



Do Institutional Differences Affect Leverage Choice?

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Abstract

This study conducts a cross-country comparison of capital structure and its determinants between UK and Germany to test alternative theories of capital structure within different institution traditions. The purpose of this study is to bring into focus the possible effect of institution differences on capital structure choice and its firm-level determinants.

Keywords: Capital structure, Firm-level determinants, OLS regression model, Institutional differences

1. Introduction

The capital structure of a firm describes the way in which a firm raised capital needed to establish and expand its business activities. It is a mixture of various types of equity and debt capital a firm maintained resulting from the firm's financing decisions.

Previous studies concluded that firms' leverage ratio closely related to firm-level characteristics. For an instance, Harris and Raviv (1991) summarize that "leverage increases with fixed assets, non-debt tax shields, investment opportunities and firm size and decreases with volatility, advertising expenditure, the probability of bankruptcy, profitability and uniqueness of the product." Most of previous empirical evidences were based on US firms with few notable exceptions. However, the experience of a single country may cover the effects of different financial system and economic tradition on capital structure choice. Cross-country comparisons are essential for the understanding of the difference in leverage choices across countries. And also cross-country comparison can be used to suggest linkages between institutional differences and empirical results about capital structure.

In order to investigate whether the capital structure and the relation between firms' financing choice and firms' characteristics differs under different institutional characteristics, this thesis compares the capital structure choice and its determinants of two European countries: UK and Germany, which similar in their levels of economic development but follow different institutional traditions. UK is known to follow a market-based tradition (also called Anglo-Saxon market-based model) with large numbers of listed companies of relative small size and the takeover market is highly active. Due to the arm's length relationship with the lenders, the firms in UK may face more information asymmetry problems. Firms in Germany operate under a bank-based tradition (also called continental Europe bank-based model), where banks play a central role in the economy and stock markets are fairly underdeveloped. There are fewer listed companies in Germany but their sizes are comparably larger than the firms in UK. In Germany, Banks' ownership in the firm creates a supervision incentive that helps to reduce the information asymmetry.

In this thesis, I will explain capital structure using three ratios: total book-debt ratio, long-term book-debt ratio and long-term market-debt ratio. These three ratios help to get a better understanding of the difference between U.K and Germany in financing patterns, including leverage ratios, maturity structure and financing choice between internal and external financing. The basic regression we estimate is based on the model used by Rajan and Zingales (1995), in which tangibility, profitability, size and market-to-book ratio being the independent variables, whereas regressors in this study are extended by including tax rates and liquidity. The data set is chosen to be recent to shed light on some prospects of the current debate about the capital structure and its determinants in bank- and market-based countries.

The results reveal that firm-specific characteristics ¹(There is widely accepted wisdom that macroeconomic conditions, such as the level of development of bank and stock market, real GDP growth, inflation rates also influence firms' capital structure choice. But test of macroeconomic impacts cannot be carried out in this thesis, for a sample of only two countries. However, the difference of macroeconomic conditions between the two countries will be presented in the next section.) affect capital structure both in UK and Germany: tangibility and liquidity have the expected sign and consistent in the two countries. While the results also show the considerable differences in relations of capital structure and firm-specific characteristics: tax rate, size, profitability and market-to-book ratio, show different effects in UK and Germany. The variation in the results suggests that the institutional differences contribute to the capital structure choice of the firms.

The rest of the thesis is organized as follows: Section 2 makes a comparison of some major institutional differences between UK and Germany. Section 3 discusses the data collecting process and regression model used in this thesis. Empirical results and interpretation is also presented in this part 4. Section 5 concludes the paper.

2. Institutional differences between UK and Germany

UK and Germany are classified as market-based and bank-based financial system based on the size or power of banking sector. However, this is just one important aspect of the institutional differences between the two countries. They also differ in legal system, patterns of corporate governance etc. Here I'll review some major institutional differences between UK and Germany and their potential influences on capital structure choice.

2.1 Bankruptcy law

UK and Germany follow different legal system: UK is common law while Germany follows a civil law tradition. There is a typical claim that common law provides better protection to investors than civil law does (See for example, Watson (1974)). In this subsection, a comparison of legal system will be presented, mainly focusing on the differences in bankruptcy law.

As Harris and Raviv (1992) suggest, bankruptcy law should be regarded as an integral aspect of a debt contract. There are a number of important effects of bankruptcy law: first, its strict enforcement of creditor rights enhances ex ante contractibility; second, it gives creditors the rights to punish managers in financial distress, thus inducing strong incentives for managers to stay clear of it; finally, strict enforcement reduces the costly and long drawn out that haggling between claimholders that ensues when there is a possibility that the original contract may be violated. (Rajan and Zingales (1995))

Insert Table 1 here

The bankruptcy law of the two countries differs considerably. Table 1 presents a brief summary of the principal bankruptcy procedure in the UK and Germany. The LLSV (La Porta, Lopez-de-Silance, Shleifer and Vishny) creditor-rights score is 3 for Germany and 4 for the UK, which indicates that British bankruptcy law provides better protection to creditors than German bankruptcy law does.

By contrast, UK bankruptcy law is more efficient in creditor rights protection than its Germany counterpart. The difference in legal system efficiency may be reflected in firms' capital structure choice, especially debt maturity structure. When the legal system is inefficient, short-term debt is more likely to be employed than long-term debt. Diamond (1991) argues that, short-term financing may reduce the expropriation of creditors by borrowers. As the short-term debt allows the creditors to review the firm's decision frequently and vary the terms of financing before sufficient losses have accumulated to make default by the borrowers. Hence, we would expect an inverse relationship between the inefficiency of a country's legal system and the use of long-term debt.

