

**CAPITAL STRUCTURE DECISIONS AN INTERNATIONAL
EXAMINATION**

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I certify that this thesis satisfies all the requirements as a thesis for the degree of
Master of Business Administration

This is to certify that we have read this thesis and that in our opinion it is fully
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Administration

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ABSTRACT
CAPITAL STRUCTURE DECISIONS AN INTERNATIONAL
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In this study, the firms in the UK and the US are analysed for their factors of capital choice. Throughout this study, it was found that the factors analysed were relatively more sensitive in the UK than in the US to the different definitions of leverage, such that; as the definition of leverage applied changes, the level of leverage of UK companies vary significantly. Although there are many factors affecting the capital structure definitions of the firms, this study focuses on five of them, which are; tangibility, profitability, growth opportunities, volatility of earnings and the size of the firms. It was observed that a positive correlation existed between the leverage and the tangibility & size, whereas a negative correlation was determined between the leverage and the proxies for profitability & growth in both countries. The relation between the earning volatility and leverage was contrary to each other in the UK and the US. There was a positive relation between them in the UK and a negative relation was found between them in the US. As a result of this study it was concluded that while the predictive ability and the strength of the factors analysed show significant changes between the UK and the US, most of them affect the level of leverage of companies in the same way in both countries.

ÖZET

SERMAYE YAPILARI KARARLARININ ULUSLARASI İNCELENMESİ

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İşletme Yüksek Lisans, İşletme Yönetimi Bölümü

Tez Yöneticisi: Prof. Dr. Turgut VAR

Bu çalışmada İngiltere ve A.B.D'deki şirketlerin sermaye yapılarının seçimlerindeki etkenler incelenmiştir. Çalışma esnasında İngiltere'deki şirketlerin borçlanma oranlarının incelenen etkenler açısından A.B.D'deki şirketlere göre daha hassas oldukları belirlenmiştir. Örnek olarak şirketlere uygulanan borçlanma oranlarının yapısı biraz değiştirildiği zaman İngiltere'deki şirketlerin A.B.D.'deki şirketlere göre daha keskin sonuç farklılıkları verdikleri gözlemlenmiştir. Şirketlerin sermaye yapısını etkileyen pek çok faktör olmasına rağmen bu çalışmada; maddi duran varlık büyüklüğü, karlılık, büyüme fırsatları, kazançlardaki dalgalanmalar, şirket büyüklükleri göz önüne alınmıştır. Yapılan çalışmada her iki ülkede de borçlanma ile şirketlerin duran varlık büyüklükleri ve şirket büyüklükleri arasında pozitif bir ilişki tespit edilirken; borçlanma oranları ile karlılık ve büyüme fırsatları arasında negatif bir ilişki gözlemlenmiştir. Kazançlardaki dalgalanmalar ve borçlanma arasındaki ilişki ise iki ülke arasında farklılık göstermekte olup ; İngiltere'de arada pozitif bir ilişki bulunurken, A.B.D.'de ise negatif bir ilişki olduğu belirlenmiştir. Özetlemek gerekirse, bu çalışmanın sonucunda tahmin edilebilme kabiliyeti ve incelenen etkenlerin güçlülüğü iki ülkede de önemli değişiklikler göstermesine rağmen, büyük bir kısmının borçlanma oranını aynı şekilde etkilediğine kanaat getirilmiştir.

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List of Abbreviations used

CIFO	-	Cash in flow from operations
EBIT	-	Earnings before interest and tax
EBITDA	-	Earnings before interest and tax plus depreciation and amortization
FRS	-	Financial Reporting Standards
FTSE Index	-	Financial Times Stock Exchange Index
GAAP	-	Generally Accepted Accounting Practices
P&L	-	Profit and Loss Statement
SFAS	-	Statements of Financial Accounting Standards (US)
SSAP	-	Statements of Standard Accounting Practice (UK)
S&P	-	Standard and Poor's
UK	-	The United Kingdom
US	-	The United States

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1 INTRODUCTION

Research Problem and Motivation

The last fifty years has produced substantial progress at both theoretical and empirical levels in the work on the factors of corporate capital structure. Pioneering theoretical models developed, such as Modigliani and Miller's (1958, 1963) "irrelevance theory", has enabled the corporate capital structure researchable and relaxation of this theories assumptions lead the way to many researchers in order to find better capital structures.

Miller's (1977) study has showed that there is an equilibrium point in which the effect of personal taxes offsets the advantage of leveraging completely, thus makes the value of the firm independent of debt-equity mix. Scott (1977) and Bradley, Jarrell and Kin (1984) developed the trade-off models to show that there should be a target point balancing the cost and benefits of debt and equity financing mix. Donaldson (1961), Myers and Majluf (1984) and Myers (1977) has related capital structure decisions to informational asymmetries between managers and outsiders and they developed pecking order theory to explain the financing behaviour of the companies. Jensen and Meckling (1976) approached the problem from the agency perspective and developed explanations related to different agency theories. Many researches have followed all of these studies and add empirical insights to this field.

However, existing empirical research on capital structure has been largely confined to the United States since sixties. While the United States has always been the source of

most applicable theories of capital structure, only a few studies have been undertaken examining rest of the world. Although that the United Kingdom had studies on capital structure, the number of the studies is still very few.

One of the major earliest UK studies was that of Marsh (1982). Marsh (1982) studied the impact of volatility of earnings, firm size and asset composition on the leverage levels of the companies in the UK.

Bennett and Donnelly (1993) have studied asset structure, business risk and firm size in the UK. In addition to these factors they studied non-debt tax shields and past profitability. They introduced market measures of leverage to their study and their study provided more significant results for market rather than book value leverage ratios. However, they found contradictory results for the earnings volatility compared to some US studies such as Bradley et al, (1984), Titman and Wessels (1988) and Kale et al (1991).

The international study of Rajan and Zingales (1995) which also includes the UK, found growth opportunities and profitability are negatively related to leverage while company size and tangibility were found to be positively related to leverage in the UK. Bevan and Danbolt (2002) replicated the Rajan and Zingales (1995) study and found similar results except their tests for tangibility had conflicting results depending on the definition of leverage. Some studies found profitability to be negatively related to capital structures consistent with the pecking order theory, some other found opposite results.

The lack of empirical work on the factors of capital structure in the UK can be attributable to view that the UK and the US exhibit more or less the same economic and financial environment and it may be assumed that the findings of studies carried out in the US also apply to the UK. However these two countries are characterised by different traditions, ownership structures, bankruptcy codes, financial and tax systems that may have implications on how firms decide their capital structure. Some studies such as Rajan and Zingales (1995) have documented that the companies in the United Kingdom (UK) and the United States (US) have different level of leverage which the UK firms are on average significantly less leveraged than the US firms. Bevan and Danbolt (2002) have documented that trade credit and equivalent” is a significant component of financing for the UK companies and must be taken into account when analysing capital structure in the UK.

The contradictory findings in previous empirical studies between the US and the UK and these countries itself (as discussed above and in section two), the possible effects of existing institutional differences between the US and the UK (as discussed in section three) provided the necessary motivation for this study.

Organization of the Study

This Study is organized as follows: Section two provides a review of the existing literature on capital structure theory first by discussing the related capital structure theories beginning with Modigliani and Miller (1958) propositions and then a critical review of the researches based on the factors of the capital structure decisions follows.

Section three provides a discussion of the features of the UK's and US' institutional environment which is expected to have different effects on capital structure in related countries. This section focuses on the differences in bankruptcy codes, tax systems and the accounting practices in these countries.

Section four provides a description and discussion of the research design. Testable hypotheses, methodology, data used, variables tested are explained in detail in this section. This section also provides the results of the tests performed.

Section five provides summary of findings and discussion followed by a conclusion of the study.

Summary

In summary, this study carries out a comprehensive empirical analysis using available secondary data from a credible database in order to extend the empirical research on the factors of capital structure. For comparison purposes the study employs UK and US data to investigate the cross-sectional factors of capital structure. A sensitivity analysis is also employed to test if the factors affecting corporate leverage level change with the different definitions of leverage.

2 LITERATURE REVIEW

Introduction

This section provides a review of the existing literature on capital structure theory. The first part of the section provides a discussion of the related capital structure theories. This discussion begins with Modigliani and Miller (1958) propositions and continues with its subsequent extensions developed by many academicians in the last 47 years.

Consistent with the objectives of this Study, second part of the section provides a critical review of the researches based on the determining factors of the capital structure decisions. The factors reviewed in this part are various factors that have been identified by theoretical studies and by previous empirical studies on data from different countries including both developed and developing countries.

Capital Structure Theory

Financial literature defines a firm's objective as "to maximise shareholders' wealth" (See for example Van Horne and Wachowicz, 1995, Eiteman, Stonehill and Moffett, 1999). Shareholder wealth is the value of the company represented by the market price per share of the firm's common stock, which in turn, is a reflection of the firm's investment, financing and asset management decisions.

According to Rappaport (1998) the value of a company can be broken down into three main concepts: the present value of cash flow from operations during the forecast period, the residual value which represents the present value of the business attributable to the period beyond forecast period and the market value of marketable securities. The discount rate, corresponds to the company's cost of capital, is a critical variable which the value of the company reacts very sensitively. Other things being equal, the lower the costs of capital, the higher the value calculated by present value of the discounted net cash flows after tax of the company. After calculating company value, shareholder value can be calculated by subtracting the value of "Debt" from the company value.

The decision of minimising the cost of capital is consistent with the maximising shareholders' wealth. However minimum cost of capital may not always attract investors and in addition there are several factors effecting the decisions of firm's on the right debt and equity mix choice which is required to minimise the cost of capital.

There have been many debates on the right mix of capital structure since Modigliani and Miller published their seminal papers in 1958. Myers (1984) begins his article by asking, "How do firms choose their capital structures?" which he answers by saying, "We don't know." Although many researches have been done and many significant insights have been accumulated on capital structure choice, theories developed do not explain the financing behaviour of firms entirely and also some of them contradict to each other.

Modigliani and Miller (1958) provide the irrelevance theorem of capital structure from the value of the firm. Their theory states that the value of a firm is independent from its capital structure in complete and perfect capital markets. In their articles, assumptions of the complete and perfect markets are as follows;

- Capital markets are without transaction costs and there are no bankruptcy costs.
- There are no corporate and personal taxes
- Individuals can borrow and lend at a risk free rate
- All firms are in the same risk class.
- All cash flows are perpetuities.
- Firms use only risk-free debt and risky equity as sources of finance.
- Managers and outsiders have the same information.
- Managers act in the interest of shareholders.
- There are no arbitrage opportunities.

Although that the assumptions of the theory seems to be unrealistic, theory itself is important because it provides a framework and a useful theoretical benchmark for managers and researchers to consider the factors effecting the capital structure. Within these 47 years many researchers has focused on each of these assumptions and showed that relaxation of these assumptions may create some conditions which the value of a firm relevant to its capital structure. Researchers mainly focused on tax implications, effects of asymmetric information and agency problem implications of this proposition.

Modigliani and Miller (1963) examine the effects of corporate taxes and the existence of tax shields on debt. Interest expense of debt is generally tax deductible while dividend and equity gains to the shareholders are not. A tax paying firm that pays interest for its debt receives a partially offsetting interest tax shield. The firm reduces income by deducting paid interest on debt and thereby reducing their tax liabilities. Their model states that under the assumption that the corporate tax is positive and interest payments on debt are tax deductible, value maximising capital structure includes enough debt to eliminate the firm's tax liabilities. However, in real life, firms may not always be profitable (tax paying), debt is not perpetual as it is in the model and there are some associated costs such as financial distress arising from increased debt, agency costs and the personal tax expense bondholders incur when they receive interest income (Miller, 1977). Even though debt is tax deductible at the corporate level, the corporate benefit of using leverage is offset by a cost (personal taxes) at investor level. According to the Miller (1977), there is an equilibrium point in which the effect of personal taxes offsets the advantage of leveraging completely, thus makes the value of the firm independent of debt-equity mix.

A number of theories which are based on Modigliani and Miller theorem have been proposed to give a clear understanding to the relevancy of capital structure by relaxing no tax and no bankruptcy assumptions. Scott (1977) and Bradley, Jarrell and Kin (1984) state that the firm will increase its leverage till it reaches to an optimal point, which is defined by the marginal value of tax shields on additional debt is offset by the increase in the present value of possible financial distress (Trade-off Theory). Basically trade-off theory suggests determining a balance between the cost and benefits of debt and equity financing and then choosing how much debt to use based

on this balancing. It implies a company should have a target debt ratio, depending on the industry which it takes place.

While trade-off theory supports the idea that highly profitable firms has more taxable income to shield, and that the firm can service more debt without risking financial distress, Myers (2001) criticizes that yet there are many established, profitable companies with superior credit ratings operating for years at low debt ratios, including Microsoft and the major pharmaceutical companies. Wald (1999) finds highly profitable firms tend to borrow less in cross-sectional test for United States, United Kingdom, Germany, France and Japan. This is contradicting to trade-off theories' tax shield assumptions, which states profitable firms, have more taxable income to shield, and the firm can service more debt without having financial distress costs. This shows that trade-off theory is weak in explaining the financing behaviours of profitable firms.

Myers and Majluf (1984) relate firms' capital structure choices to "under investment" problem. Under investment hypothesis was first introduced by Myers (1977). Firms may finance their new projects by issuing equity. If in this situation firm's equity is under priced, this may result that new investors gain more of the project net present value which damages existing shareholders. In these circumstances, under investment problem may occur due to existing shareholders' rejection of such projects even if the net present value is positive. Myers and Majluf (1984) suggest a solution to reduce the under investment problem. It requires the project financing by using funds which is less likely to be under priced by the market. If available, internal funds are this kind of funds. Firms will prefer funding investments by retentions, they will issue equity as a

last option and they will issue debt depending on their investment needs and the supply of retained earnings.

Myers (1984) refers the solution of under investment problem to pecking order hypothesis of Donaldson (1961) which explains firm's financing behaviour by pecking order hypothesis. Donaldson (1961) finds that firms prefer internal to external financing and debt to equity if the firm issues securities by analysing 25 large US corporations.

