UNIVERSITY OF STRATHCLYDE

Department of Accounting and Finance

How Corporate Tax Affects Leverage, Leasing and Systematic Risk: Evidence from the UK Corporation Tax Reform of 1984.

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ABSTRACT

This thesis investigates the impact of corporation tax on leverage, systematic risk and leasing by using the changes in corporation tax effected through the corporation tax reform of 1984. I also investigate whether there was any relationship between ownership structure of a firm and its response to the 1984 reform. Whereas theoretical models suggest that corporation tax influences corporate financial policy, extant empirical findings provide inconclusive evidence to support the tax theories of capital structure. The inconclusive findings from earlier studies are attributable to the methodology used and a failure to perfectly isolate the impact of corporation tax from that of other variables that affect leverage. I effectively curb this deficiency by analysing the effects of corporation tax on leverage, equity beta and leasing around the corporation tax reform period by using both cross-sectional and time series analysis.

My empirical results show that the corporation tax reform of 1984 affected debt-equity ratios negatively. These findings imply that corporation tax influence firm's capital structure decision. Furthermore, there is evidence that taxable profits increased significantly during the reform period. Effective corporation tax rates and non-debt tax shields are found to substitute each other and both have a significant influence on firms' capital structure decisions.

Similar to the findings of previous UK studies, leasing and debt financing are found to be substitutes. The results show further that the corporation tax reform of 1984 increased the attractiveness of leasing to the UK firms. Sector-based-analysis shows that in general UK manufacturing firms have high lease rate than other sectors analysed.

Empirical findings show also that effective corporation tax rate has significant effect in firm's systematic risk as measured by equity beta. Concerning the relationship between the responses of firms to the reform and their ownership structures, the evidence shows that the changes in debt-equity ratios and investment induced by the corporation tax reform of 1984 was related to managerial ownership.

Generally, the findings of this study show clearly that corporation tax is a major factor that influences both cross-sectional and periodic variations in debt-equity ratios.

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DEDICATION

This thesis is dedicated to my beloved wife Josephine, my children (Barnabas and Eunice) and my parents.

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1 INTRODUCTION

1.1 An overview of the study

The impact of corporation tax on the value of a firm has attracted considerable attention in corporate decision analysis since the publication of the celebrated paper by Modigliani and Miller (1958). Models have been developed to show the relationship between corporation tax and firm value.

Modigliani and Miller (1963) illustrate the positive relationship between corporate tax and the value of a firm that employs debt in its capital structure. According to Modogliani and Miller (1963), the value of a firm increases with debt and consequently their results imply that capital structure is relevant and that a high proportion of debt will be optimal.

In another development, Miller (1977) showed that, in equilibrium, capital structure is irrelevant for any individual firm. In their model, which incorporates both corporation and personal income taxes, they illustrate that the market will set marginal prices for both debt and equity in such a way that there will be no tax advantage to debt for any individual firm. They show however that there may be a net tax advantage of debt for the corporate sector as a whole that depends on the structures of both corporation and personal income taxes. It is important at this point to note that the tax advantage of debt in Modigliani and Miller (1963) and Miller (1977) originates from the deductibility of interest expenses for corporation tax purposes.

DeAngelo and Masulis (1980a) and Dammon and Senbet (1988) extend the Miller (1977) framework to show that the suggested leverage irrelevance theorem may disappear if one considers the availability of non-debt expenses (that can shelter taxable profit from the corporation tax just as interest expenses do). Their results also suggest that the impact of corporation tax on capital structure depends on the system of corporation tax followed in any one particular country.

Empirical results on the effect of corporation tax on capital structure differ. Some results fail to support the theoretical prediction that leverage levels are related to corporation tax (see for example Bradley, Jarrell and Kim (1984) and Titman and Wessels (1988)). Other studies, however, support the tax–based theories of capital structure (see for example MacKie-Mason (1990), Shum (1996), Devereux (1988), Givoly, Hayn, Ofer and Sarig (1992), and Okzan (2001)).

The question to be asked is: If corporation tax affects corporate borrowing, why do empirical studies not capture that effect? The literature attributes the lack of evidence to methodological problems (see for example Givoly et al (1992), Graham (1996b)). Another factor that may explain the inconclusive evidence to support tax–based theories of the capital structure is the presence of other factors that jointly determine firms' capital structures at any point in time.

I argue that the inability to single out the impact of corporation tax from other factors in a randomly selected period significantly explain why corporation tax is not found to be a significant determinant of capital structure. Thus, for a valid conclusion on the relevance of a particular capital structure variable to be made, there is a need to analyse the relative significances of the determinants of capital structure around a period of major change in that variable. Consequently, I use the corporation tax reform of 1984 to analyse the impact of corporation tax on a number of corporate theories in the UK. Specifically, I investigate the impact of corporation tax on leverage and the systematic risk of UK companies. Also around the corporation tax reform period, I investigate the impact of the 1984 reform on leasing by focusing on the relationship between debt financing and leasing. Under the assumption that the announcement of the corporation tax reform of 1984 contained economic information, I also investigate whether any response to the announcement of corporation tax reform is related to the ownership structure of UK companies. Earlier related studies focused on the impact of the corporation tax reform of 1984 on corporate capital investments (see Edward (1984), Devereux (1988) and Moon and Hodges (1989)). This study generalises the impact of corporation tax reform of 1984 on corporate financial policy.

It should be noted that, the specific provisions available within a particular tax system influence the impact of corporation tax on corporate decisions. The items of interest in corporate decisions are treated differently by the system of company taxation. In the following sub-section, I present the systems of company taxation and show the treatment of some items of interest and its impact on corporate financial decisions.

1.2 Systems of company taxation

This thesis focuses on the impact of changes in corporation tax structure. Because the economic effects of a tax on companies may depend on the corporate tax system employed, it useful to describe some of the main corporate tax systems.

Kay and King (1990) mention two alternative ways of classifying corporate tax systems. The first is to classify the corporate tax systems in terms of how they tax distributed profits relative to their taxation of undistributed profits. The second way is to look at corporate tax system in terms of its effects on investment decisions i.e. how the systems affect pre-tax rate of return required to induce firm to undertake an investment project. As in Kay and King (1990, p.158-159), I briefly describe the main corporation tax system as classified by using the first method mentioned above. There are four distinguishable corporation tax systems classified in terms of how they tax distributed profits relative to their taxation of the undistributed profits:

1.2.1 The classical tax system

Under this system companies pay a flat rate of corporation tax on their taxable profits. Shareholders then pay income tax on their dividends and capital gains tax on gains arising from retained earnings. This system embodies the principle that a company's tax liability should be completely independent of that of its shareholders. Under the classical tax system interest payments are deducted in assessing corporation tax liability. Thus, for a company wishing to raise a given amount of finance, ceteris paribus, debt will be preferred to both retained earnings and a new issue of shares. The fact that the effective income tax rate on capital gains is less than the income tax rate on dividends[1] means that the classical tax system discriminates between dividends and retentions. The discrimination between dividends and retentions, popularly known as 'double taxation of dividends' arises because dividends are subject to both corporation tax and personal income tax, whereas retained earnings are liable only to corporation tax (for more details see Kay and King (1990, p. 158). The classical tax system is used in many countries including the US and Canada.

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1.2.2 The Imputation tax system

Under the Imputation tax system companies pay tax on their profits at the corporate tax rate, and any profits that are subsequently distributed to shareholders are regarded as already paid income tax at a certain rate hereafter referred to as the '*imputation rate*'. The imputation system gives shareholders *tax credits* for the tax paid by a company, and shareholders may use these credits to offset their income tax liabilities on dividends. Thus, part of the company's tax liability is regarded as a prepayment of shareholders' income tax on dividends. Shareholders only have to pay additional income tax on their dividends if their marginal rates are higher than the imputation rate. On the other hand, if their marginal rates are less than imputation rate they receive refunds from the Revenue Authority. This tax system, which is used in the UK among other countries, alleviates part of the double taxation of dividends.

1.2.3 The two-rate tax system

Under the two-rate tax system the distributed profits are taxed at the corporation tax rate which is lower than that charged on undistributed profits. As in imputation tax system, the objective of this approach is to alleviate the double taxation of dividends.

1.2.4 The Integrated tax system

Under the integrated tax system each shareholder is deemed to have earned a fraction of the company's profits equal to the fraction of its share which he/she owns. Under this system company's profits, both distributed and undistributed, constitute part of the shareholders' personal taxable income. The integrated tax system simply integrates personal and corporate tax systems and it regards shareholders as partners in business for tax purposes.

As mentioned above, the alternative method of classifying a particular tax system is to look at the system in terms of its effects on investment decisions. In the following sub-section I briefly describe the impact of taxes on investments and consequently on the choice of a company's capital structure.

1.3 Taxes and Financing of Investments

There are several ways in which companies finance their activities. They include borrowing, using internally generated funds and issuing new shares. For an investment financed entirely by borrowing, a corporation tax system that allows both interest payments and true economic depreciation to be deducted for corporation tax purposes will be neutral in that it will not affect the decision of whether to go ahead with an investment or not (for details see Kay and King (1990, p. 160)). In practice, however, companies use a combination of funds to finance their activities. Determining the proportion of a company's activities to be financed by any one particular source of finance (i.e. the choice of capital structure) is considered to be one of the most important decisions faced by companies.

Modigliani and Miller (1958) argue that if there is no corporation tax, the cost of capital is simply the rate of return demanded by the suppliers of finance – for example the rate of interest at which a company can borrow. They argue further that in a competitive economy the cost of capital is independent of the particular method of finance that is chosen. This is what is popularly referred to as *capital structure irrelevancy theory.* It should be noted that the cost of capital referred to above is the overall cost of capital –sometimes referred to as the weighted average cost of capital. The reasoning behind Modigliani and Miller (1958)'s capital structure irrelevancy theory is that resorting to a particular capital source cannot reduce the cost of capital because the price of each kind of capital that the company employs will reflect the degree of risk attached to it. It follows from this that there is little to choose between alternative methods of financing if there are no tax considerations, and that such decisions will be sensitive to tax systems that favour one method of financing rather than another (see also Kay and King (1990)).

The deductibility of interest payments for corporation tax purposes is argued to be an incentive for using debt financing by companies. In contrast, equity financing has to bear at least part of the burden of corporation tax. Under the classical tax system (see the subsection 1.2.1), dividends are not deductible for corporation tax purposes. Therefore discrimination against financing investment(s) by using new equity capital is very heavy and, ceteris paribus, increases the rate of return required on firm investments. With the imputation tax system, dividends are partially deductible for corporation tax purposes, and therefore the degree of discrimination against financing investments by new equity capital (in favour of debt capital) depends on the extent to which the personal income tax rate differs from the corporation tax rate.

For investments financed by internally generated funds, the cost of finance depends on personal tax rates faced by shareholders. As explained previously under the sub-section 1.2.1, shareholders can avoid paying income tax by postponing the realisation of their capital gains. Thus, for '*rich individuals*'[2] even the combined burden may be less than the potential charge to income tax. On the other hand if the personal income tax rate fell relative to the capital gain tax rate, the use of retained earnings may become expensive because most of a shareholder's return is expected to be in the form of capital gains (as opposed to dividend yield) under this financing arrangement.

The discussion above, on the possible impact of taxes on the financing of investments, suggests that the structure of corporation tax relative to that of personal tax is important in determining the form of finance to be preferred by companies. The possibility that one form of finance may be cheap and therefore preferred to other forms is therefore sensitive to the practical implementation of the tax system. Thus, the impact of change in corporation tax on capital structure depends on the way corporations are taxed in a particular economy. In the next section I briefly describe the imputation tax system as was implemented in the UK during the period around the corporation tax reform of 1984.

1.4 The UK Imputation tax system

In Britain, the separate taxation of companies started in 1947 and the system of corporation tax that operated during that time was the classical tax system. Until then the taxation of corporate profit was integrated into a shareholder's personal income tax burden. In 1973, the classical system was replaced by the imputation system with the intention of alleviating some of the double taxation of dividends. Under the imputation tax system any company wishing to distribute dividends had to pay

[2] By rich individuals I mean individuals are able to postpone selling of their shares and who normally pay relatively higher personal income tax rates.

corporation tax at the statutory tax rate on pre-tax profits. Part of this corporate tax bill is prepayment of personal income tax at the basic rate on dividends that is deducted at source. The amount of corporation tax that is paid with regard to distributed dividends is actually paid before the date when companies are normally required to pay corporation tax on their profits for the year, and consequently this prepaid corporation tax is called advance corporation tax, hereafter referred to as ACT.

Kay and King (1990) argue that ACT constitutes the effective tax burden to corporations because the amounts that are described as ACT[3] would be paid as income tax, even if the corporation tax were completely abolished. Furthermore, since ACT was not part of a company's mainstream tax liability, it used to be offset against mainstream tax liability of a company. The problem under such tax payment arrangements is that companies with small or zero tax liabilities would have surplus or unrelieved ACT because ACT is greater than mainstream tax liability. As Kay and King (1990) note, in the 1970s and early 1980s there were many companies with small or zero tax liabilities and for these companies unrelieved ACT was a concern. Bond, Channells, and Devereux (1995) also analyse the problem of surplus ACT and argue that there was a chance that the level of dividend payments chosen by UK firms was affected by the distortions introduced by the UK tax system. It should be noted that ACT was abolished in April 1999.

In addition to the surplus ACT problem; Kay and King (1990) also argue that the imputation rate was a restrictive feature of the UK imputation tax system. The

[3] The Inland Revenue distinguish ACT from the normal corporation tax by referring to the normal corporation tax as 'mainstream' corporation tax.

problems of the UK tax system (see Kay and King (1990) p.168) originate from the administratively based reason of setting the imputation rate equal to the basic rate of income tax. Kay and King (1990) argue that setting the imputation rate equal to the basic rate of income tax has the consequence that an increase (decrease) in the basic rate of income tax increases (decreases) the tax burden on earned income; but has no effect on the tax burden on the dividend income of shareholders paying the basic rate. This is because the tax credit rises (falls) in line with the increased (decreased) income tax liability and if the credit has risen this will actually benefit exempt shareholders such as pension funds. This may have an impact on the way shareholders would prefer to realise their income. Another problem is that imputation system is that it can only lead to a neutral position for those shareholders paying one particular rate of income tax. If we ignore capital gain tax (see footnote 1 for reasoning) this neutral position exists only for shareholders paying the basic rate. For other shareholders there will be discrimination in one direction or the another. Where capital gains are taxed at income tax rates, any positive rate of imputation implies a bias in favour of distributed profit for all investors. On the other hand if effective tax rate on capital gains is less than the income tax rate then investors facing the higher rate of income tax would be in neutral position if their holding periods were such that the effective tax rate on capital gain is equal to the basic tax rate on income. Kay and King (1990) note that the income tax rate at which investors are in neutral position does not coincide with a weighted average of the marginal tax rates of shareholders, which is below the basic rate of tax (Kay and King, 1990 p. 169). Given these problems, it was apparent that the UK tax system needed a change. However, together with these problems, the responses to the corporation tax Green Paper in

1982[4] show a strong general desire to retain the imputation system in the UK. Although the British government agreed with the opinion to retain the imputation system, it acknowledged the need for some changes. The needed changes were effected in what I refer to as '*The Corporation tax reform of 1984*'. In this study I use corporation tax reforms of 1984 to test the tax-based theories of corporate finance. The relationship implied by specific theories will be presented in later chapters. In the following section I present an overview of the corporation tax reform of 1984.

1.5 The corporation tax reform of 1984

Subsequent to the introduction of corporation tax in 1947, British government has introduced a number of tax reforms since the corporation tax was introduced in 1947 occurring in 1958, 1965, 1973, 1984 and 1999. Whereas the changes in 1965 and 1973 were primarily aimed at altering the relative tax burden on dividends and retentions, the aim of the change in 1984 was twofold: First was to reduce the excessive burden of taxation faced by British corporations. As discussed in section 1.4, many companies were in a surplus ACT position due to the fact that their mainstream corporation tax liabilities were less than ACT. The second aim was to encourage corporations to search for investment projects which are truly productive rather than investing in projects which look profitable due to generous tax incentives. The second aim showed the intention of the government to have a neutral corporation

[4] See Budget Statement, 13th March 1984.

tax system[5]. The corporation tax reform of 1984 involved reducing or eliminating various allowances and simultaneously reducing the statutory rate of corporation tax.

1.5.1 The corporation tax rate

As noted in the chancellor's Budget Statement[6] of 13tht March 1984, corporation tax rates during the pre-reform period were far too high penalising profits and also blunting the cutting edge of the enterprise. Consequently, the British government announced the progressive reductions in main corporation tax rates during the March 1984 parliament session. These changes became effective and were documented in the Finance Act of 1984, published in July 1984.

According to the Finance Act of 1984, Chapter 43, section 18(1) the corporation tax rate applicable for profits earned for the financial year 1983/84, on which tax was generally paid in 1984/85[7], the rate was cut from 52% to 50%. The corporation tax rates announced during the transition period were 45%, 40% and 35% for the years 1984/85, 1985/86 and 1986/87 respectively.

As mentioned in the Budget Statement of 1984, a reduction in corporation tax rate was expected to bring benefits to the corporations by lowering their corporation tax charges. As the corporation tax rate becomes closer to the basic rate of income tax, the bias of the corporation tax system in favour of debt finance is reduced. Thus, the reform also reduced the discrimination among difference forms of finance, of which debt finance was highly favoured.

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[5] For details of neutrality of corporation tax system see Kay and King (1990) pp.160-163 and Devereux (1988).
[6] Budget Statement, 13th March 1984.
[7] The main corporation tax liability is normally payable nine months in arrears.

1.5.2 The chargeable gains

The UK government has a practice of adjusting gains realised by a company before they are added to the taxable profits and used to calculate corporation tax liability. The fraction by which, under section 18 of the Finance Act 1984, chargeable gains are to be reduced before they are, for the purposes of corporation tax, included in the profits of a company were as follows. For the financial years 1983/84 and 1984/85 chargeable gains were reduced by two fifths and one third respectively. The corresponding fractions for 1985/86 and 1986/87 were one quarter and one seventh.

1.5.3 Advance Corporation Tax

The ACT is described in section 1.4. The value of ACT is equal to the total value of tax credits received by the company's shareholders. As mentioned in section 1.4 above (see also Kay and King, 1990, pp. 166-170) the ACT represented an effective tax burden to the UK corporations. Thus, to reduce the burden emanating from ACT, the ACT rate should be reduced. However, in the corporation tax reform of 1984 there was no change in ACT rate. The applicable rate of 30% was in use since 1979/80. According to the Finance Act 1984 section 19, a rate of Advance Corporation Tax for the financial year 1983/84 was 30% and continued to be at that rate until 1985/86. For the financial year 1986/87 the ACT rate was 29%. Normally ACT is defined as the ratio of notional tax paid by the company on behalf of its shareholders to the dividends distributed. For example, for the year 1984's rate of 30%, this ratio is 30/70, which simplifies to 3/7 or three-sevenths.

1.5.4 Capital allowances

According to the British government budget statement of 13th March 1984, capital allowances represented incentives for investments in plant, machinery, and industrial buildings. The aim of these incentives was to strengthen the economy. However, as the chancellor noted in his budget speech, there is little evidence that these incentives strengthened the economy or improved the quality of investments. As part of the speech read, "*... evidence suggests that businesses have invested substantially in assets yielding a lower rate of return than investments made by our principal competitors. Too much of British investments have been made because the tax allowances make it look profitable rather than because it would be productive. We need investment decisions based on future market assessments, not future tax assessments*". According to the Finance Act of 1984 section 58, capital allowances on plant, machinery and industrial buildings were withdrawn progressively as follow.

1.5.4.1 Plant and machinery

For investment in plant and machinery and assets whose allowances are linked with them, the first year allowance rate was reduced from 100% to 75% for expenditure incurred after 13th March 1984 but before 1st April 1985. For expenditure incurred in the financial year commenced on 1st April 1985 the rate was 50%. After 31st March 1986 there were no first year allowance and all expenditures on plant and machinery qualified for annual allowances of a 25% on a reducing balance basis.

1.5.4.2 Industrial buildings

For investment in industrial buildings, the initial allowance rate was reduced from 75% to 50% for expenditure incurred after 13th March 1984 but before 1st April 1985. For expenditure incurred in the financial year commenced on 1st April 1985 the rate was 25%. There were no initial allowances for expenditures on industrial buildings incurred after 31st March 1986. However, all expenditures on industrial buildings were written off at an annual rate of 4% on a straight-line basis.

The withdrawal of first year and initial allowances was expected to have an impact on the level of investment especially in plant, machinery and industrial buildings and also on the level of corporate profits. In particular previous studies on the impact of the corporation tax reform of 1984 on investment predicted a significant decline in investment in plant, machinery and industrial buildings (see for example Edward (1984) and Devereux (1988)). My expectation is that announced changes in statutory corporation tax rate and capital allowances had an impact on the tax-related variables which are hypothesised to influence capital structure decisions and therefore I expect to find a corresponding change in debt-equity ratios. The detailed analysis of the impact of the reform of 1984 on capital structure will be given on chapter three of this thesis. A summary of the applicable corporation tax rates and capital allowance rates for the period around the reform is given in Table 1.1 at the end of this chapter.

1.6 The objective and expectations of the thesis

1.6.1 The objectives and expectations

i. To investigate the impact of the corporation tax reform of 1984 on financial leverage as measured by debt-equity ratio. With this tax reform, major tax-related relationships hypothesised to influence capital structure were affected. Specifically, the reduction or effective abolition of capital allowances is likely to reduce the level of firm investment by increasing the effective price of assets. Since companies prefer debt to equity due to the deductibility of interest expenses and due to the fact that companies borrow in order to finance their investment projects, a reduction in level of investment is likely to be associated with a reduction in debt and consequently to a firm's debt-equity ratio. Further details are presented in chapter 3.

ii. To investigate the impact of reform on the systematic risk faced by the corporations. The systematic risk of a company, as measured by its beta, measures the sensitivity of a stock's return to the return on the market portfolio. The corporation tax is an important factor in the analysis involving return on equity because it affects after-tax earnings available to shareholders and consequently return on equity. It should be noted that all companies face the same statutory corporation tax rate and other things remaining constant, one should expect corporation tax rate to affect return on company's equity share and return on market index in a similar way. However, the UK corporation tax system provisions and the firm-specific situations created tax related incentives (or disincentives) in such a way that the impact of the 1984 reform was different for each firm due to their different tax positions at the reform period. This, rather controversial, hypothesis is based on the assumption that return is a function of cash flows and will change to reflect the change in cash flows induced by the reform. The relationship between beta and financial leverage is given in Hamada (1972). Ramchand and Sethapakdi (2000) use the relationship between beta of levered equity and financial leverage (formally established in Hamada (1972)) to show a positive relationship between the changes in beta of levered equity and the changes in debt-equity ratios. Since the corporation tax reform of 1984 was considered to cause a decline in debt-equity ratios, the expectation is that similar effect on systematic risk is a possibility. The formal analysis of the impact of reform on systematic risk is given on chapter 5.

iii. To investigate the relationship between debt financing and leasing as forms of financing around the corporation tax reform period. The analysis is based on the arguably inverse relationship between leasing and debt financing. Since the corporation tax reform of 1984 is likely to have a significant negative impact on ' borrow and buy decisions', the opposite effect is expected on leasing if debt financing and leasing are substitutes. It should be noted that a change in corporation tax due to reform have the same impact on debt and lease since both interest and lease payments are deductible for corporation tax purposes. Thus, other things remaining constant, the impact of a change in corporation tax rate on debt and lease should be the same. However, the "borrow and buy "decision will be expensive due to abolition of initial and first year capital allowances. The consequence will be to shift from borrowing to leasing and this will lead to an increase in leasing.

iv. To investigate the influence of ownership structure on response of companies to the corporation tax reform of 1984. In this study I integrate corporate governance and corporate finance issues to the analysis of the impact of the corporation tax reform of 1984. In particular, I test whether the change in variables hypothesised to be significantly affected by reform is associated with managerial ownership. The expectation is that if managerial ownership is an important factor influencing company value and the reform had an impact on corporations, then companies with significant managerial ownership would adjust their investments and capital structure in a direction consistent with a value maximisation objective. The details of the theoretical and empirical arguments are given in chapter 5 of this thesis.

It should be noted that the hypotheses described above form the core of the present analysis but there are other tests performed which are equally relevant and significant. The details of these auxiliary tests are presented under the respective chapters.

1.6.2 A summary of the results.

A summary of the results of my study is as follows[8].

i. The corporation tax reform of 1984 had a negative effect on debt-equity ratio. There was also a significant increase in profitability during the transition period of the reform.

[8] The results given in points xi-xiii are for control variables. They simply show how well other variables explain the performance.

ii. Effective corporation tax rate and non-debt tax shields are substitutes and shown to be strong determinants of a firm's capital structure. Agency and profitability variables also appeared to significantly explain both cross-section and periodic variations in debt-equity ratios.

iii. Similar to the results of previous UK studies, leasing and debt financing are found to be substitutes and consequently my empirical results show that the corporation tax reform of 1984 had a positive impact on leasing levels.

iv. Generally, manufacturing firms are found to have higher lease rates than other categories of firms analysed

v. The relationship between lease rates and effective tax rates varies across industrial sectors.

vi. Size and effective tax rate are the only variables that were consistently found to be significant determinants of lease rates.

vii. Asset betas were found to be stationary (or contant) over time.

viii. Corporation tax rate is proved to be one of the fundamental determinants of systematic risk (beta of equity) of the companies.

ix. Systematic risk (as measured by beta of equity) is positively related to effective corporation tax rate, return on assets, financial risk, growth and risk of real assets.

x. A firm's systematic risk is inversely related to its market value of equity.

xi. Similar to previous studies by Morck et al (1988) and McConnell and Servaes (1990) there is a non-linear relationship between managerial ownership and performance.

xii. The results show that, on average, an inverse relationship exists between firm's performance and its size.

xiii. Growth opportunities and liquidity variables are positively related to performance.

xiv. Debt-equity ratios are inversely related to both performance and investment.

xv. Changes in debt-equity ratios and investments induced by the corporation tax reform of 1984 were inversely related to changes in managerial ownership.

1.7 Contributions of this thesis

This thesis covers four major areas in the corporate finance. Consequently its contributions are spread in these four major areas and are summarised as follow.

- The analysis of the leverage, leasing, and systematic risk around the period of major change in corporation tax structure in the UK is unprecedented. The results produced in favour of the relevance of tax variables as factors that influence leverage, leasing and systematic risk are therefore likely to be more reliable.

- The use of both cross-sectional and time series analyses of the impact of the corporation tax reform on leverage and systematic risk in one study give more insight to the general understanding of relevance of tax-variables in capital structure. Most studies use only one method.

- Expedient and innovative definition of leverage variable is more focused on the effects of tax change on capital structure. Also the comprehensive definition of non-debt tax shields to include all deductible allowances reduces the impact, if any, of using only depreciation expense in the analysis. The depreciation expense figure that is publicly available is not the one that Inland Revenue uses in estimating company's tax liability. Therefore to an extent to which these two figures are different, the analysis which uses only depreciation as a proxy for allowable capital allowances is likely to be more biased than the one which uses comprehensive measure of non-debt tax shields. Furthermore, the use of depreciation alone is likely to bring bias across companies which use different production technologies.

- The extension of recent UK studies on leasing to include more focused industrial analysis. Specifically I extend Adedeji and Stapleton (1996) model to show how the relationship between debt ratio and lease rate change across the sectors. Also show how the relationship between lease rate and effective tax rate vary across the sectors.

- Extension of systematic risk model (Badhani, 1997) enabled this study to show the impact of change in corporation tax rate on systematic risk. Most studies show how leverage is related to systematic risk and consequently they suggest a positive relationship between change in leverage and change in systematic risk. In this study I recognise that change in leverage is influenced by many factors and consequently I isolate the change in beta caused by the change leverage induced by the corporation tax change. This allows me to suggest the testable hypothesis concerning change in beta induced by change in corporation tax. For example I formally show that a change in beta induced by change in corporation tax rate is a function of profitability of assets and borrowing rate of interest.

- Whereas there is no consensus on the relationship between managerial ownership and performance, the evidence available suggest a general relationship between performance and ownership structure. No studies that I know have tested the convergence or entrenchment theories around the event which is likely to affect performance significantly. It was therefore expedient to try to test these theories around the corporation tax reform. The methodology and the results from this study will help researchers to design the best way of testing the hypothesised relationship between ownership structure and performance.

It is my expectation that the results of this thesis will give more insights to issues relating to capital structure, leasing, systematic risk and ownership structure. It is also expected that policy makers will be aware that tax changes affect more areas and to an extent that there is no efficient control mechanism, its impact may be huge, extending beyond affecting corporate investment and profitability.

1.8 The structure of the thesis

The rest of the thesis is organised as follows. Chapter two provides a summary of the literature review on tax theories of capital structure. Chapter three investigates the impact of the corporation tax reform on capital structure. In chapter four, the analysis of the impact of reform on leasing and its relationship with debt is made. The impact of corporation tax reform on systematic risk is investigated in chapter five. In chapter six, I investigate whether the way in which companies responded to the corporation tax reform of 1984 is related to their respective ownership structure. In chapter seven I provide a summary of findings, problems, conclusion and implications for future research.

Table 1-1Corporation tax rates, 1982-1988

Table 1.1

Corporation tax rates, 1982-1988

Year	*Full rate (%)*	*Rate of capital allowance (%)*				*Advance Corporation Tax (ACT)%*
		Plant and machinery		*Industrial buildings*		
		First Year	*Writing down*	*Initial*	*Writing down*	
1982-83	52	100	25	75	4	30
1983-84	50	100	25	75	4	30
1984-85	45	75	25	50	4	30
1985-86	40	50	25	25	4	30
1986-87	35	0	25	0	4	29
1987-88	35	0	25	0	4	27

Source : The Institute for Fiscal Studies, Fiscal Facts,2002 on www.ifs.org/taxsystem/corp1time.shtml

APPENDIX 1-1 DIAGNOSTIC TESTS

This study used regression analysis to test the hypothesised relationship among a number of variables. In order to check for robustness of the results diagnostic tests were carried out to make sure that the assumptions of classical linear regression analyses were met.

It should be noted that the statistical packages used (Minitab and Eview)[9] check for multicollinearity between a set of explanatory variables and eliminate automatically any explanatory variable that is linearly correlated with any other explanatory variable(s) during the estimation process. There is no explanatory variable(s) which were removed from the regression equations estimated and therefore I am confident that my sample variables do not suffer from multicollinearity. Consequently, there are no formal tests for multicollinearity that were conducted.

There are four empirical chapters in this thesis and to produce the reported results, hundreds of regression equations were run. It is therefore not feasible to report diagnostic tests results for each regression. I therefore report only few representative diagnostic tests results for chapter three, which is the main focus of this study. However, the tests shows that assumptions of Classical Linear Regression Model were satisfactorily met in all regression equations estimated in this thesis.

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[9] I first run regression using Minitab package (which automatically test for multicollinearity and remove any explanatory variable correlated with other(s)) and then I re-run the regressions again using Eview package –which is user-friend in controlling for heteroskedasticity and for conducting other diagnostic tests.

Tests for equation 3.1

Autocorrelation

To test for autocorrelation of residuals, I use Ljung-Box Q-statistics available in Eview for Windows package. As a default, autocorrelation up to 12 lags are observed and respective Q-statistics are reported together with their corresponding p-values. The p-value lower that specified significant level reject the null hypothesis of no autocorrelation. For all 12 lags the p-values range from 10.5% to 41%, indicating that there is no autocorrelation in estimated residuals at conventional levels of significance of 5% and 1%.

Normality test

To test for normality the Jarque-Bera test was used. The reported value of Jarque-Bera statistic of 3.16, with a corresponding p-value of 21% show that the null hypothesis that residuals are normally distributed is not rejected.

Heteroscedasticity

There is no formal test for heteroscedasticity that was conducted. However, Eview package allow for control for heteroscedsticity. The built-in procedure enables the consistent standard errors and variance to be estimated using White (1980) technique. Thus all standard errors used in this thesis are heteroskedasticity-consistent and all t-values or z-values are therefore reliable.

Tests for equation 3.2

The tests similar to the ones carried out for equation 3.1 were also conducted for equation 3.2. To save space, I present only the statistics and their implication for the test being conducted for testing the autocorrelation and normality. For explanations on these tests and that of Heteroskedasticity refer "Tests for equation 3.1" above.

Autocorrelation

The p-values corresponding to Ljung-Box Q-statistics for each of the 12 lags range from 28.3% to 68.4%. Thus, at 5% or better level of significant, the results show that residuals are not autocorrelated.

Normality

The reported Jarque-Bera statistic is 0.796 with associated p-value of 67.2%. These results indicate that residuals are normally distributed-the assumption of normality is satisfied.

Tests for equation 3.3 –Time Series Analysis

Autocorrelation

The p-values corresponding to Ljung-Box Q-statistics for each of the 12 lags range from 9.4% to 43.8%. The evidence shows residuals are not autocorrelated.