2.2 Market-based vs. Bank-based system

Is there systematic difference between the level of leverage in bank-based countries and market-based countries? It seems that no clear conclusion has been reached yet. Rajan and Zingales (1995) compare the aggregate leverage ratios across G-7 countries and found that contrary to the previous thought that firms in bank-based countries will have more debt than firms in market-based countries, firm leverage is fairly similar across the G-7 countries. Hence, they argue that the classification of bank-based and market-based economy is reflected more in the banks power and stock markets development than in the amount of debt. In this subsection, we will compare the power of bank and stock-market development between UK and Germany, and their possible influences on capital structure choice.

In a bank-based financial system, banks play a leading role in allocating financial resources, oversee the investment decisions of corporate managers and provide risk management vehicles. The stock markets are highly underdeveloped and used by a few firms and individuals. As the banking sector is controlled under a few large banks, there will be low competition.

While in a market-based financial system, securities markets share centre stage with banks in terms of getting society's savings to firms, exerting corporate control, and easing risk management. Banks play the role of lenders' last resort in a market-based system.

Insert Table 2 here

The ratio of domestic credit provided by the banking sector to the gross domestic product (GDP) is a measure of the development of banking sector. Table 2 shows that, the ratio of domestic credit over GDP is nearly the same for UK and Germany (both are around 145%). Diamond (1984) argues that intermediaries, such as banks, have economics of scale in obtaining information. They may also have greater incentives to use collected information to discipline borrowers than small investors subject to free-rider problem. Hence, a developed banking sector will facilitate access to external financing. In Germany, large bank and inter-corporate shareholdings are widespread. Companies raise most of their

external finance from banks that have close relationships with them. While it is not the case for UK, the evolution in the UK of a banking sector that lacks integration with industrial strategy at either the macro or micro level, leads to a high level of dependence of UK firms on equity markets to finance expansion. (Hutton(1996); Charkham (1994)). So we expect that German firms will issue more debt than British firms on average.

Market capitalization ratio is used to measure the size of stock markets. The activity or liquidity of stock markets is approximated by the ratio of stock value traded over GDP. Compared with Germany, the stock market in UK is apparently larger in size and more active. The stock market capitalization and liquidity ratio of UK are 119% and 174%, while in Germany, the ratios are only 35% and 62%.

2.3 Ownership and Control

Another important institution difference between UK and Germany is the level of ownership concentration and the working of the market for corporate control. Due to the lack of adequate data, here we briefly describe the differences in terms of ownership and control and discuss their potential implications afterwards.

In Germany, corporate ownership is highly concentrated in the hands of a relatively small number of blockholders. These usually consist of banks, family owners and other companies that are bound in networks of cross-shareholdings. Together they account for over two thirds of German share ownership (Lanno(1999)). In Germany, firms usually operate a two-tier board system, made up of a management board and a supervisory board. The blockholders exercise close control over the firms they invest, usually through board representation and the exercise of majority voting rights. Banks play an important role in industrial finance and this important role is often matched by the influence they exercise through board representation and voting rights derived from their ownership of shares and also by acting as proxies for small shareholders. As a consequence of concentrated ownership and underdeveloped stock market, hostile acquisitions are rarely heard.

In the UK, share ownership is widely dispersed among a large number of investors, especially institutional investors, and firms operate under a one-tier supervisory board (board of directors). Lanno(1999) investigates that institutional investors account for over two thirds of corporate ownership. Although on aggregate level, institutions hold a large fraction of total share of UK firms. Single investor shareholdings in a company usually amount to no more than a few percent, often much less. Holdings of more than 10 per cent are rare and are generally accounted for by small family-controlled firms or those with a significant state interest (Vitols et al (1997)). The large dispersed ownership structure may result in the divergent interest between principle and agent. As La Porta et al(2000) point out, minority investors who, due to collective action problems and easy exit opportunities, are unable or unwilling to exercise direct control, will not invest unless their interests are adequately protected from rent seeking managers. Consequently, UK financial market regulation and legal system have developed to reconcile the contradict interests between principle and agent that arise with dispersed ownership. Apart from these regulation devices, the existence of an active takeover market provides an external mechanism of corporate control. Manne(1965) argues that, a well functioning market for corporate control may deter managers from running the firm below its performance potential since that would make the firm vulnerable to takeover. Compared with Germany, UK is characterized by a more active market for corporate control, i.e., there exist a much higher numbers of mergers and hostile takeovers. Hence we expect that a more active market for corporate control to provide stronger incentives for high firm performance.

3. Data collecting and empirical model

3.1 Proxies of firm-level capital structure determinants and theoretical predicted signs.

Previous studies have shown that a number of factors affect firm's capital structure choice, such as tangibility, tax, size, profitability, growth opportunities and volatility etc. In their distinguished works, Harris and Raviv (1991) summarize that "leverage increases with fixed assets, non-debt tax shields, investment opportunities and firm size and decreases with volatility of earnings, advertising expenditure, the probability of bankruptcy, profitability and uniqueness of the product." However, the relationship between the factors and capital structure is not consistent. The empirical results vary, and sometimes contradict in many studies. Moreover, comparisons of capital structure across countries reveal that institutional differences may affect the cross-sectional relation between leverage and factors. In the next sub-section, we will present the proxies used in this thesis to test the determinants of corporate leverage choice in U.K and Germany, the two countries that are homogeneous in their level of economic development but follow different institutional traditions. I summarize the firm-level determinants of capital structure, definitions and theoretical predicted signs in Table 3.