Rationale behind pecking order theory (Myers, 1984) is firms like flexibility; internally generated funds are cheaper funding and not subject to outside interference. Debt is also relatively cheaper than issuing equity and does not require the loss of control of the firm. Myers (1993) finds profitable firms use less debt as a support to the pecking-order theory of financing choice. The negative relationship between debt ratio and profitability is consistent with the logic of pecking order theory but inconsistent with trade-off theory. Allen (1993) finds evidence of a significant negative cross-sectional relationship between measures of leverage and profitability for Australian companies as a support for pecking order hypothesis.

Myers (1984) and Myers and Majluf (1984) supported pecking order hypothesis by relating it to informational asymmetries meaning the managers know more than investors about the company. According to the informational asymmetry models, stockholders and managers signal private information to the security market in order to correct the market's perception of excellence. In their survey (questionnaire and interviews) of US firms, Graham and Harvey (2001) does not find the pecking order

to be all driven by informational asymmetries. His research shows that after having a good credit rating, firms are using stock and debt financing to try the effect the companies' earnings per share. If the stock price is overvalued, firms go and issue stock; if interest rates are low they issue debt. Graham (2005) shows managers believe that missing an earnings target or reporting volatile earnings reduces the predictability of earnings, which in turn reduces stock price because investors and analysts dislike uncertainty. His evidences show that managers are more interested in key performance metrics such as earnings per share for an external audience than the mix of equity and debt which is a more difficult measure for the external audience as a signalling tool.

Beattie, Goodacre and Thomson (2004) find some support for trade-off and pecking order in their comprehensive survey¹ (questionnaire and interviews) of 192 UK Listed companies, but similar to Graham's (2002, 2005) results they find finance directors' opinions not fully consistent with either of the main theories. They resulted that firms are heterogeneous in their capital structure decisions and this decision is a complex and multi-dimensional problem.

There are theories based on management behaviour which can affect capital structure decisions. First, asymmetric information models, that is mentioned by Myers (1984) and Myers and Majluf (1984) as a base for pecking order hypothesis which suggests

¹ Beattie, Goodacre and Thomson (2004) and Graham's (2002, 2005) approaches are carrying out surveys (questionnaire and interviews), which involves collecting primary data by asking managers how they give their financing decisions. This is a direct approach, however it has also some disadvantages such as the person answering the questions may be biased, may not be the actual decision maker or may provide what they think should be the answers instead of what is actually happening in their company.

outsiders are said to know less about the firm's prospects than the managers. Managers which have also share in common stock, attempt to maximize their value. Therefore, they will fund the investments by following a pecking order starting from retained earnings, then debt and finally by equity issues. This will result that the increased value from the investments accrues only to the existing shareholders. Second theory based on management behaviour is agency theory that is involved in conflicts among interest groups (managers, shareholders and debt holders) with claims to firms' resources.

Optimal capital structure can be obtained by trading-off the agency costs of debt against the benefit of debt, in what might be termed an extended trade-off model. (Jensen and Meckling, 1976)

Advantages of debt;

- First, Debt is a factor of the ownership structure that disciplines managers. Limiting control to a few agents that control the common stock, while the rest of the capital is raised through bond sale, can reduce agency cost of management. (Jensen and Meckling, 1976)
- Second, debt can also reduce excessive consumption of perquisites available to managers to engage in self-interest activities because creditors demand annual payments on the outstanding loan. (Free cash flow problem) (Jensen, 1986)

- Third, the use of debt finance may encourage managers to perform better in order to reduce the likelihood of bankruptcy, which is costly for managers (Grossmann and Hart, 1982).

Disadvantages of debt;

- First there is the problem of agency cost of debt that includes risk substitution and under investment. According to the risk substitution problem suggested by Jensen and Meckling (1976), for a firm having low profitability but growth opportunities, there is an incentive for managers to invest in riskier projects. Shareholders benefit from the investment if the project yields a higher return than the face value of the debt; however, there is no liability to pay by the shareholders if the project fails. Under investment problem suggests larger debt levels result in the rejection of more value-increasing projects (Myers, 1977). To reduce this under investment problem, firms with many growth opportunities should not be financed by debt.
- Second, debt also increases bankruptcy possibility by increasing the financial risk of a firm.

Prior research on Factors of Capital

Introduction

Following the theories developed on the capital structure decisions of the firms, researchers has started focusing on several factors which may effect these decisions. However, most of these studies are not entirely consistent with each other and mainly differ from each other by the different countries studied, the statistical methods applied, the factors analysed and the time interval examined.

Some of the cross sectional studies based on US firms include Bradley, Jarrell and Kim (1984), Titman and Wessels (1988) and Graham and Harvey (2001). Studies focusing on UK firms include Marsh (1982), Bennett and Donnelly (1993), Lasfer (1995), Bevan and Danbolt (2002) and Beattie, Goodacre and Thomson (2004). Major international studies including UK and US firms are Rajan and Zingales (1995), Wald (1999), Panno (2003).

Empirical researches show that there are many factors effecting the capital structure decisions, this study only includes five factors among them. These are tangibility, profitability, growth opportunities, volatility of earnings and the size of the firms. Definitions of leverage that have been used in the literature show differences according to whether book measures or market values are used. They also differ in whether all debt or only long term debt is considered. The older academic literature has tended to focus on book debt ratios. The more recent academic literature includes market debt ratios as well.

Possible Factors of capital Structure

Tangibility

The relation between tangibility and leverage arise from the fact that in general, debt may be more readily available to a firm which has high amounts of collateral in order to secure the debt. High amounts of firm's tangible assets on the balance sheet serve as collateral demanded by the debt providers. While tangibility increases the liquidation value of the firm, intangible assets such as goodwill can lose market value rapidly in the event of financial distress or bankruptcy.

Jensen and Meckling (1976) present a model in which firms take greater risks after issuing debt to switch possible gains from debt holders to equity holders namely called risk substitution problem. On the other hand, Myers (1977) presents another model in which debt causes under investment problem resulting in the rejection of more value-increasing projects. Due to these agency conflicts between debt holders and equity holders, without assets which used as collateral, the cost of borrowing may be excessively high (high interest repayments as a perquisite to making the loan). This general discussion converges to conclude that there is a positive relationship between leverage and fixed assets.

DeAngelo and Masulis (1980) states companies with high levels of depreciation would be expected to have low levels of debt. This is due to depreciation expense's tax deduction advantage and acting as a substitute to tax deduction advantage of interest expense on debt. If the proportion of fixed to total assets (i.e., tangibility)

provides a reasonable proxy for the availability of depreciation tax shields DeAngelo and Masulis would expect a negative rather than a positive correlation between tangibility and gearing.

In their empirical analysis, Bradley et al. (1984) find no support for DeAngelo and Masulis' tax-based theory. In opposite Bradley et al. (1984) find a strong positive relationship between firm leverage and the relative amount of non-debt tax shields such as depreciation and tax credits, which is very puzzling. The contradiction is interest expense on debt and non-debt tax shields are considered to be substitutes due their tax benefit creations. His explanation for this contradiction is major part of the non-debt tax shields are expenses charged from firm's tangible assets and more tangible assets means more collateral in order to increase the level of leverage.

Due to the conflict of interest between debt providers and shareholders lenders may demand security, and collateral value. Thus as a main source of collateral and security in a company, tangible assets is found to be an important factor of the level of debt finance available to companies (Scott, 1977; Williamson, 1988; Harris and Raviv, 1990). For US companies Bradley et al. (1984) and for US and UK companies Rajan and Zingales (1995) find a significant positive relationship between tangibility and total gearing. Bennett and Donnelly (1993) find a positive correlation between collateral value of tangible assets and total and short-term book and market value based debt, but a negative correlation for long-term market value based debt for UK companies. For the UK companies, Bevan and Danbolt (2002) find that the relationship between tangibility and leverage depends on the measure of debt applied as well. Their study finds tangibility to be positively correlated with short-term and

long-term forms of debt, a significant negative correlation is observed when the trade credit element is added both to the book and market based leverage definitions. Bennett and Donnelly (1993) and Bevan and Danbolt (2002) supports each others results by finding different signs of relation for different definitions of debt however contradicts to each other by finding opposite results in some of the leverage definitions.

Profitability

The relation between profitability² and leverage arise from the fact that highly profitable firms usually provide more internal financing, thus before using an external source of fund such as debt; there are more funds available in the firm to utilize in planned investments. This view is parallel with the Donaldson (1961), Myers (1984) Myers and Majluf (1984) pecking order theories. Pecking order hypothesis would be consistent with a significant negative correlation. However by contrast, trade-off theory supports the idea that highly profitable firms has more taxable income to shield, and that the firm can service more debt without risking financial distress, which can also be viewed as an extended approach of Modigliani and Miller (1958) proposals. The trade-off theory would predict a significant positive correlation between profitability and debt ratios.

On the other hand profitability is also linked to agency cost arguments. The Free Cash Flow theory (Jensen, 1986) suggests that debt reduces the agency cost of free cash flow. Debt financing disciplines management and ensures that the management is

² Profitability in here refers to past profitability which determines the level of funds retained.

directing corporate resources in ways that benefit investors by making cost efficient investment decisions and prevents excessive consumption of perquisites available to managers to engage in self-interest activities by limiting free cash available.

Stock markets react by adjusting a firms' share price in negative or positive direction following the information about the firm provided by the management to the market. This information may be related to firms' investments decisions as well as financing decisions. Signalling theory developed by Ross (1977) suggests management knows inside information better than outsiders/investors thus the choice of financial structure signals information to the market. He concludes that the values of firms will rise with leverage, since increasing leverage increases the market's perception of value. Investors take the issue of debt as a signal of higher quality earnings and managements confidence of future probability with the ability to pay its future debt obligations. This theory implies a positive association between leverage and profitability and contradicts with above findings.

However the agency cost and signalling explanations for the relation between profitability and leverage is linked from the opposite side. Unlike, the trade-off and pecking order theories, in here profitability is considered to be a result of leverage level (future profitability), not the cause (past profitability). In this study only the effect of past profitability on leverage is considered to be an objective.

Titman and Wessels³ (1988) also support this negative relation between the leverage ratio and profitability for US companies in their study consistent with the pecking order hypothesis.

Chiarella, Pham, Sim and Tan (1991) find negative relation between the leverage and past profitability for Australian companies. However they also find a positive and significant relationship between profitability and long-term debt scaled by market value of equity. Although that this is consistent with the prediction of Ross' signalling theory, they admit that this can only be a statistical anomaly due to the fact that past profitability may be an imperfect proxy for expected future profitability.

One of the most recent intense empirical researches on the relationship between leverage and profitability is done by Rajan and Zingales (1995). They empirically confirm an inverse relation in their study based on G-7 countries. Bevan and Danbolt (2002) find the same relation for the UK companies in their study focusing alternative measures of gearing and sensitivities of factors to these different measures.

Other studies consistent with above findings include Bennett and Donnelly (1993) which use the data of the UK companies and find a significant negative relationship only when debt is measured in market value, Wald (1999) use the data of the US and the UK companies and Ozkan (2001) use the data of the UK companies and reports a significant negative relationship between firm's current profitability and gearing level.

³ However they use the ratios of operating income over sales and operating income over total assets as indicators of profitability. Due to the non-cash items such as depreciation, included in profit & loss operating income, this ratio is found to be a weak indicator of profitability. This problem is analysed in more detail in section 4.6.

Growth Opportunities

In Financial literature, the relation between growth opportunities in a firm and its leverage level is referred mainly to agency theories. However trade-off theory and pecking order theory have also implications while explaining this relationship.

Myers (1977) suggests that the amount of debt issued by a firm is inversely related to growth opportunities consisting of future investment opportunities, which would increase the value of the firm when undertaken. It is argued that increased level of debt results under investment problem that is passing up some of the valuable investment opportunities by the firm's management.

As a consequence, above suggestion state firms with more investment opportunities have less leverage because they have stronger incentives to avoid underinvestment and risk substitution that can arise from stockholder-bondholder agency conflicts.

It is also suggested that although growth opportunities are capital assets which add value to a firm, in general they may provide very limited collateral value or liquidation value. They are intangible in nature and valuable as long as the firm is alive. Their value will fall precipitously if the firm faces bankruptcy, which suggests that expected bankruptcy costs for firms with greater growth opportunities will be higher (Myers, 1984; Williamson, 1988; and Harris and Raviv, 1990). Larger expected bankruptcy costs would in turn imply lower financial leverage. Moreover growth opportunities do not yet provide revenue; companies may be reluctant to take on large amounts of contractual liabilities at this stage. This prediction is inline with

the trade-off theory which suggests firms' financing decisions have an optimal point, which is defined by the marginal value of tax shields on additional debt is offset by the increase in the present value of possible financial.

Free cash flow theory, predicts that firms with more investment opportunities have less need for the disciplining effect of debt payments to control free cash flows (Jensen, 1986).

The simple version of the pecking order theory suggests that debt typically grows when investment exceeds retained earnings and falls when investment is less than retained earnings. Thus, given profitability, book leverage is predicted to be higher for firms with more investment opportunities. However, in a more complex view of the model, firms are concerned with future as well as current financing costs. Balancing current and future costs, it is possible that firms with large expected growth opportunities maintain low-risk debt capacity to avoid financing future investments with new equity offerings, or foregoing the investments. Therefore, the more complex version of the pecking order theory predicts that firms with larger expected investments have less current leverage (Drobetz and Fix, 2003).

Titman and Wessels (1988) argue that growth opportunities are capital assets that do not generate current taxable income and they find a negative relationship with market value based leverage definitions in the US firms. Rajan and Zingales (1995) report negative relationship between leverage and growth for all G-7 countries. Bennett and Donnelly (1993) find a zero relationship between the use of debt and firms with high growth opportunities for UK firms. Bevan and Danbolt (2002) find a significant

negative correlation between market-to-book ratio and leverage for UK firms. However at some of book value leverage ratios, they find contradicting results suggesting a positive relation between growth and leverage level. For Swiss firms, Drobetz and Fix (2003) find the strongest and most reliable negative relationship with gearing and growth opportunities among other factors they tested.

Volatility of Earnings

The risk of being default in payments is considered to affect capital structure. Firms with high variations in their future earnings would tend to have less debt in their capital structure in order that interest payments may be met in times of low earnings. The trade-off model predicts more volatile cash flows increase the probability of default, implying a negative relationship between leverage and volatility of cash flows. Pecking order theory allows the same prediction, however its reasoning is issuing equity is more costly for firms with volatile cash flows.