Normality

The reported Jarque-Bera statistic is 0.347 with associated p-value of 84.1%. These results indicate that residuals are normally distributed-that is the assumption of normality is satisfied.

Tests for equation 3.4 –Cross-sectional Analysis

Autocorrelation

The p-values corresponding to Ljung-Box Q-statistics for each of the 12 lags range from 13.6% to 78.2%. Thus, at 5% or better level of significant, the results show that residuals are not autocorrelated.

Normality

The reported Jarque-Bera statistic is 3.21 with associated p-value of 28.2%. These results indicate that residuals are normally distributed-the assumption of normality is satisfied.

2 REVIEW OF THE TAX THEORIES OF CAPITAL STRUCTURE

2.1 Introduction

The value of a firm depends on various factors, some of which are tangible like cash flows and some are intangible like management's expertise and goodwill. Tangible factors can be grouped according to different types of managerial decision making activity. The first group is that of *investment decisions,* which deals with the assets (or investments) the firm should invest in and is partly a function of the type of business a firm is engaged in. The second group, referred to as the *financing decision,* addresses the question of how cash that is needed to fund a desired level of investments should be raised. This involves an analysis of the different sources of funds available to the firm in terms of their relative advantages (or disadvantages) towards a long-term increase in net cash flows. The third group pertains to *dividend decisions,* and addresses a question of the proportion (if any) of earnings that should be distributed to shareholders and possibly how often it should be distributed. These related decisions are key factors in the determination and timing of relevant net cash flows. For about three decades after Modigliani and Miller (1958); the concern of the researchers has been to investigate the relationship between these managerial decisions and the firm value. It should be noted that an analysis of the relationships between these decisions and value requires an understanding of the role of financial markets in the valuation process. For example, an analysis of investment viability requires the estimation of future cash flows and project cash flows and cost of capital, which to a large extent depend on the operational and information efficiency of financial markets. Likewise, financing and dividend decisions cannot be separated from the influence of financial markets. Management has to know how the dividend policy of their firm could affect its market value. In the case of financing decisions, managers have to ask whether using debt or equity or a "combination" of the two would lead to an increase in firm value[10]. As Titman (2002) argues, '...market conditions, which are determined by preferences of individual and institutions that supply capital can have an important effect on how firm raise capital'. Thus, the theoretical understanding of how different decisions influence value is important.

Theoretical analysis suggests that, among other factors[11], taxes potentially affect a choice of capital structure. However, a complete characterisation of this corporate decision has yet to be developed. The objective of this chapter is to provide a summary of the tax-related theories of capital structure.

The review starts with a basic framework, (assuming the presence of perfectly competitive capital markets) with no taxation. I then extend the discussion to the effects of introducing taxes (at both corporate and personal level) and non-debt tax shields on the optimal capital structure of the firm.

Modigliani & Miller (1958) show that capital structure is irrelevant for a firm operating in the competitive efficient capital markets. They specify conditions under which various corporate financing decisions are irrelevant. By stating clearly the

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[10] Most literature examined debt and equity when analysing capital structure. The reason lies in the relevant characteristics of various sources of long term financing. These sources can be categorised as those having fixed obligations to the firm (represented by debt) and those without fixed financial obligations to the firm (represented by equity).

[11] Other factors, include the costs of financial distress, agency costs and the firm's product and input market strategies.

conditions under which financing decisions have no relevance, they provide a basis for examining how financing choices can create and destroy corporate value.

Capital structure theories after Modigliani & Miller (1958) have tried to show how capital structure is relevant when assumptions on "perfect capital markets" are relaxed. The next sections summarise the literature that has focused on the impact of taxes on capital structure.

The rest of the chapter is organised as follows. Section 2.2 deals with the impact of corporation tax on debt financing[12]. The impact of personal taxes on use of corporate debt is presented on section 2.3. In section 2.4 I provide a summary of the studies that focused on the impact of both corporate and personal tax on capital structure. Section 2.5 present a summary of the analyses of the impact of non-debt tax shields on optimal capital structure. Section 2.6 focuses on the equilibrium capital structure under both classical and imputation tax systems. The evidence on the impact of taxes in the UK is presented in section 2.7 and section 2.8 concludes the chapter.

2.2 Debt financing and Corporation tax

One of the criticisms of Modigliani & Miller (1958) is that it does not consider the likely impact of corporation tax on the firm's cash flows. An argument against Modigliani and Miller's (1958) paper is that firms operate in economies with corporate tax codes that allow the deduction of interest payments for corporation tax purposes. The implication of such provisions is that after tax cash flows to suppliers of capital will be higher for a firm that employs debt in its capital structure compared to that without debt in its capital structure. It is from the strength of this argument that Modigliani & Miller wrote the article in 1963, as a correction to Modigliani & Miller (1958), to demonstrate the impact of corporate taxes on a firm's cash flows.

Modigliani and Miller (1963) demonstrate that the capital structure irrelevance proposition in Modigliani and Miller (1958) does not hold once the impact of corporate taxes on the value of a firm is considered. In a Modigliani and Miller (1963) framework, the value of a firm is the sum of the discounted expected net cash flows. The net cash flows are made up of two major components, the pure investment related net cash flows, (which are equivalent to what could have been produced by "an equivalent but unlevered" firm) and pure debt related net cash flows, (which is the tax shield provided by interest payments). Their conclusion is that the value of a firm is positively related to the level of debt employed in its capital structure; and accordingly, their results suggest that, in the context of perfectly competitive markets (with the addition of taxes), a 100% debt financing should constitute the optimal financial structure. As they appreciate, the capital structure predicted by their model is not supported in practice and in practice all firms' capital structures will fall short of 100% debt. The Modigliani and Miller (1963) model fails to tell the whole story however. Their conclusion on the relationship between debt and firm value paved the way to more research on the

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[12] Empirical evidence shows that agency may be one of the important determinants of capital structure in the UK. However, since this study focus on the corporation tax reform no much discussion is given here. For more discussion on this refer Lasfer (1995).

possible factor(s) that determine leverage and indeed to the question of whether there is any relationship between the level of leverage and value[13].

MacKie-Mason (1990) provides additional evidence of a significant tax effect on the choice between debt and equity. The paper clarifies the relationship between tax shields and debt policy by using two features of the US Corporate Tax Code, namely, *tax loss carry forward* and *investment tax credit.* MacKie-Mason argues that tax shields should matter only to the extent that they affect the marginal tax rate on interest deductions. The paper further shows that *tax loss carry forwards* have a larger effect on the expected marginal tax rate on interest payments since each dollar of tax loss carry forward is quite likely to crowd out a dollar of interest deductions. On the other hand, *investment tax credit* may not have significant effect on marginal tax rates because many firms with high *investment tax credits* are quite profitable. The paper concludes that the two tax shields, *tax loss carry forward* and *investment tax credit,* have different predicted effects on a firm's financing decisions. Using US data, their results support the hypothesis that the desirability of debt finance at the margin increases with firm's effective marginal tax rate on deductible interest payments.

Givoly *et al* (1992) use the US Corporation tax reform of 1986 to analyse the impact of corporation tax on capital structure. They use cross sectional regression to provide evidence that supports tax-based theories of capital structure. Specifically, their findings show that corporate taxes and non-debt tax shields are significant

[13] For example, Brealey and Myers (1996) page 364-365, quote the results of Gordon Donaldson field survey on corporate debt policies that firms have as their long term objective the maintenance of a rate of growth which is consistent with their capacity to generate funds internally. That is, they heavily depend on internally generated funds to finance their activities.

determinants of capital structure. Their results also show that personal income taxes play a role in capital structure decisions and that dividend clienteles do actually exist. Their results are consistent with that of Miller (1977)[14] and Mayer (1986).

In an effort to investigate the significance of a tax effect on debt policy, Shum (1996) conducted a study similar to that of Givoly *et al* (1992). Using the tax provision that allows loss carry back and loss carry forwards, she explored the implication of asymmetric corporate taxes on a firm's debt policy using Canadian data. Shum (1996) provides empirical findings that support the argument that corporate taxes have a significant effect on a firm's debt policy.

Fama and French (1998) use cross-sectional regressions to study how a firm's value is related to dividend and debt. They construct a model, which considers taxes to be a potential factor affecting a firm's financing decisions. The approach used in their study is to view the market value of a firm as the market value of an *all-equity no-dividend* firm with the same pre-tax net cash flows plus the value of the tax effects of the firm's expected dividend and interest payments. The results show that leverage is negatively related to the firm's value. By using the Miller (1977) framework, a negative coefficient on the debt variable is consistent with the argument that personal tax disadvantages of debt outweigh its corporate tax advantage i.e. debt has no net tax benefits. However, given the relationship between debt and other control variables, they suspected that a negative relationship between leverage and value is attributable to the proxy effects. Particularly they argue that

[14] Miller (1977) argues that there exists an optimum debt ratio for the corporate sector as a whole but that there is no optimal debt ratio for the individual firms. Companies would find the natural clientele for their securities, regardless of their choice of preferred gearing: but each clientele is as good as the other (for more details see Miller 1977, page 269).

the imperfect control for information about profitability contained in debt might explain a negative slope on the leverage variable. Consequently they repeated their test after controlling for possible effects of profitability on the leverage-value relationship. However, their results still showed a negative marginal relation between value and leverage rendering the tests to produce no indication of a net tax benefit to debt. Thus, their conclusion is that debt conveys information about profitability missed by a wide range of control variables.

Graham (1996a) tests whether the incremental use of debt is positively related to the simulated firm-specific marginal tax rate. He calculates the marginal tax rate using a model that incorporates the effects of tax deductions and tax credits. He uses incremental debt financing decisions (as opposed to cumulative measures of financial policy) in a model that captures the relationship between debt and taxes. Graham (1996a) use a pooled cross-section of differenced time series data for over 10,000 firms, and provide the empirical findings that a firm with a higher marginal tax rate has a greater incentive to issue debt, relative to a low–marginal tax rate firm. This implies a positive association between the marginal tax rate and debt financing. Graham's results show also that there is substantial variation in marginal tax rates across time and across firms. With respect to net operating losses, his results show that firms do not appear to respond to the tax incentive associated with debt when they have net operating loss carry forwards relative to when they do not.

Patterson (1985) studied the role of taxation on a firm's financial policy and value by using a model in which the value of a levered firm is equal to the sum of values of an equivalent but unlevered firm and the risk adjusted - present value[15] of the debt related tax shield. He derives a model in which the optimal level of debt depends on corporate tax rate and operating risk. His results show that there is a negative relationship between value and leverage variables.

According to Patterson (1985)[16], the effect of taxes on leverage depends on sign and size of the estimated leverage and operating risk variables. Patterson's (1985) results show that the signs of the estimated coefficients of leverage and operating risk are negative as expected. The interpretation of such results is that the optimal level of debt is zero. Patterson recognises that the empirical results are not supported by the observed capital structures. A question that needs to be answered is that, "If a value maximising debt is zero, why do firms use debt?" Patterson argues that the possible explanations for these results are mis-specification in measuring variables, sample bias and/or that management has other goals rather than value maximisation.

Graham (1996b) carries out a comparative analysis of widely used proxies for corporate marginal tax rates. The paper defines a marginal tax rate as the present value of current and expected future tax paid on an each additional unit of income earned today. By using this definition, Graham (1996b) estimates ten proxies for corporate marginal tax rate (see Graham (1996b) pp. 192-195 for details on the proxies and the way they were estimated). After estimation of the proxies, the paper estimates what it refers to as a "perfect foresight marginal tax rate" defined as the marginal tax rate if the values of taxable income that will occur in the next 15 years

[15] The present value of the debt related tax shield is adjusted for the costs of using debt.
[16] Patterson uses a cross-sectional regression model, which controls for cross-sectional differences in operating risks, present value of future tax shields, the effects of tax shields of non - capitalised leases on value and the possibility of non-linear value – leverage relationship.

are known with certainty. He then assesses the predictive ability of the proxies by using a series of regressions that measure how well the proxies predict the estimated 'perfect foresight' marginal tax rate. The result show that simulated marginal tax rate is the best proxy of corporate marginal tax rate.

Another good proxies is trichotomous variable which is equal to i) the statutory tax rate if both taxable income and non net operating loss variables are positive, ii) one-half of the statutory tax rate if either the taxable income or non net operating loss is positive while the other is zero and iii) zero otherwise. Other good proxies are statutory marginal tax rate obtained from applying statutory tax rate on contemporaneous taxable income and taxable income variable which is a dummy variable that is equal to one if taxable income is positive and zero otherwise (see Graham 1996b, pp.193-194, 208). The results for regressions to test whether non-simulated proxies provide any incremental information missed by a simulated proxy indicate that non-simulated proxies provide very little information. In another piece of analysis, Graham (1996b) determines which proxies provide valuable information by regressing the 'perfect foresight' rate on all nine proxies simultaneously. The results indicate that most proxies provide some information although the overall fit improves by less than one percent over that of a regression using just the simulated rate. Thus, the simulated tax rate, although is difficult to calculate, is the best available proxy for the "true" marginal tax rate. The implication of these results is that sometimes the failure to capture the tax effect is attributable to the use of an inferior proxy for marginal corporation tax rate (see also Shum (1996)).

In general, these studies provide evidence that there is a positive association between marginal tax rates and debt financing. The results suggest that companies will continue to use debt so long as they have (or expect to have) profits high enough to utilise debt tax shields.

The implication of the above results is that a high level of debt is optimal. According to these results, ceteris paribus, close to 100% debt financing constitutes an optimal financing strategy. However, in practice the proportion of debt in a firm capital structures will be far less than one. There are a number of reasons put forward to explain why the proportion of debt in capital structure should be less than one. One of the reasons is that interest income attracts personal tax. The taxation of interest income affects marginal prices of debt instruments and consequently the amount to be raised through debt issues. The argument above suggests that managers need to consider the tax position of the recipients of interest income when they make a decision on their debt policies. Thus, there is a personal tax disadvantage to corporate debt that reduces the advantage of debt at corporate level. In the next section I will provide a summary of some studies that consider the impact of personal tax on debt financing.

2.3 Debt financing and personal income taxes

Masulis and Trueman (1988) introduce, among other things, differential personal tax rates to demonstrate the personal tax disadvantage of early dividend payouts. The paper also analyses both the impact of diminishing returns to scale technology for firm investment in real assets and the impact of double corporate taxation for firm investments in financial claims. Masulis and Trueman (1988) argue that the preferred level dividends depend on a firm's investment opportunities, their required level of financing, and shareholders' personal tax brackets. They set their model under perfectly competitive capital market conditions in which a risk-averse investor's object of choice is current (t = 0) consumption. They consider two possible types of securities: tax- exempt *pure discount municipal bonds* and *shares of unlevered companies* with distributions to shareholders taxable at the marginal personal income tax rate[17]. The results show that investors (whose incomes are not taxed at the marginal personal income tax rate) will hold either municipal bonds or equity shares depending on their personal tax rate relative to the marginal personal tax rate. Marginal investors will be indifferent between holding municipal bonds and equity shares. Furthermore, investors in positive tax brackets are shown to benefit from dividend deferral, and for this group of investors the cut-off rate required for project acceptance is lower under "*internal financing*" than under "*external financing*". This implies that corporate investment decisions are dependent upon the source of financing, with optimal investment levels generally higher under internal financing. Masulis and Trueman (1988) show that shareholders unanimously agree that externally financed investments should be made as long as they add value, but they might not agree on a firm's investment criterion under internal financing. Given the dispersion of shareholders' tax brackets, the results show that agreement or disagreement on internal financing depends on whether investing in securities is allowed or not. The implication of their study is that managers need to consider the tax position of security holders in deciding which security (debt or equity) to issue.

[17] The marginal personal income tax rate, in this case, is a personal income tax rate which equates after tax income from municipal bond to that from equity shares.

This implies that capital structure depends on both corporate and personal income tax structures.

Lewellen and Mauer (1988) investigate the impact of the aggregate value of tax timing options on a firm's value and show that the availability of those timing options to shareholders will be enhanced when a firm has multiple classes of tradable securities outstanding. Lewellen and Mauer (1988) employ a valuation framework in a multi–period, state–preference setting with the assumptions that a firm's investment strategies are given (i.e. are exogenous) and markets are perfectly competitive. The paper derives the security–holders' tax timing options for both levered and unlevered firms. In both cases the equity holder tax option payoff function is equivalent to that of the put option on assets (exercisable at current value) with random value at future date times the applicable capital gain tax rate. The only difference is that, the levered equity includes debt as one of the variables. A relationship similar to that of equity is established for debt. Generally, the results show that the value of the tax timing option on shares of an unlevered firm is either less than or equal to the aggregate value of the tax timing options on debt and equity securities of an otherwise identical levered firm. The unlevered firm option value will be strictly less if the tax trading opportunities of the levered firm's bondholders and stockholders are not perfectly synchronous. Thus, according to Lewellen and Mauer (1988) there is a possible advantage of using debt if personal tax is included in the analysis of optimal capital structure. The results of the paper offer an additional tax–based rationale for the existence of a complex corporate capital structure with emphasis on leverage choice.

Lie and Lie (1999) investigate the impact of personal taxation on corporate managers' choices between share repurchases and dividends as a means of disbursing cash. The paper shows that, consistent with the notion that personal taxation influences the choice of disbursement method, managers are more likely to choose share repurchases if the firm has a low dividend yield. The same result may be obtained if the firm's stock has experienced losses or small recent capital gains and if the payout occurred before the US's Tax Reforms Act of 1986. The authors provide empirical evidence to support their argument that managers consider the tax situation of the firm's investors in making corporate decisions. The evidence shows that managers are even more sensitive to the shareholders' tax situation if institutional investors hold a large fraction of shares in the firm. Their results have implications for the debate in that if an investor's tax position is such that the optimal disbursing method is the a share repurchase, then other things being equal, there should be an increase in debt-equity ratio. The increase in debt-equity ratio will be more significant if the cash used to repurchase shares is to be raised through issuing debt.

The results that have been reviewed so far show that both corporation and personal income taxes affect the optimal capital structure in several ways. Most of the reviewed studies analysed either corporation tax or personal tax independently. The popular view is that debt has a corporation tax advantage but personal tax structure may reduce or even eliminate that advantage. It is therefore important to review the studies that have analysed the collective impact of both corporation and personal tax on capital structure. This is accomplished in the next section.

2.4 Debt Financing under Corporation and Personal Taxes

Stiglitz (1973) uses the "relevant" provisions[18] of the 1972 US Tax Code to provide an analysis of the impact of taxation on corporate financial policy. The paper aims at reconciling the capital structures predicted by financial theories with the observed capital structures in the US. Using the cost of capital argument as in Modigliani and Miller (1958), Stiglitz shows that tax induced changes in financial structure have no real effect on the investment decisions of the firm. Using a multi-period model, his results suggest that most firms finance their new investments by retentions, raising additional capital required by issuing bonds. He assumes a "certainty world" and derives the optimal leverage at both corporate and personal level[19], and shows that at the personal level, marginal rate of substitution of consumption is equal to the after-tax rate of interest using the personal tax rate.

At a corporate level, the results indicate that increasing corporate debt, *ceteris paribus*, increases current consumption but decreases future consumption. Stiglitz (1973) concludes that the optimal financial policy that emerges from the analysis involving relevant provisions for both personal and corporate tax codes is in accord with the observed one. The tax advantage of debt depends on the relative tax savings on personal borrowing versus corporate borrowing. Thus, desirability of a high debt policy depends simply on whether the personal tax rate is greater or less than the corporate tax rate. He argues that it happens only by chance that the actual debt-

[18] The US Tax Code provides for taxation of interest income and dividends at personal tax rate on ordinary income, taxation of capital gains at the tax rate half of that applicable for dividend and deductibility of interest charges for corporate tax purposes.
[19] He specifically assumes that personal or individual borrowing is a perfect substitute of corporate borrowing. Consequently, any tax induced change in debt has no real effect on firm value since the interest charges are also deductible at personal level.

equity ratio is the outcome of the profit and investment history of the firm. In the absence of bankruptcy, the optimal investment decisions of the firm, whether in safe or risky assets, remain unaffected by the tax structure. The paper shows also that there is no inter-sector inefficiency resulting from an imposition of tax on corporate profit in an economy with a corporation tax system that allows interest charges to be deducted in calculating corporation tax liability.

Miller (1977) presents the argument that the capital structure of the firm is irrelevant even in a world with a tax system that allows the deductibility of interest payments in calculating a firm's taxable income. He introduces the influence of personal tax into the analysis and shows that, the marginal personal tax disadvantage of debt and supply side adjustments by the firm can offset the corporate tax advantage of debt suggested in Modigliani and Miller (1963). He derives equilibrium market prices for equity and debt instruments in a valuation framework that implies irrelevance of capital structure for an individual firm[20]. In particular, Miller derives the market equilibrium characterised by corporate sector debt with a perfectly elastic supply curve and upward sloping demand curve. He argues that given a fixed corporate tax rate and progressive personal tax system, in equilibrium, there may be no gain from leverage for the individual firm. Each firm category irrespective of its preferred debt level will find that the risk adjusted cost of debt and after tax equity will not only be equal but will also be independent of the level of debt it chooses to employ. The implication of Miller's (1977) argument is that the market will set market prices such that at equilibrium, the expected after tax return from stocks is

[20] In their joint paper with Modigliani, Modigliani and Miller (1958), they pointed out that heavy reliance on debt in their capital structure commits the firm to paying out a substantial part of its earnings in the form of interest.

equal to that from bonds. According to Miller's (1977) results, an optimal debt ratio may exist only for the corporate sector as a whole and not for the individual firm.

Schneller (1980) examines the impact of taxes on the optimal capital structure of a firm. The paper argues that when individuals differ in the tax rates imposed on their interest income they will disagree on the level of debt financing and as a result, the assumption that '*the objective of the firm is to maximise its value*' is a meaningless dictum, (page 119). The paper considers default possibility in examining the effect of debt financing (for both dividend-paying and earnings-retaining firms) on firm values. It shows that due to the possibility of illiquidity and disparity between capital gains and dividend income tax rates, interior solutions[21] for the capital structure decision of dividends paying firms may exist. The analysis shows that when dividend-paying firms are always liquid, a solution to the capital structure problem coincides with that of Miller (1977). His results show further that, in the absence of bankruptcy, the optimal capital structure for earnings-retaining firms is always a corner solution, i.e. either debt or equity financing. When bond default is allowed, an interior solution may exist.

DeAngelo and Masulis (1980b) provide a generalisation of the Miller (1977) paper. They consider a number of dimensions in Miller (1977) 's framework and conclude their analysis by making the following remarks. *First*, there are two key properties of the demand-supply interactions of investors and firms namely the *aggregate supply response* and *tax induced positive aggregate demand* that lead to

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These interest payments are taxed under personal income tax and thereby reduce the total after tax cash flows to stakeholders.

[21] The interior solution is the result of optimisation problem in which the optimal capital structure comprises both debt and equity such that a proportion of each is greater than zero but less than one.

firm level leverage irrelevance in market equilibrium. They show that market equilibrium implies irrelevance of the leverage decision in the valuation of any given firm. They also show that the aggregate supply of corporate debt and equity is socially relevant in the sense that in aggregate, investors demand positive quantities of debt and equity claims in order to arrange their portfolios in a most efficient manner. *Second*, the key demand side property reveals that the leverage irrelevance theorem is robust to the alternative assumption about personal tax codes. They argue that no single security - ownership clientele effect is uniquely associated with the theorem. Many different personal tax codes lead to the theorem and are associated with different ownership patterns. *Third*, in market equilibrium, leverage is irrelevant for firms that issue risky debt even though part of the corporate debt tax shelter is lost in default and recapture is not allowed. *Fourth*, even in complete markets, the supply side adjustments by firms that are constrained to issue only conventional securities are not always powerful enough to establish equilibrium prices that imply leverage irrelevancy to individual firms.

Finally, when a dividend-specific personal tax shelter exists, equilibrium prices will adjust to imply that any given firm is indifferent among all debt, dividend and capital gain packages of earnings. Without dividend-specific personal tax shelters, dividends will not be supplied or demanded in market equilibrium nor will dividends be held. The implication of their remarks is that when both personal and corporation tax are considered, leverage may be relevant. Their results seem to suggest that it is important to consider personal taxes when deciding on capital structure choice.

Taggart (1980) extends Miller (1977) by examining the Miller (1977) model under incomplete capital market conditions characterised (among other imperfections) by the costs associated with debt. As in Miller (1977), Taggart (1980) finds that investors have a positive demand for corporate leverage, and that this is curtailed as the taxable interest rate rises relative to the tax-exempt rate. However, unlike Miller (1977) Taggart (1980) shows that the capital structure of any firm is not a matter of indifference to all shareholders at market equilibrium. Using a certainty model with fixed supply of security assumption, he constructs a portfolio equilibrium comprising of tax-exempt bonds, fully taxable bonds and equity shares. He shows that, at the margin, a change in the market value of a firm's equity is inversely related to the ratio of the full taxable interest rate to tax exempt rate. The above result implies that, initial (or existing) shareholders will unanimously prefer more leverage if the pre-tax return on a fully taxable bond, adjusted for corporate taxes is less than the return on tax exempt bond. The paper concludes that, incorporating the costs associated with debt in the analysis provides a rationale for capital structure specialisation among firm types or industrial groups and suggests that, a given firm's capital structure is not a matter of indifference. Furthermore, the paper shows that, the incompleteness of capital markets implies that investors will not line up perfectly in tax bracket clienteles and consequently shareholders' preferences for capital structure policy will not be unanimous.

The paper by Kane, Marcus and MacDonald (1984) uses an option valuation model to determine the magnitude of tax advantage to debt that is consistent with the range of observed corporate debt ratios. Their model incorporates *differential personal tax rates* on capital gains and ordinary income and gives the conclusion that variation in the magnitude of bankruptcy costs across firms cannot by itself account for the simultaneous existence of levered and unlevered firms. The paper uses simulation analysis to determine a reasonable cross-sectional range for the optimal debt ratios, given the tax advantage of debt. The simulation results indicate that if the tax advantage of debt is small, then the cost of deviating substantially from the optimal debt ratio is small. They argue that the personal tax rate must be extremely close to the corporate tax rate in order to explain the existence of unlevered firms, and, at those rates, the annual rate of return advantage to debt is small. Their conclusion is that the trade-off between the tax advantage of debt and its associated bankruptcy costs is unlikely to play a major role in explaining observed leverage patterns. The results, though consistent with observed debt ratios, leave open the possibility of other factors, like moral hazards to be more important determinants of debt policy than the traditional tax and bankruptcy cost considerations.

Schall (1984) describes how the tax effects relating to capital gains and debt interest induce changes in aggregate corporate borrowing under inflationary conditions. He shows how these aggregate changes lead to equilibrium tax relationship, which differs from the "zero inflation" tax relationship. Schall (1984) argues that the real tax rate on business income can increase because *historic costs* rather than *replacement costs* of inventories and depreciable fixed assets (like plant & equipment) are used in computing taxable income. At an individual level, inflation can increase real personal taxes due to the taxation of shareholders capital gains that are nominal rather than real.[22] The paper shows that the use of nominal rather than

[22] Schall (1984) shows that the real capital gains tax rate depends on inflation rate, the length of holding period, the real pre-tax return on assets and the statutory capital gains tax rate. Thus using

real amounts in tax computations causes the real tax rate on interest income and the real interest tax savings of the borrower to depend both on the nominal interest rate and inflation rate. Schall (1984) assumes the existence of a "certainty" world in which capital markets are perfectly competitive and transactions are cost less. Schall's model produces results which show that tax distortions from using nominal rather than real amounts in tax computations results in a difference in tax equilibria *with* and *without* inflation. From borrowers' point of view the effects of computing taxable income by using nominal income rather than real income will encourage less borrowing in the economy and will dominate the impact of the resulting effect on shareholders' real taxes, which arguably has the effect of motivating more borrowing.

Flath and Knoeber (1985) relates the size of the *net tax subsidy* to debt and the direct *costs of bankruptcy* associated with the use of debt, to variations in capital structure. Specifically they argue that the proposition made in Modigliani and Miller (1958) that '*the value of a firm is independent of its capital structure*' does not imply that '*the average cost of capital to any firm is independent of its capital structure*'. They show that if the effects of taxes and bankruptcy costs are considered, the two propositions are not equivalent. Despite a suggestion by Miller (1977) that the size of net tax subsidy to debt and direct costs of bankruptcy are significantly small, Flath and Knoeber (1985) argue that little has been done to relate these factors to variations in capital structure. They use industry-based cross-sectional regressions to estimate the size of the personal tax advantage to debt and the costs of failure. Taking into account both corporate and personal taxes, the results show that at the

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historic cost rather than replacement cost overstates the capital gains and hence real capital gains tax margin, the cross-sectional annual tax advantage ranges from 14% to 16% and from 23% to 26% of interest payments for periods 1957-1964 and 1965–1972 respectively. With respect to the failure costs, the results imply that variations in capital structure ought not to be related to proportionate variations in failure costs and income. The results show further that variations in capital structure are best explained by differences in operating risk than by inter-industry differences in the tax advantage to interest. The findings add empirical support that failure costs and taxes do imply an optimal capital structure, at least on an industry level.

Graham (1999) investigates the degree to which personal taxes offset the corporate tax advantage of debt. He aims to present an empirical validation of the assertion made in other studies (like Miller (1977)) that "*...in equilibrium personal taxes on interest income offset the corporate tax advantage arising from deductibility of interest payments for corporate tax purposes*". The implication of the above assertion is that a tax-induced, firm-specific optimal capital structure should not exist in equilibrium and considers this to be strong argument that justifies a comprehensive study. Consequently, Graham (1999) focuses on the importance of personal taxes in the context of corporate financial decision-making. The paper shows that the personal tax burden on interest income is generally higher than that for equity income because capital gains are often taxed at a lower rate relative to interest income; and there is a chance of avoiding tax on equity income (capital gains) altogether. Graham (1999) uses cross-sectional regressions that control for personal taxes and finds that debt usage is positively correlated with tax rates. With

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rate.

properly simulated marginal tax rates[23] and a careful adjustment for personal tax penalty, the paper provides results that show strong tax effects on capital structure. When firm-specific information is used to calculate the personal tax penalty (i.e. using the firm's dividend pay-out ratio), the results show that there is a strong tax effect in the capital structure regressions; with high tax rate firms having more debt in their capital structures than low tax rate firms. The results offer evidence against the conclusion made in Miller (1977) that there is no tax-induced optimal capital structure. This implies that adjusting for marginal personal tax rates is important in analysing the effects of corporate tax on financial policy.

It should be noted that the studies reviewed so far do not consider in much detail the impact of presence of other non-debt deductions allowed by the corporation tax system in calculating corporate tax liability. In the next section I review some studies that consider the impact of non-debt tax shields on optimal capital structure.

2.5 The impact of non-debt tax shields on capital structure

DeAngelo and Masulis (1980a) and Dammon and Senbet (1988) extend the work of Miller (1977) and analyse the impact of introducing non-debt deductions allowed for tax purposes on an equilibrium level of debt for individual firm.

[23] The marginal tax rates are simulated to account for uncertainty in taxable income, as well as the tax-loss carry back and carry forward, investment tax credit and alternative minimum tax features of the US Corporate Tax Code.

Their argument is that if realistic assumptions about the corporate tax structure are made[24], an equilibrium level of debt for individual firm might exist even in the context of Miller (1977) framework. The DeAngelo and Masulis (1980a) valuation relationship show that if a firm has a positive corporate tax shield substitute for debt, the relative market prices for debt and equity will adjust until in equilibrium, each firm has a unique interior optimum level of debt. They argue that this unique interior optimum exists because there is a constant expected marginal personal tax disadvantage to debt while positive tax shield substitutes imply that the expected marginal tax benefits decline as debt is added to the capital structure[25].

One important thing to note in DeAngelo and Masulis's (1980a) interior equilibrium is that they assume a constant level of investment and they do not explain the relationship between the level of investment and the amount of debt to be employed. This is not always a legitimate assumption since firms are expected to borrow or issue new equity in order to raise funds they need to finance the desired level of investments. The non-debt tax shield (of which large proportion is true economic depreciation) is a function of the level of investment and it affects the optimal level of debt in the DeAngelo and Masulis (1980a) framework. It is therefore logical to argue that when debt changes, the level of investment will also change and consequently so will the true economic depreciation and the earnings generated by

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[24] Most corporation tax structures allow the deduction of non-debt items such as depreciation and capital allowances in arriving at taxable profit.
[25] This will be true if the tax system does not allow loss carry forwards or if expected profit is unlikely to absorb the previously incurred losses.

the firm.[26] Thus, the states of nature for which firms pay tax and the possible tax exhaustion states need to be re- examined.

Dammon & Senbet (1988) use an investment-related tax shield argument similar to that used in DeAngelo & Masulis (1980a), to analyse the effect of corporate and personal taxes on a firm's optimal investment and financing decisions. They consider a world of uncertainty in which investment is a decision variable that is not exogenously given as assumed in DeAngelo and Masulis (1980a). They show that, an increase in investment related tax shields due to an increase in tax is not necessarily associated with a decrease in leverage at the individual firm level.[27] Dammon and Senbet (1988) use a model in which the non-debt tax shield (true economic depreciation) depends on the level of investment, which then determines the net cash flows to shareholders.