Insert Table 3 here

3.2 Data description and sample selection

The data set were derived from Compustat Global. It contains historic data up to 12 years for more than 65 countries around the world, including income statement, balance sheets and market data. By standardizing the reporting methods, meaningful financial comparisons can be made among publicly traded companies. For the purpose of this thesis, we

utilize this database to obtain variables for all non-financial firms in U.K and Germany from 2003 to 2005. Financial firms such as banks and insurance companies were eliminated from the sample because the non-comparable of balance sheet with non-financial companies. The study period was chosen to be recent to gain an insight of current aspects of capital structure of the two countries. The firms' data extracted from Compustat to compute necessary proxies include total debt, long-term debt, total assets, current assets, current liabilities, market value of equity, book value of equity, property plant and equipment total net (PPENT), total sales, tax rates, and return on assets. The original samples for U.K and Germany are 844 and 619 firms respectively. Because all the regressors are averaged through three years, so the firms lacking data on the required variables in the consecutive period 2003-2005 are eliminated from the database by Eviews. The firms with either the total debt ratio or long-term debt ratio exceed 100% or containing a negative market to book ratio are removed from the data set. Since these data are obviously resulted from typographical errors. This filtration criterion helps to reduce the potential bias. The final data set contains 525 and 218 firms for UK and Germany respectively.

3.3 Dependent and Independent Variables

3.3.1 Dependent Variables

This thesis employs three measures of leverage: total book-debt ratio (TD), long-term book-debt ratio (LD) and long-term market-debt ratio (MLD) ⁴(Because of the data limitation, here book value of debt is used instead of market value of debt. As Bowman (1980) demonstrated that the cross-sectional correlation between the book value and market value of debt is very large, so the misspecification due to using book value measures is probably fairly small.) The precise definitions are presented in Appendix A. Here I use total book-debt ratio (TD) as the main measure of leverage and the other two measures are employed for robustness checks. The preference for total debt ratio above long-term debt ratio is derived by the nature that total debt ratio represents the debt capacity of a firm. When a firm wants to obtain more debt, the creditors will not only focus on how much the firm's long-term debt is, but also take into account the portion of short-term debt. The choice for a book value measure of leverage above a market value measure mainly has two reasons. First, a market value measure may induce spurious correlation. This is especially relevant for the market-to-book ratio. Even without a causal relationship between the market-to-book ratio and the market-debt ratio, a negative relationship will be measured ⁵. (Titman and Wessels (1988) argue that, assume all firms have the same debt ratio in book values. The cross-section variation in market value debt ratio will be fully determined by the difference between the book and market value of the firms.) A second reason of using book-debt ratio may stem from the fact that market values are too volatile to be used as a measure. Many studies such as Toy et al. (1974) show that financial executives consider capital structure choice in book value rather than market value terms.

3.3.2 Independent Variables

I use seven independent variables as proxies of firm-level capital structure determinants. The seven independent variables are: tangibility, size, tax rate, profitability (ROA), growth opportunity (MTB), volatility and liquidity. To capture the size effect on the leverage of firms, two alternative measures are used, i.e. natural logarithm of total sales and natural logarithm of total assets of a firm. Table 4 presents the correlation matrix of independent variables.

Insert Table 4 here

While checking for correlation matrix, two potential collinearity problems may arise. First, log(sales) variable reveals higher correlation with other independent variables than log(assets) measure. For example, the correlation of log(sales)(SIZE1) with liquidity(LIQ) are -0.447 in British firms, for log(assets)(SIZE2), the correlation reduces to -0.209. For German firms in the sample, the correlation between log(sales)(SIZE1) and profitability(ROA) is 0.468, the correlation between log(sales)(SIZE1) and liquidity(LIQ) -0.439. While for log(assets)(SIZE2) measure, the correlations are 0.357 with ROA and -0.249 with LIQ. So log(assets) is adopted as the only proxy for size after checking the correlation matrix. Second problem stems from the high correlation of profitability (ROA) and volatility, the correlation coefficient is -0.813 in UK and -0.853 in Germany. To avoid the potential collinearity problem, volatility is eliminated from the independent variables. Finally, six independent variables are adopted in this thesis, which are tangibility, size, tax rate, profitability, growth opportunity and liquidity. The precise definitions are presented in Appendix B.

In an attempt to isolate the analysis from the potential reverse causality, which exists between the independent, and dependent variable, most empirical studies of capital structure lag their independent variables, which are typically a smoothed series (See e.g., Titman and Wessels (1988) and Rajan and Zingales (1995)). Following Timan and Wessels, I average the independent variables for three years to reduce the noise, then regress the 2003 debt measures against the average tangibility, size, tax rate, profitability, growth opportunity and liquidity for the period 2003-2005.

3.4 Regression model

I estimates the relationship between tangibility, size, tax rate, profitability, growth opportunity and liquidity against three debt measures using ordinary least squares (OLS) cross-sectional regressions⁶(I also estimated cross-sectional

regressions using censored Tobit analysis adopted by Rajan and Zingales (1995). However, as they do, the OLS and Tobit results are found to be very similar. Therefore, I report the results based on OLS regression for simplicity.) The estimated regression model is specified in Equation (1):

$$\text{Leverage [Firm } i] = \beta_0 + \beta_1 \text{TANG}_i + \beta_2 \text{TAX}_i + \beta_3 \text{SIZE}_i + \beta_4 \text{ROA}_i + \beta_5 \text{MTB}_i + \beta_6 \text{LIQ}_i + \varepsilon_i \quad (1)$$

where:

Dependent variables are the three measures of debt in 2003. Independent variables are three years averages (2003-2005) of the corresponding variables.

Leverage [Firm i] is the average level of leverage of firm i in the country in 2005. Three measures are used: total book-debt ratio, long-term book-debt ratio, and long-term market-debt ratio. Total book-debt ratio is defined as total debt over book value of total assets; long-term book debt ratio is long-debt over book value of total assets; long-term market debt ratio is long-term debt over market value of assets (calculated as book value of assets less book value of equity plus market value of equity).

TANG $_i$ is shorthand term for tangibility defined by the book value of property, plants and equipment total net (PPENT) scaled by total assets of firm i , and averaged through 2003-2005.

TAX $_i$ is the average effective tax rate for firm i in the period 2003-2005.

SIZE $_i$ represents size of firm i , proxies by natural logarithm of total assets and averaged through 2003-2005.

ROA $_i$ is the shorthand term for return on assets, calculated by earnings before interest and tax divided by total assets. We use it as a proxy of profitability and average through the study period.