Empirical evidence in this area is ambiguous. Ferri and Jones (1979) find no relation between the business risk and the percentage of the debt in a firm's financial structure.

Myers (1977) studies agency costs of debt by analysing the potential interaction between the risk substitution incentive and underinvestment problem. He points out that, if investment increases the variance of project return, equity holders' incentive to shift risk will mitigate the underinvestment problem. He concludes: "The impact of risky debt on the market value of the firm is less for firms holding investment options on assets that are risky relative to the firms' present assets. In this sense we may

observe risky firms borrowing more than safe ones” (Myers, 1977, p. 167). This means according to Myers (1977) there is a positive relation between the debt level and volatility of earnings of the company.

Bennet and Donnelly (1993) also observe volatility of earnings to be positively correlated with the level of leverage for the UK companies. They give some possible explanations by referring managerial behaviour theories. “High risk firms do not have the opportunity to increase their risk, which would have the effect of transferring wealth from debt holders to equity holders. Therefore, they are able to take on more debt than less risky firms if the bankruptcy costs are less significant than the agency costs.” (Laurent, 2000 p.17).

Bradley, Jarrell and Kim (1984) find volatility of cash flows is significantly and negatively related to US firms’ leverage ratios. Titman and Wessels (1988) analysed the relation between the standard deviation of the percentage change in operating income for US firms and their leverage levels, however his results do not provide significant evidence that volatility is negatively related to gearing.

Ghosh, Cai and Li (2000) find the relationship between business risk and leverage to be quadratic in the US manufacturing industry. This suggests that when the business risk is low, the debt level will be high, but with higher business risk, debt level should be lower. This result contradicts with result obtained by Kale, Noe and Ramirez (1991). They also find a quadratic relationship between business risk and leverage level, however in the opposite way. They show that the relationship is roughly U-shaped, decreasing for low levels of business risk, and increasing for high levels.

Drobetz and Fix (2003) analyses the Swiss firms and find a negative relationship between leverage and volatility as a support for both trade-off and pecking order models.

Firm Size

Several arguments link company size to capital structure decisions. These arguments suggest that, in general, large firms have less concern than small firms about financial distress and agency costs of using debt and thus enjoy greater potential benefits from debt tax shield.

The trade-off theory of capital structure uses bankruptcy costs to argue that the threat of costly bankruptcy will discourage firms from using debt to fully exploit the potential tax advantage. In general, direct bankruptcy costs are similar for large and small firms, thus smaller firms suffer relatively more from their value during bankruptcy due to these direct costs.

Small firms may be subject to greater agency costs because they are more flexible and better able to increase the risk of investment projects. Thus, lender may be less willing to provide debt finance to small firms (Grinblatt and Titman, 2002). On the other hand, large firms are more likely to have a credit rating; they can access capital markets and borrow cheaply (Ferri and Jones, 1979).

Large firms are more diversified and, therefore, less likely to suffer financial distress. Small firms are often restricted from using long-term debt and equity because of large fixed issuing costs, and tend to finance by short-term bank loans (Marsh, 1982)

The effect of size on equilibrium leverage is quite ambiguous. Larger firms tend to be more diversified and fail less often, so size (computed as the logarithm of net sales) may be an inverse proxy for the probability of bankruptcy. (Rajan and Zingales, 1995, p. 1451)

In their study covering firms in G-7 countries, Rajan and Zingales (1995) find positive relationship between firm size and leverage for the UK and the US firms and negative relationship between firm size and leverage for France and Germany. Interestingly, they conclude that they do not know why size is correlated with gearing.

Other evidence on the effect of size on the capital structure of a firm is also varied. Titman and Wessels (1988) find a negative relation between size and long-term debt to book value of equity ratio for US firms.

Drobtz and Fix (2003) do not find size as an important factor of leverage for Swiss firms. Wald (1999) finds size to be positively related to gearing in the UK, Japan and the US but not in Germany and France and suggests that the centralised control in France and Germany is responsible for the low coefficients on size

Bennett and Donnelly (1993) find significant positive relationship between size and all book and market value measures of leverage in UK firms. Bevan and Danbolt

(2002) find positive significant coefficients for all book value measures of leverage in UK firms. However they also add that market value measures of leverage do not show a significant relationship.

Summary and Conclusion

In this chapter a review of the existing literature on capital structure theory is accomplished by discussing the related capital structure theories and by analysing the prior empirical research on factors of capital structure. The review of the prior research is limited with the following factors; tangibility, size, volatility, growth opportunities and profitability. With this review it is shown that the effects of factors on capital structure of the firms can not be explained with a unique view as the major theories do, because of the mixed results of the empirical research. Throughout this study it is found that different definitions of debt have significant influence on the factors affecting capital structure decisions. According to some studies the effects of factors of capital structure over the firms in the UK and the US show differences, although both countries are developed economies. In order to establish more clear relations between the capital structure of a firm and its factors and to have a better understanding of their relations, more research should be done.

3 INSTITUTIONAL DIFFERENCES BETWEEN THE UK AND THE US

Introduction

Capital structure choices of a firm among countries are not only the product of its characteristics but also the result of some factors such as macro-economic conditions, financial institutions and instruments available and institutional differences between countries. This section provides a brief overview of the UK and the US's institutional environment. The discussion includes the differences between bankruptcy codes, tax legislations and accounting practices in the UK and the US. These differences between the UK and the US not only have direct effects on the firms but also have some indirect effects through affecting the factors of the capital structure as it is discussed below.

The aim in this section is not to empirically test the relationship between institutional differences and capital structure but to gather enough information to support the evidence found in this study on the relation between the analysed factors and the capital structure.

Bankruptcy

A bankruptcy law tries to balance several objectives, including protecting the rights of creditors and other stakeholders and preventing the early liquidation of firms with possibility of recovering. Although that the United States and the United Kingdom are both developed and financially well structured economies, their bankruptcy laws are

significantly different especially the weight given to the debtor and the creditors, the extent to which liquidation is emphasized over renegotiation of claims, and the extent to which management has control during the bankruptcy process.

Rajan and Zingales (1995) find the United Kingdom is relatively less levered than the United States by analysing short and long term debt compositions of the firms and question this fact by asking “Is it a coincidence that countries where the ex-ante contract is most strictly enforced are also ones where firms have the least debt? Also, do firms efficiently maintain low leverage because the bankruptcy code results in too much liquidation of viable firms? Or do firms inefficiently maintain low leverage because managers fear losing their firm-specific human capital investment if the firm is liquidated?” Chen and Hammes (2004) have investigated seven OECD⁴ countries. Their study finds the same relatively low leverage ratio for the UK.

In the financial literature there are many researches studying the relation between bankruptcy laws and the capital structure of firms in different countries. (See for example Davydenko and Franks, 2005, Acharya, Sundaram and John, 2004, Smith and Stromberg, 2004 and Claessens and Klapper, 2002) Bankruptcy law has an impact on lender-borrower relationships, and as Harris and Raviv (1991) suggest, it should be regarded as an integral aspect of a debt contract.

Smith and Stromberg (2004) describe the US law as “debtor-friendly,” oriented towards reorganizing the existing company (i.e., giving the debtor a second chance), and accustomed to deviating from contractual payoff priorities. In contrast, they

⁴ United States, Italy, Sweden, United Kingdom, Canada, Denmark and Germany

describe the traditional bankruptcy procedures in many other developed countries including the United Kingdom, Germany, Japan, and Sweden as “creditor friendly,” favouring the liquidation of the debtor’s assets to pay off creditors in the order of their priority.

According to bankruptcy laws in the UK, in the event of default control rights pass to the creditors, managers and employee’s loose jobs and equity holders get nothing. Managers therefore have incentives to delay the formal filing and do so when the firms have reached an alarming stage of distress, this minimises chances of a successful reorganization. (Kaiser, 1996) Secured lenders have full discretion to realize the firm’s assets as they choose, and their actions cannot be challenged in the courts (Davydenko and Franks, 2005). The threat of early liquidation, which results in the loss of jobs, is likely to lead to lower gearing ratios.

However the bankruptcy law in the US gives management substantial rights including the ability to propose a reorganization plan within 120 days of filing, a stay on attempts by any creditor to collect, and the right to manage the firm during the proceedings. Chapter 11 of the US code provides important provisions limiting creditors’ rights, such as automatic stay, debtor in possession, and supra priority financing (Davydenko and Franks, 2005).

Franks and Torous (1993) compare the UK bankruptcy code with that in the US, and conclude that "the US code appears to have strong incentives to keep the firm as a going concern even when it is worth more in liquidation [while] the UK code, by emphasizing the rights of creditors -- and in some cases giving priority to one creditor

– is likely to lead to too many premature liquidations." Due to this characteristic of the US code, one can expect more agency conflicts in the US (between shareholders and debt holders) such as risk substitution and under investment.

Tax System

In general tax systems can be classified into classical systems and imputation systems. In classical systems, interest payments are tax deductible at the corporate level, but dividends are not. At the personal level dividends and interest are not deductibles. Therefore dividends are double taxed in classical systems; first in the corporate level and then in personal level. The United States is operating in this system. Graham (2003) finds empirical evidence to support the idea that in the US taxes affect corporate financial decisions.

Imputation systems reduce or eliminate taxation of dividends by granting a tax credit to recipients of dividends, equal to some fraction of the corporation tax paid on earnings used for dividends. This prevents the double-taxation of dividends and theoretically decreases the attractiveness of debt financing. The United Kingdom is operating in this system. Panno (2003) investigates the empirical factors of capital structure choice by analysing the firms in the UK and Italy. He concludes that for both markets, the tax advantage of debt financing plays a relevant role in capital structure decisions.

These systems both may have different impact on the capital structure decisions of the firms. Double taxation on dividends makes debt financing more attractive in classical

systems. This may be one of the reasons why Rajan and Zingales (1995) find the United Kingdom is relatively less levered than the United States by analysing short and long term debt compositions of the firms.

The explanatory power of taxes on the differences between capital structures in different countries depends on the different tax rates effective in these countries and to the extent the researcher considers including the personal tax effects on the corporate tax effects. These considerations are out of the objectives of this study.

Comparison of Accounting Policies and Financial Statements

Financial accounting in the United Kingdom has two major sources. These are Companies acts and the accounting profession respectively. There have been some significant changes in Companies acts through time. The 1989 act created a new Financial Reporting Council (FRC) with the duty of overseeing its branches: the Accounting Standards Board (ASB), an Urgent Issue Task Force (UITF) and a Financial Reporting Review Panel. The ASB issues Financial Reporting Standards.

On the other hand, the United States is regulated by a private sector body (the Financial Accounting Standards Board, or FASB) but a government agency (the Securities and Exchange Commission or SEC) underpins the authority of its standards.

Although that financial accounting in the UK is regulated by government institutions and in the US it is regulated by a private sector body, Ball et al. (2000) state that the

UK GAAP seems likely to be less conservative⁵ than US GAAP in terms of relative impact on profits.

The relation between conservatism and capital structure comes from the idea that the more conservative the financial statements the more understated the shareholders fund, thus lowering the relative leverage level. In the Appendix of this section (section 3.6.1.) the main differences between the United Kingdom and the United States general accepted accounting practices are discussed. Major part of the differences support Ball et al. (2000) statement of UK GAAP to be less conservative than US GAAP in terms of relative impact on profits. This may be another reason why the previous empirical researches find UK leverage ratios relatively lower than the US leverage ratios.

Summary and Conclusion

The discussion in this section has several implications for the leverage decisions and the factors considered as affecting the leverage decisions in the UK and the US.

The rights of the creditors are likely to lead premature liquidations in the UK code and obviously this has an impact on the risk attitudes of firms and the financial system which makes debt financing relatively less attractive to the UK. In the US, double taxation on dividends and strong incentives in the bankruptcy code to keep the firm as

⁵ Conservative accounting can be defined as choosing accounting methods and estimates that keep the book values of net assets relatively low. Conservative accounting not only affects the balance sheet, but also affects the quality of earnings reported in income statement (Penman and Zhang, 2002).

a going concern even when it is worth more in liquidation makes debt financing more attractive.

Due to these characteristic of the US bankruptcy code and tax system, agency conflicts (between shareholders and debt holders) are more expected in the US such as risk substitution and under investment.

Additionally, most of the differences between General Accepted Accounting Practices in both countries indicate that UK GAAP is less conservative than US GAAP in terms of relative impact on profits and eventually on book value of equity.

Appendix

Main GAAP Differences Between the UK and the US

Goodwill

UK GAAP requires;

- Adoption of FRS10 in 1999 requires goodwill on subsequent acquisitions to be capitalized and amortized over a period not exceeding 20 years.

US GAAP requires;

- Before July 2001, goodwill should be capitalised and then amortised over the expected useful life, not exceeding 40 years, as a charge against income.

- Goodwill arising on acquisitions since July 2001 should be capitalised but no amortization should be charged, in accordance with the transitional provisions of SFAS142.

Main Difference:

- US GAAP does not allow amortising the goodwill since July 2001 while UK GAAP allows amortization. (UK GAAP is more conservative in this aspect)

Goodwill Impairment

UK GAAP requires;

- Goodwill impairment reviews should be carried out at the end of the first financial year following an acquisition, and also when an indicator of impairment exists.
- The impairment is measured by comparing the carrying value of the goodwill with the higher of the net realisable value and the value in use.

US GAAP requires;

- Goodwill impairment reviews should be also conducted when an indicator of impairment exists, in addition to an annual goodwill impairment test, as required by SFAS12.
- The impairment is measured by comparing the carrying value of a reporting unit to its fair value. Where the carrying value is greater than the fair value, the

- impairment loss is based on the excess of the carrying value of goodwill in the reporting unit over the implied fair value of the goodwill.

Main Difference:

- US GAAP requires annual impairment evaluation even though there is no indicator. (US GAAP is more conservative)

Deferred Tax

UK GAAP requires;

- For the financial statement before 2002, a provision should be made for deferred tax under the liability method where it is probable that a deferred tax liability will become payable or a tax asset will be utilised, within the foreseeable future.
- Adoption of FRS19 in 2002 requires that full provision for deferred tax should be recognised in the financial statements.