They conclude that the impact of leverage on a firm's value due to DeAngelo and Masulis's (1980a) " pure leverage effect" which allows only debt (and not investment) to vary, will be strictly less than "the total leverage effect" which requires simultaneous optimal adjustments to all firm's decision variables. They suggest that the effect of a change in an investment related tax shields on a firm's optimal level of debt depend critically on the trade off between the "substitution effect" proposed by DeAngelo and Masulis (1980a) and the "income effect" associated with a change in optimal investment. The substitution effect between non-debt tax shields (mainly depreciation or capital allowances) and debt exists because

[26] The assertion assumes that the ratio of equity to debt (if any) required to finance investment remains unchanged. For a more detailed explanation on the impact on equilibrium of including investment as a decision variable (endogenous to the model) on optimal level of debt see Dammon and Senbet (1988).

non-debt tax shields shelter part of taxable profit and firms should only borrow to an extent that they have profit to shelter from corporation tax. Thus, at a given level of profits and non-debt tax shields, less amount of debt will be utilised by the firms with more of non-debt tax shields. On the other hand, Dammon and Senbet (1988) show that non-debt tax shields are related to investment and therefore more investment will generate more non-debt tax shields and more profit hence more debt capacity. In this case more non-debt tax shields will be associated with more debt due to more profit resulting from more investment hence the name an "income effect". Their results show that in a cross sectional analysis, firms with higher investment related tax shields need not have lower debt related tax shields if they utilise different production technologies and have less than perfectly correlated pre-tax earnings.

Cooper and Franks (1983) show how financing and investment decisions interact when a firm has unused tax credits[28]. The paper describes and compares various mechanisms for exploiting the tax losses of a firm, using both financial and real asset transactions. In their initial analysis, Cooper and Franks (1983) describe an equilibrium that requires all tax-paying corporations to pay tax in all future periods by assuming that there is a competitive supply of cost less tax-motivated financial transactions. They argue that under such equilibrium, all projects should be evaluated as if they are fully taxed with a rebate tax on losses. For non-tax paying firms, interest charges provide a cost less alternative for sheltering taxable income, so other tax shield substitutes have no value. For this case, the equilibrium requires that no

[27] DeAngelo and Masulis provide the analysis which predict that the leverage is related with tax structure. They show that, the more the non-debt (or investment related) tax shields are allowed for corporate tax purposes, the less the corporate leverage since interest seizes to provide corporate tax shield given the level of profit.
[28] Unused tax credit is a feature in US corporation tax system which is treated as a form of tax shield in calculating corporate tax liability.

corporation pay tax; and all projects should be evaluated on the basis of their pre-tax cash flows, using required rate of return on an unlevered firm as a discount rate. Cooper and Franks (1983) also assume costly financial transactions and an inelastic supply of real assets to show that the effective tax rate for a firm with tax losses is less than the full corporate tax rate. The paper concludes that differences in tax positions of corporations arise not because they are exogenously endowed with different tax rates but because some are making tax losses and others generate taxable income. The effective tax rates for corporations depend upon the length of time for which the firm expects to have tax loss carry forwards. They argue that the endogeneity of effective tax rates for corporations with tax losses has implications for both real assets and financial transactions, in that these transactions may change the tax position of firms; and as a result valuation decisions should include that impact.

Cordes and Sheffrin (1983) estimate the effective tax value of incremental interest deduction for corporations.[29] They estimate the effective tax rate as the ratio of a change in corporate tax liabilities to a change in interest deductions. They find that the estimated effective tax rate is less than the statutory corporate tax rate and they attribute it to an inability of corporations to utilise fully their interest deductions due to insufficient taxable income or availability of non-debt tax shields. The paper estimates the marginal effective tax advantage to debt finance by using a model that simulates the impact of increasing interest deductions (holding investment and production decisions constant) on the effective marginal tax advantage. Their results

[29] There are other studies that also estimate the effective corporate tax rate by incorporating realistic features of the specific corporate tax code. For details see Graham (1996a), Cooper and Franks (1983), Givoly et al (1992) etc.

show that there is a significant wedge between the statutory and effective tax advantage to debt, and that there is a significant variation in the marginal tax of debt faced by different firms and industries.

Lewis (1990) examines multi–period corporate financial policy in a world where taxation is the only market imperfection. The corporate financial policy in this setting is interpreted as a strategy that generates a state–contingent sequence of debt financing choices over the life of the firm, which determines both capital structure and maturity structure of the debt. The paper assumes that dividends and capital gains and losses are non–taxable and that corporate claims follow the " interest–first " doctrine. Using these assumptions the paper presents a valuation model in a multi–period framework, which illustrates that for a firm which maximises its value, debt maturity structure is irrelevant once the promised interest is specified. Lewis (1990) also shows that corporate financial policy affects firm value since the categorisation of cash pay–outs as interest or *"others"*[30] influences both the corporate tax deductibility of pay – outs and the market value of those pay–outs. His optimal financial policy is similar to that of DeAngelo and Masulis (1980a), with the difference that there can be many debt to assets ratios, rather than a single ratio that are consistent with value maximisation. Thus, the optimal debt to assets ratio is not unique under the multi–period model. The paper concludes by showing that capital structure relevance is a direct consequence of an optimal financial policy that involves debt financing. This implies that taxes are relevant considerations in determining the optimal financial policy.

[30] Other payouts in this case include principal amount, dividends, repurchases, etc.

2.6 Equilibrium capital structure under different tax system

Fung and Theobald (1984) investigate the impact of non-interest – related tax shelters on dividends by extending the studies by DeAngelo and Masulis (1980a, 1980b) to other tax systems in which firms and individuals tax credits are available. They derive a single period, state preference valuation model under perfectly competitive securities markets under both classical and imputation tax systems. Particularly, they derive a " positive" dividend equilibrium that implies a negative corporate tax rate under the classical tax system (a system characterised by the absence of tax credits and taxation of both dividend and interest income at the same rate). The results of their study on imputation tax systems show that, at the margin, debt will dominate dividends for the imputation tax system like that implemented in the UK and France (see section 1.2). Using a tax exhaustion argument, Fung and Theobald (1984) show that debt is undesirable if the firm is tax exhausted[31]. They argue that in the UK, the ability of a firm to recover ACT represents the main vehicle for relieving double taxation up to the basic personal tax rate, which has a profound effect on optimal leverage. They conclude that an introduction of tax credits and non-interest tax shelters in DeAngelo and Masulis (1980b) framework lead to the existence of a joint optimal level of debt and dividends.

Swoboda and Zechner (1995) summarise and analyse major results from the literature on taxes and capital structure. They present a unified framework within which different aspects of taxation and capital structure equilibria for different corporation tax systems can be analysed. The paper also derives capital structure

[31] Firm is said to be tax exhausted if not paying tax because its tax shelters is greater than its taxable income.

equilibrium in a multinational setting by considering corporate tax rates and inflation rates across countries. Their comprehensive analysis incorporates both "certain" and "uncertain" situations and it focus on both single and multi-period models.

Under the classical tax system, Swoboda and Zechner (1995) derive a securities market equilibrium that verifies the argument that in order to maximise utility, each investor (bond holder versus equity holder) will only hold a security with the highest after tax returns. Under the assumed world of certainty, it follows from their model that the equity market can only clear if all stocks offer the same before tax rate of return. The same conclusion is reached when a model is applied to the bonds markets. Thus, under the classical tax system, the capital structure equilibrium produced by Swaboda and Zechner (1995) model is similar to that of Miller (1977).

According to Swaboda and Zechner (1995), the capital structure equilibrium under the imputation tax systems depends on the extent to which the corporation tax paid on distributed dividends is credited to the personal income tax. For the case where the corporate tax paid on dividends is fully credited the results show that issuing debt is equivalent to issuing equity that pays cash dividends. Thus for a firm to issue both debt and equity the after tax returns should be equal and there should exist a marginal investor with a personal tax rate on debt income equal to that on equity income. For the case where no or only part of the corporate tax paid on distributed earnings (as in the UK and France) is credited to the personal income tax, the results show that, at the margin, investors might not be indifferent between issuing both types of shares.

The multinational analysis of capital structure reveals that under the classical tax system, firms in a high-tax country, *ceteris paribus*, are relatively more highly levered than firms in low-tax country. Furthermore, it shows that if yields are initially determined by national equilibria, firms in the high-inflation country have an incentive to issue debt denominated by the currency of a country with low inflation. Concerning the clientele effect in prices (not in quantity as in Miller (1977)), the results show that investors in different tax brackets rank bonds differently, and there is no single investor who is marginal in all bonds[32]. Swoboda and Zechner (1995) extend their analysis to incorporate the effects of tax evasion on capital structure. They suggest that the high leverage in most countries of continental Europe relative to that of the US, Canada and Great Britain is consistent with a high degree of tax evasion.

2.7 Debt financing and taxes: UK evidence

Lasfer (1995) conducts an empirical study to test the theoretical predictions of both tax and agency models of capital structure. The results on the tax model are summarised as follow. *First*, in the short run firms do not respond immediately to changes in their tax positions. Lasfer argues that in the short run firms do not change their capital structure to accommodate changes in effective tax rate because they may return to their tax paying position in the long run and consequently they may incur transaction costs to alter their debt contracts. *Second*, debt ratios (defined in terms of market value of equity) are not distributed monotonically across the effective

[32] This implies that investors in a high tax bracket prefer low-risk, low-coupon bonds even if their before tax return is slightly lower than that of high-risk, high-coupon bonds and vice versa.

corporation tax rates group. *Lastly*, tax exhausted firms are not found to have similar or higher levels of debt than tax paying firms. According to Lasfer's study, the motivation of debt financing appears to be driven by the resolution of *agency conflicts* and only in the long run (not the short run) by *tax savings*.

Bond, Denny and Devereux (1993) use the neo-classical "adjustment costs" model to analyse capital allowances and the impact of corporation tax on the level of investment in the UK. They outline three possible effects of corporation tax on the *user cost of capital* i.e. opportunity cost of investing in capital equipment.[33] The first effect is on *the change in cost of finance.* Depending on the extent to which debt, retained earnings and new equity are used to finance investments, the availability of interest deduction and imputation credits alters the cost of finance. The second effect is on *the change in opportunity cost of capital.* This depends on the extent to which the revenue generated by investments is taxed at a corporate level. They outlined the last effect of corporation tax to be *a change in the effective purchase price of assets.*

The paper demonstrates that the availability of capital allowances reduces the effective purchase price of assets. Generally, the use of debt increases the net after tax cash flows at the corporate level. On the other hand, depending on the dividend policy of the firm, the use of new equity rather than debt may decrease the corporate net after tax cash flows since the firm has to pay Advance Corporation Tax, ACT, on any dividend distributed. Bond et al (1993) argue that investment in a particular type of capital equipment will decrease if the rate of marginal product of that asset is less

[33] Devereux et al (1993) measure the cost of using capital equipment for a fixed period of time, let say a year, as the product of purchase price and the minimum rate of return required by investor to hold asset(s) for that period. This minimum rate of return reflects the opportunity cost of having wealth tied up in the asset(s) and the change in the value of assets over that period (depreciation plus capital gain /loss)

than the required rate of return. This seems to be logical since investing in such assets should lead to fall value of the company.

They conclude their paper by suggesting that capital allowances and corporation tax has a negative impact on business investment in the UK. Under the assumption that firms borrow in order to finance investments, their conclusion seems to suggest that, other things remaining constant, a change in corporation tax structure (like the one effected through the corporation tax reform of 1984) should be associated with a change in debt and hence a corresponding change in capital structure.

Mayer (1986) examined the role of corporate tax exhaustion in determining the optimal financing and investment decisions of a firm. He contends that the effective corporate tax rate of a firm diminishes as the firm extends its tax deductibility activities towards tax exhaustion. The author develops a dynamic programming model[34] to establish the effective marginal tax rate in the presence of a tax system that permits losses to be carried forward. The paper demonstrates that the internal optimal financial structure, which does not require the imposition of external (legal) constraints may exist. It shows that the cost of capital is highly sensitive to the current taxable earnings. The results show that given the stochastic nature of earnings and the existence of a tax system that allows losses to be carried forward to the subsequent periods, the optimal level of debt is primarily determined by the expectations of future earnings in relation to taxable allowances. Thus, according to

[34] The developed model referred to, as a "partial equilibrium" model is stochastic in nature in taking the tax characteristics of investors in a firm. It focuses on the determinants of the demand for funds. For more explanation of the model, see Colin Mayer, 1986," Corporation tax, Finance and Cost of Capital" *Review of Economic Studies*, Vol.53, pages 94 - 100.

the results of the model, somehow, the level of gearing is arrived at as a trade off between the tax advantages and bankruptcy risks associated by using debt. However, the tax exhaustion, in many cases, occurs well before bankruptcy so the tax considerations come to play even at modest debt-equity ratios.

Ozkan (2001) examines the empirical determinants of borrowing decisions of firms and the role of the adjustment process. A partial adjustment model is estimated by GMM estimation procedures using data for an unbalanced panel of 390 UK firms over the period of 1984-1996. Results suggest that firms have long-term target borrowing ratios and they adjust to their target ratios relatively fast, which might suggest that the costs of being away from their target ratios are significant. The results also provide support for a positive impact of size, and negative effects of growth opportunities, liquidity, profitability of firms and non-debt tax shields on the borrowing decisions of companies.

Edward (1984) analysed the general impact of the corporation tax reform of 1984 in an effort to suggest how far it should be welcomed. The study focuses on how the reform fulfilled its aims as mentioned by the Chancellor in his 1984 budget. One of the aims of the reform was to establish a neutral corporation tax system. The results of the study show that although the bias in favour of investments in plant and machinery has been removed there are still plenty of non-neutralities in the UK's new corporation tax structure. The paper mentions two of the major non-neutralities, as the lack of measure that controls for the effects of inflation and the fact that debt is still favoured over equity. The paper conclude that the corporation tax reform of

1984 had limited benefits and consider it as a missed opportunity to achieve a worthwhile reform of the UK corporation tax system.

It should be noted that this Edward's (1984) paper was written in 1984, the time of the reform, so its conclusion was based only on theoretical arguments and not empirically observed ones.

Devereux (1988) analyses the impact of the corporation tax reform of 1984 on incentive to invest. The paper analyses the effects of the reform on four types of assets namely plant, machinery, industrial buildings and stocks[35]. The results show that the reform reduced the discrimination between assets but as expected the reform led to an increase in investments in plant, machinery and industrial buildings during the transition period. In the long term, however, the results show that the reform had a negative effect on investments. As in Edward (1984), the study also reported a non-neutrality feature in the UK's corporation tax structure in that debt continued to be favoured after reform.

Moon and Hodges (1989) like Devereux (1988) analyse the impact of the corporation tax reform of 1984 on corporate capital investment. They give a comprehensive analysis of how rates of return were affected by the reform. The results, which are similar to that of Devereux (1988) show the expectation that a greater degree of relative neutrality between different types of capital investment had been achieved but at the expense of less incentives for investment in plant, machinery and industrial buildings. It should be noted that, like Edward (1984), and

[35] For details of how the reform affected these assets see chapter 1 under section 1.5 and table 1.1.

Devereux (1988), this paper was written well before the impact of reform on investment could be observed.

2.8 Concluding remarks

In this chapter I review the tax theories of capital structure. The review started with the basic framework without market imperfections as presented in Modigliani and Miller (1958). The rest of the theories reviewed focused on the impact of including tax (at both corporation and personal levels) on the capital structure decision. The results reported in these papers show that:

i. There is a corporate tax advantage of debt,

ii. The net tax advantage of corporate debt depends on both the personal and corporation tax system,

iii. The presence of non-debt tax shields (especially those related to investments) have an effect on leverage which depends on both substitution and income effects of non-debt tax shields,

iv. Firms have long-term target borrowing ratios and they adjust to their target ratio relatively fast[36]. This implies that an optimal capital structure of some form exists, and

v. Variables like size, liquidity, profitability and growth opportunities play a significant role in determining firms' capital structures

[36] Note that Lasfer (1995)'s results showed that in short term firm's capital structure seems to be driven by the resolution of agency conflicts and only in long term do taxes play a major role. This is a

These results suggest that a change in the corporation tax structure like the one that occurred in 1984 should have an impact on firms' capital structure. It should be noted that the previous studies on the impact of corporation tax reform of 1984 investigated the effects of reform on investments in four assets namely plant, machinery, industrial buildings and stocks. They also touched lightly on the implication of reform on the alternative sources of finance. None of these studies investigated the impact of reform on capital structure as a whole. I fill that gap by investigating the impact of corporation tax reform of 1984 on the firms' capital structures in the next chapter.

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conflict taking into account that both studies are based on the UK data; however the method used by Okzan (2001) is more appealing and I am inclined to think that its results are more reliable.

3 THE IMPACT OF CORPORATION TAX REFORM ON LEVERAGE

3.1 Introduction

The empirical research on corporate financial policy over 30 years since the publication of Modigliani and Miller (1963) has focused mainly on the impact of taxation (both corporate and personal) on corporate debt policy. However, empirical literature provides results that are inconsistent with theoretical predictions and give inconclusive evidence on the significance of tax-related determinants of capital structure. For example the theoretical models of Modigliani and Miller (1963) and DeAngelo and Masulis (1980a) propose that corporation tax is one of the most important determinants of capital structure whereas the results of empirical studies by Bradley, Jarrel and Kim (1984), and Titman and Wessels (1988) to mention only few, do not support such theoretical predictions. These conflicting results are not expected given the intuitive and clearly appealing effect that taxation seems to have on corporate debt policy (see for example Miller (1977), Kim, Lewellen and McConnell (1979), Devereux (1988), Moon and Hodges (1989)).

Empirically, the lack of consistent evidence to support tax-based theories of capital structure is attributed to methodological problems and to the fact that the data used (especially time series data) are likely to be influenced by other micro-economic and macro-economic factors. As Bradley, Jarrell and Kim (1984) remark concerning studies extending Miller (1977), '... *the existence of an optimal capital structure is essentially an empirical issue as to whether or not the various leverage–related costs are economically significant enough to influence the cost of borrowing*'. The implication of that remark is that there are some situations where a particular cost (or advantage) of borrowing is economically significant. Similarly, there are times and/or situations when the effect of taxation on debt policy is likely to overshadow other factors (see also Shum (1996).

The objective of this chapter is to test the equilibrium target-adjustment model of capital structure using the UK corporate tax reform of 1984. As shown on section 1.5 of chapter 1, in 1984 the British government announced a major corporation tax reform, which, among other things, reduced the corporation tax rate and abolished first year and initial allowances[37]. The changes announced were to be implemented successively over the period 1984-1986 and the transitional arrangements were such that the steady state position would not be reached until end of 1986.

This reform provides a good environment to test tax-based theories of capital structure because tax-related determinants of capital structure were affected considerably. Furthermore, this reform was unique and significant in that it gave corporations enough time to plan how they would finance their investments since effectively the changes were announced three years in advance. Given the existence of an optimal debt ratio as suggested by Miller (1977) and generalised by DeAngelo and Masulis (1980a), value-maximising firms should have responded to the announced reform by adjusting their debt towards more optimal levels – those levels leading to high firm value.

The relevant literature on the importance of taxation that I refer to in this study dates back in 1963, when Modigliani and Miller (1963)'s article suggested a valuation relationship that implies a positive relationship between the value of a firm and both the amount of debt it employs and the corporation tax rate. Their valuation model seems to suggest that, as long as the marginal corporation tax rate faced by a

[37] The corporation tax rate was reduced from 52% to 35% and the first year allowance rate was reduced progressively over 1983-1986 from 100% to zero.

company is positive, ceteris paribus, close to 100% debt financing would constitute an optimal capital structure.

Miller (1977) extended the debate on capital structure by introducing personal taxes into the Modigliani and Miller (1963) model and by allowing for adjustments in the supply of debt in a complete market. He concluded that, as long as the net tax advantage of debt is positive, firms would continue to issue debt. The optimal level of debt in the Miller (1977) model is at a point where the net advantage of debt is zero. This implies that in equilibrium, capital structure has no effect on firm value and is therefore irrelevant. In Miller's (1977) equilibrium, the change in either the corporate or personal tax rate should make capital structure relevant (at least in the corporate sector as a whole) in that it will cause a valuation effect (i.e., the net tax advantage of debt will be different from zero). To arrive at a "new" equilibrium the capital structure should change. If the change results in a negative (positive) net tax advantage of debt, *ceteris paribus*, there should be a decrease (increase) in debt in the firm's capital structure.

DeAngelo and Masulis (1980a) formulate a model of corporate leverage choice in which corporate taxes, differential personal taxes and the supply side adjustments by firms enter into the determination of relative equilibrium prices of debt and equity. They argue that the existence of corporate tax shield substitutes for debt (or *non-debt tax shields* such as depreciation and investment credits) implies a market equilibrium in which each firm has a unique interior optimum leverage decision. Their result suggests that if a firm has non-debt tax shields the relative market prices for debt and equity will adjust until in equilibrium, each firm will have a unique interior optimum level of debt. The level of debt will be negatively related to these non-debt tax shields for a given level of pre-tax profits.

One way of testing models like Miller (1977) and DeAngelo and Masulis (1980) is to identify a period with significant changes in the hypothesised variable(s) and implement the model around that period. As Givoly, Hayn, Ofer and Sarig (1992) argued in their analysis on the US Corporation tax reform of 1986, corporate tax reform provides the best opportunity of testing tax-based theories of capital structure.

This chapter investigates the impact of the corporate tax reform of 1984 on corporate debt financing. In investigating the impact of the reform I make two working assumptions. First I assume that the objective of management is to maximise the value of their firm. The second assumption is that an optimal[38] capital structure exists. [39]In contrast to Shum (1996) and Givoly, et al (1992), I use changes in the relevant "ratios" for the hypothesised variables to estimate both time series and cross sectional regression models. Empirical studies on capital structure argue that the use of debt ratios to test theories of capital structure is unlikely to give reliable results that support or reject these theories simply because debt ratios at a particular time are a cumulative result of hierarchical and separate financing decisions over time (see for example MacKie-Mason (1990) and Gropp (1997). I argue that using changes in debt-equity ratios and the careful identification of a period with a significant change in relevant variable(s) will overcome the weakness of using absolute debt-equity ratios and provide reliable and easy to interpret results.

[38] I use the term optimal capital structure to reflect the capital structure which maximise firm's value. This may (or may not) be similar to target capital structure. Depending on the specific circumstances

This chapter tests the relative relevance of variables documented in the literature to be determinants of capital structure. I use a model similar in structure[40] to that used by Givoly, et al (1992) but different in that I use changes in ratios instead of the absolute difference of the values of the variables scaled by some measures, as used in Givoly et al (1992)[41] to analyse the impact of corporation tax reform on debt-equity ratios. The use of absolute changes of the variables scaled by some measures especially averages have an inherent problem of either over-estimating or under-estimating the change in conventional ratios in case of increases or decreases in values of one variable relative to the other. Since the objective of this study is to assess the impact of the corporation tax reform of 1984 on capital structure (as represented by the debt-equity ratio) the use of change in ratios is more appealing and appropriate.

This study provides additional evidence of substantial tax effects on financing decisions. Its contributions to the literature are as follows. First, I study a particular event (namely the corporation tax reform of 1984) to analyse the impact of the changes in specific tax–related on firms' capital structure. Using the changes in debt-equity ratios as a capital structure variable, I provide results which strongly support the views that corporation tax affects firms' financing decisions. Given the effects of the corporation tax reform on tax-related determinants of capital structure, the tests based on the changes in tax-related variables around the reform period should have

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or otherwise managers may set target capital structure which is not necessarily optimum (e.g. When they are entrenched).

[39] These assumptions are important in that the decision(s) taken by managers in response to the reform should aim at maximising the value of the company. If their objective is not to maximise value of the firm, managers may take decision(s) (e.g. borrowing or retiring debt) which are sub-optimal. On the other hand if optimal capital structure do not exists there will be no economic motive to use a particular form of finance and capital structure will rarely change.

[40] The similarity in this case arise from the fact that my model also exclusively includes tax variables, namely effective tax rate and non-debt tax shield. Other variables, however, are different.

greater power in explaining the changes in debt-equity ratios if corporation tax is indeed an important determinant of firms' debt policy.

The results imply that although it is true that debt-equity ratios are cumulative result of years of separate financing decisions, the changes in debt-equity ratios induced by the reform provide desired, clear and easy to interpret results. In other words, the changes in tax-related determinants of capital structure influenced by the reform resulted in a significant change in debt-equity ratios.

Second, I use both cross sectional and time series regressions to study the relative significance of tax-related variables as determinants of capital structure. I include, as explanatory variables, a set of other (non-tax) variables regularly argued to be determinants of capital structure. Using these satisfactorily controlled regressions, I show that the changes in tax-related variables significantly explain both cross sectional and year-to-year variations in debt-equity ratios.

The rest of this chapter is organised as follow: Section 3.2 provides a review of related studies. A description of data and methodology is presented in section 3.3. Section 3.4 presents the model to be tested and discusses the results. Section 3.5 concludes.

3.2 Review of the related studies

Many tax–related theories of capital structure imply that, other things being equal, the incentive to use debt finance increases with firms' marginal corporate tax rate due to the deductibility of interest expenses (see for example Modigliani and Miller (1963) and other studies as presented in section 2.2). Miller (1977) shows that by including personal income taxes in the analysis, one arrives at an equilibrium in

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[41] Usually, the absolute values are scaled by average values of total assets or sales

which debt financing is irrelevant for any individual firm. However, for the corporate sector as a whole, Miller (1977) showed that there is a net advantage of debt which depends on marginal corporation and personal income tax rates.

Using a similar line of argument, DeAngelo and Masulis (1980a) showed that debt financing (and therefore capital structure) matters if the analysis incorporates the presence of non-debt (especially those related to investment) tax shields. By assuming a fixed non-debt tax shield they proposed a substitution effect of non-debt tax shield on debt that implies an interior optimal debt level. Dammon and Senbet (1988) on the other hand, using a methodology similar to that of DeAngelo and Masulis (1980a) found that an increase (decrease) in investment related tax shields due to an increase (decrease) in corporate tax is not necessarily associated with decreases (increases) in leverage at the individual firm level. They show that the effect of a change in allowable investment related tax shields on the optimal level of a firm's leverage depend critically on the trade off between the "*substitution effects*" proposed by DeAngelo and Masulis (1980a) and the "*income effects*" associated with an increase in optimal investment. A common strand linking these studies is that, ceteris paribus, a significant change in the corporate tax rate and/or capital allowances rate has an impact on the equilibrium level of debt.

A number of studies have tested the tax theories of capital structure. However, the consensus view points to a lack of evidence to support the theoretical prediction that leverage levels are negatively related to firms' non-debt tax shields (see for example Bradley, Jarrel and Kim (1984)[42], Auerbach (1985), and Titman and Wessels (1988)). The failure to provide any support of these theories may be attributed to methodological problems as discussed in Givoly, et al (1992), Shum (1996) and Graham (1996b). However, other empirical studies do provide evidence to support tax-based theories of capital structure. Shum (1996), MacKie-Mason (1990), and Scholes, Wilson and Wolfson (1990) provide empirical evidence to support the tax-based theories of capital structure.

Shum (1996) used Canadian data to explore and analyse the effects of both tax loss carry forwards and tax loss carry backs on corporate debt policy. She used net debt as opposed to the traditional debt-assets ratio. Her results support the tax hypothesis that the use of debt increases with past tax paid, and firm's investment level and hence expected earnings.[43]

MacKie-Mason (1990) on the other hand argues that tax loss carry forwards have a larger effect on the expected marginal tax rate on interest payments while investment tax credits may not have a significant effect on the marginal tax rates. He argues that firms with higher investment tax credits are, in most cases, highly profitable. He concludes that the two widely used tax shields namely tax loss carry forwards and investment tax credits have opposite predicted effects on a firm's debt level. Using US data, MacKie-Mason (1990) provides empirical results that support the hypothesis that the desirability of debt financing at the margin increases with the firm's effective marginal corporate tax rate on deductible interest payments.

Scholes, Wilson and Wolfson (1990) focused on financial institutions and they find a relation between marginal tax rate and the financing decisions of commercial banks. Givoly, et al (1992) employ cross sectional regressions of 'actual'

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[42] Bradley, Jarrell and Kim(1984) find that the relationship between non-debt tax shields and debt is significantly positive. Using Dammon and Senbet (1988) this indicates that the income effects of non-debt (investment related) tax shields overshadow its substitution effects.

changes in the values of hypothesised variables following enactment of the Tax Reform Act of 1986 in the US to test the significance of "tax variables" in determining the corporate debt level. Using a controlled environment, they find that both corporate taxes and non-debt tax shields are significant determinants of capital structure.

Edward (1984), Devereux (1988) and Moon and Hodges (1989) analysed the impact of the UK corporation tax reform of 1984 on the neutrality of the corporation tax structure as a whole. Specifically they focused on the impact of the reform on investments in plants, machinery, industrial buildings and stocks. Generally, the results of these studies, among other things, predicted a negative effect of reform on investments. They also showed that debt remains to be a favoured source of finance relative to retentions or new issue of shares.

As mentioned earlier, all studies that analysed the impact of corporation tax reform of 1984 were conducted either during the reform or just after the reform. Consequently, none of these studies analysed the impact of the reform by using observed empirical data. In this chapter I use data for a period long enough to reflect the full impact of the reform. In the next section I present the data and methodology used to analyse the impact of the reform.

3.3 Data and Methodology

3.3.1 Data

I start my data set with all firms listed in London Stock Exchange's FT All Share Index as categorised in *Datastream*. Firms are excluded in the final sample if

[43] The results on the relationship between debt and earnings also support the bankruptcy-based theories of capital structure.

they were categorised under the '*financial*' sector or if they have missing data in '*accounting* ' or '*market value of equity*' variables. For each variable I use annual data covering the period from 1974 to 1999 inclusive - a total of 26 years. Whereas the choice of starting point and ending point is arbitrary, the use of 1974 –1999 period was chosen to allow a long time series data in which the corporation tax reform took place.

The requirement for continuous data restricts my final sample to 237 firms. This restriction may bias my sample towards relatively large firms because data for small firms are more likely to have gaps. This is likely to affect the standard errors of the estimated parameters and consequently their tests of significance due to the possibility of heteroskedasticity, which is an inherent phenomenon especially when one uses the absolute values. However this bias, even if it exists, will not affect the tests and results because I am working with ratios and change in ratios and not actual values and the standard errors are estimated after fully control for the effect of heteroskedasticity. The estimation and descriptive statistics of the variables used in this study are shown on Table 3.4 at the end of the chapter.

3.3.2 Methodology

The main analysis in this study is based on both cross sectional and time series regressions. For cross sectional regressions, I calculate a change in each variable during the reform period, 1984 – 1987. The change is estimated by subtracting the three-year average of the variable just before the reforms (i.e. an average for years 1981-1983) from the three-year average of the variable just after reforms (i.e. an average for years 1988-1990).

For the time series regression, data used are the changes in average values of each relevant variable for all firms in each of 25 years from 1975 to 1999. The variables are *ETR, NDTS, RONI, DYLD, SIZE, AGENCY, BRUPTCY, TFI* and *PROF* and they are estimated as shown on table 3.4. Given the working assumptions as mentioned earlier, at any time, due to the changes in relevant variables in the models for optimal debt-equity ratio, firms may find themselves operating at sub-optimal debt ratios; so they gradually change their financing mix towards more optimal debt-equity ratios.

The equilibrium models developed by Miller (1977), DeAngelo and Masulis (1980a) and Dammon and Senbet (1988) suggest that a change in any one of the key variables of the model should bring about dis-equilibrium. Specifically, relevant to this study, I argue that a simultaneous reduction of corporation tax rate and elimination of first year and initial capital allowances reduced the corporation tax advantage of debt. Thus, to attain a new equilibrium, firms had to optimally reduce the proportion of debt in their capital structures. Since a change in debt-equity ratio is a reversion towards the optimal ratio, a change in either direction is generally expected to result in a higher firm value.

I test the general impact of reform on debt-equity ratios by using a time series regression model in which the dependent variable is the first difference of debt-equity ratio and explanatory variables are lagged changes in debt-equity ratios and a dummy variable that isolates the changes of debt-equity ratios due to corporation tax reform. In essence, the model tests both mean reverting behaviour of debt-equity ratios (which is basically testing the trade off theory of capital structure as in Shyam-Sunder and Myers (1999)) and the impact of the corporation tax reform on debt-equity ratios.

The comprehensive time series model is also used to test the impact of the reform and the relative significance of other variables hypothesised to explain the behaviour of debt-equity ratios over time. For this model the first difference of all relevant variables are used together with a dummy variable that isolates the impact of the reform not captured by tax-related variables. These variables are presented in section 3.4.4 and their definitions are given in table 3.4.