MTB $_i$ is growth opportunities of the firm i in study period, proxies by market value of equity over book value of equity and average from 2003 to 2005.

LIQ $_i$ represents liquidity. It is calculated as the current assets divided by current liabilities of firm i and averaged through 2003-2005. This ratio serves as an indicator of firm's ability to pay short-term obligations.

4. Empirical results and interpretations

4.1 Summary Statistics

As we have mentioned above, in Germany, large banks and inter-corporate shareholdings are widespread. Companies raise most of their external finance from banks that have close relationships with them. While in UK, the evolution of a banking sector that lacks integration with industrial strategy at either the macro or micro level, leads to a high level of dependence of UK firms on equity markets to finance expansion. (Hutton (1996); Charka (1994)). So we expect that German firms will issue more debt than British firms on average. This expectation is confirmed from the leverage ratios in the sample firms.

Insert Table 5 here

Descriptive statistics (Table 5) shows that, in the sample firms, on average German firms have higher debt (total-book, long-term book and long-term market debt) ratios (23.84%, 13.03% and 11.61%) than British firms (16.78%, 10.51% and 8.74%). The relatively higher debt ratios in German confirm the view that German firms tend to borrow more than British firms because of the easier access to debt finance. The lower debt ratios in the UK emphasize the relative importance of equity finance where share ownership is widely dispersed.

Insert Table 6 here

As table 6 shown, three measures of leverage are highly correlated with each other. In UK, the correlation is 0.802 between book total and long-term debt ratios (TD and LD), 0.921 between book and market long-term debt ratios (LD and MLD). In Germany, the correlation is 0.762 between book total and long-term debt ratios (TD and LD), 0.944 between book and market long-term debt ratios (LD and MLD). As these debt measures are highly correlated, for simplicity, the interpretation of regression results will mainly base on total debt ratio.

Among the explanatory variables, the correlations are at reasonable levels (under 0.40), which indicate that there will not be serious multicollinearity problems.

4.2 Cross-sectional Regressions

Insert Table 7 here

As table 7 shown, among the independent variables, tangibility and liquidity are the only two variables that have the expected and consistent signs both in UK and Germany. Other variables, such as tax, size, market-to-book ratios and profitability show different effects across the two countries, which indicates that institutional differences may play an important role in capital structure determinants. In the paragraphs below we discuss the role of firm-level capital structure determinants in detail.

4.2.1 Tangibility

The coefficients of tangibility variable are both positive and significant at in UK and Germany. This positive relation is consistent with the theoretical predictions. As Jensen and Meckling (1976) point out that, the agency cost of debt exists as the firm may shift to riskier investment after the issuance of debt, and transfer wealth from creditors to shareholders to exploit the option nature of equity. If a firm's tangible assets are high, then these assets can be used as collateral, mitigating the lender's risk of suffering such agency costs of debt. Hence, a high fraction of tangible assets is expected to be associated with high leverage, and also the value of tangible assets should be higher than intangible ones in case of bankruptcy. Besides, Williamson (1988) and Harris and Raviv (1990) suggest leverage should increase with liquidation value and both papers also predict that leverage is positively correlated with tangibility, which is now once more confirmed by this study.

4.2.2 Effective tax rate

In the previous section we argue that, under the premise of sufficient taxable income, effective tax rate is expected to be positively associated with the level of debt. Thus firms with higher taxable income ought to have more debt to benefit from tax-shield gain. On the other hands, higher effective tax rate also reduce internal funds and increase the cost of capital. Hence a negative relationship between effective tax rate and level of debt is expected. Some studies also find no significant relation between effective tax rate and leverage ratio. Since the theoretical predictions are mixed, the sign of correlation might vary, depending on which of the (sometimes contradicting) effects seems to be dominant.

In our sample, the estimated coefficient of effective tax rate is significantly negative in UK and positive while insignificant in Germany. These distinctive effects of tax rate may stem from the differences in the debt financing related cost (e.g., agency and bankruptcy costs) between the two countries. Since British firms have arm length relationship with the lenders, information asymmetry problems are likely to be more severe than German firms. If the debt financing related costs prevailed over the tax benefits of debt financing, a negative effect of tax rate may be found.

4.2.3 Size

In our regression, this variable also creates inconsistent results across the two countries. In UK, the coefficient of SIZE is 1.83 and significant at 1% level, implying that the borrowing capacity of firm is positively correlated to the size of the firm. This result is consistent with the theoretical expectations. Since larger firms are not only more diversified and have more stable cash flow, but size can also be interpreted as a reversed proxy for bankruptcy cost. Rajan and Zingales (1995) suggest that larger firms are less likely to bankrupt; therefore, size would be positively correlated with debt.

While for German firms, the coefficient between size and leverage is negative and highly insignificant with a p-value of 0.96, which means that the null hypothesis that the coefficient equals to zero cannot be rejected with the probability 96%. Although the coefficient is insignificant, it requires some explanation since it contradicts the theories about size and capital structure. Rajan and Zingales (1995) also find that the coefficient on size has a different effect in Germany than in the other G-7 countries.

A tentative explanation may base on the concentrated ownership structure in German firms and the inter-corporate share holdings with banks. As debt serves to discipline managers' behavior (Jensen and Meckling (1976)), larger firms ought to issue more debt to mitigate the conflicts between managers and shareholders. Since size proxies the relative dilution of control, smaller firms are more subject to shareholder intervention in the case of mismanagement because a reasonably small group of shareholders can gain a controlling interest in the firms. However, this argument may not hold for German firms. Roe (1993) examines corporate governance in Germany, Japan and the United States and argue that large German firms are much like small U.S. firms. Since German banks control large shares of firms, even the largest German companies. For instance, the three largest German banks control 60.64 percent shares of the largest German firm, Siemens; the second largest, Daimler-Benz, is 41.80 percent controlled by Deutsche Bank (Roe (1993)). Hence, in Germany, the concentrated ownership and close relationship with banks force management to act in the shareholders' interests. Thus, the discipline role of debt is of less importance in Germany. The above argument suggests that the centralized firm control in Germany is responsible for the insignificant effect of size on leverage.