US GAAP requires;

- Deferred tax should be provided on a full liability basis, and a valuation adjustment should be established against deferred tax assets where it is more likely than not that some portion will not be realised.

Main Difference:

- Adoption of FRS19 in 2002 eliminates most of the differences that previously existed between UK GAAP and US GAAP.

Revaluation of Fixed Assets

UK GAAP requires;

- Before the adaptation of FRS15, UK GAAP allowed for the periodic revaluation of land and buildings with depreciation then being calculated on the revalued amount. Any surplus or deficit (to the extent that the revaluation reserve was in surplus) on the revaluation was then taken directly to shareholders' funds.
- Under FRS15 of UK GAAP which is effective periods ending or after 23 March 2000, revaluation to current value for a class of assets is optional.

US GAAP requires;

- Revaluations of fixed assets are not permitted and, as a result, fixed assets are stated with historical cost and the depreciation charge is adjusted accordingly.

Main Difference:

- Shareholder funds in the UK financial statements may be relatively overstated due to revaluation reserves. This has a direct effect on leverage ratios of the UK companies making it relatively less to the US companies leverage ratios.

Pensions

UK GAAP requires;

- Pension plan assets and obligations should be based on the results of the latest actuarial valuation.
- Plan assets should be valued either at a market related value or at the discounted present value of expected future income.
- Liabilities should be assessed using the expected rate of return on actual plan assets.
- SSAP 24 does not mandate a particular method, but requires that the method and assumptions, taken as a whole, should be compatible and lead to the actuary's best estimate of the cost of providing the benefits promised.

US GAAP requires;

- Plan assets should be valued by reference to market-related value at the date of the financial statements.
- Liabilities should be assessed using the rate of return obtainable on fixed or inflation-linked bonds.
- SFAS 87 mandates a particular actuarial method – the projected unit credit method – and requires that each significant assumption necessary to determine annual pension cost reflects best estimates solely with regard to that individual assumption.

Main Difference:

- There is a significant difference in the treatment of actuarial gains and losses arising during the accounting period. UK GAAP recognises the actuarial gains and losses in full in the year in which they arise in the statement of total recognised gains and losses. Under US GAAP, the actuarial gains and losses which exceed ten per cent of the value of the assets or liabilities at the start of the accounting period are amortised over the remaining service lives of scheme members. This will lead shareholder funds in UK financial statements relatively understated to US financial statements in the short term.

- Second difference is UK GAAP allows discounted present value of expected future income while valuing the plan assets. US GAAP does not allow this method.

Inventory

UK GAAP requires

- Inventory should be valued at the lower of cost or net realizable value on a FIFO or average cost basis; LIFO is not acceptable.

US GAAP requires;

- LIFO, FIFO and average cost methods are permissible and widely used for inventory pricing. LIFO is popular because it can be used for federal income tax purposes. However, if LIFO is used for tax purposes, it must also be used for financial reporting purposes.

Main Difference:

- Allowed practice of LIFO in the US results some differences between the UK accounts. The LIFO method allocates the cost on the premise that the last goods purchased are the first ones sold. The ending inventory that remains on the balance sheet under this approach represents the inventory that was purchased first. This is considered conservative for income statement purpose, since the resulting cost of goods sold (expense) is generally higher (assuming rising prices).

4 RESEARCH DESIGN, DATA AND METHODOLOGY

Aim & Objectives of the Study

This section provides a description and discussion of the research design. In this first part aims and objectives of the research are stated. In the next part, information related to data and methodology is provided. Section continues with the explanations of variables used in this analysis and related hypotheses. Last part of the section provides the results of the tests performed.

Aim and Objectives

The aim of this study is to analyse the capital structure decisions by examining the factors of capital structure by using a sample of publicly listed firms in two developed countries: the United States and the United Kingdom.

Associated objectives of this study comprise;

1. Extending the empirical research on the topic of capital structure theory by providing additional evidence on the understanding and significance of the factors of corporate capital structure decisions.
2. Application of a sensitivity analysis to empirically explore if the factors affecting capital structure change with the different definitions of leverage.

3. Making a comparison between the United States and the United Kingdom in order to empirically determine; first, whether the factors considered as factors by the previous empirical studies are able to predict the capital structure levels in similar ways, second, which predictor among the ones specified in this study predicts the capital structure level best in each of these countries.

Data

The data used for the empirical analysis is derived from the commercial database maintained by Extel Company Research Database. This database contains balance sheet, profit and loss and cash flow statement information for both current and extinct companies in a host of countries. For the purposes of this investigation, this database is utilized to obtain the required variables, where available, for the publicly quoted firms in the United Kingdom and the United States over the time period from 1999 to 2004. For UK samples, FTSE 350 Index is used as a benchmark. This index includes approximately 350 of the largest stocks (by market value) listed in UK. For US samples, S&P 500 Share Index is used as a benchmark. This index includes 500 of the largest stocks (by market value) listed in the US and accounts for around 70% of the US market. The reason for choosing samples from the publicly quoted firms is to increase the number of samples which have complete data in order to perform related study. Due to their reporting requirements, financial accounting information of the publicly quoted firms is periodically published by these companies.

Financial firms such as banks, insurance companies and investment trusts are eliminated from the sample because their leverage is strongly influenced by explicit (or implicit) investor insurance schemes such as deposit insurance. Furthermore, their debt-like liabilities are not strictly comparable to the debt issued by non-financial firms. Finally, regulations such as minimum capital requirements may directly affect capital structure.

Computation of Variables and Interpretation of Descriptive Statistics

Accounting and market data relating to 350 UK listed companies and 500 US listed companies are obtained from the Extel database. After eliminating 102 firms in the UK and 82 firms in the US due to their industry classification (Financial Industry Firms; such as banks, insurance companies, investment trusts) and another 23 firms in the UK and 31 firms in the US due their missing data to perform the necessary calculations, six measures of leverage, and seven proxies representing the five attributes were calculated.

Before starting the regressions analysis, existence of any outliers⁶ were checked in order to remove them from the sample populations related to both dependent and independent variables. Finally, outlier determination and their eliminations left 205 firms in the UK and 366 firms in the US as the sample population.

⁶ An outlier is a case with such an extreme value on one variable (a univariate outlier) or such a strange combination of scores on two or more variables (multivariate outlier) that they distort statistics and may lead to Type I and Type II errors (Tabachnick and Fidell, 1996, p.66).

Descriptive statistics were computed for all dependent and independent variables in order to describe the characteristics of the sample and to control the variables for violation of the assumptions underlying the statistical technique used in the research.

Summary descriptive statistics for the variables are given in Table 4.1 and 4.2. As it can be seen from these tables, level of indebtedness of the UK and the US firms varies significantly depending on the measure of leverage applied. Definitions of leverage ratios in this study are given in section 4.5. In both countries, among six different leverage definitions, the ones using book value of equity in their denominator are relatively higher than the ones using market value of equity in their denominator.

The first debt ratio in Table 4.1 is the widely used measure of leverage, referring to the ratio of long-term debt to capital, where as capital includes long-term debt plus book value of equity. This ratio is 33% and 36% for UK and US firms respectively. The second debt ratio is an approximation of the first debt ratio, adjusted by the market value of equity. Interestingly, this ratio is 21% for both types of firms. US leverage ratio is higher than the UK for the third leverage definition however in the market value adjusted version of the same ratio (fourth definition) US leverage is lower than the UK leverage. For the last two leverage ratio definitions, the US ratios are significantly lower than the UK leverage ratios. Third and fourth leverage definitions include short term debt and fifth and sixth leverage definitions include total trade credit as a part of the total debt structure in firms.

As it is already mentioned in section 3, Rajan and Zingales (1995) and Chen and Hammes (2004) find UK firms relatively less levered than US firms by analysing

short and long term debt compositions of the firms. Their analysis covers the period between 1987-1991 and 1990-1996 respectively where as, the leverage ratios in this study covers the period between year 2001 and 2004. However, in this study the book value leverage ratios have the same results except the one adjusted by the trade credit.

Due to the different kind of definitions in the literature making comparisons between empirical studies is difficult. One of the comparable debt ratios between this study and Chen and Hammes (2004) is the third and fourth leverage ratios which defines the leverage as total debt to capital (total debt plus book value of equity in third definition and total debt plus market value of equity in fourth definition). According to this comparison, since 1996 UK firms' debt ratios (third and fourth leverage definitions) has increased from 26% to 38% and 19% to 25% respectively. US firms' debt ratio has decreased from 42% to 40% and 25% to 23% respectively.

Summary descriptive statistics for the independent variables are also provided in Table 4.1 and 4.2. An interesting result in here is the relatively high mean statistic in the US growth measure. It is measured as 2.26 in the US where as it is only 1.69 in the UK. For the 1987-1991 periods, Rajan and Zingales (1995) calculate this measure as 1.58 for both of the country samples and for the 1990-1996 periods, Chen and Hammes (2004) calculate 1.77 and 1.65 for the UK and the US data respectively. After these comparisons the US data is reviewed back and investigated for the errors for several times. In the end it is concluded that there are no errors and most of the firms in the US sample has high growth rates. Most of the high growth firms are technology companies. Since the beginning of the 90s technology firms has increased their growth ratios significantly.

On the other hand, Table 4.1 and 4.2 shows that asset structure of the UK (37%) firms include relatively more tangible assets than the US firms (32%). This results is consistent with the previous empirical researches (e.g. Wald (1999), Rajan and Zingales (1995)). Perhaps the explanations for the growth measure discussed above give some clue about this comparison as well. The US data includes more technology firms which have significant intangible assets in their asset structure. As a result the overall tangibility ratio for the US firms is lower. Moreover, as stated in section 3.6.1.4, US GAAP does not permit revaluation of fixed assets and, as a result, fixed assets are stated with historical cost and the depreciation charge is adjusted accordingly. However under FRS15 of UK GAAP which is effective periods ending or after 23 March 2000, revaluation to current value for a class of assets is optional. This suggests that some of the UK firms have additional value on their tangible assets arising from revaluation which eventually increases the tangibility ratio of the firm.

Profitability ratios for the UK and the US firms are both 15% for the first definition of the profitability (EBITDA/Total Assets) and 13% and 11% for the second definition of the profitability (CIFO/Total Assets) respectively.

Size approximation is calculated by using natural logarithm of the sales in order to make comparisons and statistical calculations usable. The mean of logsales over the period from 2000 to 2004 indicates that the average turnover of companies in the UK sample was approximately £1.19 billion (Logsales = 7.08) where as it was approximately £3.8 billion (Logsales = 8.23) for the US samples.

Mean statistics for the volatility measures presented in Table 4.2. In both countries, there are small differences between EBIT based (Volatility 1) and cash flow based (Volatility 2) volatility ratios. For the UK firms, EBIT based volatility mean statistic is 24% where as cash flow based mean statistic is 26%. The same statistics are 26% and 28% for the US firms. These results show that both countries firms' have similar volatility in both earnings measures and these companies' cash flows are more volatile than profit and loss based earnings. Leverage ratios in Table 4.2 have similar characteristics with the leverage ratios in Table 4.1. Again starting from first and second definitions of leverage the UK firms are less levered than the US firms whereas the situation is opposite when it comes to fifth and sixth definitions of leverage which includes trade credit as a source of financing.

In Tables 4.1 and 4.2 skewness and kurtosis measures for the UK and the US data are also provided. The skewness value provides an indication of the symmetry of the distribution. Kurtosis on the other hand provides information about the 'peakedness' of the distribution. In a perfectly normal distribution skewness and kurtosis should be obtained as 0 which is a very rare situation social science researches (Pallant, 2001, p. 53). In this study, although that there are exceptional approximations to 0, most of the values for skewness and kurtosis, are ranging higher than 0. Both the UK and the US skewness results are positive, meaning that scores clustered to the left at the low rates. Most of the US and some of the UK kurtosis results are negative (platykurtic), meaning distributions relatively flat (too many extreme cases in the extremes even after eliminating outliers). However, with large samples skewness will not make a substantive difference in the analysis (Tabachnick and Fidell, 1996, p. 73). Kurtosis

can result in an underestimate of the variance, however this risk is also reduced with a large sample (200+ cases: see Tabachnick and Fidell (1996, p. 73).

Up to this point, descriptive statistics in this study show that;

- Perhaps due to factors (defined independent variables) examined in this study or the market conditions or the macro economic factors such as interest and exchange rates, leverage level of the UK firms and US firms are changing in the opposite way since the beginning of 1990.
- Long term and Total debt measures shows that the UK firms are less levered than the US firms, however after adding trade credit item to the leverage definition, the UK firms are relatively more levered than the US firms for both book and market leverage ratios.
- The difference between the first leverage definition (Long-term debt to Book Value of Equity) and the fifth leverage definition (Total debt and Trade credit to Book Value of Equity) is 5% in the US where as it is 14% in the UK. Trade credit item is a significant source of fund in the UK where as the situation is opposite for the US firms.
- The institutional differences between countries discussed in section 3 and summarized in section 3.5 seem to affect the average debt level in both countries as it is expected. Relatively strict bankruptcy code in the UK, forces firms to use less debt and more trade credit as a source of funding. The US firms' more conservative shareholders fund relative to the UK's firms' due to the different accounting policies applied, makes the UK firms relatively less levered than the US firms.

- Both countries have similar mean statistics for the profit and loss based and cash flow based volatility measures ranging between 24% and 28%.
- UK firms have higher tangibility and lower growth rates relative to US firms due to the accounting differences⁷ between countries and the technology firms with significant intangible assets in the US samples.

⁷ Such as optional revaluation policy in UK GAAP

Methodology

To assess the factors of capital structure in UK and US, a multiple regression model is used. This methodology is standard in most of the other researches examining factors of capital structure (e.g. Rajan and Zingales (1995)). Multiple regression analysis is a statistical technique to assess how well a set of independent variables is able to predict one dependent variable and which independent variable is the best predictor of the dependent variable.

There are number of different types of multiple regression analyses that are widely used depending on the nature of the research question (e.g. standard, hierarchical and stepwise).

In standard multiple regression, all the independent variables are entered into the equation simultaneously. This approach addresses the question of how much variance in a dependent variable is explained by the independent variables as a group and individually. In this study, standard multiple regression is used as the type of the model.