In order to observe whether changes in debt are sensitive to industry (or sectors), firms were grouped according to the FTSE Global Classification System available in the Datastream database. Initially, all firms were grouped into 27 sectors and different measures of changes in debt were employed in order to analyse the change in the relative advantage of debt financing following the corporation tax reform. However, 2 sectors were dropped because they share exactly the same companies with other sectors. One of the dropped sectors is '*Construction*', which share companies with '*Building Materials*'. Another sector is '*Oil Integrated*, which share companies with '*Oil Exploration and Production*'. Thus, the final sample consisted of 25 sectors.

3.4 Empirical tests and results

3.4.1 General impact of the reform using different measures of change in debt

As mentioned earlier the main objective of this study is to investigate the impact of the corporation tax reform on corporations' debt policy and consequently to provide additional evidence on the significance of tax-related variables in the models for determining an optimal capital structure. In order to show the general impact of the corporation tax reform of 1984 on debt financing, I use different measures of change in debt for all 25 sectors. The descriptive statistics and the definition of each measure of change in debt for each sector are given on tables 3.1 to 3.3. Tables are located at the end of chapter 3.

Table 3.1 shows the relative annual change in net debt[44]. A positive value shows an increase whereas a negative value represents a decrease. Thus, both decreasing trends of positive values and negative values show the decreasing use of debt financing. It should be noted that the transition period of this reform (i.e. the period between 1984-1987 inclusive) was long enough for the company to plan ahead and take the appropriate course of action well before the period classified as 'after' reform (i.e. the period 1988-1990 inclusive). Thus, any negative values or decreasing trend of positive values during the years 1984-1987 may be associated with the reform. As table 3.1 shows, in 19 out of 25 sectors there was either a decreasing trend in positive annual change or a negative annual change in net debt in either the sub-period '84-87' or the sub-period 'after'. This provides evidence that, on average, the 1984 corporation tax reform made debt financing a less attractive

[44] Net debt is defined as total loan capital minus cash and cash equivalents.

form of finance (see columns 2-4 of table 3.1). For all sectors, the average annual increase in net debt was 9% for the period before the reform. After the reform the trend changed and there was an average decrease in annual change in net debt of about 64% (see last row of columns 2 and 4 of table 3.1)[45]. This implies that on average it was no longer attractive to borrow after the reform. An increase in annual change during the transition period is consistent with the view that corporations borrowed in order to bring forward investments and take advantage of generous allowances before they were completely abolished.

In order to assess the general impact of the 1984 corporation tax reform on capital structure, I construct a capital structure variable (referred to here as debt ratio) as the ratio of debt to sum of debt and equity capital and reserves. The descriptive statistics are summarised on table 3.2. The average debt ratio decreased from 51.1% before the reform to 23.3% during the reform and to 22.6% after the reform for all sectors (see the last row of table 3.2). Except for '*Services*' and '*Support services*' sectors, all other sectors reduced the proportions of debt in their capital structures either during the reform or after the reform, relative to their respective values before the reform (see columns 2-4 of table 3.2). The increased use of debt financing during or after the reform by *services* and *support services* sectors does not come as a surprise. Companies grouped under these sectors are not likely to have a significant amount of capital allowances and consequently the impact of the reform on their investments is on average less. For these companies the impact of the reform manifested itself in the effective corporation tax rate. As long as the effective

[45] It should be noted that no adjustment to inflation was made for these data. The period covered in this analysis is long enough and there is a possibility that inflation affected different sector differently. Although no large bias is expected, the results for different sector should be compared with caution

corporation tax rate is positive, debt financing is likely to be preferred to other sources of finance and hence more borrowing. And this seems to be the case for these industries.

It should be noted that the choice of a particular form of finance over others is rational only if it has an impact on the value of a company. Thus, it is useful to analyse the impact of reform on a ratio of total loan capital to the market value of equity (hereafter referred to as debt-equity ratio). The descriptive statistics of debt to market value of equity are given in table 3.3. There is significant evidence that the corporation tax reform had a negative impact on the average debt-equity ratio. In all but one sector, there was a decrease in the debt-equity ratio. Only in the *service* sector was there an increase in the debt-equity ratio during the reform. The mean debt-equity ratio for all firms covered in this study prior to the reforms was 0.486 and this declined by about 57% to 0.21 after the reforms (see last row, 2^{nd} and 4^{th} columns of Table 3.3). In most of the analysed sectors there was a noticeable decrease in debt to market value of equity ratios. These general results support the view that the corporation tax reform of 1984 had a negative impact on debt financing and consequently on capital structure.

As mentioned earlier, in order to perform a comprehensive assessment of the impact of reform on debt-equity ratios, I use two basic regression models to isolate the changes of debt-equity ratios induced by the reform from the changes due to other factors: a time series regression model and a cross-sectional regression model. In the following section, I use a time series regression model to analyse the impact of reform on debt to equity ratios.

(especially for period between 1974-1977 as inflation and interest rates were very high during this period).

3.4.2 *Impact of the reform on debt-equity ratio: Time series model with a dummy variable*

A time series regression model used to assess the impact of the reform on debt-equity ratio is given by the following equation.

$$\Delta(D/E)_{t,t-1} = \alpha + \beta\Delta(D/E)_{t-1,t-2} + \gamma RP_t + \varepsilon \qquad (3.1)$$

Where D/E is debt-equity ratio, a variable that represents the capital structure. The subscripts for debt-equity ratio show how the change in the ratio was calculated while the subscript for a dummy variable *RP* identifies the year. A symbol Δ stands for a change in variable and RP_t, is a dummy variable included to isolate the changes in debt-equity ratio induced by the corporation tax reform. A dummy variable, RP_t, is defined such that it takes the value of one during reform period (i.e. for the years 1984-1987) and zero elsewhere.

The theoretical relationship between the corporate tax and financial leverage discussed previously suggests that the corporation tax reform of 1984 affected debt to equity ratio negatively. Consequently, I test the hypothesis that the *corporation tax reform of 1984 had no impact on debt-equity ratios* against an alternative hypothesis that the *reform affected debt-equity ratios negatively*. Under the null hypothesis, I expect the estimated coefficient of a dummy variable to be indifferent from zero. On the other hand, if the corporation tax reform had a negative impact on the debt to equity ratio, the estimated coefficient of a dummy variable will be negative. Thus, a negative coefficient of a dummy variable, ceteris paribus implies that the corporation tax reform of 1984 reduced the attractiveness of debt as a source of finance by reducing the tax advantage of debt.

The beta,β, measures the extent to which debt-equity ratio is reverting towards the means (or optimal) debt-equity ratios. Under the assumption that an optimal capital structure exists and managers are seeking to operate at optimal levels, the presence of random events, which bump managers away from optimal levels, implies a mean reverting behaviour in debt-equity ratios. This is because managers are assumed to work gradually towards their optimal debt-equity ratios. Consequently, if there is a mean reverting behaviour in debt-equity ratios, the estimated value of β will be different from zero[46]. On the other hand, the estimated value of one implies that the adjustments to the previous debt-equity ratio fully explain current debt-equity ratio. Shyam-Sunder and Myers (1999) argue that an estimate of β less than one implies positive adjustment costs. By using equation 3.1 above, the alternative interpretation of the Shyam-Sunder and Myers argument is that a relatively large portion of the changes in debt-equity ratios are accounted for by the estimated coefficient of a dummy variable. In other words, I argue that a significant portion of the changes in debt-equity ratios is accounted for by the corporation tax reform than by other random effects.

Table 3.5 presents the results of the time series regression model (equation 3.1). According to the model, the changes in debt-equity ratio at time t is explained by the changes in debt-equity ratio in time t-1 due to random effects and the changes due to the corporation tax reform as represented by a dummy variable RP_t. The results show that the estimated coefficients of $\Delta(D/E)_{t-1,t-2}$ and RP_t have the expected sign and are highly significant (see columns 6 and 7 of Table 3.5 for p-values and t statistics). Column 2 reports the mean estimates of the coefficients of

[46] More specifically, the mean reversion behaviour literature suggests that the estimated coefficient

$\Delta(D/E)_{t-1,t-2}$ and RP_t as –0.126 and –0.057 respectively. The interpretation of the negative coefficient of $\Delta(D/E)_{t-1,t-2}$ is that on average firms operated at higher leverage levels than they should have and consequently there was a trend of reducing their leverage towards the optimal lower levels. The results also provide evidence that the corporation tax reform of 1984 had a negative impact on debt-equity ratios. The estimated negative coefficient of RP_t is consistent with the argument that the reform reduced the relative attractiveness of debt as a source of finance.

It should be noted that the estimates discussed above are average values and may be influenced by outliers. In order to provide strong support of my argument I also calculated the proportion of firms that reduced their debt-equity ratios following the reform. In this respect I present the percentage of firms in which I obtained negative coefficients of RP_t. The results of such analysis are shown on the last column of Table 3.5. As the results show, 68% of all firms under consideration decreased their debt-equity ratio in response to the impact of corporate tax reform of 1984. The results also show that on average 73% of the firms adjusted their debt-equity ratios downward (see the estimated negative coefficient of $\Delta(D/E)_{t-1,t-2}$).

This result is consistent with the findings of Kay and King (1990) who found that in most UK firms, allowable deductions for tax purposes exceeded their taxable profits and they were not paying any corporate taxes prior to the corporation tax reform of 1984. In that situation together with the uncertainty of future profits, interest payments cease to provide a tax shield and consequently debt became less desirable source of finance leading firms to adjust their debt-equity ratios downward.

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will be less than zero.

Thus, on average, the results show that the corporation tax reform had a negative impact on corporations' debt-equity ratios. In response to the reform, corporations optimally reduced their debt-equity ratios to reflect a relative decrease in the tax advantage of debt.

3.4.3 The impact of the reform on pre-tax profits: Time series model with a dummy variable.

I also analyse the impact of reforms on the profitability of the UK corporations. As mentioned earlier, the corporation tax reform reduced capital allowances. Prior to the reform, corporations in the UK were allowed to offset the entire cost of investment categorised as 'plant and machinery' and 75% of the cost of investment in 'industrial buildings' against their respective corporation tax liabilities during the year at which the investment was undertaken. The obvious effect of reducing or removing the capital allowances as deductible items for corporation tax purposes is an increase in effective cost of assets. However, during the 1984 reform capital allowances were reduced progressively from 100% and 75% in 1983/84[47] to zero in 1986/87 (see table 1.1 for detail of changes). It is therefore expected that companies would recognise the declining capital allowances and bring forward some profitable investments during the reform period. Consequently, an increase their profits during reform periods is expected. The extent of change in profitability due to the abolition of capital allowances depends on the availability of firms that could benefit from these allowances. Under the assumption that management's objective is to maximise the after tax cash flows, I expect an increase in pre-tax profit and consequently the return on assets during the reform period. It should be noted there is no separate analysis on the affected assets carried out in this study to show whether or not there was a change in investment in this assets. However, the study by Bond, Denny and Devereux, 1993, p.10) shows that there was an increase in investment rate for manufacturing sector during reform period and a decrease after reform. My data for profits show an increase in pre-tax profits by 41% (data on pre-tax profit not reported. Table 3.4 also show an increase in profitability during reform period.

The model estimated to analyse the impact of reforms on corporate profit is as follow.

$$(\Pr ofit / Assets)_t = \alpha + \beta\Delta(\Pr ofit / Assets)_{t,t-1} + \gamma RP_t + \varepsilon_t \qquad (3.2)$$

Where "*Profit*" stands for pre-tax profits and "*Assets*" stands for book value of total assets. The dummy variable RP_t is as defined in the previous section and is introduced to capture the impact of corporation tax reform on profitability. Equation 3.2 is a simple way of showing that "Profit/Assets" at time t is equal to a constant value which is independent of all factors which might have impact on "Profit/Assets" plus the adjustment to previous (time t-1) "Profit/Assets" caused by all relevant factors that influence "Profit/Assets" plus the change in "Profit/Assets" caused by the corporation tax reform of 1984. In order to isolate the impact of corporation tax reform of 1984 on "Profit/Assets" I use Δ"Profit/Assets"t,t-1 to represent the series of changes in "Profit/Assets" caused by factors other than corporation tax reform and a reform dummy variable, RP to represent a change in average "Profit/Assets" caused by the reform. As such, I expect the estimated coefficient of a dummy

[47] As mentioned earlier and shown on table 1, the first year allowance was 100% for investments in plant and machinery and 75% for investments in industrial buildings.

variable to be positive and significant if reform led to a significant increase in profitability.

The estimate of β can take any sign whereas the estimate of the constant term is expected to be significantly positive due to the fact that there are other possible factors that affect the profitability of assets. The results of the model are shown on Table 3.6. The constant term is positive and highly significant, as expected with a p-value equal to zero. This result indicates that profitability of assets depends on other firm factors like the product line, quality of management etc. that are not necessarily related directly to the previous changes in return on assets.

The estimated coefficient of $\Delta(Profit/Assets)_{t,t-1}$ is negative but not significant at conventional levels (the estimated p-value = 0.0509). This result suggests that previous profitability is not necessarily a significant determinant of current profitability. Although the factors that affect profitability of assets are reasonably stable, the influence of those factors on current profits is not necessarily related to their influence on previous profitability and consequently current profitability need not to be related to the previous profitability.

The estimated coefficient of a dummy variable is positive as expected and significant at 5% level (the estimated p-value = 0.012). This result supports the view that there was an increase in profitability during the reform period[48] and one possibility is that firms took advantage of capital allowances and brought forward their profitable investments and these investments increased profitability.

[48] It should be noted that the values of both pre-tax profits and total assets increased during the reform period (results not individually reported). Thus, the increase in "profit/assets" ratio indicates the increase in profitability.

3.4.4 The relative relevance of tax-related variables

As I mentioned earlier, there is a set of variables theoretically argued to be determinants of capital structure. These variables include effective tax rate, *(ETR)*, non-debt tax shields, *(NDTS)*, return on new investment, *(RONI)*, measure of bankruptcy costs, *(BRAPTCY)*, and a measure of agency, *(AGENCY)*. Other variables are size, *(SIZE*, dividend yield, *(DYLD)*, profitability, *(PROF)* and total investment of the firm, *(TFI)*.

ETR and *NDTS* are *tax-related* variables and under the view that corporation tax reforms influenced the changes in debt-equity ratios, the estimated coefficients of these variables should be significant in both cross sectional and time series regression models in which the change in debt-equity ratio is used as a dependent variable. Specifically, I expect the coefficient of *ETR* and *NDTS* to be positive and negative respectively in both cross sectional and time series regressions. The sign and significance of estimates of coefficients of other variables will show how well other competing theories of capital structure explain both cross-sectional and periodic variations in debt-equity ratios. Whereas all other variables are documented in the literature to have some influence in leverage in one way or another, AGENCY variable worth more attention. Recent studies in the UK by Lasfer (1995) and Okzan (2001) all show that agency variable significantly influence leverage in the UK. To estimate this variable I use a ratio of net tangible assets to total assets (see table 3.4). The agency variable is related to the agency costs literature of capital structure (see Jensen and Meckling, 1976). This branch of theory suggests that companies with higher percentage of net tangible assets relative to total assets (i.e. assets-in-place) have lower agency cost of debt. This is because unlike intangible assets, tangible assets can be used as collateral in the debt contract. Consequently, in order to control for the possible effects of agency costs on capital structure, a ratio of assets which can be used as collateral to total assets is used (for example Shum (1996) used a ratio of fixed assets to total assets as a proxy for agency variable).

In this study I use the corporation tax reform of 1984 to assess the relevance of variables that are frequently hypothesised to be determinants of capital structure. The same set of variables is used to determine both cross sectional and periodic[49] variations of debt ratios. As mentioned in chapters 1 and 2, the empirical evidence is not fully supportive of the tax theories of capital structure. I also mentioned that the failure to support the tax related theories of capital structure might be attributable to an inability to single out the period with a significant change in tax variable. Since the time framework of this study reflects the corporation tax reform, the tax related variables should be significant in cross sectional analysis; while the estimated coefficient of a dummy variable used to isolate the impact of tax reform should be significant in a time series regression.

3.4.4.1 Relevance of tax-related variables: Cross sectional analysis

Panel A of Table 3.7 presents the results for the cross sectional regression model (equation 3.3) below:

$$\begin{aligned}\Delta(D/E) = \alpha + \beta_1\Delta ETR + \beta_2\Delta NDTS + \beta_3\Delta RONI + \beta_4\Delta DYLD + \beta_5\Delta SIZE + \\ \beta_6\Delta AGENCY + \beta_7\Delta BRUPTCY + \beta_8\Delta TFI + \beta_9\Delta PROF + \varepsilon\end{aligned} \quad (3.3)$$

The variables are as defined on Table 3.4 in the end of the chapter. Note also that the subscript for the firm for each variable is omitted in order to reduce unnecessary details to the model. The *tax-related* variables in the above model are

ΔETR *and* $\Delta NDTS$, thus I expect the estimate of β_1 and β_2 to be statistically significant.

Theoretically, the effective tax rate is positively related to debt-equity ratios in that the higher the effective tax rate results into higher tax advantage of debt and ceteris paribus this increases the incentive to use debt financing.

As for the non-debt tax shields, it is argued that they substitute interest payments in shielding the corporation profits from the corporation tax. Thus, theoretically the presence of a significant amount of non-debt tax shields should be associated with lesser use of debt by firms since debt ceases to be a tax shelter. The changes in non-debt tax shield $\Delta NDTS$ should therefore be negatively related with the changes in debt-equity ratios.

The results show that, the estimated coefficients of all *tax-related* variables have expected signs and are highly significant. The estimates are 0.0086 and –0.0059 for ΔETR *and* $\Delta NDTS$ respectively (column 2 of Panel A of Table 3.8). The corresponding p-values are 0.0031 and 0.0038. The t-statistics shown on column 4 are calculated to test the hypothesis that the estimated coefficient is zero against the alternative hypothesis that they are different from zero.

These results provide evidence to support the theoretical arguments that debt-equity ratios are positively related to the effective corporation tax rate and negatively related to non-debt tax shields. The results also show negative significant relationship between agency variable and leverage. According to the branch of agency theory presented earlier, a positive relationship was expected. The interpretation of this result is that despite the availability of assets which could be

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[49] For time series (or periodic) an additional dummy variable is included to isolate the impact of tax

used as collateral, the decrease in debt-equity ratio during the reform was necessary due to the corporation tax reform. This finding contradicts that of Lasfer (1995) who found agency costs to be the only dominant determinant of capital structure in the UK. On the other hand these findings are consistent with the predictions of other UK based studies [Edward (1984), Devereux (1988) and Moon and Hodges (1989)]. The results also support the findings by Shum (1996), Givoly et al (1992), Graham (1996) and Okzan (2001). My results suggest that corporation tax reforms had a negative impact on debt-equity ratios and strongly support the results presented earlier (from model 3.1).

3.4.4.2 Relevance of tax-related variables: Time series analysis

Panel B of Table 3.8 presents the results for the time series regression model given below:

$$\begin{aligned}\Delta(D/E)_t = \alpha + \beta_1\Delta ETR_t + \beta_2\Delta NDTS_t + \beta_3\Delta RONI_t + \beta_4\Delta DYLD + \beta_5\Delta SIZE_t + \\ \beta_6\Delta AGENCY_t + \beta_7\Delta BRUPTCY_t + \beta_8\Delta TFI_t + \beta_9\Delta PROF_t + \beta_{10}RP_t + \varepsilon_t\end{aligned} \quad (3.4)$$

The variables are as defined in Table 3.4. The dummy variable RP_t is designed to isolate the impact of the corporation tax reform and therefore the coefficients of tax-related variables in model 3.4 above may appear insignificant. In other words, the significant coefficients of the *tax-related* variables in equation 3.4 (together with a significant estimate of β_{10}) will provide the strong support of the importance of tax-related variables as the determinants of capital structure.

Again, the results show that the estimated coefficients of tax-related variables have the expected signs although only ΔETR is statistically significant at 5% level of significance (p-value =0.0486). The coefficient of $\Delta NDTS$ is insignificant at

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reforms. The dummy variable takes the value of one during reform years and zero elsewhere.

conventional levels of significance, with p-value of 0.0858. The coefficient of the dummy variable RP_t is negative and significant as hypothesised. The estimated coefficient of RP_t is –0.07 with associated p-value of 0.027. The results provide strong support of the tax-based theories of capital structure in general and in particular they show that the corporation tax reform of 1984 had a negative impact on firms' debt-equity ratios.

Thus, in general, results show that the corporation tax reform of 1984 had a negative impact on debt-equity ratios. Furthermore, the reforms led to a significant increase in nominal taxable profits as proxied by pre-tax profits. This led to an increase in the effective corporation tax rate. More importantly, the results provide strong evidence to support the tax-based theories of capital structure in that the estimated coefficients of the tax-related variables in both time series and cross sectional regression models are statistically significant.

Thus, the reduction in corporation tax rate together with the abolition of first year and initial allowances made debt relatively unattractive and consequently it led to significant decreases in debt-equity ratios.

The implication of these findings is that firms had adjusted their capital structures to respond to the corporation tax reform of 1984. As Okzan (2001) suggests, the costs of operating away from optimal level might be significant. However, if the costs of operating at a sub-optimal capital structure are lower than the costs of adjusting toward an optimal level, firms might not adjust their capital structures. It is therefore important that financial markets should be as efficient as possible to allow corporations to adjust their capital structures at reasonable costs.

3.5 Conclusion

Tax theories of capital structure have provided testable hypotheses about the relation between taxes and debt-equity ratios; however the empirical evidences in both UK and US based studies do not fully support the theoretical predictions. In an attempt to test the tax theories of capital structure, I use the UK's corporation tax reform of 1984. This reform provides a unique way in which one can effectively test the tax theories of capital structure. In this study I use both cross sectional and time series regressions to assess the impact of the 1984 UK corporation tax reform on debt-equity ratios and profitability.

My results support the theoretical prediction of tax-based theories of capital structure. Specifically, I find a positive relationship between effective corporation tax rates and debt-equity ratios. I also find a significant negative relationship between non-debt tax shields and debt-equity ratios at 1% and 10% level for cross-sectional and time series regressions respectively.

The results also support the view that the corporation tax reform of 1984 was associated with significant decreases in debt-equity ratios. I also find a significant increase in profitability during the reform period. Thus, the tax reform had a negative (positive) impact on debt-equity ratios (profitability) of UK corporations.

The results also show that the effective corporation tax rate, non-debt tax shields, agency costs and profitability are significant determinants of capital structure. The variables used as proxies for these determinants were found to be statistically significant in explaining both cross sectional and periodic variation in debt-equity ratios.

The analysis of the impact of the corporation tax reform of 1984 on capital structure defined debt as either net debt or total loan capital. It should be noted that these measures include, among others 'debt-like' instruments, capitalised lease and hire purchase payments. Since lease payments are also deductible for corporation tax purposes, its inclusion is not likely to affect the change in attractiveness of debt as a whole influenced by the corporation tax reform of 1984. However, the reform is likely to affect *buy versus lease* decisions differently. More specifically, the elimination of first year and initial capital allowances on investments in plant & machinery and industrial buildings meant that the effective purchase prices of those assets would increase and this would affect buy decisions (not necessarily lease decisions) especially for companies with significant debt capacity.

There is therefore a possibility that the relative attractiveness of the use of lease versus non-lease debt financing will change following the reform. In the next chapter, I investigate the impact of corporation tax reform of 1984 on lease financing. I focus on the relationship between leasing and debt financing. As it should be discussed, a direction of change in leasing depends on whether lease and non-lease debt are complements or substitutes of each other.

Table 3-1: Descriptive Statistics of Relative change in debt

This table shows the descriptive statistics for annual relative change in debt using equally weighted average of all firms in sample. The relative change in debt is calculated as a ratio of annual change in book value of net debt at time t to the book value of net debt at time t-1. The column labelled "Before" shows the calculated values of relative change in net debt for the period from 1974 to 1983. The column labelled "After" shows the calculated values for the period from 1988 to 1999, where as the columns labelled '84-87' and '74-99' show the calculated values for the periods 1984 - 1987 and 1974 - 1999 respectively.The last row shows the average value of the relative change in net debt for all sectors.

SECTOR NAME	DESCRIPTIVE STATISTICS								
	Mean			Median			Stdev	Min	Max
	Before	'84 – '87	After	Before	'84 – '87	After	'74-'99	'74-'99	'74-'99
Alcohol& Beverages	0.376	0.321	0.144	-0.003	0.529	0.125	0.816	-0.640	3.887
Building Materials	0.116	0.167	0.359	0.199	0.143	0.176	0.671	-0.830	2.552
Consumer goods	0.090	0.038	-1.256	0.129	0.012	-0.118	2.727	-13.545	0.799
Chemicals	0.089	0.003	0.142	0.091	0.026	0.117	0.291	-0.353	1.067
Distributors	0.077	-0.221	2.453	0.059	-0.278	0.169	5.297	-0.966	26.352
Diversified Industries	1.740	0.331	-0.953	-0.046	-0.025	-0.617	4.845	-13.145	16.498
Electronic Equipment	0.048	0.228	0.294	0.127	-0.090	0.063	0.638	-0.655	2.092
Engineering	0.126	0.003	0.248	0.166	-0.004	0.126	0.416	-0.421	1.569
Extractive Industries.	0.322	-0.081	0.483	0.208	-0.085	0.148	0.952	-0.656	3.773
Food producers	0.139	-1.913	0.180	0.094	-1.551	0.129	1.208	-4.448	2.335
General Industries	0.115	-0.218	0.656	0.102	-0.211	0.147	1.107	-0.537	4.932
Health care	-0.061	0.347	-1.291	-0.019	0.275	-0.251	3.780	-18.136	4.297
Household goods	0.069	-2.504	1.241	0.043	-1.309	-0.072	3.938	-7.432	17.047
Media	0.069	-0.182	0.493	0.096	-0.172	0.488	0.600	-0.509	2.197
Mineral Extract	0.164	0.517	-21.066	0.506	0.384	0.555	48.858	-238.857	2.005
Oil Exploration & Production	0.341	-0.087	0.157	0.247	-0.102	0.242	0.416	-0.380	1.216
Paper packaging & Printing	0.056	0.011	0.435	0.050	0.039	-0.046	0.833	-0.696	3.026
Property	-0.012	0.196	0.122	-0.038	0.188	0.131	0.132	-0.131	0.398
Brew, Pubs & Restaurants	0.037	0.164	0.170	0.019	0.149	0.134	0.202	-0.225	0.742
Services	0.279	9.522	0.569	-0.223	1.155	0.260	7.569	-4.398	36.611
Support services	-1.344	3.837	0.799	-0.896	2.898	0.322	2.940	-4.154	10.313
Textiles & Apprl.	-0.807	-2.399	0.237	-0.507	-2.376	0.025	1.836	-4.372	4.671
Tobacco	0.166	0.073	-0.052	0.164	0.041	-0.018	0.287	-0.987	0.389
Transport	0.006	0.327	0.105	0.043	0.293	0.068	0.264	-0.531	0.693
Vehicle Engineering	0.059	0.035	-0.638	0.134	0.062	-0.134	1.070	-4.626	0.567
All Sectors	0.090	0.341	-0.639	0.030	0.000	0.087	3.668	-12.865	6.001

Table 3-2: Descriptive Statistics for debt ratio

This table shows the descriptive statistics for average debt ratios of all sectors calculated by assuming an equally weighted portfolio of all firms in sector for whole sample. The debt ratio is calculated as a ratio of book value of net debt at time t to the the sum of book value of *net deb* t and *equity capital and reserves* at time t. The column labelled "Before" shows the calculated values of debt ratio for the period from 1974 to 1983. The column labelled "After" shows the calculated values of debt ratio for the period from 1988 to 1999, whereas the columns labelled '84-87' and '74-99' show the calculated values of debt ratio for the periods 1984-1987 and 1974 - 1999 respectively.The last row shows the average value of debt ratio for all sectors.

SECTOR NAME	DESCRIPTIVE STATISTICS								
	Mean			Median			Stdev	Min	Max
	Before	'84 – '87	After	Before	'84 – '87	After	'74-'99	'74- '99	'74 – '99
Alcohol & Beverage	0.313	0.305	0.336	0.311	0.305	0.318	0.072	0.235	0.542
Building Materials	0.183	0.156	0.221	0.183	0.156	0.219	0.059	0.051	0.334
Consumer goods	0.248	0.198	0.127	0.237	0.257	0.168	0.091	-0.036	0.312
Chemicals	0.298	0.290	0.297	0.301	0.290	0.275	0.090	0.156	0.548
Distributors	0.387	0.244	0.100	0.370	0.244	0.096	0.155	0.005	0.573
Diversified Industries	0.226	0.241	0.028	0.237	0.241	0.084	0.286	-1.086	0.443
Electronic Equipment	0.305	0.257	0.198	0.309	0.257	0.206	0.084	0.043	0.351
Engineering	0.277	0.347	0.211	0.268	0.347	0.199	0.092	0.073	0.426
Extractive Industries	0.357	0.517	0.254	0.362	0.517	0.278	0.091	0.143	0.517
Food producers	0.217	0.228	0.062	0.216	0.228	0.197	0.217	-0.590	0.286
General Industries	0.254	0.217	0.132	0.266	0.217	0.104	0.090	0.027	0.349
Health care	0.284	0.210	0.235	0.293	0.210	0.222	0.120	-0.012	0.441
Household goods	0.159	0.101	0.204	0.159	0.101	0.282	0.142	-0.165	0.347
Media	0.292	0.211	0.276	0.248	0.211	0.251	0.112	0.069	0.574
Mineral Extract	0.316	0.283	0.234	0.311	0.283	0.235	0.062	0.167	0.373
Oil Exploration & Production	0.309	0.238	0.229	0.312	0.238	0.229	0.065	0.139	0.362
Paper packaging & Printing	0.409	0.305	0.228	0.398	0.305	0.183	0.133	0.073	0.549
Property	0.268	0.246	0.343	0.261	0.246	0.358	0.070	0.213	0.430
Brew, Pubs & Restaurants	0.221	0.182	0.208	0.210	0.182	0.193	0.053	0.150	0.330
Services	0.044	0.198	0.205	0.024	0.198	0.186	0.097	-0.037	0.311
Support services	0.030	0.107	0.288	0.014	0.107	0.207	0.186	-0.111	0.617
Textiles & Apprl.	0.070	-0.065	0.195	0.026	-0.065	0.230	0.113	-0.065	0.297
Tobacco	6.685	0.784	0.581	0.431	0.784	0.303	12.269	-0.552	58.000
Transport	0.364	0.301	0.383	0.397	0.301	0.375	0.055	0.241	0.457
Vehicle Engineering	0.268	-0.287	0.065	0.261	0.287	0.147	0.179	-0.279	0.350
All Sectors	0.511	0.233	0.226	0.256	0.258	0.222	0.599	-0.046	2.725

Table 3-3: Descriptive Statistics for debt-equity ratio

This table shows the descriptive statistics for average debt to equity ratios of sectors calculated by assuming an equally - weighted portfolio of all firms in sector for whole sample. The debt to equity ratio is calculated as a ratio of *total loan capital* at time t to the *market value of equity* time t. The column labelled "Before" shows the calculated values of debt to equity ratio for the period from 1974 to 1983. The column labelled "After" shows the calculated values of debt to equity ratio for the period from 1988 to 1999 whereas the columns labelled '84-87' and '74-99' show the calculated valuesfor periods 1984 - 1987 and 1974 - 1999 respectively.The last row shows the average value of the debt to equity ratio for all sectors.