4.2.4 Growth Opportunities

Contrary to the theoretical predictions and majority of empirical evidence, market-to-book ratio is found to have a significantly positive correlation with leverage ratios in Germany. The estimated coefficient in British firms is negative while insignificant at conventional level. (Although the coefficient for long-term market leverage is significant at 10% level, it may due to the spurious correlation induced by market value).

In Myer's (1977) model, existing debt provokes a conflict interest between debtholders and equityholders. This conflict causes the firm to pass through positive NPV projects. However, this explanation seems not apply to German firms in our sample where high growth firms tend to use more debt. Rajan and Zingales (1995) argue that firms with high market-to-book ratios suffer higher costs of financial distress, so leverage ratio should be negatively correlated with

growth opportunities. While we put forward a tentative argument that high growth firms in Germany may experience lower costs of financial distress. Because the lenders of German firms, especially the banks, are frequently present in the supervisory board, and this close relationship with management help the lenders to be better aware of the quality of the firm and investment opportunities as well. Hence this close relationship with lenders gives firms easier access to external borrowing and reduces the risk premium demanded by the lenders. Furthermore, in a bank-based system a special bank-firm relationship may exist even if the bank does not hold shares. This is the case in the German "Hausbank" context where a bank has a very close relationship with an enterprise leading to special lending behavior over the business cycle and in financial distress situations (Kremp et al(1999)). Thus, high growth firms in Germany are less subject to financing constraints from the banking sector, and the conflict between debt holders and equity holders in Myers's (1977) model doesn't apply. Instead, the positive and highly significant coefficient of the market-to-book ratio indicates that, German firms with growth opportunities generally hold more debt.

4.2.5 Profitability

Results in Table 7 reveal a significant negative relationship between profitability and leverage in Germany. This is consistent with pecking order theory, which argues that firms prefer internal funds to finance their investments before raising external debt capital. This argument is based on the view that higher profitability increases internal funds and hence reduces the need for external finance. By implication our results are inconsistent with agency-based theoretical models where debt is used as a discipline device to ensure that managers pay out profits rather than build their empires (Myer's (1977)), and then for firms with free cash flow, or high profitability, high debt can restrain management discretion (Jensen (1986)).

The relationship between profitability and leverage is also negative UK, but it is not significant at 10% level. A possible explanation may lie in the effects of widely dispersed ownership structure. Because of the much wider distribution of share ownership, information asymmetry problem is expected to be more severe in UK than Germany. British firms may be required to distribute more dividends, which, in turn, reduces the importance of profitability when considering corporate financing decisions.

4.2.6 Liquidity

This is one variable creating strong consistency across the two countries in our sample. Liquidity is significantly negatively related to leverage ratios for both German firms and British firms in our sample. This inverse relationship between liquidity and leverage confirms our expectation that firms with high liquidity tend to avoid raising external loan capital. Thus reduces the leverage ratio of firms.

5. Conclusion

In this study I conduct a cross-country comparison of capital structure and its determinants between UK and Germany to test alternative theories of capital structure within different institution traditions. The purpose of this study is to bring into focus the possible effect of institution differences on capital structure choice and its firm-level determinants.

Empirical evidence shows that on average German firms have more debt than British firms; among the explanatory variables, some variables, such as tangibility and liquidity, have the expected sign and are consistent across the two country. While other variables, such as tax rate, size, profitability and market-to-book ratio, show different effects in UK and Germany. This result indicates that institutional differences may be significant determinants of capital structure. These findings also indicate that institutional differences contribute to the variation in capital structure choice and the effects of determinants. While the explanations of causes of cross-country differences are tentative, further research and evidence is required to verify which institution effect produce the observed correlations.

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APPENDIX A: Dependent Variable Definitions

TD Total book-debt ratio, calculated as total debt (DT) divided by book value of total assets (AT) $TL = DT / AT$ (Equation A1)

LD Long-term book-debt ratio, the ratio of total long-term debt (DLTT) to book value of total assets (AT) $LD = DLTT / AT$ (Equation A2)

MLD Long-term market-debt ratio, the ratio of total long-term debt (DLTT) to market value of total assets (book value of assets (AT) less book value of equity (SEQ) plus market value of equity (MKVAL)) $MLD = DLTT / (AT - SEQ + MKVAL)$ (Equation A3)

APPENDIX B: Independent Variable Definition

Tangibility (TANG) The ratio of book value of property, plants and equipment total net (PPENT) to book value of total assets (AT). (Equation B1)
 $TANG = PPENT / AT$ (B1)

Effective tax rate (TAX) The ratio of income taxes – total (TXT) to taxable income (pretax income (PI) less appropriations to untaxed reserves (AUTXR)). (Equation B2)
 $TAX = TXT / (PI - AUTXR)$ (B2)

Size (SIZE) The natural logarithm of total assets (AT). (Equation B3)
 $SIZE = \text{Log} (AT)$ (B3)

Market-to-book ratio (MTB) The ratio of market value of equity (MKVAL) to book value of equity (SEQ). (Equation B4)
 $MTB = MKVAL / SEQ$ (B4)

Profitability (ROA) The ratio of earnings before interests and taxes (EBIT) to total assets (AT). (Equation B5)
 $ROA = EBIT / AT$ (B5)

Liquidity (LIQ) The ratio of current assets (AC) to current liabilities (LC). (Equation B6)
 $LIQ = AC / LC$ (B6)

Table 1. Bankruptcy procedures in UK and Germany

| Main procedure | UK Administrative receivership | Germany Insolvenzordnung (the 1999 code) |
|-------------------------------------|-----------------------------------|---|
| Bankruptcy trigger | Default (covenant breach) | Cessation of payments or over-borrowing |
| Control rights | Secured creditor | Creditors under court supervision (secured creditors have more power) |
| Automatic stay | None | 3 months |
| Super-priority financing | None | Creditors' approval required |
| Dilution of secured claim | None | Limited |
| LLSV creditors score (max=4) | 4 | 3 |
| Source: Davydenko and Franks (2004) | | |

This table lists principal bankruptcy procedures in UK and Germany and compares the main characteristics. Creditor protection scores estimated by La Porta, Lopez-de-Silanes, Sheifer and Vishny (1998) are reported in the bottom row.