The dependent variable in this study is defined by six different leverage ratios which are explained in detail in section 4.5. There are five independent variables which two of them has two alternative measures each and explained in detail in section 4.6.

In order to prevent multicollinearity⁸, collinearity statistics are investigated and correlations between the independent variables are controlled. No sign of multicollinearity has found for the UK and the US variables.

Tabachnick and Fidell (1996) define outliers as cases that have a standardised residual of more than 3.3 or less than -3.3. Tabachnick and Fidell (1996) also add that with large samples, it is not uncommon to find a number of outlying residuals. The presence of outliers in regression results also controlled from the scatter plots of each regression equation. Few outliers found among the US and the UK cases, just out of the stated ranges above. No action taken for these few outliers.

Homoscedasticity is the assumption that the standard deviations of errors of prediction are approximately equal for all predicted dependent variables (Tabachnick and Fidell, 1996, p. 121). This assumption is controlled and seen that except from minor deviations in these measures, there is no sign of heteroscedasticity in the UK and the US cases.

Normal probability plots of the regression standardised residuals are controlled in order to check normality assumption. After controlling all the figures for the UK and US cases, it is determined that all the points lie in a reasonably straight diagonal line from the bottom left to the top right. This suggests no major deviations from normality assumption. Linearity assumption is checked by controlling the scatter plot of the standardised residuals. It is determined that residuals roughly have a

⁸ Multicollinearity exists when the independent variables are highly correlated to each other.

rectangular distribution, with most of the scores concentrated in the centre. This suggests no major deviations from linearity assumption.

The estimated regression model may be represented as:

$$\text{Leverage}_{i,A} = \beta_1 + \beta_2 \text{Growth}_{i,A} + \beta_3 \text{Logsale}_{i,A} + \beta_4 \text{Profitability}_{i,A} + \beta_5 \text{Tangibility}_{i,A} + \alpha_{iA}$$

where leverage refers to each of the individual leverage measures (as specified in the next two sections), i refers to the individual firms, A to the average time period (2001-2004 for the leverage ratios, 2000-2004 for the independent variables).

The independent variable called “volatility of earnings” was not included in the above equation for several reasons. First, in order to increase the reliability of the results, it is considered that volatility of earnings measures were supposed to be calculated at least from six years data (1999-2004). Due to the lack of required information, sample size of this measure in both of the countries is relatively less than other independent variables. Second, if this variable is not added to the above equation, results become comparable to most of the previous empirical studies such as Rajan and Zingales (1995) and Bevan and Danbolt (2002). As a result in order to keep the study comparable to other studies, it is decided to analyse this variable apart from other variables by applying a simple linear regression.

The results of these regression analyses are given in section 4.7 and reported in Tables 4.3.a, 4.3.b, 4.4.a and 4.4.b.

Dependent Variable

Financial literature provides several measures of leverage used in empirical researches. However it is observed that these measures are differentiated from each other in three aspects. First aspect is the debt's maturity composition. These measures include variations of short or long term borrowing. Second is the nature of the borrowing. Some examples of measures in this type are bank borrowings, trade credit or leasing as a part of leverage formulas. Last aspect is the variation on the value of the equity. Some studies use book value while others use market. There are also some studies which use both.

Different leverage definitions in the financial literature make it hard to compare the findings among these studies. These studies' results show significant differences when the definition of the leverage is changed.

In this study dependent variable, leverage, is defined in six versions which cover all the aspects defined above as much as possible in order to capture the implications of capital structure theories that predict different relationships between predicted attributes and different measures of leverage.

The following abbreviations are used to denote different measures of gearing used in this study.

LTD => Long-term Debt (book value)

STD => Short-term Debt (book value)

TD => Total Debt (LTD + STD)

LTTC => Long-term Trade Creditors

STTC => Short-term Trade Creditors

TTC => Total Trade Creditors (LTTC + STTC)

BVE => Book value of Equity

MVE => Market value of Equity

4.5.1. Long-term Debt to Capital

Debt includes only long-term debt where as capital includes long-term debt plus book value of equity,

$$\text{LTD} / (\text{LTD} + \text{BVE}) \qquad \qquad \qquad (\text{Leverage Formula 1})$$

and market value of equity,

$$\text{LTD} / (\text{LTD} + \text{MVE}) \qquad \qquad \qquad (\text{Leverage Formula 2})$$

The former ratio is the most widely used ratio in the financial literature, and the latter is a derivative of the same ratio adjusted for the market value of the equity. For example, Chen and Hammes (2004) use a similar leverage ratio.

4.5.2. Debt to Capital

Debt includes total debt where as capital includes total debt plus book value of equity,

$$TD / (TD + BVE)$$

(Leverage Formula 3)

and market value of equity,

$$TD / (TD + MVE)$$

(Leverage Formula 4)

This ratio includes also short-term debt as a component of total debt which may or may not have a significant effect on financing the tangible assets of the company or may or may not be collateralized by tangible assets. Second ratio in here is a derivative of the first ratio adjusted for the market value of the equity.

4.5.3. Debt plus Trade Creditors to Capital

Debt includes total debt where as capital includes total debt, total trade credit plus book value of equity,

$$(TD + TTC) / (TD+TTC+ BVE)$$

(Leverage Formula 5)

and market value of equity,

$$(TD + TTC) / (TD +TTC+ MVE)$$

(Leverage Formula 6)

This ratio includes also total trade credit as a component of total debt which may or may not have a significant effect on financing the tangible assets of the company or

may or may not be collateralized by tangible assets. This ratio also shows the relative external amount of external borrowing. Second ratio in here is a derivative of the first ratio adjusted for the market value of the equity.

Bevan and Danbolt (2002) use a similar leverage ratio by including trade credit to their formulas and documented that trade credit and equivalent is a significant component of financing for UK companies.

Independent Variables

The independent variables in this study are the explanatory factors which are considered as affecting the determination of dependent variable, capital structure. These factors are tested against the various measures of gearing defined in section 4.5. In this cross-sectional analysis all the explanatory variables except earnings volatility are 5-years averages (2000-2004). Earnings volatility measures are calculated by using 6-years averages (1999-2004).

This study also introduces additional new measures, those never used before in a comparison of factors of capital structure study between the UK and the US (See 4.6.2 and 4.6.4).

These independent variables are tangibility, growth opportunities, size, profitability and volatility of earnings respectively.

Tangibility / Asset structure

There is a clear consensus on the definition of tangibility in the financial literature. This study and major part of the empirical researches on capital structure defines tangibility ratio as the book value fixed assets minus accumulated depreciation to total assets. (See for example, Bennett and Donnelly (1993), Rajan and Zingales (1995), Bevan and Danbolt (2002, 2004) and Chen and Hammes (2004))

Titman and Wessels (1988) and Chiarella (1991) work on collateralizable asset concept, thus define their measure as the sum of inventory and gross plant and equipment over total assets.

Hypothesis 1:

There is a positive relationship between tangibility and leverage level.

Expected Result:

Firms with tangible assets that can be used as collateral are likely to hold more debt.

Profitability

Although that the profit amount in the financial statements of a company is useful in establishing the absolute level of profit earned during a period, it fails to indicate the performance of the company because it does not take account of the resources available for the generation of the profit (Pendlebury and Groves, 2004, pp.119).

There are several measures of profitability which can be used for different objectives. These measures differ among each other according to the items used in their numerators and denominators. Most common ones are “Return on total assets/capital employed”, “Return on Equity” and “Earnings per share”.

Return on total assets is usually expressed as a percentage and calculated as earnings before interest paid, taxation and exceptional items (EBIT) over capital employed. Return on equity and Earnings per share ratios show profitability of the company in terms of the capital provided by the owners of the company. It is obvious that these ratios only concerns one side of the capital structure equation and can not be a good measure for this study, thus no more details will be given related to these two ratio.

Alternative measure for EBIT is EBITDA, which is defined as EBIT with the depreciation and amortization expenditure added back. One of the advantages of this measure is not being influenced by different taxation of profits and different depreciation rules (especially those rules regarding goodwill amortization which vary a lot across country general accepted accounting rules). In the late years researchers has started using EBITDA instead of EBIT due to its advantages.

Titman and Wessels (1988), Chiarella (1991) and Drobetz and Fix (2003) use two indicators; first one is operating income over total assets and the second one is operating income over sales. Bennett and Donnelly (1993) and Wald (1999) use only operating income over total assets to proxy profitability. Rajan and Zingales (1995), Ozkan (2001), Bevan and Danbolt (2002, 2004) and Chen and Hammes (2004) use EBITDA over book value of total assets.

As these studies suggest, there is a progress in the definition of profitability in time from using EBIT in 1980's and 1990's to EBITDA in the late 1990's till now. However, EBIT and EBITDA are all profit and loss statement based measures which will obviously include some non cash items and also accruals. Figures derived from cash flows have the advantages of being more objective (for example, no assumptions on whether debtors will or will not pay) and less dependent on arbitrary allocations than conventional accrual based figures. In addition to these, a cash flow based measure will be more reliable, because it will not be based on different estimates and judgements of different companies.

This study uses two measures in order to proxy profitability. First one was defined as the ratio of earnings before interest, tax and depreciation (EBITDA), to the book value of total assets. The results will help us to make a comparison between previous empirical studies on this factor.

Alternatively, due to the disadvantages discussed above, it was decided to add a cash flow based profitability measure to this study. "Cash return on capital employed (total assets)" was found to be appropriate and defined as the ratio of net cash inflow from operations to the capital employed (total assets) expressed as a percentage. This is the first time use (at least for the reviewed literature) of this ratio while analysing the relation between profitability and leverage in an empirical research.

Capital employed in "Return on total assets/capital employed measure" is usually taken to be the total assets of the company, fixed assets plus current assets, or the net assets. The use of total assets is a more appropriate choice in order to be consistent

with the objectives of this study, because resulting profitability measure will be focused on the efficiency with which all of the resources available to the managers of the company and funded by the companies' whole equity and debt mix.

Hypothesis 2:

There is a negative relationship between profitability and leverage level.

Expected Result:

Firms that have been profitable will be less leveraged.

Growth Opportunities

Measure of growth opportunities in this study was defined as the ratio of the book value of total assets less the book value of equity plus the market value of equity, to the book value of total assets as it has been defined by some of the previous empirical researches. (e.g. Rajan and Zingales, 1995, Barclay and Smith, 1995, and Ozkan, 2001) Simple cash flow valuation models suggest that this is a forward looking measure.

Titman and Wessels (1988) and Chiarella (1991) use past growth rate of total assets such as growth of total assets measured by the percentage change in total assets. However, this measure is not found to be appropriate because historical growth is not necessarily linked to future growth (e.g., see Chan, Karkeski and Lakonishok, 2003).

Hypothesis 3:

There is a negative relationship between growth opportunities of a firm and leverage level.

Expected Result:

Firms with growth opportunities will be negatively related to leverage.

Volatility of Earnings

Business risk is considered as the volatility in a firm's earnings before interest and tax produced by its total assets.

Many researchers have applied different measures of volatility and business risk to their studies. Some of the definitions are given below;

Definition type 1;

Volatility in earnings is defined as the standard deviation of the percentage change in operating income. (Titman and Wessels, 1988)

Definition type 2;

Volatility in earnings is defined as the standard deviation of the first difference in earnings before interest, depreciation and taxes scaled by the average value of the firm's total assets. (Bradley, 1984, Bennet and Donnelly, 1993, Laurent, 2000 and Drobetz and Fix, 2003))

Definition type 3;

Business risk is defined as the coefficient of variation of operating income before interest and taxation (Kale, Noe and Ramirez, 1991, Ghosh, Cai and Li, 2000)

As it can be seen from the above, first and third definitions do not consider the change in firm's asset size which may have a direct effect on the percentage change of earnings and the second definition uses standard deviation instead of coefficient of variation. By many researchers, coefficient of variation is accepted as the most commonly used measure of relative variability (e.g. Neter, Wasserman and Whitmore, 1992, p.p. 83). Using only standard deviation of the percentage change in operating income may be a misleading proxy for measuring volatility of earnings of number of firms.

Two measures were defined in order to proxy volatility of earnings of a firm in this study. One of these ratios includes earning before interest and tax data from the profit and loss statement (P&L), while the other one uses net cash inflow from operations from the cash flow statement. The measure derived from the P&L statements gives an opportunity in order to compare this study's results with the previous empirical studies' results which have used P&L based measures. Other measure derived from the cash flow statement represents the volatility of earnings related to particular revenue stream from which interest payments are made. Formulas for the measures are the standard deviation of earnings (whether P&L base earnings (EBIT) or cash flow based (CIFO), adjusted by the size (*proxy by total assets*)) divided by the mean of earnings of the firm. Following Ferri and Jones (1979), above adjustment (scaling with total assets) to the business risk measures was made in order to decouple volatility from the sheer effects of size. One important aspect of using these two formulas is; it will be the first time use (at least for the reviewed literature) of these ratios while analysing the relation between volatility of earnings and leverage in an empirical research focused in the UK and the US.

Hypothesis 4:

There is a negative relationship between volatility in a firm's earnings and leverage level.

Expected Result:

Firms with volatile earnings are likely to be less leveraged.

Size

Wald (1999) measures firm size by using natural logarithm of total assets. Titman and Wessels (1988), Rajan and Zingales (1995) and Drobetz and Fix (2003) define size as natural logarithm of sales. Drobetz and Fix (2003) argue that sales is a better measure than total assets because many firms attempt to keep their reported size of asset as small as possible, e.g. by using lease contracts. Chiarella (1991) uses again natural logarithm of sales instead of using total assets and argues that using total assets as a measure of size may result some confusions between the measures of growth opportunities in a firm. Some studies such as Titman and Wessels (1988) and Rajan and Zingales (2001) use the number of employees as an approximation to the size of the company. However in this study, due to the lack of data related to number of employees and the likely disadvantages of total assets, natural logarithm⁹ of sales (Ln (Sales)) was found to be an ideal approximation for the size of the firms in the sample population.

⁹ The idea behind using natural logarithm is to increase the practical readability of comparisons and statistical calculations.

Hypothesis 5:

There is a positive relationship between size of a firm and leverage level.

Expected Result:

Larger firms are likely to be relatively highly leveraged.