SECTOR NAME	DESCRIPTIVE STATISTICS								
	Mean			Median			Stdev	Min	Max
	Before	'84 – '87	After	Before	'84 – '87	After	'74-'99	'74- '99	'74 – '99
Alcohol & Beverage	0.550	0.365	0.195	0.519	0.370	0.196	0.185	0.120	0.746
Building Materials	0.355	0.251	0.303	0.345	0.259	0.277	0.090	0.184	0.502
Consumer goods	0.467	0.219	0.151	0.452	0.223	0.138	0.176	0.080	0.653
Chemicals	0.678	0.280	0.220	0.616	0.286	0.206	0.246	0.149	1.096
Distributors	0.274	0.121	0.082	0.232	0.113	0.078	0.113	0.030	0.477
Diversified Industries	0.409	0.372	0.243	0.388	0.378	0.199	0.197	0.111	0.897
Electronic Equipment	0.257	0.163	0.131	0.257	0.173	0.101	0.099	0.038	0.397
Engineering	0.421	0.263	0.184	0.386	0.256	0.182	0.128	0.133	0.540
Extractive Industries	1.135	0.733	0.244	1.160	0.732	0.206	0.474	0.083	1.564
Food producers	0.538	0.233	0.174	0.531	0.223	0.193	0.191	0.067	0.668
General Industries	0.344	0.211	0.180	0.335	0.207	0.190	0.097	0.133	0.493
Health care	0.282	0.111	0.086	0.245	0.111	0.104	0.126	0.021	0.458
Household goods	0.148	0.074	0.161	0.145	0.077	0.171	0.060	0.034	0.252
Media	0.503	0.157	0.183	0.517	0.162	0.152	0.200	0.105	0.769
Mineral Extract	0.705	0.379	0.197	0.671	0.374	0.200	0.272	0.066	0.996
Oil Exploration & Production	0.652	0.328	0.190	0.607	0.323	0.199	0.252	0.063	0.950
Paper packaging & Printing	0.844	0.189	0.212	0.803	0.209	0.175	0.409	0.036	1.746
Property	0.741	0.520	0.716	0.593	0.517	0.705	0.245	0.483	1.447
Brew, Pubs & Restaurants	0.407	0.179	0.210	0.375	0.171	0.208	0.129	0.135	0.597
Services	0.037	0.048	0.118	0.036	0.049	0.116	0.044	0.019	0.176
Support services	0.172	0.110	0.111	0.136	0.109	0.116	0.082	0.044	0.360
Textiles & Apprl.	0.212	0.091	0.199	0.147	0.090	0.201	0.111	0.061	0.516
Tobacco	0.494	0.341	0.230	0.514	0.286	0.186	0.178	0.086	0.635
Transport	0.995	0.303	0.383	0.999	0.308	0.397	0.349	0.217	1.269
Vehicle Engineering	0.539	0.300	0.143	0.529	0.299	0.121	0.220	0.055	0.832
All Sectors	0.486	0.254	0.210	0.462	0.252	0.201	0.187	0.102	0.761

Table 3-4: Descriptive Statistics and definitions of the variables

The model is estimated as follow:

$$(D/E)_i = \alpha + \beta_1 ETR_i + \beta_2 NDTS_i + \beta_3 RONI_i + \beta_4 DYLD_i + \beta_5 SIZE_i + \beta_6 AGENCY_i + \beta_7 BRUPTCY_i + \beta_8 TFI_i + \beta_9 PROF_i + \varepsilon_i$$

The variables are defined as follow:

$$(D/E)_i = \frac{Total\,loan\,capital}{Market\,value\,of\,Equity}$$ = The measure of corporate leverage.

$$ETR_i = \frac{Actual\,corporation\,tax\,paid + Deferred\,taxation}{\Pr e - tax\,\Pr ofit}$$ = Effective tax rate

$$NDTS_i = \frac{Directors'\,remuneration + Auditors'\,remuneration + Depreciation + Plant\,hire}{\Pr e - tax\,\,profit}$$

$$RONI_i = \frac{\Delta \Pr e - tax\,profit}{\Delta Total\,Assets}$$ = Return on new investments

$$DYLD_i = \frac{Ordinary\,dividends}{Market\,value\,of\,Equity}$$ = Dividend yield

$$SIZE_i = \log_e(Market\,value\,of\,Equity)$$

$$AGENCY_i = \frac{Net\,\tan gible\,assets}{Total\,assets}$$

$$BRUPTCY_i = \frac{Total\,loan\,capital}{Net\,\tan gible\,assets}$$ = Measure of long- term bankruptcy.

$$TFI_i = \frac{\Delta Total\,assets}{Average\,total\,assets}$$ = Measure of change in firm investments.

$$PROF_i = \frac{\Pr e - tax\,profit}{Total\,assets}$$ = Measure of firm profitability.

For each year from 1974 to 1999 the value of the variables are estimated using the above formulae. Where delta, Δ, applies the value is estimated using consecutive years. The subscript "*i*" stands for firm "*i*". The values under column labelled 'Before' are estimated for the period 1981 to 1983; where as the values under columns labelled "84 – 87" and 'After' are estimated for the periods 1984 – 1987 and 1988 – 1999 respectively. The values for the columns labelled 'Stdev', 'Min', and 'Max' cover the full period, 1974- 1999.

Variable	Descriptive Statistics								
	Mean			Median			Stdev	Min	Max
	Before	84 -87	After	Before	84 -87	After	74-99	74-99	74-99
D/E ratio	0.335	0.167	0.179	0.342	0.164	0.171	0.117	0.112	0.567
ETR	0.217	0.419	0.347	0.214	0.422	0.338	0.150	0.000	0.467
NDTS	0.280	0.121	0.108	0.271	0.118	0.105	0.084	0.037	0.390
RONI	0.782	0.151	0.110	0.738	0.151	0.115	0.177	0.021	0.682
DYLD	0.049	0.031	0.035	0.048	0.032	0.034	0.013	0.025	0.071
SIZE	3.898	4.689	5.415	3.895	4.623	5.409	1.269	2.575	6.458
AGENCY	1.752	0.884	0.705	1.525	0.885	0.674	0.505	0.388	1.840
BRUPTCY	1.785	0.462	0.544	1.332	0.447	0.542	0.546	0.417	1.988
TFI	0.059	0.07	0.149	0.059	0.067	0.166	0.050	0.019	0.202
PROF	0.088	0.101	0.111	0.087	0.099	0.113	0.015	0.070	0.125

Table 3-5: The effects of the Corporation Tax Reform of 1984 on corporate leverage

In each of the 26 years covered in this study the corporate leverage is measured using Debt-Equity (D/E) ratio. The change in D/E ratio (ΔD/E) at time t is calculated by subtracting the D/E ratio at t-1 from D/E at time t. The total of 202 UK firms having data for whole period, 1974 through 1999, are used in this study. The results summarised below are estimates of the following model.

$$\Delta(D/E)_{t,t-1} = \alpha + \beta\Delta(D/E)_{t-1,t-2} + \gamma RP_t + \varepsilon_t$$

Where $\alpha, \beta\ and\ \gamma$ are parameters to be estimated, $RP_t\ and\ \varepsilon_t$ represent dummy variable (which takes the value 1 during the year with reforms and zero otherwise) and error term respectively. The model isolates the effects of corporate tax reforms from the tendency of the corporations to change their leverage towards the targeted ratio (mean reversion of D/E ratio).

Variable i.e. est. coefficient.	Cross-sectional estimates of:						% of negative coefficients
	Mean	Median	Q1	Q3	T-value for mean	P-value for mean	
Alpha, α	0.001	0.000	-0.014	0.016	0.260	0.600	50%
Beta, β	-0.126	-0.163	-0.317	0.019	-5.440	0.000	73%
Gamma, γ	-0.057	-0.018	-0.087	0.007	-4.990	0.000	68%

Table 3-6: The effect of the corporation Tax Reform of 1984 on corporate profits

The total assets figure in each year (1980 - 1999) was used to scale pre-tax profit. The change in this ratio is calculated by taking the ratio in year t minus the ratio in time t-1. The dummy variable RP_t is introduced in the analysis to isolate the impact of tax reform on corporate profit. The dummy variable takes the value of 1 for each of the reform years (1984-1987) and zero otherwise. The following regression model is estimated:

$$(\Pr ofit / Assets)_t = \alpha + \beta\Delta(\Pr ofit / Assets)_t + \gamma RP_t + \varepsilon_t$$

Where $(\Pr ofit / Assets)_t$ is the ratio of pre-tax profit at time t, $\Delta(\Pr ofit / Assets)_t$ is the change in the ratio of pre-tax profit to total assets at time t (i.e. the ratio at time t minus the ratio at time t-1). RP_t is the dummy variable , ε_t is the error term. $\alpha, \beta, and\, \gamma$ are parameters to be estimated.

Dependent variable: Profit/Assets				
Variable	Coefficient	White SE	T- statistics	P- value
Constant	0.083	0.005	16.010	0.000
Δ(Pre-tax profits/ Total Assets)	-0.714	0.340	-2.101	0.051
Dummy	0.016	0.006	2.810	0.012
R-squared	0.382			

Table 3-7: Estimated parameters from both cross-sectional and time series regression models

The model estimated here is the same as the one referred in table 2.4 above; with the exception that this model considers the change in variables. Panel A show the results of cross-sectional regression model; the change, denoted by delta Δ, is calculated by taking the average value of the variable in 1988-1999 minus the average value in 1981-1983.

Panel B shows the results of time series regression model; in this case, the change, denoted by delta Δ, is calculated by taking the value of the variable at year t minus the value of variable at year *t-1*.

Panel A: Results for a cross-sectional regression model

Dependent variable: ΔD/E ratio

No. of observations: 237

The estimated model is:

$$\Delta(D/E)=\alpha+\beta_1\Delta ETR+\beta_2\Delta NDTS+\beta_3\Delta RONI+\beta_4\Delta DYLD+\beta_5\Delta SIZE+\beta_6\Delta AGENCY+\beta_7\Delta BRUPTCY+\beta_8\Delta TFI+\beta_9\Delta PROF+e$$

Variable	Cross-sectional estimate of: Coefficient	White SE	T-statistic	P-value
Constant	-0.0529	0.0644	-0.8222	0.4118
ΔETR	0.0086	0.0029	2.9865	0.0031
ΔNDTS	-0.0059	0.0020	-2.9229	0.0038
ΔRONI	0.0009	0.0022	0.4121	0.6807
ΔDYLD	0.2762	0.6388	0.4325	0.6658
ΔSIZE	-0.0129	0.0483	-0.2674	0.7894
ΔAGENCY	-0.0200	0.0071	-2.8343	0.0050
ΔBRUPTCY	0.0002	0.0003	0.7892	0.4308
ΔTFI	0.3084	0.2136	1.4440	0.1501
ΔPROF	-2.7323	0.6228	-4.3873	0.0000
R-squared	24%			

Panel B: Results for a time series regression model

Dependent variable: $\Delta(D/E)_t$

No. of observations: 21

The estimated model is:

$$\Delta(D/E)_t=\alpha+\beta_1\Delta ETR_t+\beta_2\Delta NDTS_t+\beta_3\Delta RONI_t+\beta_4\Delta DYLD_t+\beta_5\Delta SIZE_t+\beta_6\Delta AGENCY_t+\beta_7\Delta BRUPTCY_t+\beta_8\Delta TFI_t+\beta_9\Delta PROF_t+\beta_{10}RP_t+e_t$$

Variable	Cross-sectional estimate of: Coefficient	White SE	T-statistic	P-value
Constant	0.4547	0.2374	1.9150	0.0845
ΔETR	0.0351	0.0156	2.2447	0.0486
ΔNDTS	-0.0351	0.0184	-1.9058	0.0858
ΔRONI	-0.0003	0.0003	-0.9949	0.3433
ΔDYLD	2.0023	2.4916	0.8036	0.4403
ΔSIZE	-0.0218	0.0249	-0.8743	0.4025
ΔAGENCY	-0.0781	0.0245	-3.1891	0.0097
ΔBRUPTCY	0.0109	0.0057	1.9238	0.0833
ΔTFI	-0.4056	0.2228	-1.8203	0.0987
ΔPROF	-0.1266	0.5357	-0.2363	0.8180
RP	-0.0699	0.0270	-2.5878	0.0271
R-squared	89.45%			

Notes

In order to save space, the subscripts for variables on column one, panel B were ommitted.

Dummy variable is defined such that $RP_t=1$ for each year 1984-1987inclusive and zero elsewhere

Figure 3-1: Trend of average debt-equity ratios for 1974-1999

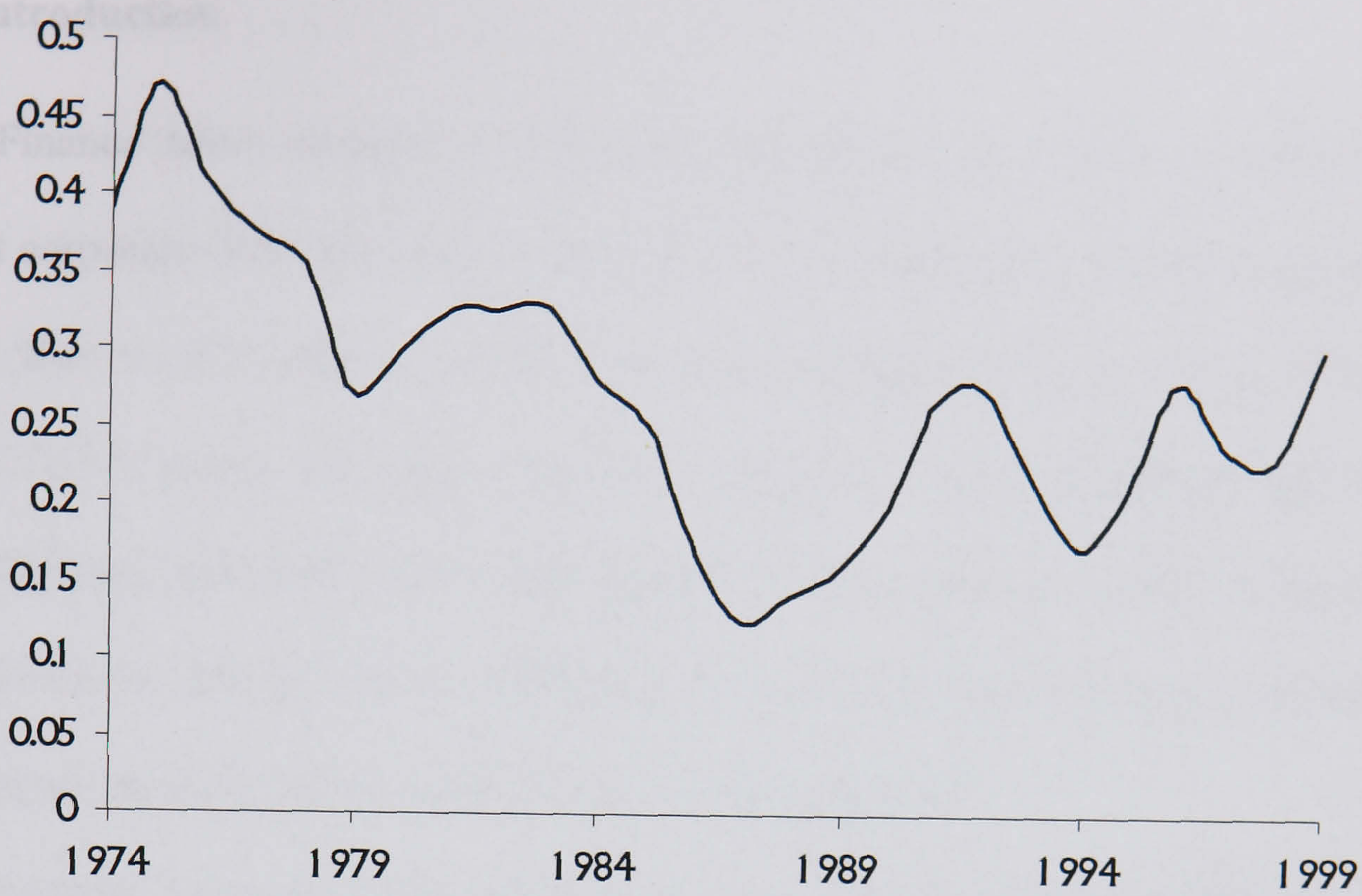
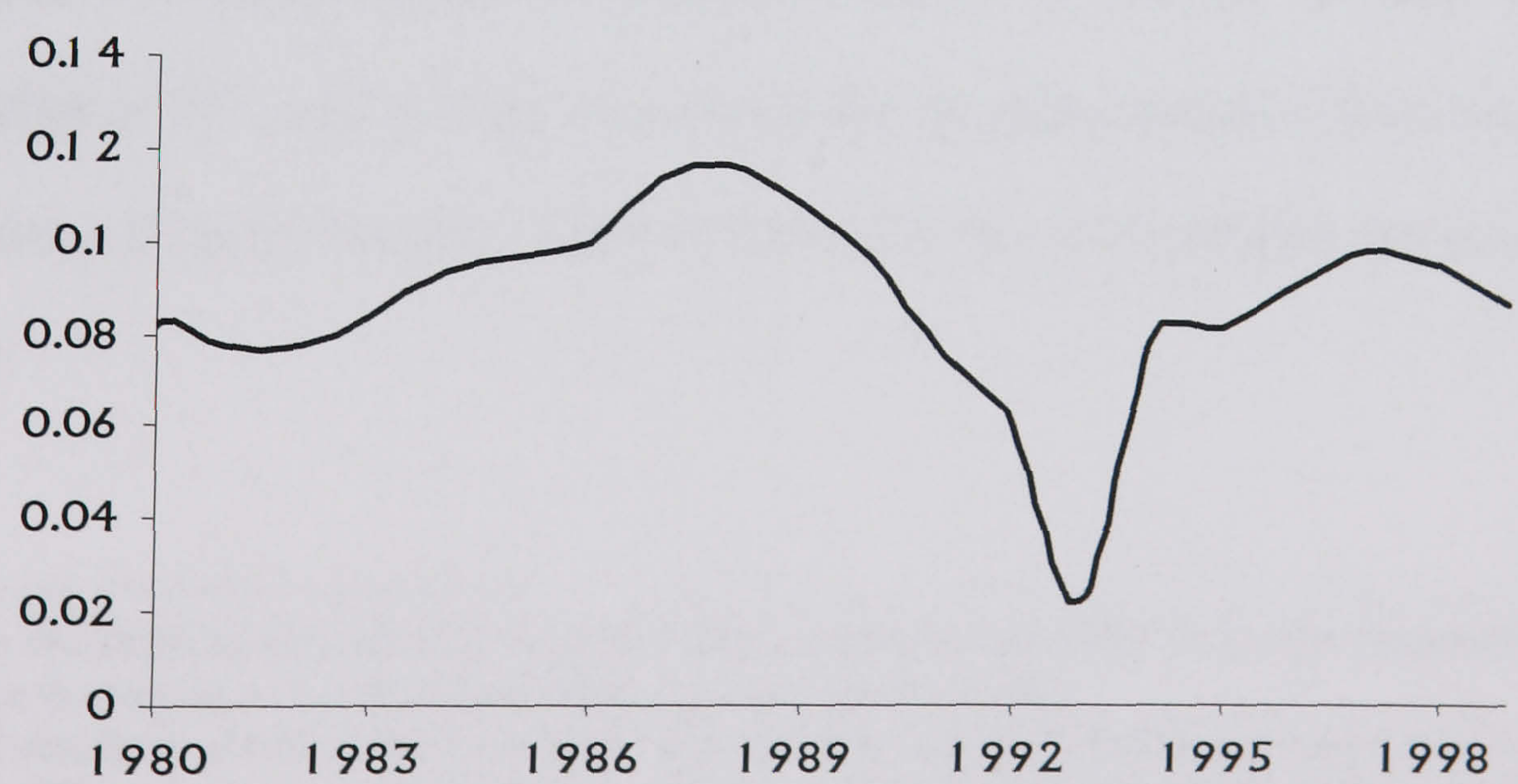


Figure 3-2: Trend of pre-tax profits 1980-1999



4 THE IMPACT OF THE 1984 CORPORATION TAX REFORM ON LEASING

4.1 Introduction

Finance theory suggests that finance leases and corporate debt are substitutes, and that corporate debt financing is preferred to lease financing. If such suggestions are true, then taxable capacity will be negatively related to leasing. Myers, Dill and Bautista (1976) argue that lease payments, which are fixed obligations like other loans, displaces debt and reduce debt capacity[50]. The intuition is that if firms are assumed to have optimal capital structures, then, to the extent to which it represents off – balance sheet financing, leasing reduces debt capacity[51].

Another example is documented by Ross, Westerfield and Jaffe ((1999), p.630) "*...debt displacement is a hidden cost of leasing. If a firm leases, it will not use as much regular debt as it would otherwise. The benefits of debt capacity will be lost, particularly the lower taxes associated with interest expenses*". Given the documented relationship between leasing and debt financing, ceteris paribus, an increase in leasing should be negatively related to the use of debt. Given the treatment of lease and debt for corporation tax purposes, the tax system that is biased in favour of one of these two forms of finance is likely to influence the growth of the other.

[50] Ross, Westerfield and Jaffe [1999] define debt capacity as the ability to borrow, that is the amount a firm can borrow up to a point where firm value no longer increases.
[51] This statement assumes that leasing activity of a firm is not reflected in any report that is available to the public; so no one, even the market, will know about the leasing activity of the company. This is rather restrictive assumption. My expectation is that although leasing activity of a company is not reported in balance sheet, such information will appear in profit and loss account and cash flow statement and as such it effect will be dully reflected in the market.

Mayes and Nicholas (1988) analyse the economic impact of leasing in the UK and attribute the rapid growth of leasing to the tax investment incentives based on capital allowances which among other things increase after tax return to the firm and permit firms to offset their capital expenditure against their taxable profit. This reduced firms' corporation tax liabilities.

Clearly, if there is no sufficient taxable profit to utilise available capital allowances immediately, a tax benefit will fall in value the longer it has to be postponed and tax exhausted firms may reduce their overall investments. The presence of companies in the economy with taxable profits means that tax-paying companies could purchase assets and lease them out to tax exhausted firms. By so doing both categories of firm are able to benefit from the tax advantage of capital allowances in some proportion. Thus, the theory of leasing has predominantly focused on the differential tax position of the lessee as the primary rationale for leasing.

Another rationale for leasing documented in the literature refers to the fact that leasing allows firms to avoid making large lump sum payments usually involved in buy decisions. However, if retained profit and/or other external financing are available at a cheap rate, this rationale ceases to explain leasing behaviour. In the UK, however, the corporation tax system, especially that which existed during pre-reform of 1984 period was biased in favour of debt finance (see for example Edward (1984) and Moon and Hodges (1989).

Furthermore, the literature on the growth of leasing in the UK, as documented by Mayes and Nicholas (1988), suggests that tax advantages were a major influence in stimulating rapid growth in leasing. For example the initial capital allowances rate deductible for corporate tax purposes was 10% in 1966 and increased over time to 100% in 1972; the associated values of leased assets was £61 millions in 1966 and £130 millions in 1972.[52]

The corporation tax reform of 1984, among other objectives, aimed at changing the tax position of a company by reducing corporation tax liabilities. In order to achieve that objective, the UK government reduced the corporation tax rate from 52% in 1983 to 35% in 1987 and eliminated initial (or first year) capital allowances (see table 1.1 for details). To understand how the corporation tax reform of 1984 affected leasing consider a case where a company has a fixed debt capacity in any given period. Note that optimal capital structure implies that firm can borrow or lease only up to its debt capacity. Note also that the impact of change in corporation tax rate have same effect on both lease and debt due to deductibility of both lease and interest payments. However, the impact of withdrawal of first year and initial capital allowances is likely to make leasing more attractive because the effective price of assets will increase (that is it will be less attractive to borrow and buy the assets) and large amount of money will need to be committed initially. Some companies, especially medium and small companies (which are likely to find debt markets to be relatively expensive) are likely to use lease to finance the use of most of their assets. Thus, given these changes and their effect on debt financing, the effects of tax on leasing as documented in the literature and the observed relationship between debt financing and lease financing, it is expected that there will be a significant change in leasing after the 1984 reform. Furthermore, the reform was

[52] The figures were obtained from David G.Mayes and Clive S. Nicholas " The Economic Impacts of Leasing",Macmillan Press, 1988 (chapter 2, pp 13-16)

expected to affect corporate debt[53] negatively. Thus, the substitutional relationship between corporate debt and leasing mentioned above implies that leasing should increase relative to debt during or after the corporation tax reform of 1984.

This study focuses on the change in lease financing induced by the change in corporation tax structure. The results support the view that leasing and debt financing are substitutes. I also find that the corporation tax reform had a positive impact on leasing.

It should be noted that companies invest different amounts in capital equipment (due to the nature of their business) and consequently the significance of the tax advantage associated with capital allowances is likely to vary across companies and sectors. I therefore analyse whether there are significant variations in lease rate across sectors. I find that on average, manufacturing firms (those under group 1 on Table 4.2) have higher lease level than other firms analysed. The results show further that the relationship between debt and effective tax rate varies across sectors. Whereas a number of variables are hypothesised to be fundamental determinants of leasing, I find that only the effective tax rate and size significantly explain changes in the lease rate. This is consistent with the argument made by Adedeji and Stapleton (1996) that tax rate is an important determinant of leasing. Thus, the analysis of the changes in leasing activities around the corporation tax reform period provides additional insights to the understanding of the behaviour of leasing in the UK in general.

The rest of the chapter is structured as follow. Section 4.2 presents the literature review relevant to this study. The theoretical framework and empirical

[53] The choice between corporate debt and lease is sometimes referred to as the "Buy versus Lease" decision. It is assumed that money required to buy an asset can be borrowed. Thus the decision to use

evidence on the relationship between leasing and debt are presented in section 4.3. Section 4.4 briefly describes the possible implications of the corporation tax reform of 1984 on non-lease debt versus lease relationship and presents the relevant issues arising from introduction of SSAP 21. Data, definition of variables and methodology are explained in section 4.5. Results and conclusion are given in sections 4.6 and 4.7 respectively.

4.2 Literature review

The literature that is referred to in this section focuses on the relationship between leasing and debt financing and the impact of corporation tax on leasing. It will also focus, to a lesser extent, on the degree of substitutability between leasing and debt financing.

Smith and Wakeman (1985) show that under the assumptions of perfectly competitive capital markets with no taxes, no out of the pocket contracting costs and fixed real investment choice, firms will be indifferent between owning an asset and leasing it. They show further that by adding an assumption of equal corporation tax rates, there is no tax advantage to leasing since total tax liability is independent of the ownership structure. However, it is the marginal corporation tax rate (not statutory corporation tax rate) that a company faces which matters.

It should be noted that the tax based advantages of leasing and debt financing will only accrue to the company (and therefore be relevant) if the company is in a tax-paying position. In other words, both debt and lease financing will only generate tax savings to the company if the company has taxable capacity or is likely to be in that position in a reasonably near future. This theory stems from the work of Myers

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corporate debt is similar to the decision to buy.

et al (1976) which presents examples of the benefits of leasing based upon the assumption that the lessee is in a non-tax paying position or pays a tax rate which is different from that paid by the lessor in perpetuity. The study by Myers et al (1976) shows that tax is the only obvious motive for leasing. The argument on dominance of tax as the motive for leasing can be summarised as follows: leasing allows low tax firms to sell their tax shield to higher tax firms and therefore the leasing activity of a company should be inversely related to its tax rate.

Frank and Hodges (1978) generalise the work of Myers et al and show that the value of a lease can be sensitive to the forecast of a company's tax position. Their results show that the attraction of leasing depends critically on the length of non-tax paying period.

Brealey and Young (1980) extended the analysis to examine the implications of Miller's (1977) equilibrium model for the cost of leasing. By assuming a world of certainty, Miller analysed the capital structure decision when investors face different marginal rates of personal tax, with equity income and bond income being taxed at different rates. He argued that in equilibrium the corporate sector would issue debt up to the point at which the marginal reduction in corporate tax is equal to the increase in personal tax incurred by the marginal shareholder. Brealey and Young (1980) showed that in such a world leasing is likely to be the preferred source of financing only if a company is in a temporary non-tax-paying position. They show further that equity is likely to be the preferred source if the company is in a permanent non-tax- paying position.

The tax-based theories of optimal capital structure predict a positive relationship between the use of debt financing and the corporate marginal tax rate.

For example Modigliani and Miller (1963), in a correction to their earlier, Modigliani and Miller (1958) irrelevance proposition, recognised that tax law in many other countries, UK inclusive, favoured the use of debt over equity because interest payments (but not dividend payments) are tax deductible[54] hence double taxation of dividend. Thus the marginal tax benefit to debt is always positive in the Modigliani and Miller (1963) model.

Miller (1977) argued that in a world of differential personal taxes, marginal personal tax disadvantage of debt, combined with supply-side adjustments by companies will mitigate the corporate tax advantage of debt and drive market prices to an equilibrium, implying the irrelevancy of leverage for any given company. DeAngelo and Masulis (1980a) on the other hand suggest that the existence of corporate non-debt tax shields, such as depreciation, is sufficient to overturn the Miller (1977) leverage irrelevancy theorem. They show that when a company's debt capacity to fully utilise tax shields is limited, the use of debt financing is reduced.

Lasfer (1995), using UK data, shows that companies that pay lower taxes, after accounting for stock relief, capital allowances, trading losses and ACT recoverable, are likely to have lower debt financing in their capital structure. In particular, he found that companies that are tax exhausted use less debt than tax-paying companies.

Lewis and Schallheim (1992) extend the work of DeAngelo and Masulis (1980) to model the leasing and borrowing decision. They focus on leasing as a means for selling excess non-debt tax deductions. In their model, non-debt tax shields are transferred or 'sold' via leasing. This reduces the potential redundancy of

[54] It should be noted that in the UK, the imputation system allowed partial deduction of dividend through the advance corporation tax (ACT). The ACT has now been phased out but the argument

interest deductions and makes the marginal value of debt positive by allowing the lessee to issue additional debt. In this way, Lewis and Schallheim (1992) establish the theoretical possibility of a positive relationship between debt and lease financing. Furthermore, in their model, Lewis and Schallheim (1992) show that leasing can be an advantageous form of financing in perfectly competitive markets even if the marginal tax rate is the same for both the lessor and the lessee.

The empirical evidence provided to date on the influence of taxes on leasing is mixed. For example, Ang and Peterson (1984) report that, contrary to expectations, the average tax rates of companies using leasing was consistently higher than that of non-leasing companies over the period covered in their study.

Finucane (1988) and Krishnan and Moyer (1994) showed that tax- related factors are not significantly associated with the level of leasing by a company. Their results may, however, be driven by the fact that both studies looked at capital leases as defined by FASB Statement No. 13 in the USA, which are not likely to be affected by tax factors because they are treated by the Internal Revenue Service as instalment sales contracts for tax purposes. In a further study, Mehran and Taggert (1996)[55] used the ratio of reported tax less the change in deferred tax to earnings before interest and tax in order to estimate the impact of taxes on leasing for a sample of 134 large US companies over the period 1979-80. They find that the coefficient of this variable is not significant[56].

Other studies, on the other hand, do find evidence of tax effects. Barclay and Smith (1995) find that companies with a high proportion of tax losses carried

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against it was that double taxation of dividend re-emerged in form of irrecoverable ACT.

[55] This reference was taken from Bedford, R. (2002).

[56] It should be noted that these results may be driven by the small number of companies analysed and the short sample period covered.

forward rely more on lease finance. Sharpe and Nguyen (1995) construct two alternative proxies for a company's tax status: the ratio of tax expense over pre-tax income and a dummy variable equal to one if the company reported tax losses carried forward in its financial statements. The companies that reported a tax loss carry forward are considered to be tax exhausted and thus unable to take full advantage of the tax benefits of ownership. Sharpe and Nguyen (1995) report that these two measures are significant for all three of their measures of leasing propensity, suggesting that capitalised leases are used more heavily by companies for which the tax benefits of ownership appear low, a result in contrast to that reported by Krishnan and Moyer (1994).

Graham, Lemmon, and Schallheim (1998) argue that the tax- related findings of the latter two papers are difficult to interpret because they are largely based on tax system in which leases are not necessarily classified as true (tax-advantaged) leases by the IRS. Graham et al. suggest that capital leases are likely to be a mixture of true and non-true leases (the latter are treated as debt by IRS). They suggest that whilst the findings by Barclay and Smith (1995) and Sharpe and Nguyen (1995) show a positive relationship between the use of capital leases and tax losses carried forward (in support of the expected negative relationship between leases and tax rates), their tax results may be spuriously caused by the endogeneity of corporate tax status mentioned earlier.

To address these problems, Graham et al. (1998) construct a before-financing tax rate by examining the marginal tax rate that the company faces after making the investment decision, but prior to making the lease versus purchase decision.

Furthermore, the authors focus on operating leases as well as capital leases, as the former are likely to be classified as true tax-advantaged leases by the IRS. They show that a change in the marginal tax rate from zero to 46 per cent will, on average, result in a 17 per cent decrease in the company's ratio of operating leases to company value and a 5.1 per cent decrease in the ratio of capital leases to company value.

A number of recent studies in the UK have also analysed the impact of taxes on the decision to lease, albeit with mixed results. Adedeji and Stapleton (1996), utilising UK data in a direct test of the Ang and Peterson results, find a significant negative relationship between taxable capacity and the use of finance leases. Adams and Hardwick (1998), using a similar tax variable to that used by Adedeji and Stapleton, however found no statistically significant relationship between the propensity to lease and the tax position of companies in their sample. In addition, Beattie, Goodacre and Thomson (2000), in their initial replication of the Ang and Peterson (1984) and Adedeji and Stapleton (1996) studies, analyse the relationship between the propensity to use finance leases and a company's tax ratio. Utilising a comprehensive lease ratio (finance leases plus estimated operating lease liability divided by total assets), the authors find a generally insignificant relationship between the propensity to use finance leases and a company's tax ratio[57]. Beattie et al. (2000) point out that the nature of utilising operating leases for retail assets in the UK may partially explain this result.