Table 2. Banking sector and stock market indicators of UK and Germany (2003)

| Countries | GDP (current \$) | Bank Credit | Listed companies | Market Capitalization | Market Liquidity | Turnover Ratio |
|-----------|----------------------|----------------|------------------|--------------------------|---------------------|-------------------|
| | \$-billion | % of GDP | | % of GDP | % of GDP | |
| U.K | 1566 | 145 | 1701 | 119 | 174 | 135 |
| Germany | 1984 | 145 | 715 | 35 | 62 | 141 |

Bank credit is domestic credit provided by the banking sector includes all credit to various sectors on a gross basis, with the exception of credit to the central government. It is used to measure the growth of banking system because it reflects the extent to which savings are financial. Market capitalization (also known as market value): measure the development of stock market, calculated as share price times the number of shares outstanding. Market liquidity is the total value traded divided by GDP. Turnover ratio is the total value of shares traded during the period divided by the average market capitalization for the period. It is another measure of liquidity, and high turnover indicates low transaction costs. Average market capitalization is calculated as the average of the end-of-period values for the current period and the previous period. Listed companies are the domestically incorporated companies listed on the country's stock exchanges at the end of the year. This indicator does not include investment companies, mutual funds, or other collective investment vehicles.

Source: World Development Indicators 2004, World Bank.

Table 3. Summaries of determinants of capital structure, definitions and theoretical predicted signs

| Proxy (Abbreviation) | Definitions | Predicted Signs |
|---------------------------|---|-----------------|
| Tangibility(TANG) | Book value of plants and equipment -total net (PPENT) scaled by total assets. | + |
| Tax (TAX) | Effective tax rate | +/- |
| Size (SIZE) | Natural logarithm of total sales | + |
| Profitability (ROA) | Earnings before interest and tax divided by total assets | +/- |
| Growth opportunities(MTB) | Market value of assets over book value of assets | - |
| Volatility (VOL) | Standard deviation of ROA | - |
| Liquidity (LIQ) | Current assets divided by current liabilities | - |

Note: “+” means that leverage increases with the factor.
“-” means that leverage decreases with the factor.
“+/-” means that both positive and negative relations between leverage and the factor are possible.

Table 4. Correlation matrix of dependent and independent variables(include volatility variable and both measures of size)

| | | | | | | | | | | | |
|---------|--------|--------|--------|--------|---------------|--------|--------|--------|---------------|-------|-------|
| UK | TD | LD | MLD | TANG | SIZE1 | SIZE2 | TAX | MTB | ROA | LIQ | VOL |
| TD | 1.000 | | | | | | | | | | |
| LD | 0.800 | 1.000 | | | | | | | | | |
| MLD | 0.732 | 0.920 | 1.000 | | | | | | | | |
| TANG | 0.251 | 0.300 | 0.374 | 1.000 | | | | | | | |
| SIZE1 | 0.147 | 0.182 | 0.171 | 0.063 | 1.000 | | | | | | |
| SIZE2 | 0.184 | 0.310 | 0.297 | 0.201 | 0.791 | 1.000 | | | | | |
| TAX | -0.066 | 0.017 | -0.006 | -0.052 | 0.315 | 0.230 | 1.000 | | | | |
| MTB | -0.074 | -0.029 | -0.148 | -0.222 | -0.081 | -0.085 | -0.006 | 1.000 | | | |
| ROA | 0.014 | 0.076 | 0.071 | 0.183 | 0.358 | 0.176 | 0.375 | 0.015 | 1.000 | | |
| LIQ | -0.263 | -0.197 | -0.195 | -0.254 | -0.447 | -0.209 | -0.162 | 0.018 | -0.197 | 1.000 | |
| VOL | -0.020 | -0.081 | -0.116 | -0.181 | -0.199 | -0.140 | -0.245 | 0.003 | -0.813 | 0.065 | 1.000 |
| Germany | TD | LD | MLD | TANG | SIZE1 | SIZE2 | TAX | MTB | ROA | LIQ | VOL |
| TD | 1.000 | | | | | | | | | | |
| LD | 0.762 | 1.000 | | | | | | | | | |
| MLD | 0.720 | 0.942 | 1.000 | | | | | | | | |
| TANG | 0.430 | 0.523 | 0.589 | 1.000 | | | | | | | |
| SIZE1 | 0.204 | 0.112 | 0.129 | 0.251 | 1.000 | | | | | | |
| SIZE2 | 0.157 | 0.141 | 0.169 | 0.242 | 0.862 | 1.000 | | | | | |
| TAX | 0.099 | 0.032 | -0.014 | 0.059 | 0.185 | 0.102 | 1.000 | | | | |
| MTB | 0.147 | 0.133 | 0.006 | -0.019 | 0.019 | -0.055 | 0.116 | 1.000 | | | |
| ROA | 0.059 | 0.022 | 0.061 | 0.339 | 0.468 | 0.357 | 0.334 | 0.089 | 1.000 | | |
| LIQ | -0.454 | -0.327 | -0.314 | -0.302 | -0.439 | -0.249 | -0.041 | -0.065 | -0.061 | 1.000 | |
| VOL | -0.102 | -0.078 | -0.109 | -0.339 | -0.370 | -0.328 | -0.284 | -0.014 | -0.853 | 0.007 | 1.000 |

Total book-debt ratio (TD) is defined as the total debt divided by total assets. Long-term book-debt ratio (LD) is defined as the total long-term debt divided by total assets. Long-term market-debt ratio (MLD) is the ratio of long-term debt to

market value of total assets(calculated as book value of assets less book value of equity plus market value of equity). Tangibility (TANG) is calculated as property plant and equipment total net divided by total assets. Here we employ two measures of size. SIZE1 is the nature logarithm of total sales and SIZE2 is the nature logarithm of total assets. Effective tax rate (TAX) is the ratio of total tax charge to total taxable income. Market-to-book ratio (MTB) is market value of equity over book value of equity. Return on assets (ROA) is defined as earnings before interests and tax divided by total assets. Liquidity (LIQ) is the ratio of current assets to current liabilities. Volatility (VOL) is the standard deviation of ROA.