Results

A number of standard multiple regressions were performed between different types of leverage measures as the dependent variables and tangibility, profitability, size, growth opportunities (independent variables) and a dummy variable in order to be able make a comparison and differentiate the results between countries. Additionally another series of regression models were run for the leverage and earnings volatility variables again with a dummy variable. Analyses were performed using SPSS Regression for evaluation of assumptions. As it is explained in detail in section 4.4, remaining data used in the regression equations do not violate the assumptions of normality, linearity and homoscedasticity of residuals. Tables 4.3.a, 4.3.b, 4.4.a and 4.4.b display the regression results for the UK and the US firms.

Size

Results in Tables 4.3.a and 4.3.b show highly significant (99% level) positive relations for the firms in the US, for all definitions of leverage. Also firms in the UK have a positive relation between size and for all definitions of leverage. However, while the UK firms' results are highly significant (99% level) for book value based

leverage ratios, some insignificant and some relatively less significant (95% level) results are obtained for market value based leverage definitions. Moreover, explanatory power of the size coefficients in market value based leverage definitions is lower relative to book value based leverage definitions.

These results are consistent with the hypothesis in this study and most of the previous empirical researches that the size factor is positively related to leverage in the UK and the US. Among the previous empirical researches Bennett and Donnelly (1993), Rajan and Zingales (1995), Wald (1999), Bevan and Danbolt (2002) and Chen and Hammes (2004) all find significant positive relationship between size and leverage. In line with the results in this study Rajan and Zingales (1995) and Bevan and Danbolt (2002) also find that market value measures of leverage do not show a significant relationship with size in the UK.

General results of size variable imply that large firms are more diversified and have less concern than small firms about financial distress and agency costs of using debt, thus enjoy greater potential benefits from debt tax shield. These results first, support the trade-off theory of capital structure which states the threat of costly bankruptcy will discourage firms from using debt to fully exploit the potential tax advantage and secondly, support the agency theory which states small firms may be subject to greater agency costs because they are more flexible and better able to increase the risk of investment projects. Thus, lender may be less willing to provide debt finance to small firms (Grinblatt and Titman, 1998)

As it is mentioned above, in the UK, long-term debt to market value measures of leverage do not show a significant relationship with size and total debt to market value measures of leverage show a less significant (95%) relationship with size. Only significant (99%) relation in market value measures of leverage is the one includes trade credit to the leverage definition. This fact should be related to trade-off theory of capital structure. As it is discussed in more detail in section 3.2, the threat of early liquidation, which results in the loss of jobs, is likely to lead to lower gearing ratios in the UK. Perhaps the market value measures of leverage in the UK are slightly above the optimal point defined by the marginal value of tax shields on additional debt is offset by the increase in the present value of possible financial distress as trade-off theory. While this fact keeps the relation between size and market value based leverage ratio positive, it provides an insignificant and less significant relation between long-term (leverage definition 2) and total debt (leverage definition 4) to market value ratios due to increased financial distress. Trade credit in leverage has a relatively less financial distress affect thus still a significant relation between size and leverage (leverage definition 6) exists in the UK. This affect does not exist in the US, because US bankruptcy code is not as strict as the UK bankruptcy code which is also defined as debtor-friendly code.

Growth

Hypothesis 3 in this study states that “There is a negative relationship between growth opportunities of a firm and leverage level”. While, results in Tables 4.3a and 4.3.b are consistent with this hypothesis for the US firms, there are some contradicting

predictions of the regression models in the UK for the ones using book value based leverage definitions.

Results show highly significant (99% level) negative relations for the firms in the US for all definitions of leverage. Firms in the UK have a highly significant (99% level) negative relation between growth opportunities and market value based leverage definitions. However, insignificant positive results are obtained for the book value based leverage definitions. Explanatory power of the growth coefficients in book value based leverage definitions is lower relative to market value based leverage definitions.

Among the previous empirical researches, Titman and Wessels (1988) (US), Rajan and Zingales (1995) (US and UK) and Bevan and Danbolt (2002) (UK) find a significant negative relation between market-to-book ratio and leverage. However at some of book value leverage ratios, Bevan and Danbolt (2002) (UK) and for all the book value leverage ratios Titman and Wessels (1988) (US) find contradicting results suggesting a positive relation between growth and leverage level. Interestingly, the same contradicting result for the UK firms is found in this study as well.

From the capital structure theories' view, the US firms' results are strongly supporting agency theories (under investment problem and risk substitution) and trade-off theories. Underinvestment problem occurs when an increased level of debt in a firm results passing up some of the valuable investment opportunities by the firm's management. However if a growth firm passes up valuable investment, it can not continue its life cycle as a growth firm and eventually market devalues its equity

which decreases its market to book value ratio (proxy used in this study). On the other hand, creditor institutions will be less willingly to provide debt to companies that provide very limited collateral value and with intangible assets that provide very low liquidation values which is also inline with the trade-off theory.

In the UK firms, regression models that is including market value based leverage definitions supports the capital structure theories in the same way as it is in the above paragraph. Observed insignificant positive coefficients (regression cases including book value based leverage definitions) is explained by Titman and Wessels (1988) as the firms' increased debt capacity, hence, the ratio of debt to book value, due to value created by the future growth opportunities and firms' inability to reflect this value in the book value shareholder fund. However, growth proxy used in Titman and Wessels (1988) are past looking measures such as past capital expenditures to total assets and the growth rate of total assets measured by the percentage change in total assets. The growth measured used in this study is a forward looking measure defined in 4.6. This being the case, the statistically insignificant positive coefficient findings in this study is probably a result of statistical anomaly.

Tangibility

A positive relationship between tangibility and leverage level is hypothesised in this study and as Tables 4.3a and 4.3.b illustrate results supports this hypothesis in both countries. Tangibility ratio defined as the book value of fixed assets minus accumulated depreciation to total assets give positive significant (99%) results for all

market value and book value based leverage definitions in the US and in the UK, except the third and fifth leverage definitions in the UK which includes short term and trade credit as a source of finance respectively. Although that long-term plus short-term debt to book value of equity (definition 3) is still significant at 95%, total debt plus trade credit to book value of equity has an insignificant positive coefficient in the UK.

Among the previous empirical researches¹⁰, Rajan and Zingales (1995) (UK and US) and Bennett and Donnelly (1993) (UK) both find significant positive coefficients for the relation between tangibility and all definitions of leverage.

Bevan and Danbolt (2002) find that the relationship between tangibility and leverage depends on the measure of debt applied. Their study finds tangibility to be positively correlated with short-term and long-term forms of debt, a significant negative correlation is observed when the trade credit element is added both to the book and market based leverage definitions.

¹⁰ As it is mentioned in section 4.6.1, Titman and Wessels (1988) and Chiarella (1991) work on collateralizable asset concept, and define their measure as the sum of inventory and gross plant and equipment over total assets. Both of their results do not provide support for an effect on debt ratios arising from collateral value. Titman and Wessels (1988) concludes that the predicted effects in their study were not uncovered because of the inadequacy of indicators used. In a well working financial environment, short term assets are financed with short term funding and the long term assets are financed with long term financing. As a result due to the combined (short and long term assets) definition of collateralizable assets in above studies, regression coefficient did not provide significant results for none of the leverage definitions.

As it is discussed by Scott (1977), Williamson (1988) and Harris and Raviv (1990) due to the possible conflicts of interest between debt providers and shareholders such as under investment and risk substitution, lenders may demand security, and collateral value. Tangible assets are the main source of collateral and security in a company for the debt holders. However, trade credit does not require as much collateral as short-term debt and short-term debt does not require as much collateral as long-term debt. Thus, a relatively less or insignificant relation should be expected between tangibility and the leverage definitions including short term debt and trade credit to long term debt. This also implies short term liabilities are used to finance short term assets rather than tangible assets. This is what it is observed in the UK samples in this study. Starting from long-term debt to equity ratios the significance level is decreasing and then for the leverage definition including total debt plus trade credit there is no significant relation. This effect is only observed in the UK, not in the US, because as it can be seen from the Table 4.1, the leverage level in the UK significantly differs among the leverage definitions but not in the US. This means the ratio of the short-term debt to long-term debt and the ratio of the trade credit to total debt in the UK is significantly greater than it is in the US.

As a result it can be concluded that high amounts of firm's tangible assets on the balance sheet serve as collateral demanded by the debt providers as a support for the agency based theories such as risk substitution (Jensen and Meckling, 1976) and under investment (Myers, 1977).

Profitability

A negative relationship between past profitability and leverage level is hypothesised in this study. Results of the US and the UK firms, in Tables 4.3a and 4.3.b confirms the evidence of Titman and Wessels (1988) and Rajan and Zingales (1995) that more profitable firms (for both types of profitability measure¹¹) have less **market leverage** which the relations are all statistically significant in 99%.

These findings support the pecking order theory of Donaldson (1961), Myers (1984) and Myers and Majluf (1984), implying that higher earnings provide more internal financing, thus before using an external source of fund such as debt, more funds are available in the firm to utilize in planned investments.

On the other hand, Rajan and Zingales (1995) and Bevan and Danbolt (2002, 2004) both find that more profitable firms have less **book leverage**. In this study all coefficients of profitability are negative for book leverage however they are statistically insignificant in both countries for the EBITDA based profitability definition and again statistically insignificant for the UK in CIFO based profitability definition. US firms negative relation is statistically significant (99%) in CIFO based profitability definition.

Like this study, Bennett and Donnelly (1993) find a significant negative relationship only when debt is measured in market value for the UK firms. However while their study find some insignificant positive and negative relations between profitability and

¹¹ See section 4.6 for the different definitions for the profitability measure, used in this study.

book leverage, this study finds insignificant negative relations when debt is measured in book value.

In brief, results in this study supports pecking order theory as it is explained above and reject trade off theory¹² which supports the idea that highly profitable firms has more taxable income to shield, and that the firm can service more debt without risking financial distress.

The statistically insignificant negative results obtained, (when the leverage is scaled by book value) shows that management finds market-based measures more critical while deciding their financial structure according to their profitability level.

It is also found that, more significant results generated in the US when the cash flow based measures as opposed to profit and loss based measures are included into the profitability measures. This implies that management in the US is utilizing more from the cash flow based measures than the management in the UK while giving decisions about profitability and leverage.

Volatility of Earnings

As it is explained in section 4.4 in detail, in order to keep the study comparable to other studies, it is decided to analyse volatility variable apart from other variables by applying a simple linear regression. Moreover, volatility measures are calculated from

¹² The trade-off theory would predict a significant positive correlation between profitability and debt ratios.

6 years averages, thus samples size for the variable is relatively less than the other variables tested in the multiple regressions.

Mean statistics for the volatility measures presented in Table 4.2 shows that both countries firms' have similar volatility in both earnings measures and these companies' cash flows are more volatile than profit and loss based earnings. However corresponding leverage ratios starting from first and second definitions of leverage (Table 4.2) presents the UK firms are less levered than the US firms (2-3%) whereas the situation is opposite and becomes very significant (7-8%) when it comes to fifth and sixth definitions of leverage which includes trade credit as a source of financing. First, this seems quite confusing; two different countries with close volatility ratios have different levels of leverage. However the major difference between leverage ratios comes from the significant trade credit effect in the UK and as defined in section 4.6, both volatility measures¹³ used in this study are chosen from the earnings isolated from the effects of trade credit. So it can clearly be said that both countries have similar leverage levels and volatilities in earnings.

Although that previous empirical evidence related to volatility as being a factor of capital structure is unclear, a negative relationship between volatility in a firm's earnings and leverage level is expected in this study as a support to the trade-off and pecking order theories.

¹³ Coefficient of variation of EBIT and Coefficient of variation of CIFO.

However R^2 values¹⁴ in volatility regression results are very low relative to other factors analysed as independent variables (See Tables 4.4.a and 4.4.b). This means that volatility does not seem to be one of the main factors of the capital structure in any of the countries.

There are various earnings volatility measures¹⁵ in the financial literature. By analysing the lack of these measures two new measures are developed and used in this study to test the same relation between volatility and leverage. One of them is P&L based¹⁶ and the other one is cash flow based¹⁷. Cash flow based measure have not provided any significant results for any of the countries, while P&L based have provided some interesting significant results in each countries.

Like the previous empirical studies on the relation between volatility and leverage, this study's results are also remarkably contradicting. The US results for cash flow based volatility measures does not provide significant results and some of the coefficients are positive while the others negative. Like this study, Ferri and Jones (1979) and Titman and Wessels (1988) find no significant evidence that volatility is negatively related to gearing. However their measures were P&L based. Interestingly, the US results in this study for P&L based volatility measure provides significant negative coefficients for the book value leverage measures like the studies of Drobetz

¹⁴ R^2 tells how much of the variance in the dependent variable (leverage) is explained by the model (which only includes volatility as an independent variable in this case)

¹⁵ Such as (1) standard deviation of the percentage change in operating income, (2) coefficient of variation of operating income before interest and taxation and (3) standard deviation of the first difference in earnings before interest, depreciation and taxes scaled by the average value of the firm's total assets

¹⁶ Coefficient of variation of EBIT scaled by Total Assets

¹⁷ Coefficient of variation of CIFO scaled by Total Assets

and Fix (2003) and Bradley, Jarrell and Kim (1984) as a support for the trade-off theory. More volatile cash flows increase the probability of default, implying a negative relationship between leverage and volatility of cash flows.

Bennet and Donnelly (1993) also observe volatility of earnings to be positively correlated with the level of book and market value leverage for the UK firms which is exactly what is found in this study for the UK firms. The significance level for the relation between book value leverage ratios and the P&L based volatility is 95%. In market book value leverage ratios this level is 99%. So basic argument related to this finding comes from Myers (1977) risk substitution theory and Laurent (2000) stating that in order to transfer the risk from share holders to debt holders high risk firms, may able to take on more debt than less risky firms if the bankruptcy costs are less significant than the agency costs. This suggests a positive relation between the debt level and volatility of earnings of the company as it is observed in the UK firms in this study.