Lasfer and Levis (1998) analyse financial statements of all unquoted and publicly quoted UK companies for which the appropriate data is available. Their sample covers a total of 3,008 individual companies over the period 1982-96, resulting in 23,411 pooled time-series and cross-sectional observations. Taking into account the features of the imputation tax system then in force in the UK, the authors construct five different proxy variables in which to evaluate the tax impact on the decision to use finance leases and hire purchase finance. The results show that taxation is a major determinant of leasing for quoted companies and large companies, whereas for unquoted companies and small companies proxies are not significant. As shown previously, one of the economic motives for leasing is the tax advantage associated with deductibility of lease payments for corporation tax purposes. Other things remaining constant, low corporation tax rate is associated with low effective corporation tax rate and low present value of tax-shield. Thus, in terms of effect of on present value of tax shield, corporation tax rate has the same effects on both debt and lease. It should be noted that corporate debt instruments and consequently interest payments are relatively standardised and lender and borrower have little chance of manipulating the interest payments. On the other hand, literature shows that if for example lessors are tax-exhausted, they can still enjoy the benefit of assets ownership by buying assets and leasing it to taxable lessee for relatively lower lease payments-hence chance to lease even more since lease will use less debt capacity. Such arrangement suggests that there is a possible shift from debt to lease after reform. Recall that effective price of assets rose after reform and therefore to avoid large lump sum expenditure, firms are likely to use lease financing (see other motive that might reinforce the use of leasing on section 4.6.1). From the results of most of these studies it seems that debt capacity plays a leading role in the use of lease

[57] In their study they used data for five years and their results show a significant positive relationship between the propensity to use finance leases and a company's tax ratio for two out of five years covered in their analysis.

finance. Thus, it is important to explore the relationship between lease and debt capacity.

4.3 The relationship between leasing and debt capacity

4.3.1 Debt-to-lease substitutability: A Theoretical framework

There has been much research into the relationship between debt and finance leases as alternative financing instruments and, more specifically, on the degree of substitutability (or complementarity) between debt and leasing. The notion that leasing is a substitute for debt financing is widely accepted in the finance literature and it gained its clearest expression in Myers et al (1976). Inherent in their (1976) model, are a number of crucial assumptions:

i. The company regards lease payments as contractual obligations, equivalent to interest and principal payments on the company's debt.

ii. The model assumes that a company has a certain debt capacity due to the tax-deductibility of interest payments. Therefore, borrowing is valuable up to the debt capacity.

iii. Companies borrow 100 per cent of the tax shields generated by interest, depreciation and lease payments.

Leasing and debt are thus viewed as fixed, contractual obligations. Both leasing and debt reduce a company's debt capacity and, consequently, greater use of debt financing should be associated with less use of leasing. The Myers et al (1976) model does not consider the determinants of an optimal capital structure; rather the model takes the optimal capital structure as exogenous and assumes that the company is operating at below its optimal level of debt, i.e. the company has 'excess debt capacity'. The model is used to compare leasing and borrowing by determining whether debt or leasing 'uses up' less debt capacity, under the maintained assumption that debt and leases are substitutes.

It should be noted that the choice of leasing over debt financing will be economically and financially appropriate if leasing uses up less debt capacity than borrowing. The opposite is true if borrowing is cheaper and uses up less debt capacity than leasing.

In order to determine the cheapest form of finance (i.e. buy versus lease) Myers et al (1976) used the following formula.

$$V_{0\,(lesee)} = A_0 - \sum_{t=1}^{N} \frac{L_t(1-T)+D_tT}{(1+r(1-T))^t} \tag{4.1}$$

Where:

A_0 = purchase price (current value of the asset)

V_0 = net present value accruing to lessee if an asset is leased rather than bought

r = appropriate hurdle rate assuming perfect capital markets and all- equity financing

L_t = lease payment at time t

T= corporate tax rate

Dt = depreciation at time t.

Most of corporate finance text books use equation 4.1 to determine whether to lease or to buy an asset. If V_0 is greater than zero is profitable to lease, otherwise it is better to lease. Note also that in the hurdle rate used reflect the certainty of lease payments.

Most studies, including that by Myers et al. (1976), question the realism of the result represented by the equation 4.1 above. It should be noted that the underlying assumption of the above formula is that lease obligations and various tax shields displace debt on a one-to-one basis. The corresponding assumption for the lessor is that 100 per cent debt financing, constitutes an optimal financing strategy, a conclusion similar to that reached by Modigliani and Miller's (1963) note on debt financing. This statement simply implies that lessor borrow the entire fund required to buy assets that he leases out. Thus, so long as there is advantage of engaging in leasing activities, lessor is assumed to finance the purchase of all assets by borrowing. As with criticism of Modigliani and Miller's (1963) paper, it is hard to visualise how any company could operate at such a level of debt and is not what is observed in practice.

To take account of this unrealistic scenario, Myers et al. (1976 assumed that lease payments and the various tax shields support, at most, λ of debt per £1 of assets leased. That is, the company borrows λ times the value of the various tax shields and reduces borrowing by λ times the value of lease payments. They obtained the following formula for NPV of leasee:

$$V_{0(leasee0} = A_0 - \sum_{t=1}^{N} \frac{L_t(1-T)+D_tT}{(1+r(1-\lambda T))} = A_0 - \sum_{t=1}^{N} \frac{L_t(1-T)+D_tT}{(1+r^*)^t} \qquad (4.2)$$

Where: $r^* = r\ (1- \lambda T)$ = (Modigliani and Miller's (1963)) weighted average cost of capital

r = appropriate hurdle rate assuming perfect capital markets and all- equity financing

L_t = lease payment at time t

T = corporate tax rate

Dt = depreciation at time t.

A_0 = purchase price (current value of the asset)

V_0 = net present value accruing to lessee if an asset is leased rather than bought

The net present value of leasing (to lessee) represented by (4.2) above reduces to that represented by (4.1) in a special case where $\lambda = 1$.

4.3.2 Is lease a complement or a substitute of debt?: Empirical evidence

The degree of substitutability among leases, non-leasing debt and equity is complex because it demands that the appropriate level of investment as well as the optimum mix of all sources of finance, one of which may be leasing, be determined. Thus, it is no surprise, therefore, that there are competing views on the value of the debt-to-lease displacement ratio in the literature. Myers et al.(1976) suggest that the empirical value of the debt-to-lease displacement ratio may be less than 1. The basis of their argument is that for the lessor the lease payments carry a degree of systematic risk as the probability of default by the lessee (and the value of the underlying leased asset, if default occurs) depends on the health of the economy.

Franks and Hodges (1978), and Brealey and Young (1980), among others suggest that the value of the ratio would be one, because capital markets would view finance leases and debt as perfect substitutes.

In practice, however, there may be differences in the nature of actual or perceived cash flows assumed under leasing and debt financing arrangements. In their study, Smith and Wakeman (1985) refer to examples of such differences and use them to identify potential lessors and lessees as well as the types of asset most likely to be leased by a given lessee. They argue that if the term of the agreement in a noncancellable lease is shorter than the economic life of the asset, there may be advantages to the lessee if the useful life of the asset is expected to be less than the asset's economic life. Likewise, there may be some advantages to the lessee if there are significant costs associated with transferring ownership. However, if markets were assumed to be rational one would expect the lease payments to be higher in these circumstances to reflect the additional risk which the lessor bears on behalf of the lessee. With finance leases the lessee bears the risk of obsolescence.

Klein, Crawford & Alchian (1978), however, showed that the value of the debt to lease displacement ratio might be greater than one if the leased assets are industry- or company-specific. Such specialised assets have less-well-developed secondary markets and are therefore likely to be difficult to sell in the event of default or bankruptcy, exposing the lessee to more liquidity risk.

The results of empirical examination of the debt displacement effects of leasing tend to contradict the theoretical prediction. Using a sample of 92 US companies, Bowman (1980) examined the impact of lease leverage on equity betas and found that leasing has an effect on a company's systematic risk that is indistinguishable from ordinary debt. The interpretation of their results implies that the market viewed the two forms of financing as close substitutes. Bayless and Diltz (1988) gave a similar interpretation of the same results. According to them, the results suggest that lease and debt cash flows have a similar effect on equity betas as both forms of financing involve fixed payments that must be made in order to avoid default.

A UK – based study by Narayanaswamy (1994) investigated the extent to which the volatility of equity return is affected by using debt or leasing finance. Using data covering the period 1981-90, the paper also examined whether changes in the accounting treatment of leases in the UK affected the market's perception of finance leases. The results support the hypothesis that lease obligations, on average, have a positive effect on the volatility of the return on equity similar to that of a secured debt but to a significantly lesser extent. Consequently, Narayanaswamy (1994) concludes that the market considers lease obligations more favourably than secured debt, thus providing an incentive for lease financing relative to debt financing. It is interesting to note that although this result holds both before and after the enforcement of the regulation which required lease payments to be capitalised[58] and reported in leasee's balance sheet, the effect of lease obligations, relative to that of secured debt, on equity return volatility increases over the sample period. This suggests that the market's favourable perception of leases has changed, perhaps in part due to the introduction of the mandatory capitalisation of finance leases. As Narayanaswamy (1994) states: "... the market does not fully share the Accounting Standard committee (ASC)'s notion of the economic substance of finance leases, though there is some indication that this may be changing slowly".

Ang & Peterson (1984) attempted to directly estimate the extent to which leases substitute for debt. Using a Tobit cross-sectional analysis on a sample of

[58] This regulation was enacted in a Statement of Standard Accounting Practice number 21 of 1984 More detail on this is given in section 4.4.2.

approximately 600 companies over the period 1976-81, they estimated the relationship between the likelihood and the extent of leasing activity and a company's debt ratio and other explanatory variables. Their results show a statistically significant positive relationship between leasing activity and reported debt ratios; suggesting that lease finance complements debt financing (and not substituting it).

By using a cross-sectional Tobit analysis on a sample of 600 companies over the period 1981-85, Finucane (1988) results showed a positive correlation between leasing and debt financing thus supporting the study by Ang and Paterson (1984).

Adams and Harwick (1998) discuss possible reasons for this complementarity. They suggest that, in the absence of rules requiring the capitalisation and inclusion of leases in the writing of debt covenants, leasing agreements could enable owners and managers of companies to circumvent restrictive debt covenants and '... employ leased assets to generate cash flows that could be used to finance bonus and perquisite consumption'. Based on a sample of 100 UK-owned companies listed on the London Stock Exchange for the year 1994, Adams and Hardwick (1998) use a composite leasing variable to capture the incidence of both finance and operating leasing in a similar way to that developed by Sharpe and Nguyen (1995). Their results provide support for the hypothesis of complementarity between leasing and leverage.[59] They estimate that on average an increase of 0.1 in a company's leverage will lead, ceteris paribus, to an increase of approximately 0.08 in its leasing share.

[59] It should be noted that the sample period used did not allow for time-series comparisons and the sample size was small and restricted to – by definition – large companies).

Adedeji and Stapleton (1996) suggest the reason behind the complementarity of lease and debt is that, as lessors will bear some of the costs of assets ownership they will pass on these costs to the lesees in the form of higher lease payments, charges that could be higher than the cost of debt. As a result, leasing may be used as a secondary, more expensive form of finance and will rank below debt in management's choice of finance. Thus, a company that employs lease will also have higher level of debt. Adedeji and Stapleton (1996) argued that Ang and Peterson's results are to be expected if a large number of non-leasing companies are included in the sample. They hypothesise that if an attempt were made to explain the leasing behaviour only of those companies that engage in leasing, then the negative relationship between the use of finance leases and debt would hold empirically. Indeed, they find that finance leases and debt displace each other on a less than one-to-one basis. The debt-to-lease displacement ratio was estimated to vary from £0.82 to £0.39 over the three years in their sample. As their paper puts it, they expected that '*... firms with low debt ratios to also have low lease ratios and a high use of finance leases will only be observed in the case of those companies which had already used up their primary debt capacity*' (p. 72). Thus, the relationship between leasing and debt finance is likely to be complementary rather than substitutive.

Mukherjee (1991) surveyed Fortune 500 companies to ask their chief financial officers about their leasing activities and the way they view leases relative to debt as sources of finance. The results of the survey reveal that about 47 per cent of the companies responded in the sample viewed leasing as a substitute for debt, 22% viewed leasing as a complement to debt, whilst 31 per cent believed that debt and leases are independent decisions.

The study by Lewis and Schallheim (1992), view leasing as a mechanism for selling excess non-debt tax deductions and their results support the complementarity relationship between leasing and debt financing. They argue that leasing can motivate the lessee firm to increase the proportion of debt relative to an otherwise identical firm that does not lease. Since the authors determine the optimal leasing and capital structure decision endogenously, their model does not assume that debt and leases are substitutes. Thus the theory developed by Lewis and Schallheim (1992) demonstrates the relationship between debt and leases to be complementary. That is, a lessee company optimally uses more debt with leasing than it would if it restricted itself to debt alone.

As in other studies, empirical work on the relationship between leasing and debt financing is criticised for failing to control for the underlying factors that determine debt capacity. Smith and Wakeman (1985), in particular, assert that the results of Ang and Peterson (1984) stemmed from the inability to adequately control for debt capacity across cross-sections of individual companies. Smith and Wakeman (1985) argue that companies with higher debt capacity may also have other characteristics that make leasing relatively attractive. In particular, companies with certain asset characteristics are likely to have greater debt capacity and, as such, they can afford to use more lease and debt financing than other companies.

Bayless and Diltz (1988) argued that the studies of both Bowman (1980) and Ang and Peterson (1984) do not distinguish between debt instruments, and therefore ignore the possibility that any given lease may displace different amounts of debt depending on the type. They control for debt capacity by constructing an experimental setting in which bank loan lending officers in the USA are queried regarding the amount they would be willing to lend under various hypothetical circumstances. The authors found that, in the case of a term loan decision, banks did not treat outstanding capital leases and debt differently; however, leases had a negative relative effect on credit line decisions. They conclude that the relationship between leases and other forms of debt should generally depend upon the particular use for which the company's other debt has been targeted.

Marston & Harris (1988) examined changes in, rather than levels of leases and debt by using a more comprehensive measure of leasing and non-leasing debt than Ang and Peterson (1984). Using US data for the period 1976-82, they found that changes in the debt ratio and lease ratio for individual companies were inversely related over time, concluding that debt and lease financing are substitutes. Companies employing lease financing typically use higher levels of debt compared to companies that do not. They also show that companies reduce non-leasing debt with increases in leasing at a less than one-to-one basis. These results have found support in the US study by Krishnan and Moyer (1994), who examined the company's decision to use leasing finance as a way to reduce bankruptcy costs and note a significantly negative relationship between the use of long-term debt and capital leases.

Beattie et al. (2000), however, find no support for the hypothesis of a substitutability relationship between finance leases and debt. In contrast to Adedeji and Stapleton (1996), they continue to find a positive but insignificant relationship when performing an OLS regression for the sub-sample of companies recording finance leases in their accounts. They report a significant negative relationship between the use of all forms of leasing and debt finance. For the comprehensive lease measure, they estimated a debt-to-lease displacement ratio of approximately £0.23 over the period 1990-94. The same ratio was estimated with finance and operating leases separately. There was a similar debt-to-lease displacement ratio recorded when the operating lease ratio was used. The coefficients for the finance lease measure were not significant. This suggests that substitutability between debt and leases is not uniform across lease types.

Lasfer and Levis (1998) report that differences in the levels of gearing between lessee and non-lessee companies are not homogeneous across companies of different size. For their whole sample, they find that lessee companies have on average higher gearing ratios and lower relative levels of bank loans than non-lessee companies. However, whereas for large companies leasing and debt finance are complements, for small and medium-sized companies leasing and debt finance are substitutes, suggesting that for the latter leasing is a cheaper source of finance.

4.4 The Corporation Tax reform of 1984

4.4.1 An overview of the reform

The British government had introduced a number of tax reforms since the corporation tax was introduced in 1965. In 1984, the Government Budget introduced reforms to the structure of the UK corporation tax. The reforms involve reducing or eliminating various allowances and simultaneously reducing the statutory corporation tax rate (see Table 1.1). An overview of the reform is given in chapter 1. This study assesses the extent to which these reforms changed the relative advantage of debt and lease finance as forms of funding. As it is for leverage, the corporation tax reform of 1984 form a natural way for testing the impact of a change in corporation tax on leasing. Given the relative change in attractiveness between debt and leasing, the substitutional relationship between leasing and debt finance and consequently the tax theories of capital structure can be effectively tested. Although it might be argued that it is not sensible to test for suThe reasoning is that, if leasing and debt financing are substitute the corporation tax reform (which made debt relatively unattractive) should make leasing relatively attractive.

Some of the possible implications of these reforms to the UK corporations are as follow: First, it might lead to an increase in pre – tax profits due to a drastic reduction in allowable allowances. The discussion on the possible impact of reform on profitability was discussed in chapter 3. Secondly, the level of investments (especially in fixed assets) might decrease due to a relative increase in effective purchase prices to the firms. This is true from an investment appraisal perspective in that the tax benefit of capital allowances is subtracted from initial investment at time zero of the investment. Thus, an investment in assets[60] with NPV less than the tax benefit of capital allowances will cease to be attractive after the reforms. On the other hand, companies may bring forward their future investments in order to enjoy the capital allowances which were about to be reduced or eliminated (see the progression of changes in capital allowances on table 1.1). Under this possibility, there may be an increase in investment during reform period 1985-1987. The final implication of the tax changes is the possible relative decrease in tax liability due to a decrease in the statutory corporation tax rate. This is a straightforward implication especially for less capital-intensive firms with little or no investment related tax shields. For capital-intensive firms the effect of reform on corporate tax liability will depend on which factor played a leading role: the increase of tax liability as a result of decreased capital allowances or the decrease in tax liability due to decreased statutory tax rate.

4.4.2 The Issues related to SSAP 21

The Statement of Standard Accounting Practice number 21, hereafter referred to as 'SSAP 21', covers lease and higher purchase contracts. The Accounting Standards Committee announced it on August 1984 and the statement is applicable to accounts based on both historic and current cost conventions.

Prior to announcement of SSAP 21, reporting of leasing activities was voluntary and consequently leasing was an off balance sheet form of finance. The statement considers finance leases as a substance transfer to the lessee of the majority of risk and rewards of ownership and therefore treats finance leases as creating both

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[60] It should be noted that a decrease in investment in fixed assets is expected to be apparent in those assets which cannot be conveniently leased.

an asset and a liability. Operating leases on the other hand are considered as a contract to supply services rather than finance and accordingly are treated only as an operating expense.

According to SSAP 21, as from 1987 a finance lease should be reported on the lessee's balance sheet as an asset and liability. At the inception of the lease, both asset and the related lease obligation should be recorded at the present values of the minimum lease payments. Leased assets should be described in the balance sheet to distinguish them from owned assets. SSAP 21 is important in this study because my study covers the period before and after the introduction of SSAP 21. In other words as from 1987 finance leases had a similar effect on balance sheet gearing as debt finance.

4.5 Data, Variable definition and Methodology

4.5.1 Data

The data source for my analysis is the Datastream database which provides both accounting data on companies and the market value of equity. The sample was constructed to include all companies with non-missing values for each variable[61] for 10 years period from 1981-1990. The companies belonging to the financial sector and utilities sector were eliminated from the sample due to their specific regulations. The data used in this study were drawn from 22 sectors classified according to London Stock Exchange's FTSE Global Classification System. A full sample comprises of 178 companies. Out of this sample, 106 companies used leasing as one

[61] The exception is lease rate, a variable that needs a capitalised value of lease payments and higher purchase (item 267 on Datastream). The capitalisation of lease payments was not mandatory before 1987 and regulation regarding the capitalisation of leases (SSAP 21) was announced in late 1984. Thus, satisfactory data for lease rates were available only from 1984.

source of finance whereas 72 companies (about 40%) did not use leases over this period.

4.5.2 Definition of variables

The variables are defined as follows:

$$\text{Lease rate} = \frac{\textit{Capitalised value of lease and hire purchase}}{\textit{Total assets}}$$

$$\text{NLD/E ratio} = \frac{\textit{Total loan capital} - \textit{capitalised value of lease and hire purchase}}{\textit{Market value of equity}}$$

$$\text{Price-Earnings ratio} = \frac{\textit{Price of a share}}{\textit{Earnings per share}}$$

$$\text{Effective tax rate} = \frac{\textit{Total tax charge}}{\textit{Adjusted pre-tax profit}}$$

$$\text{Liquidity} = \frac{\textit{Total Current liabilities}}{\textit{Total Current assets}}$$

Total Assets = *ln(Total assets)* = Size

Where NLD/E stands for Non-lease debt to equity

4.5.3 Methodology

In order to assess the impact of corporation tax reforms on leasing I first test the assumption that leasing and debt financing were close substitutes during my sample period. To achieve this I test the Adedeji and Stapleton (1996) model using both OLS regression and a Censored Normal (Tobit) model for the sub-periods '*before*', '*during*', and '*after*' the reform for all companies. I also run the models using changes in variables instead of levels following the corporation tax reform of 1984.

To run the cross sectional regression for the sub-period '*before*' I use the 1981-1983 average value of each variable except for the *lease rate* in which the data used for the sub-period '*before*' relates to the year 1984. For the sub-period '*during*' I use the average value for 1985-1987. For the sub-period '*after*' all variables use values calculated as average for the 1988-1990 period. In all regressions the standard errors are estimated after controlling for any possibility of heteroskedasticity, a phenomenon likely to affect standard errors especially when cross-section data are analysed.

4.5.4 The Hypotheses to be tested

The following sub-section provides an overview of the hypotheses that will be tested relating to the examination of the relationship between leasing and debt finance. Principally, the aim is to investigate, using UK data, the relationship between the use of leasing finance and a company's debt capacity and then to analyse the impact of corporation tax reform on lease financing. The issue is of some importance since, by analysing leasing as one form of equipment financing (alongside equity and debt), insights into this relationship may allow an additional understanding of the broader issues of capital structure.

In building upon the initial direct empirical test of the relationship between leasing and debt capacity via an investigation of changes in a company's use of the two forms of financing, I hope to provide additional evidence on the relevance of corporation taxes on leasing decisions and leasing behaviour in the UK.

Hypothesis 1:

There a negative relationship between lease and debt financing or alternatively stated firms with a high level of non-lease debt ratio will be associated with low lease rate.

The corporate finance literature suggests that corporate debt and leases are close substitute forms of financing. The relationship emanates from the fact that they both shield corporate profit from corporate taxation. According to the literature, firms are likely to prefer the form of finance which is cheap, convenient and has some additional advantages like being an off the balance sheet form of finance and having tax-related advantages. Specifically, the company will prefer lease financing to debt financing if the present value of lease payments is less than the effective cost of buying assets. Since the effective cost of assets depends on a company's tax position (given potential tax shields), the decision on which form of financing to choose will depend on the taxable capacity of the company.

A theoretical model of Adedeji and Stapleton (1996) as modified from Ang and Peterson (1984) suggests a negative relationship between debt ratio and lease ratio. The corporation tax reform of 1984 reduced the statutory corporation tax rate from 52% to 35% and eliminated first year capital allowances on plant and machinery[62], which used to be 100% of an asset's cost. This increases the effective cost of assets and is likely to have an impact on the choice of the source of finance that a company should choose. Recall that in buy versus lease analyses the assumption is that the money used to buy an asset is borrowed. Thus, given an increase in effective purchase price caused by the reform, and the possibility that

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[62] The initial allowances on industrial buildings were also eliminated and they used to be 75% of the cost of a building.

lease may end up using less debt capacity, leasing arrangements is likely to be preferred to debt financing. Thus, I expect an increase in leasing after the reform. A negative relationship between change[63] in debt ratio and change in lease ratio is expected. The same relationship is also expected if levels as opposed to changes in variables are used[64].

Hypothesis 2:

Firms with higher effective tax rate will use more non-lease debt and consequently will have low lease rate

The relationship between a change in a company's effective corporation tax rate and change in lease ratio is expected to be negative. This is consistent with the generally accepted view in the finance literature that corporate tax has a negative influence on the leasing decision. A negative relationship between corporate tax rate and leasing emanates from the argument made earlier that debt financing was preferred to lease prior to the reform and that effective or marginal corporation tax rate is positively related to debt. Under such relationships, a company facing higher effective tax rate is likely to employ more debt. Furthermore, since debt and lease are substitute, a decrease in effective corporation tax rate due to the 1984 reform is expected to be associated with an increase in lease finance. However, it should be noted here that under the strict tax motive for leasing, a relationship between a change in the effective tax rate and lease rate is expected to be positive since lease payments offer the tax advantage similar to that offered by interest payments.

[63] The change in both debt ratio and lease ratio is calculated by subtracting the average ratio 3 years before reform from the average ratio 3 years after reforms.

Hypothesis3:

Financial distress is likely to affect firms' lease rates

The corporate financial theory shows that financial distress potentially affects financial leverage. However, the direction of the relationship can not be determined with certainty. Consequently, the sign of the relationship between lease financing and financial distress as represented by a liquidity variable[65] is uncertain. The literature suggests that a shortage of liquidity may be strong reasons for firms undertaking lease finance. However, firms with a higher liquidity ratio might support a relatively higher debt ratio (and consequently low lease ratio-assuming substitution between debt and lease).

On the other hand, firms with greater liquid assets may use these assets (cash and cash equivalent) to finance investments. This will exert negative impact on both lease rate and debt ratio. Therefore theoretically, the signs of the variables proxying for the liquidity of a company can be either negative or positive. Given the tax disadvantage of retention as a financing source in the UK as discussed in Bond et al (1993), it is reasonable to assume that firms declined to use internally generated cash to finance their activities and therefore the shortage of liquidity is assumed to be better explanation of using lease finance. Consequently, the positive relationship between liquidity variable and lease rate is expected.

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[64] This hypothesis test the documented negative relationship between debt and lease financing.

Hypothesis 4:

Firm size is inversely related to its lease rate

Sharpe and Nguyen (1995) argue that the quality of information concerning a company's performance and future prospect is a negative function of its size. Building on the argument by Sharpe and Nguyen (1995), Adams and Hardwick (1998) argue that the contracting costs associated with transacting business are likely to be greater for small companies compared with large companies, which suggest that small companies are likely to resort to financing the uses of their assets by leasing. Thus, firm size is predicted to be inversely related to the decision to use financial leases since, the size of a company is considered to be one of the factors influencing the form of financing used by companies. The literature shows for example that small firms will have less easy access to other forms of finance like borrowing or issuing new equity (see for example Lasfer and Levis (1998)). Another reason why leasing could be inversely related to size is that small companies may only make partial use assets and therefore face greater uncertainty regarding the future requirements of those assets. Therefore, leasing could help small companies to minimize costs associated with ascertaining assets requirements. The situation is opposite for large companies and to reduce costs of switching between different assets uses they are likely purchase rather than leasing assets. Thus, the small the size of the company the high is likely to be the lease rate and vice versa.

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[65] Note that liquidity is calculated as the current ratio, therefore the higher the ratio the less the financial distress and consequently the higher the lease rate.

Hypothesis 5:

Firm's growth has an effect on its leasing activities

This hypothesis investigates the influence of growth on lease rate and is adopted from Bedford (2002, P. 202). Following the study by Myers (1977) companies with higher growth opportunities are likely to employ less debt financing due to the investment disincentive and asset substitutability problems. He contends that two elements comprise company value: tangible assets-in-place which are valued independent of future corporate investment opportunities and intangible growth options which reflect future discretionary investments. Contracting costs like monitoring expenditure are likely to be lower in companies with tangible assets because such investments are likely to commit owners and managers to certain course of action and thus restrict managerial discretion in decision making. In contrast companies with higher growth options are likely to be associated with uncertain future net cash flows therefore necessitating higher contracting costs. Krishna and Moyer (1994) argue that lease financing is the only financing alternative to equity for rapidly growing companies.Thus companies with high growth options are likely to have higher lease rate than companies with tangible assets consequently positive relationship between lease rate and price-earnings ratio should be expected.

On the other hand, Adedeji and Stapleton (1996) argue that companies that employ less debt (i.e. growth companies) are also likely to use less lease finance due to similarities between debt and leasing. This suggests a negative relationship between lease and growth variables. Given these disagreements in the literature, the direction of the relationship between growth variables and lease rates is less easy to estimate.

I test the above hypotheses by using the following model:

$$\begin{aligned} Lease\ rate &= \alpha + \beta_1 Debt\ ratio + \beta_2 Tax\ rate + \beta_3 Total\ assets + \beta_4 Liquidity \\ &+ \beta_5 P/E\ ratio + \varepsilon \end{aligned} \quad (4.3)$$

Where the variables are as defined in section 4.5.2, βs are coefficients to be estimated, α is the intercept term which captures the unobservable firm characteristics that have an impact on a firm's leasing decision and ε is the error term. The equation above is estimated using actual data for each of the three sub-periods covered in this study as shown on sub-section 4.5.3 and for the changes in variables after the reform.

4.6 Results

4.6.1 General impact of corporation tax reform of 1984 on leasing and debt–lease relationship

In discussing the impact of reform on leasing and debt financing, it should be noted that there are different advantages attributable to leasing as one of the source of financing. Mayes and Nicholas (1988) summarise them as follows.

An additional Source of Finance

Leasing finances the use of an asset without using existing resources. A leasing agreement can cover the full cost of an asset and the payments are normally spread over a period so avoiding lump sum expenditure. The conserved resources may be utilised for other purposes hence cash flow advantages.

Lower Cost

Leasing provides a mechanism for recovering part of the capital allowances that cannot be absorbed immediately due to insufficient taxable profits through the reduced rental payments by a lessor who is tax exhausted. This can effectively lower the cost of finance to the firm and enables it to gain from investment tax incentives which otherwise might be eroded in value and ultimately forgone.

Reduction in Risk

Leasing arrangements enable certain risks to be reduced. An operating lease, for example, transfers the risks of ownership such as technological obsolescence away from the lessee to the lessor. Leasing provides a hedge against inflationary increases in the cost of capital assets by enabling the firm to acquire the use of an asset with lease payments based on current costs the funding of which is spread into the future periods possibly with high inflation.

Long-term Finance

Some sizeable investment programmes require large sum of money which can not be raised from other sources of finance. The funding of such programmes can be conveniently raised over relatively long terms through leasing. Furthermore, financial institutions may prefer to fund by leasing secured on specific assets rather than by other forms of lending.

Improved Portfolio Balance

Leasing is an alternative source of finance to the firm and can assist in forming a balance of funding between various forms of funding operations. It is also commonly held that leasing can increase the debt capacity of the firm.

Ease and Flexibility

Relative to other sources of finance, leasing is often easier to arrange and the form of agreement can be very flexible. Payment of lease payments may be structured to meet revenue patterns of firms, an arrangement that reduces cash flow problems.

Off-balance Sheet

Prior to August 1984 leasing has been considered an off-balance sheet form of finance which does not affect balance sheet gearing ratios. However, in August 1984 a 'Statement of Standard Accounting Practice No. 21' (SSAP 21) which requires the mandatory disclosure of finance leases in the accounts of the lessee was announced and consequently since then finance leases affect balance sheet gearing ratios.

Avoids Controls

Leasing can provide finance which may not be available from other sources as a result of institutional factors. In periods of strict credit control, leasing may be exempt from regulation or there may simply exist a shortage of medium-term finance from financial institutions.

Fixed Agreement

Leasing is a fixed form of agreement which can ease administration, budgetary accuracy and cash flow forecasting.

Revenue Not Capital Account Transaction

Lease payments are met from revenue and so it is possible to avoid capital expenditure limits or borrowing restrictions.

In this study, however, I focus on tax advantage as the motive for leasing. It should also be noted that it is likely that there may be some contamination from other motives. For example one advantage of leasing mentioned in Mayes and Nicholas

(1988) is that lease is considered to be an off-balance sheet form of finance in that they do not affect balance sheet gearing ratios. This advantage, however, seized after the introduction of SSAP 21 that requires that finance leases be disclosed in the accounts of lessee. It is likely that firms reduced the use of leases because of their impact on the balance sheet leverage ratios. Whereas the reform had a negative impact on debt ratios the corresponding impact on lease rates is not obvious, possibly due to the impact of SSAP 21. To analyse the general impact of the 1984 reform on lease rates and debt ratios, I construct a non- lease debt ratio, debt ratio and lease ratio[66] for 1984-1999 using the following formulas:

$$DR1_L = \frac{Total\ loan\ capital - Lea\sin g\ \ finance\ \&\ Hire\ \ purchase}{Total\ \ assets}$$

$$DR2_L = \frac{Total\ \ loan\ \ capital}{Total\ \ assets}$$ - for firms with positive lease rates for 1984-1999

$$LR_L = \frac{Lea\sin g\ \ finance\ \&\ Hire\ \ purchase}{Total\ \ assets}$$

$$DR_L = \frac{Total\ loan\ capital}{Total\ assets}$$

$$DR - NL = \frac{Total\ \ loan\ \ capital}{Total\ \ assets}$$ - for firms with zero lease rates for 1984-1999

The graph showing the relationship of these variables for 1984-99 is presented as figure 4.1 at the end of the chapter. As the graph shows, for this sample, there is evidence of declining lease activities for these companies for the period from 1984 to

[66] Note any observation on finance lease and hire purchase collected for the year 1984 relate to companies which voluntarily disclosed their leasing activities.