Table 5. Descriptive statistics of dependent and independent variables for UK and Germany

| UK | TD | LD | MLD | TANG | SIZE | TAX | MTB | ROA | LIQ |
|---------|-------|-------|-------|-------|------|--------|-------|--------|-------|
| Mean | 16.78 | 10.51 | 8.74 | 31.51 | 4.28 | 21.00 | 2.25 | -2.69 | 2.13 |
| Median | 13.60 | 4.83 | 3.72 | 26.56 | 4.31 | 24.57 | 1.44 | 2.59 | 1.44 |
| Std.Dev | 15.75 | 12.79 | 11.31 | 24.42 | 1.25 | 20.41 | 2.53 | 17.08 | 2.53 |
| Minimum | 0.00 | 0.00 | 0.00 | 1.03 | 0.66 | -71.91 | 0.19 | -112.8 | 0.25 |
| Maximum | 95.63 | 62.40 | 76.20 | 98.56 | 6.80 | 90.79 | 22.25 | 24.40 | 21.93 |

| Germany | TD | LD | MLD | TANG | SIZE | TAX | MTB | ROA | LIQ |
|---------|-------|-------|-------|-------|------|--------|-------|--------|-------|
| Mean | 23.87 | 13.03 | 11.61 | 24.41 | 4.68 | 24.41 | 2.18 | -4.71 | 2.87 |
| Median | 23.04 | 9.82 | 7.91 | 21.30 | 4.65 | 29.55 | 1.54 | 0.90 | 1.95 |
| Std.Dev | 17.73 | 12.82 | 11.98 | 18.71 | 1.03 | 27.35 | 2.96 | 14.65 | 2.93 |
| Minimum | 0.00 | 0.00 | 0.00 | 0.41 | 2.36 | -84.75 | 0.13 | -71.26 | 0.19 |
| Maximum | 83.70 | 54.65 | 57.99 | 91.13 | 6.81 | 91.46 | 33.23 | 21.93 | 24.04 |

Total book-debt ratio (TD) is defined as the total debt divided by total assets. Long-term book-debt ratio (LD) is defined as the total long-term debt divided by total assets. Long-term market-debt ratio (MLD) is the ratio of long-term debt to market value of total assets (calculated as book value of assets less book value of equity plus market value of equity). Tangibility (TANG) is calculated as property plant and equipment total net divided by total assets. We define size(SIZE) as the nature logarithm of total assets. Effective tax rate (TAX) is the ratio of total tax charge to total taxable income. Market-to-book ratio (MTB) is market value of equity over book value of equity. Return on assets (ROA) is defined as earnings before interests and tax divided by total assets. Liquidity (LIQ) is the ratio of current assets to current liabilities. The number of observations (firms) is 525 for UK and 218 for Germany.

Table 6. Correlation matrix of dependent and independent variables

| UK | TD | LD | MLD | TANG | SIZE | TAX | MTB | ROA | LIQ |
|------|--------|--------|--------|--------|--------|--------|-------|--------|-------|
| TD | 1.000 | | | | | | | | |
| LD | 0.802 | 1.000 | | | | | | | |
| MLD | 0.734 | 0.921 | 1.000 | | | | | | |
| TANG | 0.249 | 0.294 | 0.372 | 1.000 | | | | | |
| SIZE | 0.198 | 0.321 | 0.310 | 0.182 | 1.000 | | | | |
| TAX | -0.075 | -0.003 | -0.021 | -0.038 | 0.211 | 1.000 | | | |
| MTB | -0.080 | -0.039 | -0.157 | -0.222 | -0.097 | -0.006 | 1.000 | | |
| ROA | 0.022 | 0.079 | 0.077 | 0.191 | 0.193 | 0.378 | 0.004 | 1.000 | |
| LIQ | -0.267 | -0.201 | -0.200 | -0.258 | -0.233 | -0.167 | 0.026 | -0.213 | 1.000 |

| Germany | TD | LD | MLD | TANG | SIZE | TAX | MTB | ROA | LIQ |
|---------|--------|--------|--------|--------|--------|--------|--------|--------|-------|
| TD | 1.000 | | | | | | | | |
| LD | 0.762 | 1.000 | | | | | | | |
| MLD | 0.721 | 0.944 | 1.000 | | | | | | |
| TANG | 0.428 | 0.530 | 0.593 | 1.000 | | | | | |
| SIZE | 0.133 | 0.119 | 0.147 | 0.230 | 1.000 | | | | |
| TAX | 0.093 | 0.043 | -0.002 | 0.076 | 0.136 | 1.000 | | | |
| MTB | 0.149 | 0.135 | 0.011 | -0.015 | -0.074 | 0.111 | 1.000 | | |
| ROA | 0.063 | 0.030 | 0.069 | 0.342 | 0.368 | 0.338 | 0.070 | 1.000 | |
| LIQ | -0.452 | -0.332 | -0.320 | -0.311 | -0.242 | -0.061 | -0.057 | -0.125 | 1.000 |

Total book-debt ratio (TD) is defined as the total debt divided by total assets. Long-term book-debt ratio (LD) is defined as the total long-term debt divided by total assets. Long-term market-debt ratio (MLD) is the ratio of long-term debt to market value of total assets (calculated as book value of assets less book value of equity plus market value of equity). Tangibility (TANG) is calculated as property plant and equipment total net divided by total assets. We define size (SIZE) as the nature logarithm of total assets. Effective tax rate (TAX) is the ratio of total tax charge to total taxable income. Market-to-book ratio (MTB) is market value of equity over book value of equity. Return on assets (ROA) is defined as earnings before interests and tax divided by total assets. Liquidity (LIQ) is the ratio of current assets to current liabilities.