Although it seems like the US and the UK results for the relation between earnings volatility and leverage is supported by the dominant capital structures, one point is still confusing. As it is discussed in section 3.2, it is concluded that the UK has relatively more strict bankruptcy code in favour of the creditors, thus the threat of early liquidation, which results in the loss of jobs, is likely to lead to lower gearing ratios. This idea is inline with the trade-off theory of Scott (1977) and Bradley, Jarrell and Kin (1984) stating that firm will increase its leverage till it reaches to an optimal point which is defined by the marginal value of tax shields on additional debt is offset by the increase in the present value of possible financial distress. On the other hand,

the US has a debtor oriented bankruptcy code with strong incentives to keep the firm as a going concern even when it is worth more in liquidation, thus one may expect more agency conflicts such as risk substitution effect in the US. The contradiction in here is, while these discussions on financial distress suggest a negative relation between earnings volatility and leverage for the UK and a positive relation for the US, opposite results is found in this study suggesting a positive relation between earnings volatility and leverage for the UK and a negative relation for the US.

Appendix

Table 4.1: Descriptive statistics for the UK and the US variables in the cross-sectional analysis

Country		N	Minimum	Maximum	Mean	Std. Deviation	Skewness	Kurtosis
		Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic
United Kingdom	Size ^b	205	3.46	10.30	7.08	1.40	-.07	-.35
	Growth ^b	205	.79	6.44	1.69	.83	2.36	7.36
	Tangibility ^b	205	.00	.94	.37	.26	.52	-.84
	Profitability (EBITDA/TA) ^b	205	.03	.39	.15	.07	1.12	1.59
	Profitability (CFIO/TA) ^b	205	.00	.38	.13	.07	1.17	2.10
	LTBVE ^a	205	.00	.98	.33	.21	.62	.31
	LTMVE ^a	205	.00	.72	.21	.15	.76	.24
	LTSTBVE ^a	205	.00	.99	.38	.21	.47	.07
	LTSTMVE ^a	205	.00	.74	.25	.16	.59	-.05
	LTSTTCBVE ^a	205	.03	.99	.47	.19	.34	.23
	LTSYTTCMVE ^a	205	.01	.77	.31	.16	.34	-.29
United States	Size ^b	366	5.33	11.34	8.23	1.12	.06	-.38
	Growth ^b	366	.84	7.34	2.26	1.34	1.69	2.52
	Tangibility ^b	366	.01	.92	.32	.21	.72	-.44
	Profitability (EBITDA/TA) ^b	366	-.04	.33	.15	.07	.25	-.18
	Profitability (CFIO/TA) ^b	366	-.04	.28	.11	.06	.32	-.21
	LTBVE ^a	366	.00	.94	.36	.20	.24	-.48
	LTMVE ^a	366	.00	.85	.21	.17	1.02	.76
	LTSTBVE ^a	366	.00	.97	.40	.21	.19	-.42
	LTSTMVE ^a	366	.00	.87	.23	.18	.90	.31
	LTSTTCBVE ^a	366	.00	.98	.41	.22	.19	-.39
	LTSYTTCMVE ^a	366	.00	.87	.25	.19	.86	.22

a. Refer to section 4.5 for the definitions.

b. Refer to section 4.6 for the definitions

Table 4.2: Descriptive statistics for the UK and US Volatility of Earnings variable

		N	Minimum	Maximum	Mean	Std. Deviation	Skewness	Kurtosis
Country	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic
United Kingdom	Volatility 1 ^b	175	.02	.74	.24	.16	1.11	.94
	Volatility 2 ^b	175	.03	.79	.26	.16	1.04	.59
	Leverage 1 ^a	175	.00	.98	.34	.21	.55	.17
	Leverage 2 ^a	175	.00	.72	.21	.15	.77	.30
	Leverage 3 ^a	175	.00	.99	.39	.21	.39	.00
	Leverage 4 ^a	175	.00	.74	.25	.16	.58	-.03
	Leverage 5 ^a	175	.05	.99	.48	.18	.30	.24
	Leverage 6 ^a	175	.01	.77	.31	.16	.34	-.15
United States	Volatility 1 ^b	300	.04	.78	.26	.18	1.16	.58
	Volatility 2 ^b	300	.04	.78	.28	.15	1.03	.77
	Leverage 1 ^a	300	.00	.94	.36	.20	.23	-.43
	Leverage 2 ^a	300	.00	.74	.19	.16	.89	.23
	Leverage 3 ^a	300	.00	.95	.39	.21	.07	-.45
	Leverage 4 ^a	300	.00	.77	.22	.17	.80	-.03
	Leverage 5 ^a	300	.00	.96	.41	.21	.01	-.49
	Leverage 6 ^a	300	.00	.77	.23	.17	.74	-.11

a. Refer to section 4.5 for the definitions

b. Refer to section 4.6 for the definitions

Table 4.3.a: Multiple Regression results for the UK and US firms (Approximation by Profitability 1^a measure)

Model	Logsales ^a		Growth ^a		Tangibility ^a		Profitability 1 ^a		Number of Observations		R ²		F stat	
	UK	US	UK	US	UK	US	UK	US	UK	US	UK	US	UK	US
Leverage 1 ^b	0.2360 <i>0.001**</i>	0.0980 <i>0.04**</i>	0.0860 <i>0.323</i>	-0.3360 <i>0.000**</i>	0.1970 <i>0.006**</i>	0.2310 <i>0.000**</i>	-0.0980 <i>0.257</i>	-0.0580 <i>0.275</i>	205	366	0.0920	0.2780	5.0750 <i>0.001**</i>	34.6700 <i>0.000**</i>
Leverage 2 ^b	0.0990 <i>0.088</i>	0.1020 <i>0.008**</i>	-0.2510 <i>0.001**</i>	-0.3200 <i>0.000**</i>	0.3750 <i>0.000**</i>	0.3470 <i>0.000**</i>	-0.2180 <i>0.003**</i>	-0.3420 <i>0.000**</i>	205	366	0.3740	0.5410	29.8180 <i>0.000**</i>	106.4890 <i>0.000**</i>
Leverage 3 ^b	0.2480 <i>0.000**</i>	0.128 <i>0.008**</i>	0.0740 <i>0.398</i>	-0.351 <i>0.000**</i>	0.1500 <i>0.035*</i>	0.1960 <i>0.000**</i>	-0.1050 <i>0.225</i>	-0.0220 <i>0.686</i>	205	366	0.0880	0.2670	4.8260 <i>0.001**</i>	32.9570 <i>0.000**</i>
Leverage 4 ^b	0.1170 <i>0.043*</i>	(0.120) <i>0.002**</i>	-0.3060 <i>0.000**</i>	-0.3450 <i>0.000**</i>	0.3190 <i>0.000**</i>	0.3090 <i>0.000**</i>	-0.2000 <i>0.006**</i>	-0.3170 <i>0.000**</i>	205	366	0.3760	0.5260	30.1760 <i>0.000**</i>	100.2620 <i>0.000**</i>
Leverage 5 ^b	0.3230 <i>0.000**</i>	0.1340 <i>0.006**</i>	0.0500 <i>0.555</i>	-0.3720 <i>0.000**</i>	0.0020 <i>0.976</i>	0.1700 <i>0.001**</i>	-0.1110 <i>0.193</i>	-0.0120 <i>0.817</i>	205	366	0.1250	0.2710	7.1550 <i>0.000**</i>	33.4930 <i>0.000**</i>
Leverage 6 ^b	0.1840 <i>0.001**</i>	0.1220 <i>0.002**</i>	-0.4300 <i>0.000**</i>	-0.3620 <i>0.000**</i>	0.1330 <i>0.017*</i>	0.2870 <i>0.000**</i>	-0.2060 <i>0.002**</i>	-0.2980 <i>0.000**</i>	205	366	0.4450	0.5130	40.1210 <i>0.000**</i>	94.9610 <i>0.000**</i>

(*) and (**) indicate that coefficients are significant at the 5 and 1% level respectively.

^a Refer to section 4.6 for variable definitions.

^b Refer to section 4.5 for variable definitions.

Table 4.3.b: Multiple Regression results for the UK and US firms (Approximation by Profitability 2^a measure)

Model	Logsales ^a		Growth ^a		Tangibility ^a		Profitability 2 ^a		Number of Observations		R ²		F stat	
	UK	US	UK	US	UK	US	UK	US	UK	US	UK	US	UK	US
Leverage 1 ^b	0.2380 <i>0.001**</i>	0.1200 <i>0.01**</i>	0.1150 <i>0.199</i>	-0.2020 <i>0.001**</i>	0.2290 <i>0.003**</i>	0.2870 <i>0.000**</i>	-0.1410 <i>0.118</i>	-0.2470 <i>0.000**</i>	205	366	0.0970	0.3120	5.3940 <i>0.000**</i>	41.0030 <i>0.000**</i>
Leverage 2 ^b	0.1080 <i>0.059</i>	0.1000 <i>0.006**</i>	-0.2250 <i>0.003**</i>	-0.2250 <i>0.000**</i>	0.4250 <i>0.000**</i>	0.3830 <i>0.000**</i>	-0.2510 <i>0.001**</i>	-0.4360 <i>0.000**</i>	205	366	0.3800	0.5750	30.6180 <i>0.000**</i>	122.2420 <i>0.000**</i>
Leverage 3 ^b	0.2530 <i>0.000**</i>	0.152 <i>0.001**</i>	0.0840 <i>0.350</i>	-0.2100 <i>0.001**</i>	0.1730 <i>0.024**</i>	0.2540 <i>0.000**</i>	-0.1170 <i>0.194</i>	-0.2240 <i>0.000**</i>	205	366	0.0890	0.2980	4.8840 <i>0.001**</i>	38.2850 <i>0.000**</i>
Leverage 4 ^b	0.1260 <i>0.028*</i>	0.1210 <i>0.001**</i>	-0.2850 <i>0.000**</i>	-0.2420 <i>0.000**</i>	0.3630 <i>0.000**</i>	0.3500 <i>0.000**</i>	-0.2250 <i>0.003**</i>	-0.4280 <i>0.000**</i>	205	366	0.3800	0.5670	30.6790 <i>0.000**</i>	118.3300 <i>0.000**</i>
Leverage 5 ^b	0.3300 <i>0.000**</i>	0.1590 <i>0.001**</i>	0.0500 <i>0.575</i>	-0.2320 <i>0.000**</i>	0.0200 <i>0.791</i>	0.2280 <i>0.000**</i>	-0.1040 <i>0.239</i>	-0.2140 <i>0.000**</i>	205	366	0.1240	0.2980	7.0660 <i>0.000**</i>	38.3850 <i>0.000**</i>
Leverage 6 ^b	0.1920 <i>0.000**</i>	0.1240 <i>0.001**</i>	-0.3990 <i>0.000**</i>	-0.2580 <i>0.000**</i>	0.1830 <i>0.002**</i>	0.3280 <i>0.000**</i>	-0.2470 <i>0.000**</i>	-0.4120 <i>0.000**</i>	205	366	0.4540	0.5540	41.4960 <i>0.000**</i>	0.5490 <i>0.000**</i>

(*) and (**) indicate that coefficients are significant at the 5 and 1% level respectively.

^a Refer to section 4.6 for variable definitions.

^b Refer to section 4.5 for variable definitions.

Table 4.4.a: Regression results related to leverage and volatility (Approximation by P&L based measure) of the UK and US firms

Model	Volatility 1 ^a		Number of Observations		R ²		F stat	
	UK	US	UK	US	UK	US	UK	US
Leverage 1 ^b	0.1570 <i>0.037*</i>	-0.1230 <i>0.034*</i>	175	300	0.0250	0.0150	4.3980 <i>0.037*</i>	4.5420 <i>0.034*</i>
Leverage 2 ^b	0.2060 <i>0.006**</i>	0.0560 <i>0.332</i>	175	300	0.0420	0.0030	7.6330 <i>0.006**</i>	0.9430 <i>0.332</i>
Leverage 3 ^b	0.1640 <i>0.03*</i>	-0.157 <i>0.007**</i>	175	300	0.0270	0.0250	4.8030 <i>0.03*</i>	7.4950 <i>0.007**</i>
Leverage 4 ^b	0.2190 <i>0.004**</i>	0.037 <i>0.519</i>	175	300	0.0480	0.0010	8.6890 <i>0.004**</i>	0.4180 <i>0.519</i>
Leverage 5 ^b	0.1270 <i>0.093</i>	-0.1520 <i>0.008**</i>	175	300	0.0160	0.0230	2.8580 <i>(0.093)</i>	7.0950 <i>0.008**</i>
Leverage 6 ^b	0.2020 <i>0.007**</i>	0.0420 <i>0.470</i>	175	300	0.0410	0.0020	7.3350 <i>0.007**</i>	0.5220 <i>0.470</i>

(*) and (**) indicate that coefficients are significant at the 5 and 1% level respectively.

^a Refer to section 4.6 for variable definitions.

^b Refer to section 4.5 for variable definitions.

Table 4.4.b: Regression results related to leverage and volatility (Approximation by Cash Flow based measure) of the UK and US firms

Model	Volatility 2 ^a		Number of Observations		R ²		F stat	
	UK	US	UK	US	UK	US	UK	US
Leverage 1 ^b	-0.1620 <i>0.033*</i>	-0.0540 <i>0.355</i>	175	300	0.0260	0.0030	4.6410 <i>0.033*</i>	0.8600 <i>0.355</i>
Leverage 2 ^b	-0.1210 <i>0.112</i>	0.0920 <i>0.112</i>	175	300	0.0150	0.0080	2.5510 <i>0.112</i>	2.5470 <i>0.112</i>
Leverage 3 ^b	-0.1580 <i>0.037*</i>	-0.045 <i>0.434</i>	175	300	0.0250	0.0020	4.4280 <i>0.037*</i>	0.6130 <i>0.434</i>
Leverage 4 ^b	-0.1170 <i>0.122</i>	0.1100 <i>0.057</i>	175	300	0.0140	0.0120	2.4160 <i>0.122</i>	3.6550 <i>0.057</i>
Leverage 5 ^b	-0.0820 <i>0.283</i>	-0.0370 <i>0.520</i>	175	300	0.0070	0.0010	1.1610 <i>0.283</i>	0.4150 <i>0.520</i>
Leverage 6 ^b	-0.0060 <i>0.942</i>	0.1180 <i>0.042**</i>	175	300	0.0000	0.1180	0.0050 <i>0.942</i>	4.1820 <i>0.042**</i>

(*) and (**) indicate that coefficients are significant at the 5 and 1% level respectively.

^a Refer to section 4.6 for variable definitions.