1987. Specifically, the lease rate, *LR* decreased by around 56% from 0.016 to 0.007 (see Table 4.3 for values used to create the above graph). At the same time the debt ratio, $DR2_L$ decreased by only 4% whereas $DR1_L$ increased by 4%. An increase in $DR1_L$ suggests that these firms increased their usage of non-lease debt financing to leasing probably due to the fact that lease finance was no longer an off-balance form of finance and there were capital allowances to benefit from. Alternatively it can be argued that a negative impact that the introduction of SSAP 21 had on leasing outweighed its tax advantage emanating from the 1984 corporation tax reform. The negative impact of SSAP 21 on leasing originates from the view that debt and lease are substitutes in that they have similar tax advantage. To an extent that finance lease had an additional advantage of being off the balance sheet in pre-SSAP 21 period, the introduction of SSAP 21 probably led to a shift to operating leases. Assuming that the corporation tax reform made debt relatively expensive and therefore no shift from finance lease to debt was economical, ceteris paribus, the introduction of SSAP 21 was expected to be associated with a decrease in finance leases. As noted earlier however, advantage of lease being off-balance sheet, if any, is not expected to persist. Market efficiency theory suggests that such unfound advantage will not consistently exist and if it exists it will be very temporary and insignificant.

On the other hand, corporation tax reform had a negative impact on the overall leverage of companies (*DR* decreased by 4% during the period from 1984 to 1987). Observing the general relationship between lease rate and debt ratios shows that there exists a negative correlation between these two ratios. Specifically, correlation between LR_L and $DR1_L$ is –0.386 and between LR_L and $DR2_L$ is –0.296. Statistically, none of the correlation coefficients is significantly different from zero.

However, these correlation coefficients do suggest that debt financing and lease are substitutes.

4.6.2 The impact of reform on leasing – for non-zero lease companies

Columns 3 through 5 of table 4.5 show the estimated coefficients of equation 4.3 above. The significant negative coefficient of debt ratio supports the theoretical argument that debt financing and leasing are substitutable forms of finance. Note that the negative relationship between debt and lease rates is highly significant for the periods before and during the reform, suggesting that one form of finance dominated the other during these periods. For example it is argued that debt financing is cheap and therefore a more preferred source of financing than equity and leases (see for example Beattie et al. (2000)). For the companies with capacity to borrow they are likely to prefer debt (hence low lease) during these periods. The relationship between change in leasing and change in debt financing following the reform is insignificantly positive. This suggests that, on average, this reform affected both leasing and debt in the same direction. The impact of a change in corporation tax rate (which implies a positive relationship between lease and debt) more than offset the impact of withdrawing the initial and first year capital allowances (which implies negative relationship).

The sign of the effective tax rate is negative as predicted although the coefficient is statistically insignificant for all 3 sub-periods analysed. The change in lease rate is positively related to the change in effective tax rate. Although the estimated coefficient is small but it is statistically significant. This finding is consistent with the tax motive for leasing documented in the literature (see for example Mayes and Nicholas (1988), Adedeji and Stapleton (1996)). The sign of the variable for size is negative and significant as predicted. The signs of liquidity are negative as predicted but they are statistically insignificant. Similarly, the estimated coefficients of growth are statistically insignificant. This finding is consistent with views that, in general only the effective tax rate and size seem to significantly explain the variations in lease rates. The estimated coefficients are 0.001 and – 0.009 for effective tax rate and size respectively (see last column of Table 4.5).

4.6.3 Industry influence on leasing for firms with non-zero lease rate

4.6.3.1 The influence of industry on the average lease rate

The results showing the industry influence on leasing for firm with non-zero lease rates are given on table 4.6. The inclusion of industry dummy variables reduces the significance of estimated coefficients although the predicted signs remain the same. For example, the estimated coefficients of debt for sub-periods '*before*' and '*during*' were both –0.008 and significant at 5% before adding industry dummy variables (see table 4.5) but they decreased to –0.006 and –0.007 respectively and they are only significant at 10% after adding industry dummy variables (see table 4.6).

Furthermore, the result shows that the average lease rate varies across the sectors. More specifically, the positive coefficients for '*Ind1*' suggest that, on average, manufacturing (and similar) companies use more leasing than other companies. This partly explains the argument that asset characteristics influence leasing. There was a decrease in the average change in lease rate following reform, with a significant decrease for manufacturing and related companies (see the last four rows of the last column of table 4.6). This suggests that the motivation for leasing changed following the reform.

It can be argued that most of the companies who used to borrow (and hence use less lease financing) due to availability of assets which can serve as collateral[67], turned to leasing after the reform because buying assets was no longer attractive due to the absence of first year and initial capital allowances. This argument suggests a negative relationship between the changes in lease rates and 'Ind1' sector dummy because companies categorised under 'Ind1' are likely to have assets which qualify to serve as collateral. Note also a weak positive relationship between the changes in lease rates and the changes in non-lease debt to equity ratio. It should be remembered that after SSAP 21 debt and leasing became more similar in their effects on balance sheet gearing ratios. Note also that both lease and interest payments are tax shelters in that they are deductible for corporation tax purposes.

The effect of the reduction of corporation tax rate was the reduction in corporation tax liability which increases debt capacity of a firm. On the other hand the impact of abolishing initial and first year allowances was to increase the effective costs of assets which result in reduced borrowing. Thus, the results seem to suggest that the positive impact of the reform emanating from the reduction in statutory corporation tax rate dominate the negative impact resulting from reduced capital allowances. Furthermore, the literature shows that even after the reform there was a bias in favour of debt, so it is not a surprise that there was but insignificant increase in non-lease debt to equity ratios after the reform. It is also possible that some long-term debt contracts were still valid and although debt was relatively unattractive,

[67] The details of how assets structure affect company borrowing behaviour are given in Beattie et al. (2000, p. 431).

either it was not legally possible to terminate such contracts or it was uneconomic to do so.

The results discussed under this section to some extent differ from that presented by Adedeji and Stapleton (1996) in that they find no industry influence on leasing. Possible explanation for the difference is that Adedeji and Stapleton (1996) did not group sectors with similar leasing-incentive characteristic(s) and consequently some sectors had very few observations and possibly this reduced the power of their tests.

4.6.3.2 The influence of industry on the relationship between lease rates and debt ratios

In order to test the influence of industry on the relationship between leasing and debt financing I added a multiplicative industry-dummy on the variable NLD/E in equation (4.3). The results provide evidence of the changed significance of coefficients of non-lease debt to equity ratio although the signs are negative as predicted.

The degree of substitutability of debt–to-lease seem to differ across sectors albeit statistically insignificant. For example, the degree of substitutability decreased from being significant at 5% to being significant at 10% for companies categorised under industry group 1, *Ind1*, which is dominated by manufacturing/engineering companies (see Table 4.2 for details of industry grouping and table 4.7 for the results). In either case, however, the displacement ratio is significantly less than one but statistically different from zero. On the other hand, the degree of substitutability increased for companies categorised under group 3-which is dominated by support services and retail businesses.

The results show further that, the changes in lease rates following the reform are positively related to the changes in effective tax rate and inversely related to the size of the company (see the last column of table 4.7). In general, the inclusion of a multiplicative industry dummy variable does not change the expected sign as documented in Adedeji and Stapleton (1996).

4.6.3.3 The influence of industry on the relationship between lease rate and effective tax rate

The tax-related advantage is argued to be one of the most important motives for leasing (see for example Lasfer and Levis (1998)). The empirical results from this study support the argument that effective tax rate is negatively related to lease rate (see tables 4.6 to 4.8). The results imply that companies with higher effective tax rates, on average, finance relatively small fraction of their assets by using leases. This evidence supports the pecking order theory of capital structure, which suggests that, ceteris paribus, debt is the preferred form of financing next only to retained earnings (see for example Beattie et al (2000) and Myers and Shyam-Sunder (1999)). It is interesting, therefore to analyse whether the documented relationship differs across sectors.

The results show that the relationship between tax rate and lease rate differs across sectors. More specifically, by assuming that debt financing is preferred to leasing, results show that capital intensive companies (i.e. those grouped under '*Ind1*' in Table 4.2) used lease financing despite the claimed preference of debt over leasing. On the other hand companies grouped under 'Ind3', those with relatively less capital investments, preferred to finance their investments by borrowing rather than leasing (see the last 4 rows of column 3, Table 4.8). For this group of companies there was no significant impact resulting from abolished initial and first year capital allowances and it enjoyed the relatively lower cost of finance offered by leasing relative to the cost of borrowing. Thus, during the sub-periods 'during' and 'after' it is also possible that the companies categorised under 'Ind3' used tax-motivated leases probably because of tax disadvantage of debt prompted by corporation tax reform (see the positive coefficients of multiplicative dummy variables on last 2 rows of columns 4 and 5, Table 4.8). For the sub-period 'before' the negative coefficient of '*Ind3 × Tax rate*' implies that borrowing money to finance the purchase of assets was advantageous due the generosity of corporation tax during that period. It is therefore not a surprise for a company with taxable profit to prefer debt financing to leasing during this sub-period. As expected, and as opposed to the influence of industry on the '*lease rate*' versus '*debt ratio*' relationship, the multiplicative dummy variables on effective tax rate significantly explain the change in lease rates following the reform. The variable proxing for size continues to be a significant determinant of leasing activities across companies.

Note that the discussion so far used the empirical data on companies with positive lease rates. In the following sub-section I discuss the results of analysis of data involving all companies- those that used lease financing and those with zero lease rates. I use a tobit model similar to that used by Adedeji and Stapleton (1996) but I extend the analysis of industry influence to include multiplicative dummy variables on both debt ratio and effective tax rate. The aim, as mentioned before, is to investigate whether the relationship between leasing and debt financing is affected by the corporation tax reform and more importantly to investigate whether the strength of taxable capacity as one of the determinants of leasing vary across the sectors.

4.6.4 The Impact of reform on leasing: Results obtained by using Tobit Model on full sample

Columns 3 through 5 of Table 4.9 show the parameters of equation 4.3 as estimated by the Tobit model. The significant negative coefficient for debt ratio supports the theoretical argument that debt financing and leasing are substitutable forms of finance. Note that the negative relationship between debt and leasing is highly significant for the sub-periods '*before*' and '*after*' the reform, suggesting that one form of finance dominated the other during these sub-periods.

As discussed previously debt financing is considered to be the cheaper mode of financing and therefore the preferred source of financing by some companies (see for example Beattie et al. (2000)). For companies with a capacity to borrow they are likely to prefer debt at these periods, whereas those that have reached their debt capacity are likely to use leases. Furthermore, it is argued in the literature that the pre-reform corporation tax system in the UK favoured debt and therefore debt was preferred to other forms of finance (see for example Edward (1984), Devereux (1988) and Moon and Hodges (1989)). On the other hand it can be argued that a significant negative relationship during the '*after*' sub-period is attributable to the unattractiveness of borrowing, which, other things remaining constant, was associated with an increase in use of leasing. Thus, my results suggest that debt dominated leasing for the period before the reform but due to the reduced attractiveness of debt, leasing dominated debt financing after reform. The relationship between the changes in leasing and the changes in debt financing following the reform remains insignificantly positive. This suggests that, on average, the corporation tax reform affected both leasing and debt financing in the same direction (see the analysis on section 4.6.3.2).

The sign of the effective tax rate is predominantly positive albeit statistically insignificant for all 3 sub-periods. The relationship between effective tax rate and lease rate is positive except for the sub-period 'before'. This is opposite to the general theoretical prediction as documented in the Adedeji and Stapleton (1996) study. The results seem to suggest that, once the analysis includes both leasing and non-leasing companies, the taxable capacity play an important role in influencing leasing. A negative coefficient of ETR for the sub-period 'before' is consistent with the view that most companies were not paying tax and already they had a larger amount of debt so it was uneconomical to use lease. The change in lease rate is positively related to the change in effective tax rate; this is consistent with a tax motive for leasing. The sign of the variable for size is negative and significant as predicted. The signs of liquidity and growth are as predicted but they are statistically insignificant. In general only the effective tax rate and size seem to significantly explain the changes in lease rate following reform.

4.6.5 The influence of Industry on leasing: Full sample analysis –Tobit Model

4.6.5.1 The influence of the industry on average lease

The results showing the influence of leasing for full sample comprising companies that use leases and those that do not use leases are given in Table 4.10. The estimated value of the intercept, α, that represents the average value of the lease rate independent of a set of explanatory variables used, is significantly positive over all sub-periods analysed (see row 4 of Table 4.10). This suggests that for some reason(s), companies in the UK consider leasing as an important source for financing their activities. This, to some extent, supports the results by Mayes and Nicholas (1988) who reported increased leasing activities in the UK. Similar to the reported results for firms with a positive lease rate, there is an insignificant decrease in the significance of estimated coefficients when the industry dummies are added in the analysis. The signs of coefficients, however, remain unchanged. The results (see the last but 3 rows of table 4.10) show that the average lease rate is high for companies grouped under industry group 1 (i.e. *Ind1*). The estimated z-values for all 3 sub-periods are above 4, indicating a significant upward shift of the intercept term. For companies grouped under industry group 3 (i.e. *Ind3*), the results show a relatively small upward shift of the intercept term for the sub-period '*before*'. In other sub-periods the upward shift is significant (see last 2 rows of columns 4 & 5 of Table 4.10). This significant increase in average lease rate for the sub-periods 'during' and 'after' is partly attributable to the unattractiveness of debt induced by the corporation tax reform and support the argument that reform had a positive impact on leasing.

It is interesting to note that after including firms with zero lease rate, the estimated coefficients of growth and liquidity turned out to be significant. Ozkan (2001) and Adedeji and Stapleton (1996) argue on the basis of bankruptcy costs that growing firms are likely to use lower financial leverage. Adedeji and Stapleton (1996) argue further that similarities between finance leases and debt imply that growth firms will also use fewer leases, and consequently they predicted a negative relationship between lease and growth. The estimated coefficients (given in Table 4.10) are predominantly positive, with the coefficient for sub-period '*before*' highly statistically significant. This rather unexpected result might have been driven by the fact that about 40% of the companies in this sample do not use leasing and their respective debt ratios are on average higher than that of companies that do use lease financing.

A shortage of liquidity is argued to be one of the possible reasons for using lease financing (see for example Ozkan (2001)). Previous results for firms that use leases support this argument. However, once the analysis involves all companies in the sample (those using leases and those who do not), the results seem to suggest otherwise. The estimated coefficients of liquidity for all sub-samples (see Table 4.10 for details) are negative and significant supporting the argument that firms with a higher level of short-term liabilities relative to liquid assets tend to avoid the use of leasing (and debt financing). As shown in the analysis of firms with positive lease rates (see sub-section 4.6.3.1), changes in lease rates are positively related to the changes in effective tax rates; this is consistent with the tax motive for leasing. The estimated coefficient of size variable is negative and significant as predicted. The signs of liquidity and growth variables are as predicted but they are statistically insignificant. In general only size seems to significantly explain the changes in lease rate following the reform. Note that size is estimated by using total assets, so companies which experienced large change in total assets are probably large companies with profitable investments that were brought forward and financed by borrowing to utilise the capital allowances that were still available during the reform period. For these companies, there was only a small change in lease rates. The opposite is true for small companies.

4.6.5.2 The industry influence on the relationship between lease rate and debt ratio

The results to show the influence of industry categorisation of firms on the relationship between lease rate and debt ratio are shown on Table 4.11. Comparing the results given on Table 4.9 and 4.11 it is evident that the estimated coefficients of debt ratio and their significance decreased considerably after the introduction of dummy variables. For example, for the sub-period '*before,*' the estimated coefficient decreased from –0.006 (see table 4.9) to –0.001 (see Table 4.11); whereas for the sub-period '*after*' it decreased from –0.031 to –0.001. There is no significant change in estimated coefficients for the sub period *'during'*.

Thus, the degree of substitutability between debt and leasing varies across sectors. Consistent with a tax motive for borrowing and leasing, the change in lease rate following reform is positively related to debt ratio and effective tax rate. The changes in all other variables are negatively related to a change in lease rate following reform. All estimated coefficients, however, are statistically insignificant except for the coefficient of size.

4.6.5.3 The industry influence on the relationship between lease rate and effective tax rate

The results presented on Table 4.12, show that the inclusion of a multiplicative industry dummy variable on effective tax rate has a significant impact not only on the relationship between lease rates and effective tax rate but also on other variables. For example, the estimated coefficients indicate that all variables significantly explain the cross sectional variations in leasing for the sub-period '*before*' (compare the statistical significance of estimated coefficients under sub-period '*before*' on table 4.12 with corresponding coefficients shown on Tables 4.9-4.11). The estimated coefficients of multiplicative dummy variables '*Ind1 x TR*' and '*Ind3 x TR*' are positive and highly significant. This suggest that regardless the sector to which the firm belong, there is a decrease in the negatively relationship between lease rate and effective tax rate. Specifically, the results suggest that corporation tax rate have negative impact on leasing.

Furthermore, the results show that changes in lease rates following reform are significantly explained by changes in effective tax rate and size. As the last column of Table 4.12 shows, the extent to which effective tax rate explain the changes in lease rates vary across sectors being higher for less capital intensive companies i.e. those grouped under 'IND3' on table 4.2 (see last 4 rows of the last column of Table 4.12).

4.7 Summary and Conclusion

In this study I analyse the impact of corporation tax reform of 1984 on leasing and in so doing I test the relationship between lease and debt financing. I analyse the predicted relationship between lease rate and its determinants (one of them being tax rate) for three sub-periods around the corporation tax reform of 1984. On the strength of theories, I also investigate whether the relationship between lease and both debt and tax rate varies across sectors (see for example Bedford (2002)).

The results show that the corporation tax reform of 1984 had an impact on leasing and consequently support the evidence found in earlier study by Adedeji and Stapleton (1996) that debt financing and leasing are substitutes. On average for those firms which employ lease (i.e. those with non-zero lease rate), an increase in debt-equity ratio by 0.1 unit will be associated with a decrease in lease rate by 0.0008 for the period 'before' the reform and by 0.0019 units for the period 'after' the reform. On average, the highest amount of lease rate displaced by debt is 0.0016 units per 0.1 unit of debt ratio employed.

I also find that for firms that employ finance lease there is a negative relationship between effective tax rate and lease rate. However, the changes in effective tax rates following reform are positively related to lease rates. Thus, the results support the tax motive for leasing. In general, size and effective tax rate are significant determinants of lease rate in all sup-periods analysed.

Perhaps the interesting result is that on average the debt-to-lease displacement ratio varies across industries. As shown in previous sections, the average lease rate also varies across industries. Industries that invest heavily on machinery seem to have relatively higher lease rate.

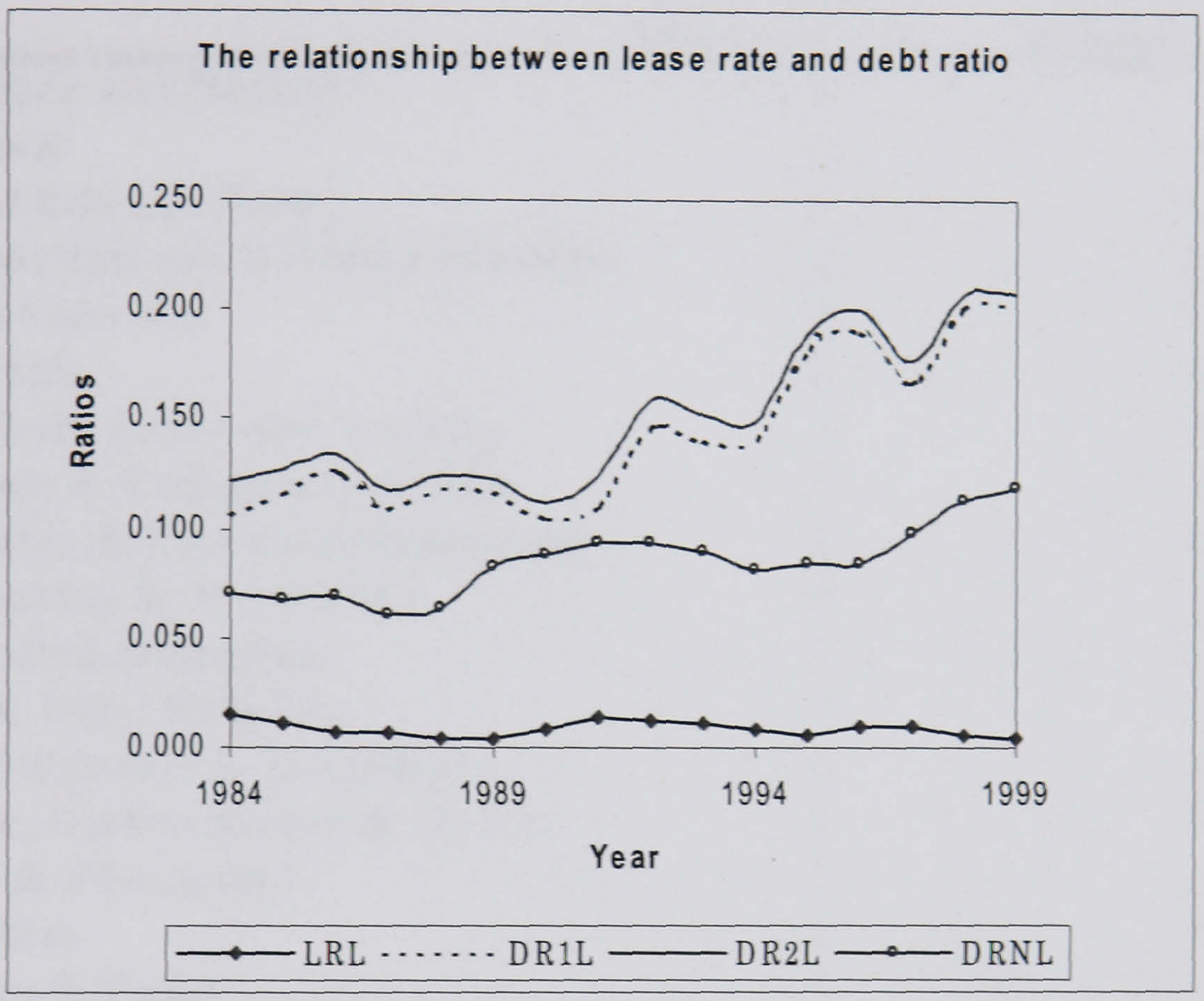
The results produced by using Tobit model for full sample are similar to those for firms with non-zero lease rate except that the significance of estimated coefficients were higher for full sample results. Furthermore, liquidity and growth variables, which failed to be significant under analysis involving non-zero lease rate, turned to be significant in the analysis of full sample. This is logical since one cannot argue for example on the impact of lack of liquidity on leasing by analysing the firms that employ lease alone. In most cases, the signs of estimated coefficients are as predicted by theory.

It should be noted that this conclusion is based on a relatively small sample and that the period covered is unique in that I analyse the impact of reform on leasing using the period during which the reporting of lease was not mandatory. The small sample size used in this study reflects the fact that only few companies willingly reported their leasing activities at the period around the reform. It is possible that these results have some feature that is unique and therefore a similar study using different sample period might end up with different conclusion. However, the results support the argument that, given the relationship between lease and debt as forms of financing, the reform will have impact on leasing activities in the UK.

The analysis covered in chapters 3 and 4 show that corporation tax is one of the most important factors that need to be considered in deciding on a company's capital structure. Furthermore, the literature shows that analysts use after tax cash flows in determining the value of companies (see for example Modigliani and Miller (1963), Pike and Neale (2003), to mention only few). It should be noted that after tax cash flows of a particular company at a particular period depend on the tax position of that company at that period. The UK corporation tax system provides for deduction of allowances that are not evenly distributed across the companies and consequently, the volatility of after tax cash flows across companies may be different. It is therefore important to investigate whether the volatility of after tax cash flows changed during the reform.

In chapter 3 I analysed the impact of reform on capital structure. The results showed that corporation tax reform of 1984 had some effects on capital structure. That being the case, I expect the reform to have an impact on return on equity and consequently on the systematic risk of the companies. In the next chapter, chapter 5, I investigate the impact of reform on the systematic risk of the companies.

Figure 0-1: Relationship between lease rate and debt rate for 1984-99



Notes:

The values used to draw this graph are mean value of the ratios calculated by using formulas above. The label LRL in the legend stands for lease rate for firms with positive lease rate where as DR1L stands for non-lease debt ratio for firms with positive lease rate. DR2L is overall debt ratio for the firms with positive lease rate. DRNL stands for debt ratio for the firms with zero lease rate.

Table 0-1: Sample composition by sector

Sector	Companies which employ lease	Companies which did NOT employ lease
Aerospace and Defence	4	-
Transport	3	-
Automobile and Parts	2	-
Construction and Building Materials	10	16
Support services	10	3
Chemicals	8	4
Household goods and Textiles	5	8
Software & Computer services	6	-
Electronic & Electrical Equipment	8	5
Engineering & Machinery	15	3
Diversified industrials	2	1
Food & Drug Retailers	5	4
Food Producers & Processors	4	3
Leisure, Entertainment & Hotels	2	8
Media & Photograph	7	1
Oil & Gas	2	3
Forestry & Paper	2	-
General Retailers	6	7
Telecommunication Services	1	1
Tobacco	1	-
Distributors	3	2
Beverages	-	2
Mining	-	1
Total	**106**	**72**

Table 0-2: Grouping of sectors

Sectors are grouped into workable groups conveniently arranged to undertake industrial analysis. The three groups form three dummy variables and capture the extent to which corporation tax reform is likely to affect different sectors differently.

Group 1 (IND1)	Group 2 (IND2)	Group 3 (IND3)
Aerospace & Defence	Construction & Building Materials	Business support
Electronic & Electrical Equipment	Chemicals	Food & Drug retailers
Engineering & Machinery	Beverages	General retailers
Diversified industrials	Food Producers & Processors	Leisure, Entertainment & Hotels
Automobile & Parts	Household goods & Textiles	Media & Photography
Oil & Gas	Tobacco	Telecommunication services
Mining	Forestry & Paper	Distributors
		Transport
		Software & Computer services
Groups Summary:		
Leasing firms = 33	Leasing firms = 30	Leasing firms = 43
Non-leasing firms =17	Non-leasing firms = 31	Non-leasing firms = 24
Total firms = 50	Total firms = 61	Total firms = 67

Notes:
All data used to categorise the companies were obtained from Datastream. The industry analysis results reported in this table are based on London Stock Exchange's FTSE Global Classification System.

Table 0-3: The mean value of lease rates and debt ratios for the period 1984-99.

Year	LRL	DR1L	DR2L	DRNL
1984	0.016	0.106	0.122	0.071
1985	0.012	0.116	0.127	0.068
1986	0.008	0.127	0.135	0.070
1987	0.007	0.110	0.117	0.061
1988	0.005	0.119	0.124	0.064
1989	0.005	0.118	0.122	0.082
1990	0.008	0.105	0.112	0.088
1991	0.014	0.110	0.124	0.095
1992	0.012	0.146	0.158	0.094
1993	0.011	0.142	0.152	0.090
1994	0.008	0.141	0.149	0.081
1995	0.006	0.183	0.189	0.084
1996	0.010	0.190	0.200	0.085
1997	0.010	0.167	0.177	0.097
1998	0.006	0.202	0.208	0.113
1999	0.004	0.203	0.207	0.119

Notes:
The values under the column labelled 'LR_L' are mean values for the variable '*lease rate*' for leasing firms. The column labelled '$DR1_L$' contain mean values of the 'non-lease debt ratio' for leasing firms whereas that labelled '$DR2_L$' contains mean values of '*overall debt ratio*' for the firms with positive lease rate. The values under the column labelled 'DR_{NL}' are mean values for the debt ratio for firms with zero lease rate (i.e. those which didn't use lease over the period 1984-99).

Table 0-4: The descriptive statistics of the variables used as determinants of lease for three sub-periods

Variable	Statistics	Before	During	After
Lease Rate	Mean	0.008	0.009	0.009
	Median	0.002	0.002	0.002
	Std. Dev.	0.015	0.020	0.019
	Minimum	0.000	0.000	0.000
	3rd Quartile	0.008	0.008	0.010
Debt ratio	Mean	0.686	0.758	0.667
	Median	0.074	0.067	0.062
	Std. Dev.	3.002	3.629	3.403
	Minimum	-0.090	-0.083	-0.004
	3rd Quartile	0.234	0.207	0.219
Tax Rate	Mean	3.010	0.699	0.369
	Median	0.520	0.412	0.350
	Std. Dev.	32.480	4.002	0.514
	Minimum	0.000	0.000	0.000
	3rd Quartile	0.530	0.431	0.359
Total Assets (Size)	Mean	529.081	566.977	801.761
	Median	40.903	67.171	113.171
	Std. Dev.	2187.926	1972.633	2383.598
	Minimum	0.425	1.031	1.700
	3rd Quartile	213.428	252.889	458.478
Liquidity	Mean	0.681	0.734	0.795
	Median	0.641	0.649	0.710
	Std. Dev.	0.280	0.370	0.600
	Minimum	0.135	0.231	0.135
	3rd Quartile	0.809	0.806	0.884
P – E ratio	Mean	18.820	27.380	16.180
	Median	13.400	15.530	12.070
	Std. Dev.	20.700	74.550	24.760
	Minimum	2.700	3.200	5.130
	3rd Quartile	21.270	22.000	15.050

Notes:

Variables are defined in section 5. The values of Total assets are given in million £. The values for columns labelled 'before', 'during' and 'after' represent the values for the respective sub-periods and are calculated as given in section 4.5.

Table 0-5: The estimated OLS coefficients for leasing companies for the periods around corporation tax reform of 1984.

Dependent Variable: Lease Rate
Method: Least Squares
White Heteroskedasticity-Consistent Standard Errors & Covariance

Variable	Coefficient	Before	During	After	Change
Intercept		0.014 *	0.035 ***	0.037 ***	0.005 *
		(1.736)	(3.613)	(2.812)	(1.946)
Debt Ratio	1	-0.008 **	-0.008 **	-0.019	0.001
		(-2.279)	(-2.106)	(-1.147)	(0.375)
Effective Tax Rate	2	-0.002	-0.001	-0.001	0.001 ***
		(-1.138)	(-0.094)	(-0.005)	(3.483)
Size (Total assets)	3	-0.001	-0.002 ***	-0.002 *	-0.009 ***
		(-0.195)	(-2.587)	(-1.883)	(-3.196)
Liquidity	4	0.001	0.007	0.002	-0.001
		(0.077)	(1.017)	(0.902)	(-0.322)
Growth (PER)	5	0.001	-0.001	-0.001	-0.001
		(0.626)	(-1.298)	(-0.122)	(-0.331)

Notes:
The dependent variable LR is calculated by dividing the capitalised value of lease and hire purchase (item 267) by the book value of total assets (item 392). Debt ratio is calculated as a ratio of total loan capital (item 321) excluding lease and hire purchase (item 267) to the market value of equity. Effective tax rate is calculated as a ratio of total tax charge (item 203) to the adjusted pre-tax profit (item 157). Size is estimated as the natural logarithm of total assets. Liquidity is calculated as the ratio of total current liabilities (item 389) to the total current assets (item 376). Growth is estimated as the ratio of market price of company share to earnings available to shareholders. The column labelled 'before' shows the coefficients and their respective t-statistics estimated by using the average values of the variables for 1981-83. The column labelled 'during' shows the coefficients and their respective t-statistics estimated by using the average values of the variables for 1985-87. The column labelled 'after' shows the coefficients and their respective t-statistics estimated by using the average values of the variables for 1988-90. The column labelled 'change' shows the coefficients and their respective t-statistics estimated by subtracting the values of the variables 'during' reform from the values of the variables 'after' the reform. T-statistics are enclosed in brackets. The symbols ***,**, and * indicate that coefficient is significant at 1%, 5% and 10% levels, respectively.

Table 0-6: The OLS coefficients estimated to analyse the impact industries on average lease rate: A non-zero lease rate sample

Dependent Variable: Lease Rate

Method: Least Squares

White Heteroskedasticity-Consistent Standard Errors & Covariance

Variable	Coefficient	Before	During	After	Change
Intercept	α	0.012	0.031 ***	0.032 ***	0.007 ***
		(1.453)	(3.433)	(2.528)	(2.777)
Debt Ratio	β_1	-0.006 *	-0.007 *	-0.016	0.002
		(-1.676)	(-1.756)	(-1.115)	(0.693)
Effective Tax Rate	β_2	-0.004 **	0.001	-0.001	0.001
		(-2.189)	(-0.756)	(-0.529)	(1.538)
Size (Total assets)	β_3	-0.001	-0.002 ***	-0.002 *	-0.009 ***
		(-0.418)	(-2.743)	(-1.742)	(-3.635)
Liquidity	β_4	0.003	0.006	0.001	-0.001
		(0.477)	(0.956)	(0.582)	(-0.377)
Growth (PER)	β_5	0.001	-0.001	0.001	-0.001
		(0.957)	(-1.522)	(0.028)	(-0.597)
Ind1	β_6	0.009 **	0.007 *	0.002	-0.005 **
		(2.079)	(1.873)	(0.721)	(-2.024)
Ind3	β_7	-0.002	0.006	0.007	-0.001
		(-0.711)	(1.123)	(1.291)	(-0.094)

Notes:

The variables 'Ind1' and 'Ind3' are dummy variables for companies belonging to sector group 1 and 3 respectively (see table 4.2 for detail of groupings). They are introduced to capture the changes in average lease rate across the industries. T-statistics are enclosed in brackets. The symbols ***,**, and * indicate that coefficient is significant at 1%, 5% and 10% levels, respectively. See also notes under Table 4.5 above.

