-consistent

standard errors. These robust standard errors were used in Model 3, thereby making it a better model than the previous two models. In principle, robustness of the results has already been proved. Because the 4 traditional determinants (profitability, size, tangibility and growth) have consistently shown the same signs over three different regression models. If the results were not robust the researcher would have seen inconsistency in the signs of the variables when different methods were applied. For example, Model 1 assumes no cross-sectional effects and heteroskedasticity, Model 2 assumes there are cross-sectional effects, and Model 3 finds results in the existence of heteroskedasticity, yet the 4 traditional variables have the same signs of the explanatory variables over the three models, this authenticates the robustness of the results.

4. 6 Summary

This chapter analyses the empirical implications of the results of the three different regression models explained in Chapter 3. In terms of the hypotheses of the determinants of capital structure have been settled and the results support both the pecking order theory and the trade-off theory. The results obtained are robust since Model 2 is a better model than Model 1 and Model 3 is better than both Model 1 and Model 2, yet all the traditional determinants (profitability, size, tangibility and growth) of capital structure show the same effects on gearing. The White test is used to test for heteroskedasticity and, there is significant evidence of heteroskedastic which makes Model 3 the better model. Model 3 also finds key findings of determinants of capital structure before and after the recession and finds debt is highly undesirable after the recession.

Chapter 5 – Conclusion

This final chapter will conclude this study and summarise the key findings and discuss whether the aims of this research have been met. Possible further research will also be discussed.

5. 1 Contributions of the study

The aim of identifying the key determinants of capital structure in the manufacturing industry has been accomplished by finding 90 firms in the UK using FAME and DataStream and using EViews 7 and STATA to conduct sophisticated statistical analysis. The results are statistically significant and robust and have been successfully cross-referenced to the pecking order theory and the trade-off theory. Moreover, it is found that distance to bankruptcy becomes a significant determinant of capital structure after the recession as well as other findings that support the idea that firms tend to minimise debt in their capital structure after a recession. Tests have been conducted to authenticate these results and this fulfils the main aim of the study.

5. 2 Summary of Findings

The findings in Model 1 and Model 2 settle majority of the hypothesis originally made and are similar to the results obtained in previous studies. The results for Model 3 (which is the best model of the three) shows that all the variables are significant determinants of capital after the recession and. Growth, liquidity, size have been consistently significant over the three models. Moreover, profitability, size, tangibility and growth have consistently shown the same signs over the three models. The results are consistent with

previous studies in a sense that they do not really support one particular theory. Furthermore, it is found that after the recession almost all variables have a much larger negative effect on gearing than before the recession. The results obtained are robust as the models have been treated for heteroskedasticity and cross-sectional effects; this makes the findings robust and accurate. The use of such treatment is justified by the results of the White test which supported the existence of heteroskedasticity.

5. 3 Further Research

The sample size in this study is reasonable, although further research could be carried out with more firms and a longer time period. The key findings of the pre and post-recession results could also be carried out against firms in different industries, or a different country and a comparison could be made to see if similar results are obtained. Moreover, a direct study into a particular theory (pecking order, or trade-off) could be conducted before and after a recessionary period to see whether firms follow a particular theory after a recessionary period. Rather than examining the before and after effects of recession, a cross-sectional or time period analysis of the period of recession could be carried out to examine how firms behave during a recession. As this research takes into account the effect of the 2008 financial crisis, which was a strong macroeconomic fluctuation, on the same wavelength the determinants of capital structure can also be examined in an expansionary period (boom, or economic recovery) and evaluate any results different from the results obtained in this study. There are many ways in which the dependent variables and independent variables in this study can

be calculated, perhaps different calculations methods can be used to see if similar determinants are found to affect the capital structure of firms.

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