^b Refer to section 4.5 for variable definitions.

Table 4.5.a: Correlation matrix for multiple regression variables in cross-sectional analysis (UK)

	Size	Growth	Tangibility	Profitability 1	Profitability 2	Leverage 1	Leverage 2	Leverage 3	Leverage 4	Leverage 5
Growth ^a	(0.15)									
Tangibility ^a	(0.06)	(0.22)								
Profitability 1 ^a	(0.24)	0.58	0.04							
Profitability 2 ^a	(0.21)	0.56	0.21	0.88						
Leverage 1 ^b	0.23	(0.05)	0.16	(0.10)	(0.08)					
Leverage 2 ^b	0.17	(0.48)	0.42	(0.38)	(0.31)	0.75				
Leverage 3 ^b	0.25	(0.06)	0.11	(0.12)	(0.09)	0.97	0.70			
Leverage 4 ^b	0.19	(0.51)	0.37	(0.40)	(0.34)	0.74	0.97	0.75		
Leverage 5 ^b	0.34	(0.06)	(0.03)	(0.16)	(0.14)	0.87	0.58	0.90	0.63	
Leverage 6 ^b	0.29	(0.61)	0.21	(0.50)	(0.47)	0.62	0.86	0.63	0.90	0.69

^a Refer to section 4.6 for variable definitions.

^b Refer to section 4.5 for variable definitions.

Table 4.5.b: Correlation matrix for multiple regression variables in cross-sectional analysis (US)

	Size	Growth	Tangibility	Profitability 1	Profitability 2	Leverage 1	Leverage 2	Leverage 3	Leverage 4	Leverage 5
Growth ^a	(0.29)									
Tangibility ^a	0.15	(0.36)								
Profitability 1 ^a	0.03	0.46	0.07							
Profitability 2 ^a	(0.03)	0.55	0.06	0.88						
Leverage 1 ^b	0.23	(0.47)	0.36	(0.19)	(0.34)					
Leverage 2 ^b	0.24	(0.63)	0.45	(0.46)	(0.54)	0.78				
Leverage 3 ^b	0.26	(0.47)	0.34	(0.16)	(0.33)	0.98	0.75			
Leverage 4 ^b	0.26	(0.64)	0.43	(0.45)	(0.54)	0.81	0.98	0.80		
Leverage 5 ^b	0.27	(0.48)	0.32	(0.17)	(0.33)	0.96	0.74	0.99	0.79	
Leverage 6 ^b	0.26	(0.64)	0.42	(0.44)	(0.54)	0.81	0.96	0.82	0.99	0.82

^a Refer to section 4.6 for variable definitions.

^b Refer to section 4.5 for variable definitions.

Table 4.6: Correlation matrix for simple regression variables in cross-sectional analysis (US and UK)

United Kingdom	Volatility 1	Volatility 2	Leverage 1	Leverage 2	Leverage 3	Leverage 4	Leverage 5
Volatility 2 ^a	0.48						
Leverage 1 ^b	0.16	(0.16)					
Leverage 2 ^b	0.21	(0.12)	0.78				
Leverage 3 ^b	0.16	(0.16)	0.97	0.73			
Leverage 4 ^b	0.22	(0.12)	0.78	0.97	0.79		
Leverage 5 ^b	0.13	(0.08)	0.87	0.61	0.90	0.66	
Leverage 6 ^b	0.20	(0.01)	0.70	0.89	0.70	0.92	0.73
United States	Volatility 1	Volatility 2	Leverage 1	Leverage 2	Leverage 3	Leverage 4	Leverage 5
Volatility 2 ^a	0.43						
Leverage 1 ^b	(0.12)	(0.05)					
Leverage 2 ^b	0.06	0.09	0.78				
Leverage 3 ^b	(0.16)	(0.05)	0.98	0.76			
Leverage 4 ^b	0.04	0.11	0.77	0.99	0.78		
Leverage 5 ^b	(0.15)	(0.04)	0.97	0.75	0.99	0.77	
Leverage 6 ^b	0.04	0.12	0.77	0.98	0.78	0.99	0.78

^a Refer to section 4.6 for variable definitions.

^b Refer to section 4.5 for variable definitions.

5 SUMMARY AND CONCLUSION

5.1 Introduction

The final section of this study provides a summary of major findings in this study and their link between major capital structure theories.

5.2 Summary of Findings and Discussion

The study applied comprehensive statistical tests in order to empirically determine; first, whether the factors considered as factors by the previous empirical studies are able to predict the capital structure levels in similar ways in the UK and the US second, which predictor among the ones specified in this study predicts the capital structure level best in each of these countries. Taken together, the findings in this study show that most factors are able to predict the capital structure levels of the firms in similar ways in both countries, however there are still some exceptional differences on the direction of the relations and best predictors of the capital structure in each country.

After the examination of previous empirical studies, it was realized that making comparisons among these studies about the findings is very difficult and sometimes meaningless due to the different definitions of leverage applied. In this study, six versions of leverage defined according to the value of the equity (market or book value), maturity of the external financing and type of the external financing. As it is expected, findings in this study provided significant evidences related to the

sensitivity of different definitions of leverage to the factors considered as factors of capital structure. In order to clear the confusions in the literature, results are linked to the major capital structure theories.

This study's findings show that in most of the cases, explanatory powers of the multiple regression models as measured by "R-Square" value, give significantly higher results when the market as opposed to the book value of equity is included in the denominator when computing leverage. This shows that management of the firms in both countries use or at least considers market based leverage measures while deciding capital structure thus market based leverage measures are an inseparable part of the empirical studies focusing on capital structure.

This study's findings show that according to the "Long-term" and "Total debt" measures firms in the UK are relatively less levered than the firms in the US, however after adding "Trade credit" item to the leverage definition, the UK firms are relatively more levered than the US firms for both book and market leverage ratios. The differences between these leverage ratios show that the "Trade credit" item is a significant source of fund in the UK where as the situation is opposite for the US firms.

Above findings are also supported by the discussion¹⁸ in section 3. This discussion concludes with the prediction that due to bankruptcy codes and tax systems, debt financing is relatively less attractive to the UK than the US. Without knowing the exact impact on profits and the value of equities, accounting practices in the UK are

¹⁸ See section 3.5 for the conclusion of institutional differences between the UK and the US.

relatively less conservative than the US equivalents which may eventually lead relatively lower levels of leverage in the UK.

The first part of the empirical tests investigated factors namely; profitability, size, tangibility and growth. In this part, study introduced a previously untested measure of profitability into related research field. This cash flow based measure¹⁹ provided relatively more significant results than the traditional P&L based measures and confirmed the pecking order theory of capital structure proposing that “the higher earnings provide more internal financing, thus before using an external source of fund such as debt, more funds are available in the firm to utilize in planned investments” by providing statistically significant results for the US.

In order to increase the comparability of the study and to keep the sample size relatively high fifth independent variable, called earnings volatility, was separated and analysed individually. The second part of the empirical tests includes the investigation of earnings volatility. This time two different and new measures were introduced into related research field which were developed at the end of an analysis based on the lack of the measures used in previous empirical studies (see section 4.6.4). Although that one of the measures has not returned significant results to the study, the other one had important implications which represent contradictory results between two countries.

Cross-sectional results in this study indicate very significant evidence that size is positively related to leverage in the UK and the US. This may be due to the suggestion

¹⁹ Cash return on capital employed (total assets). In this study this measure is called as “Profitability 2”.

that large firms are more diversified and have less concern than small firms about financial distress and agency costs of using debt, thus enjoy greater potential benefits from debt tax shield. These results first, support the trade-off theory of capital structure which states that an optimal level of leverage can be attained by balancing the costs (potential bankruptcy costs and agency costs of both debt and equity) and benefits (present value of interest tax shields) arising from using debt and secondly, as a part of the trade off theory support the agency theory which states small firms may be subject to greater agency costs because they are more flexible and better able to increase the risk of investment projects. Thus, lender may be less willing to provide debt finance to small firms. The observed difference in significance levels of the market value coefficients between the UK and the US may be due to the differences in bankruptcy codes in these countries. The creditor oriented bankruptcy code in the UK weakens the relation between size and market value measures in the UK, where as the debtor oriented bankruptcy code in the US strengthens this relation.

Tangibility is also found to show a very strong positive influence on leverage in both countries. Scott (1977), Williamson (1988) and Harris and Raviv (1990) argue that due to the risk of risk substitution and under investment problems which may cause to shift the risk from equity holders to debt holders, debt providers demand collateral from the firms in order to lower their risk. High amounts of tangible assets on the firm's balance sheet serve as collateral demanded by the debt holders. As a result a strong positive relation between tangibility and leverage supports the impact of agency theories²⁰ of Jensen and Meckling (1976) and Myers (1977).

²⁰ Risk substitution and Under investment

However this relation is weak in the UK for book value equity definition where the trade credit is added as a source of funding. As a source of funding, trade credit's role in the UK is significantly higher than its role in the US. On the other hand, trade credit does not require as much collateral as long-term debt. Thus, an insignificant relation is observed in the UK between tangibility and the leverage definition including trade credit to long term debt.

In the statistical models used, these two variables; size and tangibility are found to be relatively more explanatory²¹ in the UK than the other variables while predicting the relation between leverage.

Results show highly significant evidence that growth opportunities of firms in the UK and the US are negatively related to leverage. However, an insignificant positive relation is found for the relation between growth and book value leverage in the UK. This insignificant positive relation is considered as a statistical anomaly.

Negative relation between growth and leverage supports agency theories and trade-off theories. Due to the possible negative effects of risk substitution problem creditor institutions require collaterals as a guarantee and they will be less willingly to provide debt to companies that provide very limited collateral value and with intangible assets that provide very low liquidation values which is also inline with the trade-off theory. For the growth firms the cost of bankruptcy is higher because they may loose more from the market value of their equity in the event of being default. On the other hand the occurrence of underinvestment problem is less likely for the growth firms, because

²¹ Coefficients are higher in Tables 4.3.a and 4.3.b.

if a growth firm passes up valuable investment, market devalues its equity which decreases its market to book value ratio and eventually the firm loses its growth firm category.

As the growth variable profitability variable is also found to be negatively related to leverage significantly. Results provide strong evidence in support of pecking order theory of Donaldson (1961), Myers (1984) and Myers and Majluf (1984) implying that higher earnings provide more internal financing, thus before using an external source of fund such as debt; more funds are available in the firm to utilize in planned investments. On the other hand results reject the trade off theory²² which supports the idea that highly profitable firms has more taxable income to shield, and that the firm can service more debt without risking financial distress.

Results also provided evidence that while deciding the financial structure according to their profitability level, management finds market value based leverage measures more critical than the book value based leverage measures. Additionally, in the US, cash flow based profitability measures predict the relation between leverage and profitability significantly better than the P&L based measures.

In the statistical models used, growth and profitability are found to be relatively more explanatory²³ in the US than the other variables while predicting the relation between leverage.

²² The trade-off theory would predict a significant positive correlation between profitability and debt ratios.

²³ Coefficients are higher in Tables 4.3.a and 4.3.b.

There are various earnings volatility measures²⁴ in the financial literature. By analysing the lack of these measures two new measures are developed and used in this study to test the same relation between volatility and leverage. One of them is P&L based²⁵ and the other one is cash flow based²⁶. Cash flow based measure have not provided any significant results for any of the countries, while P&L based have provided some interesting significant results in each countries. However statistical evidence in this study indicates that volatility is not one of the main factors of the capital structure in any of the countries.

Like the previous empirical studies on the relation between earnings volatility and leverage, this study's results are also remarkably contradicting. Results for P&L based volatility measure provides significant negative coefficients for the book value leverage measures in the US. This supports the trade-off theory in a way that more volatile cash flows increase the probability of default, thus implying a negative relationship between leverage and volatility of cash flows.

Conversely to the US evidence, a positive relation is observed between the earnings volatility and the leverage for the UK firms. Myers' (1977) risk substitution theory and Laurent (2000) argument which states "in order to transfer the risk from share holders to debt holders high risk firms, may able to take on more debt than less risky

²⁴ Such as (1) standard deviation of the percentage change in operating income, (2) coefficient of variation of operating income before interest and taxation and (3) standard deviation of the first difference in earnings before interest, depreciation and taxes scaled by the average value of the firm's total assets

²⁵ Coefficient of variation of EBIT scaled by Total Assets

²⁶ Coefficient of variation of CIFO scaled by Total Assets

firms if the bankruptcy costs are less significant than the agency costs” explains this relation.

On the other hand, creditor oriented bankruptcy code in the UK supports lower leverage levels, which is inline with the trade off theory and debtor oriented bankruptcy code in the US is expected to encourage higher leverage levels which may result agency conflicts such as risk substitution.

As it can be seen, there is a contradiction in here between the evidence found and the likely effects of the bankruptcy codes in each country. They both have opposite predictions. This means there is still unclear results about the relation between earnings volatility and leverage.

5.3 Conclusion

This study extends the findings of the prior research by providing additional evidences. A sample of 205 UK companies and 366 US companies have been analysed in this study in order to see the effects of factors of capital structure on leverage. A number of contributions were made to the understanding and the significance of corporate capital structure in both countries with this study.

The firms in the UK and The US have been analysed by using a variety of gearing measures. The firms in two developed countries were tested with six different measures. As a result of these measures, it is found that the factors analysed were more sensitive in the UK than the US to the different definitions leverage such that as

the definition of leverage applied changes, the level of leverage of the UK companies vary significantly.

Among many factors affecting the capital structure decisions of the firms, five of them were included in this study and their relations were analysed. A positive relation was determined between leverage and tangibility & size both in the UK and the US. As factors of the capital structure in these countries, these factors were found relatively more explanatory in the UK than in the US. A negative correlation was observed between leverage and the proxies for profitability & growth was observed in both developed economies. On the contrary, this time these factors were found relatively more explanatory in the US than in the UK. The relation between earning volatility and leverage showed differences in the UK and the US. Although the relations between the factors and the leverage enable us to predict the direction of the change; the strength of the effect depends on the country analysed and the type of measure²⁷ used.

As a result of this study, it is concluded that while the predictive ability and the strength of the factors analysed show significant changes between the UK and the US; most of them affect the level of leverage of companies in the same way in both developed countries.

²⁷ Cash flow based or P&L Based

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