Table 7. OLS analysis results on total book-debt ratio

| | UK | Germany |
|------------------------|---------------------|---------------------|
| Intercept | 10.76 (0.00) | 17.68 (0.00) |
| TANG | 0.11 (0.00) | 0.34 (0.00) |
| SIZE | 1.83 (0.00) | -0.05 (0.96) |
| TAX | -0.10 (0.01) | 0.06 (0.16) |
| MTB | -0.15 (0.56) | 0.77 (0.03) |
| ROA | -0.03 (0.41) | -0.18 (0.03) |
| LIQ | -1.37 (0.00) | -2.07 (0.00) |
| Number of observations | 525 | 218 |
| Adjusted R2 | 0.13 | 0.30 |

The dependent variable is total book-debt ratio (TD) which is total debt divided by book value of total assets in 2006. Tangibility (TANG) is calculated as property plant and equipment total net divided by total assets. We define size (SIZE) as the nature logarithm of total assets. Effective tax rate (TAX) is the ratio of total tax charge to total taxable income.

Market-to-book ratio (MTB) is market value of equity over book value of equity. Return on assets (ROA) is defined as earnings before interests and tax divided by total assets. Liquidity (LIQ) is the ratio of current assets to current liabilities. All the independent variables are three-year averages (2003-2005). p-values are in parentheses. The regression is estimated using ordinary least squares (OLS) model. The estimated equation is: $\text{Leverage [Firm } i] = \beta_0 + \beta_1 \text{TANG}_i + \beta_2 \text{SIZE}_i + \beta_3 \text{TAX}_i + \beta_4 \text{MTB}_i + \beta_5 \text{ROA}_i + \beta_6 \text{LIQ}_i + \epsilon_i$.

Note: Coefficients in bold are significant at conventional levels.

Table 8. OLS analysis results on Long-term book-debt ratio

| | UK | Germany |
|------------------------|---------------------|---------------------|
| Intercept | -4.02 (0.08) | 4.29 (0.31) |
| TANG | 0.12 (0.00) | 0.36 (0.00) |
| SIZE | 2.81 (0.00) | -0.09 (0.91) |
| TAX | -0.04 (0.15) | 0.03 (0.31) |
| MTB | 0.21 (0.32) | 0.51 (0.03) |
| ROA | -0.01 (0.75) | -0.17 (0.00) |
| LIQ | -0.47 (0.03) | -0.83 (0.00) |
| Number of observations | 525 | 218 |
| Adjusted R2 | 0.16 | 0.31 |

The dependent variable is long-term book-debt ratio (TD) which is total long-term debt divided by book value of total assets in 2006. Tangibility (TANG) is calculated as property plant and equipment total net divided by total assets. We define size (SIZE) as the nature logarithm of total assets. Effective tax rate (TAX) is the ratio of total tax charge to total taxable income. Market-to-book ratio (MTB) is market value of equity over book value of equity. Return on assets (ROA) is defined as earnings before interests and tax divided by total assets. Liquidity (LIQ) is the ratio of current assets to current liabilities. All the independent variables are three year averages (2003-2005). p-values are in parentheses. The regression is estimated using ordinary least squares (OLS) model. The estimated equation is: $\text{Leverage [Firm } i] = \beta_0 + \beta_1 \text{TANG}_i + \beta_2 \text{SIZE}_i + \beta_3 \text{TAX}_i + \beta_4 \text{MTB}_i + \beta_5 \text{ROA}_i + \beta_6 \text{LIQ}_i + \epsilon_i$.

Note: Coefficients in bold are significant at conventional levels.

Table 9. OLS analysis results on Long-term market-debt ratio

| | UK | Germany |
|------------------------|--------------------|---------------------|
| Intercept | -2.99 (0.13) | 3.78 (0.34) |
| TANG | 0.14 (0.00) | 0.38 (0.00) |
| SIZE | 2.26 (0.00) | -0.05 (0.95) |
| TAX | -0.04 (0.10) | 0.01 (0.83) |
| MTB | -0.29 (0.10) | 0.03 (0.89) |
| ROA | -0.01 (0.70) | -0.14 (0.01) |
| LIQ | -0.36 (0.06) | -0.70 (0.00) |
| Number of observations | 525 | 218 |
| Adjusted R2 | 0.20 | 0.35 |

The dependent variable is long-term market-debt ratio (TD) which is total long-term debt divided by market value of total assets in 2006. Tangibility (TANG) is calculated as property plant and equipment total net divided by total assets. We define size (SIZE) as the nature logarithm of total assets. Effective tax rate (TAX) is the ratio of total tax charge to total taxable income. Market-to-book ratio (MTB) is market value of equity over book value of equity. Return on assets (ROA) is defined as earnings before interests and tax divided by total assets. Liquidity (LIQ) is the ratio of current assets to current liabilities. All the independent variables are three-year averages (2003-2005). p-values are in parentheses. The regression is estimated using ordinary least squares (OLS) model. The estimated equation is: $\text{Leverage [Firm } i] = \beta_0 + \beta_1 \text{TANG}_i + \beta_2 \text{SIZE}_i + \beta_3 \text{TAX}_i + \beta_4 \text{MTB}_i + \beta_5 \text{ROA}_i + \beta_6 \text{LIQ}_i + \epsilon_i$.

Note: Coefficients in bold are significant at conventional levels.