Table 0-7: The OLS coefficients estimated to analyse the impact industry on the relationship between lease rate and debt ratio: A non-zero lease rate sample

Dependent Variable: Lease Rate

Method: Least Squares

White Heteroskedasticity-Consistent Standard Errors & Covariance

Variable	Coefficient	Before	During	After	Change
Intercept	α	0.014 *	0.036 ***	0.036 ***	0.005 *
		(1.697)	(3.644)	(3.644)	(1.81)
Debt Ratio	β_1	-0.008	-0.007	-0.007	0.001
		(-1.422)	(-1.517)	(-1.517)	(0.349)
Effective Tax Rate	β_2	-0.002	-0.001	-0.001	0.001 ***
		(-1.100)	(-0.127)	(-0.127)	(3.451)
Size (Total assets)	β_3	-0.001	-0.002 ***	-0.002 *	-0.009 ***
		(-0.218)	(-2.702)	(-2.702)	(-3.050)
Liquidity	β_4	0.001	0.007	0.007	-0.001
		(0.091)	(1.039)	(1.039)	(-0.304)
Growth (PER)	β_5	0.001	-0.001	-0.001	(-0.001)
		(0.62)	(-1.256)	(-1.256)	-0.328
Ind1 X Debt Ratio	β_6	0.001	0.002	0.002	-0.001
		(0.047)	(0.146)	(0.146)	(-0.067)
Ind3 X Debt Ratio	β_7	-0.001	-0.001	-0.001	-0.001
		(-0.137)	(-0.183)	(-0.183)	(-0.044)

Notes:

The variables '*Ind1 x Debt ratio*' and '*Ind3 x Debt ratio*' are multiplicative dummy variables for companies belonging to sector group 1 and 3 respectively (see table 4.2 for detail of groupings). They capture the change in estimated coefficients of '*Debt ratio*' across industries. T-statistics are enclosed in brackets. The symbols ***,**, and * indicate that coefficient is significant at 1%, 5% and 10% levels, respectively. See also notes under Table 4.5 above.

Table 0-8: The OLS coefficients estimated to analyse the impact industry on the relationship between lease rate and effective tax rate: A non-zero lease rate sample

Dependent Variable: Lease Rate

Method: Least Squares

White Heteroskedasticity-Consistent Standard Errors & Covariance

Variable	Coefficient	Before	During	After	Change
Intercept	α	0.018 **	0.038 ***	0.037 ***	0.004
		(2.066)	(3.934)	(2.764)	(1.594)
Debt Ratio	β_1	-0.006 *	-0.007 *	-0.016	0.001
		(-1.662)	(-1.640)	(-1.112)	(0.362)
Effective Tax Rate	β_2	-0.014 *	-0.019 **	-0.018	-0.037 **
		(-1.780)	(-2.308)	(-1.291)	(-2.163)
Size (Total assets)	β_3	-0.001	-0.002 ***	-0.002	-0.009 ***
		(-0.463)	(-2.637)	(-1.520)	(-3.450)
Liquidity	β_4	0.005	0.007	0.001	-0.001
		(0.603)	(1.097)	(0.595)	(-0.021)
Growth (PER)	β_5	0.001	-0.001 *	0.001	0.001
		(0.615)	(-1.649)	(0.004)	(0.047)
Ind1 X Tax Rate	β_6	0.013 *	0.019 **	0.005	0.037 **
		(1.648)	(2.311)	(0.63)	(2.172)
Ind3 X Tax Rate	β_7	-0.006	0.011	0.018	0.038 **
		(-0.827)	(0.909)	(1.317)	(2.176)

Notes:

The variables '*Ind1 x Tax rate*' and '*Ind3 x Tax rate*' are multiplicative dummy variables for companies belonging to sector group 1 and 3 respectively (see table 4.2 for detail of groupings). They capture the change in estimated coefficients of 'effective tax rate' across industries. T-statistics are enclosed in brackets. The symbols ***,**, and * indicate that coefficient is significant at 1%, 5% and 10% levels, respectively. See also notes under Table 4.5 above.

Table 0-9: Regression coefficients estimated by using 'censored normal (Tobit)' model for full sample.

The model estimated is:

$$LR = \alpha + \beta_1 DR + \beta_2 ETR + \beta_3 Size + \beta_4 LIQ + \beta_5 GR + \varepsilon$$

Dependent Variable: Lease Rate

Method: ML - Censored Normal (TOBIT)

Variable	Coeff	Before	During	After	Change
Intercept	α	0.015 ***	0.050 ***	0.031 ***	0.004 ***
		(10.158)	(12.457)	(6.742)	(4.011)
Debt Ratio	β_1	-0.006 ***	-0.001	-0.031 ***	0.001
		(-2.726)	(-0.764)	(-3.729)	(0.089)
Effective Tax Rate	β_2	-0.003	0.001	0.002	0.001
		(-0.826)	(0.122)	(0.282)	(0.107)
Size (Total assets)	β_3	-0.001 ***	-0.004 ***	-0.002 ***	-0.007 ***
		(-3.394)	(-10.097)	(-3.417)	(-7.492)
Liquidity	β_4	-0.004 ***	0.002	-0.004 ***	-0.001
		(-2.518)	(0.929)	(-4.097)	(-0.051)
Growth (PER)	β_5	0.001 ***	-0.001	0.001	-0.001
		(10.692)	(-0.657)	(0.763)	(-0.525)

Notes:

LR = lease rate; *DR* = debt ratio; *ETR* = effective tax rate; *Size* = natural logarithm of total assets; *LIQ* = liquidity and *GR* = is growth variable.

See also notes under table 4.5. Z-values are enclosed in brackets.

Table 0-10: Regression coefficients estimated by using 'censored normal (Tobit)' model for full sample with simple sector dummy.

The model estimated is

$$LR = \alpha + \beta_1 DR + \beta_2 ETR + \beta_3 Size + \beta_4 LIQ + \beta_5 GR + \beta_6 Ind1 + \beta_7 Ind3 + \varepsilon$$

Dependent Variable: Lease Rate

Method: ML - Censored Normal (TOBIT)

Variable	Coeff.	Before	During	After	Change
Intercept	α	0.007 **	0.037 ***	0.028 ***	0.005 ***
		(2.162)	(5.304)	(6.125)	(3.630)
Debt Ratio	β_1	-0.001 ***	-0.001	-0.001	0.001
		(-2.48)	(-1.569)	(-1.424)	(0.114)
Effective Tax Rate	β_2	-0.004	0.001	0.001	0.001
		(-0.985)	(0.025)	(0.056)	(0.068)
Size (Total assets)	β_3	-0.001	-0.003 ***	-0.002 ***	-0.007 ***
		(-1.204)	(-6.262)	(-4.068)	(-7.633)
Liquidity	β_4	-0.001	-0.004 ***	-0.002 **	-0.001
		(-0.762)	(-2.694)	(-2.001)	(-0.074)
Growth (PER)	β_5	0.001 ***	-0.001	0.001	-0.001
		(6.228)	(-0.949)	(0.410)	(-0.528)
Ind1	β_6	0.009 ***	0.013 ***	0.008 ***	-0.003
		(8.169)	(6.972)	(4.037)	(-1.595)
Ind3	β_7	0.002 *	0.016 ***	0.010 ***	-0.001
		(1.781)	(8.556)	(5.627)	(-0.193)

Notes:

See notes on Table 4.6 and Table 4.9 for description of the variables and test statistics. See also Table 4.2 for sectors groupings.

Table 0-11: Regression coefficients estimated by using 'censored normal (Tobit)' model for full sample with multiplicative dummy on DR.

The model estimated is:

$$LR = \alpha + \beta_1 DR + \beta_2 ETR + \beta_3 Size + \beta_4 LIQ + \beta_5 GR + \beta_6 Ind1 \times DR + \beta_7 Ind3 \times DR + \varepsilon$$

Dependent Variable: Lease Rate

Method: ML - Censored Normal (TOBIT)

Variable	Coeff.	Before	During	After	Change
Intercept	α	0.005 *	0.022 ***	0.021 ***	0.004 ***
		(1.717)	(3.554)	(3.647)	(3.986)
Debt Ratio	β_1	-0.001	-0.001	-0.001	0.001
		(-0.310)	(-0.088)	(-0.050)	(0.054)
Effective Tax Rate	β_2	-0.002	0.001	0.001	0.001
		(-0.560)	(0.013)	(0.075)	(0.106)
Size (Total assets)	β_3	-0.001	-0.002 ***	-0.001 **	-0.007 ***
		(-0.242)	(-2.679)	(-2.316)	(-7.341)
Liquidity	β_4	0.003 **	0.007 ***	0.003 ***	-0.001
		(2.425)	(3.267)	(3.076)	(-0.048)
Growth (PER)	β_5	0.001	-0.001	0.001	-0.001
		(2.055) **	(-0.229)	(0.437)	(-0.459)
Ind1x DR	β_6	0.001	0.001	0.001	-0.001
		(0.152)	(0.083)	(0.014)	(-0.031)
Ind3 x DR	β_7	0.001	0.001	0.001	-0.001
		(0.178)	(0.045)	(0.023)	(-0.033)

Notes:
The multiplicative dummy variables '*Ind1 x DR*' and '*Ind3 x DR*' analyse the change in estimated coefficients due to the fact that companies belong to a particular sector group. For more details see Table 4.2. See also notes under Table 4.8 and 4.9.

Table 0-12: Regression coefficients estimated by using 'censored normal (Tobit)' model for full sample with multiplicative dummy on ETR.

The model estimated is:

$$LR = \alpha + \beta_1 DR + \beta_2 ETR + \beta_3 Size + \beta_4 LIQ + \beta_5 GR + \beta_6 Ind1 \times ETR + \beta_7 Ind3 \times ETR + \varepsilon$$

Dependent Variable: Lease Rate
Method: ML - Censored Normal (TOBIT)

Variable	Coeff.	Before	During	After	Change
Intercept	α	0.017 ***	0.048 ***	0.020 ***	0.003 ***
		(5.708)	(8.629)	(5.018)	(3.287)
Debt Ratio	β_1	-0.006 ***	-0.001	-0.031 ***	0.001
		(-3.965)	(-1.457)	(-3.739)	(0.086)
Effective Tax Rate	β_2	-0.020 ***	-0.030 ***	-0.056 ***	-0.023 ***
		(-3.861)	(-7.594)	(-5.025)	(-2.614)
Size (Total assets)	β_3	-0.001 *	-0.003 ***	-0.001	-0.007 ***
		(-1.919)	(-5.733)	(-0.632)	(-7.668)
Liquidity	β_4	-0.005 ***	-0.002	-0.006 ***	0.001
		(-3.448)	(-1.000)	(-5.464)	-0.118
Growth (PER)	β_5	0.001 ***	-0.001	0.001	0.001
		(7.940)	(-0.644)	(0.728)	(-0.308)
Ind1x TR	β_6	0.017 ***	0.030 ***	0.033 ***	0.023 *
		(7.580)	(7.490)	(5.991)	(1.898)
Ind3 x TR	β_7	0.011 ***	0.031 ***	0.057 ***	0.024 **
		(3.685)	(7.158)	(6.952)	(2.338)

Notes:
The multiplicative dummy variables '*Ind1 x TR*' and '*Ind3 x TR*' analyse the change in estimated coefficients due to the fact that companies belong to a particular sector group. For more details see Table 4.2. See also notes under Table 4.8 and 4.9.

5 THE IMPACT OF THE CORPORATION TAX REFORM OF 1984 ON SYSTEMATIC RISK

5.1 Introduction

The notion of risk, its measurements, determinants and relationship with value is of fundamental importance to modern finance theory. Its importance is centred on the risk-return trade off implied by a number of financial models. For example, standard CAPM, one of the dominant equilibrium models, use equity beta as a measure of risk and suggests a positive linear relationship between return and risk. Standard CAPM assumes that unsystematic risk is irrelevant in determining the required rate of return because it can be diversified away. According to standard CAPM:

$$E(R_j) = R_f + \beta_J[E(R_m) - R_f] \qquad (5.1)$$

Where $E\ (R_j)$ is expected return on security j, R_f is risk free rate, $E\ (R_m)$ is expected return on market and β_j is the systematic risk (or beta) of security j.

Thus, the change in systematic risk (beta) is positively related to change in the required rate of return (cost of equity capital). Using the above relationship, one can argue that the factors that affect the systematic risk of the firms may have some effects on the cost of equity capital of the firm, and consequently on the value of the firm. One way in which the relationship between firm value and its cost of capital can clearly be seen is to assume that the value of firm is a sum of discounted future cash flows. Future cash flows of the firm originate from assets financed using different sources of capital which consequently have different risk. Since the discount rate should reflect the risk of future cash flows, the appropriate discount rate should be a weighted average of discount rates applicable for sources of capital employed by firm. The risk of future cash flows can be thought of as the uncertainty associated with future cash flows. Thus, for more certain cash flows the risk free rate of interest may be used as discount rate whereas for more uncertain cash flows a higher rate should be used. On the other hand risk of sources of capital is the risk associated with selecting a particular source of finance. It may be thought of as additional fluctuations of returns to shareholders caused by the choice of particular source of finance (or a particular mix of sources of finance). For the purpose of analysis, theoretical literature distinguishes between two sources of capital. These are debt capital and equity capital. Thus, the appropriate discount rate used by particular firm may reflect a firm's capital structure[68]. In deed, in analysing the impact of financing decision on firm value, most studies analyse how such decisions affect the cost of capital.

The interrelationship between financial leverage, cost of capital and value has been widely studied and documented in the literature (see for example, Auerbach (1985), Devereux et al (1993), Dammon and Senbet (1988), Lasfer (1995), Shum (1996), Fama and French (1998), Mayer (1986)). The relationship between financial leverage and value of a company can be traced back to 1958, when Modigliani and Miller [in Modigliani and Miller (1958)] suggested conditions under which capital structure is irrelevant. Their proposition is based on the assumptions that financial markets are perfectly competitive and that corporate profit is not taxable at corporation level. The arbitrage mechanism assumed in perfectly competitive financial markets ensures that there is no abnormal return emanating from the way a firm's productive assets are financed. The use of debt financing increases risk to the

[68] It should be noted that in some cases when a company undertake a particular project financed by a specific source(s) of finance that may not necessarily represent all sources of finance usually used by

equity holders and consequently return on equity increases just enough to compensate equity holders for the additional risk (financial risk), resulting from adding debt in a firm's capital structure. There is no change in the return on productive assets (which is equivalent to the cost of unlevered equity) and therefore firm value remains unchanged. On the basis of these arguments, Modigliani and Miller (1958) conclude that the market value of a firm is independent of its capital structure. They proposed the following relationship between capital structure and cost of equity:

Return on equity: No corporation tax case:

$$r_e = r_A + \frac{D}{E}(r_A - r_d) \qquad (5.2)$$

The relationship between cost of capital and capital structure when corporate profit is taxable at the corporate level is given by the following equation:

Return on equity: Corporation tax case:

$$r_e = r_A + \frac{D}{E}(1-T)(r_A - r_d) \qquad (5.3a)$$

Where, r_e is return on equity, r_A is return on assets, r_d is return on debt, T is corporation tax rate, D and E are market value of debt and equity respectively.

If the concept of risk-return trade off is applied (as presented in equation (5.3a) above) and if the assumption that investors are only rewarded for taking systematic risk[69] holds, one can say that, ceteris paribus, there is a negative relationship between corporation tax rate and systematic risk (beta). The underlying assumption here is that if company is financed entirely by equity, then return on

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that company. The discount rate used in such a project will not reflect the company's capital structure.

[69] This will only be the case if firm j is well diversified. For such a firm, total risk is equal to systematic risk measured using the market model as $\beta_j^2 \sigma_m^2$.

equity r_e should be equal to r_A. The term to the right of r_A. in the right hand side reflect the compensation for financial risk. If re is determined by the market, then compensation for financial risk reflect level of systematic risk assumed. It should be noted that equation (5.3a) takes *D/E* ratio as given, i.e. the debt-equity ratio is not affected by the corporation tax rate. However, the theory of corporate financial policy, predicts a positive relationship between corporation tax rate and *D/E* ratio (see for example Modigliani & Miller (1963), DeAngelo and Masulis (1980a), Dammon and Senbet (1988),Givoly et al (1992)). To establish the condition for a hypothesised relationship between corporation tax (*T*) and return on equity capital (r_e) I re-write equation (5.3a) by showing how *D/E* is related to other variables[70].

$$D/E = \frac{r_e - r_A}{(1-T)(r_A - r_d)} \qquad (5.3b)$$

Given that r_A and r_d are constants, it is clear from the relationship given by (5.3b) that for a debt-equity ratio, *D/E*, to remain unchanged, an increase (or decrease) in corporation tax rate, *T*, must cause a corresponding decrease (or increase) in return on equity, r_e. Thus, the negative relationship between corporation tax rate and return on equity (and consequently systematic risk), ceteris paribus, implies that the negative impact of corporation tax on return on equity more than offsets its positive impact on return on equity induced by a change in debt-equity.

In this study I empirically investigate the impact of corporation tax on systematic risk by using UK data and the corporation tax reform of 1984. Using both time series and cross sectional regression analysis and assuming non-stationarity behaviour of beta, I show that corporation tax is one of the determinants of

[70] This re-arrangement assume an equilibrium condition and consequently in equilibrium (according to that model) debt-equity ratio can be expressed in terms of return on equity, return on assets, return on

systematic risk. In this context the results of my study imply that the impact of corporation tax on systematic risk does not necessarily manifest itself only through other factors like leverage. In fact the results show that whether or not firms adjust their capital structure immediately to reflect a change in corporation tax structure, effective corporation tax rate remains to be a relevant determinant of systematic risk[71]. I also find that the impact of a change in corporation tax on systematic risk is inversely related to return on assets.

I also test the relationship between equity beta and its fundamental determinants as documented in the literature. My findings support the view that, over time, systematic risk is positively related to leverage, effective corporate tax rate, return on assets, financial risk, growth in earnings and the risk of real assets. The results also support the non-stationarity model of beta proposed by Brenner and Smidt (1977). That is firm's systematic risk over time is inversely related to its market value. In general, this study provides empirical evidence to show that corporation tax is a fundamental determinant of systematic risk and that the corporation tax reform of 1984 in the UK led to a significant decrease in firms' equity betas.

The rest of the chapter is organised as follows. Section 5.2 summarises the literature and provides possible extensions relevant to this study. In section 5.3 I describe the data used and outline the test methodology used to perform empirical tests. The stationarity of beta of assets (beta of unlevered equity) is analysed in section 5.4. The general impact of corporation tax reforms is analysed in section 5.5.

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debt and corporation tax rate.

[71] It should be noted that corporation tax influence beta via debt-equity ratio. Since there are other factors which influence debt-equity ratio, it is expedient to ascertain the change in beta induced by the

In section 5.6 I simultaneously test the significance of corporation tax as a determinant of systematic risk and the hypothesised relationships between beta and other fundamental determinants. Section 5.7 summarises a study and presents a concluding remark.

5.2 Literature Review

I start this review by looking at the relationship between systematic risk (beta) and financial leverage studied in Hamada (1972). His attempt was to link empirically using US data, corporate finance issues with portfolio and securities analyses through the effects of firms' leverage on the systematic risk of its common stock. The paper uses Modigliani and Miller's (1963) proposition to establish a relationship between systematic risk of a levered firm and that of an equivalent but unlevered firm. Hamada (1972) without thorough analysis of the relationship between corporation tax and leverage provides the results that approximately 24% of the variation in systematic risk is explained by variation in the debt-equity ratio.

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impact of change in corporation tax on debt-equity ratios. A partial derivation of beta with respect to corporation tax show that beta is positively affected by change in corporation tax.

Ramchand and Sethapakdi (2000) use a more general form of the relationship between beta of levered equity and that of unlevered equity and show a linear relationship between beta of levered common stock *(β_e)* and debt-equity ratio. They establish the following relationship:

$$\beta_e = \beta_a + (\beta_a - \beta_d)D/E \tag{5.4}$$

Where β_e is beta of levered equity, β_a is beta of assets (a weighted average of betas of equity and debt), β_d is beta of debt and D/E is debt-equity ratio. Using (5.4) and assuming that $\beta_d = 0$[72] and that β_a is unaffected by capital structure decision (as in Modigliani and Miller (1958)), a change in equity beta is positively related to a change in debt-equity ratio. More specifically, the change in levered equity beta is given as:

$$\Delta\beta_e = \beta_a \Delta(D/E) \tag{5.5}$$

Using a sample of 147 equity issues between 1986 and 1993 the paper finds that US firms which issued equity (i.e. decreased their debt-equity ratios) experienced a decline in price volatility and systematic risk. It further showed that a decrease in systematic risk is sensitive to whether the equity issue was global (i.e. issued in foreign market) or domestic. The results show that a decline in systematic risk following an equity issue was larger for firms which issued equity globally.

[72] Note that the agency theory issues discussed in chapter 3 may contradict somehow with the assumption that debt is risk free. Although market risk premium is zero for risk free investment like debt but bondholders may still need to cover themselves against possible non payment of interest which I consider to be specific to the borrower and therefore more reflective of unique risk and not systematic risk.

It should be noted that equation 5.5 ignores the fact that there are other determinants of beta and debt-equity ratio which might be in operation at the same time. There is a need of controlling for the effects of other determinants.

Badhani (1997) like Hamada (1972) analysed the effects of financial leverage on cost and value of equity; but unlike Hamada (1972) Badhani (1997) does not use the Modigliani and Miller (1963) theory to link corporate finance issues to CAPM.[73] Badhani (1997) uses the covariance structure of both levered and unlevered equity returns with the market return to show the relationship between betas. The paper shows the following relationship between beta of levered equity β_L and beta of unlevered equity β_U:

$$\beta_L = \frac{1}{1-L}\beta_U \qquad (5.6)$$

Where L is financial leverage given as a ratio of debt to capital employed. It is clear from (5.6) that for $0 \leq L < 1$, there is a positive relationship between L and β_L i.e. an increase (or decrease) in L leads to an increase (or decrease) in β_L, holding β_U constant.

The study by Hamid, Prakash and Anderson (1994) analyses the relationship between systematic risk and growth in earnings. They use non-constant growth, Gordon's valuation model and the security market line to determine the covariance between the return on a security and its beta. They show that:

$$Cov\left(R_{it,}\beta_{it}\right) = \left(1 + \frac{D_{it-1}}{P_{it-1}}\right) Cov\left(g_{it,}\beta_{it}\right) \qquad (5.7)$$

Where,

[73] In Badhani (1997), page 345, he argues that the present analysis does not confirm the consistency between Modigliani and Miller theory and CAPM.

$$R_{it} = \frac{P_{it-1}(1+g_{it}) + D_{it-1}(1+g_{it})}{P_{it-1}}$$

g_{it} = Growth in earnings, prices and dividends in period t

D_{it} = Dividend in period t

P_{it} = Price in period t

Note that all terms with subscript t-1 are constants at time t.

The paper concludes that since (from CAPM) $Cov(R_{it,}\beta_{it})$ is positive, then $Cov(g_{it,}\beta_{it})$ is also positive. Thus, their study shows that systematic risk is positively correlated with growth in earnings.

Most of the studies reviewed up to this point investigate a relationship between systematic risk and other variables by using beta that are assumed to be "stationarity". However, some empirical and theoretical studies argue that beta cannot considered to be stationary (see Blume (1975), Fisher and Kamin (1972), Myers (1977), Brenner and Smidt (1977) and Faff, Lee and Fry (1992), Faff, Hillier and Hillier (2001) to mention only few).

Brenner and Smidt (1977) suggest a specific model of non-stationarity of beta that, they believe, gets into the source of non stationarity of systematic risk. The paper investigates the relation between the risk of a security and the risk of an underlying asset. The authors adopt the following model for beta:

$$\beta_t = \frac{B}{V_{t-1}} \qquad (5.8)$$

Where β_t is systematic (relative) risk at t, B is the risk of real assets and V_{t-1} is value of underlying assets at t-1. According to the above model (equation (5.8)), the stationarity of β_t implies that either both underlying variables remain constant or the firm acquires additional assets but makes no change in its capital structure[74]. The latter condition implies a proportional change in both B and V_{t-1} such that beta remains unchanged. Using equation (5.8) and assuming that the risk of real assets remains constant, variations in beta are inversely related to variations in the value of assets. By substituting the value of beta given in equation (5.8) above into a market model, the study provides a finding that systematic (relative) risk, βt and absolute risk, B are statistically constant over time. This general model suggests that any other change in the underlying conditions that might lead to a change in the price of a security (or change in risk of real assets) is likely to lead to a change in beta.

Faff et al (1992) also suggests that beta is not stationary as some studies implicitly assume and (after analysis of other documented models of beta) proposes *AR (1)* as an appropriate model of beta. Thus, the paper tests stationarity of beta against an alternative that beta varies according to an AR (1) process shown below:

$$\beta_{jt} - \overline{\beta} = \rho\left(\beta_{jt} - \overline{\beta}\right) + u_{jt} \Leftrightarrow \beta_{jt} = \overline{\beta} + \rho\left(\beta_{jt-1} - \overline{\beta}\right) + u_{jt} \qquad (5.9)$$

By using Australian data, the paper provides an evidence of non-stationarity of beta. These results imply that equity beta varies according to AR (1) process. Furthermore, Faff et al (1992) note that the magnitude of non-stationarity of beta depends on the way returns are calculated i.e. whether they are calculated under assumption of discrete or continuous compounding.

Chung (1989) shows that systematic risk of common stock is a function of net income to net equity ratio, degree of financial leverage (DFL), degree of operating leverage (DOL) and firm's intrinsic business risk as measured by firm's demand beta

[74] This implication essentially assumes that a change in capital structure leads to a change in value.

(B^D). Using a logarithmic transformation of the variables, the empirical results obtained after running a linear cross sectional regression model show that, *DFL, DOL* and B^D have a positive effect on systematic risk as hypothesised although only coefficients of *DOL* and B^D were found to be statistically significant at the 5% level.

Most empirical studies that have focused on the relationship between systematic risk and leverage report a positive relationship between change in leverage and change in systematic risk (see for example Hamada (1972), Chung (1989), and Ramchand and Sethapakdi (2000)). Specifically, these studies find that an increase in leverage led to an increase in systematic risk and vice versa. However, Shah (1994) using a more focused capital structure change approach, provides results that suggest that leverage increases and decreases convey qualitatively different information. Using exchange offers, Shah (1994) shows that leverage increasing exchange offers lower the investors' assessment of risk (beta) but leaves the cash flows statistically unchanged while leverage decreasing exchange offers have no effect on systematic risk but lead to a significant decrease in the expected cash flows. The findings of this study suggest that a leverage decreasing decision might not lead to a corresponding decrease in systematic risk. This finding is important for my study because if this result holds, then a decrease in leverage following the 1984 corporation tax reform might not lead to an expected decline in beta.

Campbell and Mei (1993) decompose beta into three components using unexpected excess return on stock. They argue that unexpected excess return is a function of revisions in future dividends, news about future real rate of interest and news about future excess return on stock. Defining beta as the covariance of unexpected excess return with the excess return on the market, divided by the variance of excess return on market, enabled Campbell and Mei (1993) to decompose beta and assess the significance of each of its components mentioned above. They present the following decomposition of beta:

$$\beta_{i,m} = \beta_{di,m} - \beta_{r,m} - \beta_{ei,m} \qquad (5.10)$$

where $\beta_{i,m}$ is market beta (defined using unexpected excess returns)

$\beta_{di,m}$ is market beta of news about future cash flows of assets i.

$\beta_{r,m}$ is market beta of news about future real interest rates.

$\beta_{ei,m}$ is market beta of news about future excess return on asset i.

The paper, among other findings, concludes that:

i. Expected excess return beta with aggregate market is typically larger than cash flow betas with the market. This indicates that cash flows betas do not fully explain the aggregate beta.

ii. Cash flows beta, future real interest rates beta, and excess future returns beta often have offsetting effects on the overall beta.

iii. There is no strong cross sectional correlation between assets' cash flows betas and their expected excess return betas.

The results show that cash flow beta varies inversely with firm size. This implies that factors such as corporation tax and leverage, which affect cash flows, will be related to firm size. For example, since leverage affects cash flows beta positively, then the changes in beta following the corporate tax reform of 1984 in the UK (the reform is considered to have a negative impact on leverage), is expected to be inversely related to firm size.

Kim (1999) investigates the sensitivity of return measurement intervals to the estimates of market beta. The paper argues that when returns are serially correlated (and this seems to be the case in most studies) betas estimated using OLS methods change systematically when measurement interval is varied. Consequently, Kim (1999) suggests that a market beta should be estimated by using the method that incorporates investment horizons through a Vector Autoregressive (VAR) process. The method takes into account security returns' contemporaneous, lead and lagged own and cross relation structure with return on market portfolio through a VAR process. By adjusting for a particular investment horizon, the method captures the bivariate serial correlation structure of unit period return on assets and on the market, the attribute which improves empirical statistical efficiency over conventional methods like OLS.

In summary, most of the reviewed literature suggests determinants of systematic risk and how they are likely to influence systematic risk and the form of non-stationarity of beta. The variables that influence systematic risk as presented in this section form a basic set of relevant determinants of equity beta to be included in a model to be used in assessing the impact of corporation tax reform of 1984 on systematic risk.

5.3 Description of data and methodology used to investigate the impact of reform on systematic risk

The study covered in this chapter uses the corporation tax reform of 1984 as an event to investigate the impact of corporation tax on systematic risk. This event affects all corporations simultaneously, but the extent of reaction depends mainly on the corporate tax position of each individual company. For each relevant variable used in this study, annual data are drawn from Datastream for the period from 1974 to 1999 inclusive. For variables used to test the stationarity of beta of assets,[75] however, data used were available only for 1980-1999 period. The number of firms used to test the stationarity of beta of assets is 114 while those used to test the impact of reform on systematic risk is 197. The difference in number of firms used was caused by the unavailability of data on variables needed to estimate return on assets. More specifically, data on pre-tax profits were available only from 1980 and only 114 had enough observations. All these firms are listed in London stock exchange. In order to assess a change in systematic risk following the corporation tax reform of 1984, I estimate the market model beta. It should be noted here that market model is simply an expression of statistical relationship between realised return on assets and realised return on market index; it is not based on theoretical assumptions like CAPM. It is rather an empirical counterpart of CAPM commonly estimated via ordinary least squares. Consequently, the inference concerning the coefficients estimated using market model requires the error term to be normally and independently distributed. The estimated beta coefficients (used here as a measure of systematic risk) will be used as the dependent variable in regression analysis (time series and cross sectional) involving a set of fundamental determinants of beta as explanatory variables. The estimated coefficients will be used to assess the hypothesised relationships between these variables and systematic risk. Also, a non-stationary process for beta, namely *AR(1)* will be assumed to test the general impact of corporation tax reforms on

[75] The explanation of the reason why it is important to test the stationarity of beta of assets is given in a later section.

systematic risk. The details of each method and/or model will be given later in their respective sections.

5.4 Stationarity of firm's asset betas over time

5.4.1 Introduction

One of the assumptions regularly made when analysing involving changes in systematic risk (beta of equity) is that the volatility of operating profit/earnings before interest and taxes (business or operating risk) is constant over time. More specifically, in analysing the impact of a change in financial leverage on systematic risk, business risk as measured by beta of assets is assumed to be constant (see for example Hamada (1972) and Sethipakdi and Ramchand (2000)). The importance of this assumption is that it simplifies the process of separating financial risk from business risk by enabling the volatility of earnings available to shareholders to be attributed to the use of debt in a firm's capital structure. Thus, a change in systematic risk is assumed to be caused by to a change in financial risk.

An analysis that assumes a constant beta over time essentially assumes that the determinants that beta remain unchanged over that period. It is less likely that the determinants of beta of assets will remain constant over a long period (e.g. 20 years in this case), but the cumulative effects of random changes of these determinants for each firm are expected to be negligible over time. Consequently, when analysing the impact of the corporation tax reform of 1984 on systematic risk, I need to know the behaviour of the operating (or business) risk of each firm over time. Using the study by Sethipakdi and Ramchand (2000) as an example, a violation of the above assumption implies that, a change in systematic risk due to tax reform will not be attributable only to a change in corporation tax (or debt-equity ratio), but also to a change in business risk. For a proper analysis of the impact of tax reform on systematic risk, it is important to analyse the behaviour of the beta of assets over time and specifically around the reform period. An understanding of the behaviour of asset betas around the reform period is useful in isolating the impact of corporation tax reform on systematic risk. Other things remaining constant I expect asset betas to be constant over time.

5.4.2 Test of stationarity of asset betas over time

5.4.2.1 An overview

In empirical studies relating to capital structure decisions, asset betas are traditionally assumed to be constant and set equal to the value of unlevered equity betas. The unlevered equity beta is unobservable[76] and needs to be estimated by drawing from a particular finance theory. Various theories and methods have been used to estimate asset betas (or unlevered equity betas). For example, Hamada (1972) and Ramchand and Sethapakdi (2000) used Modigliani and Miller (1958,1963) to estimate the beta of unlevered equity by using beta of levered equity. Both studies assume that asset betas are constant and that changes in equity betas are linearly related to changes in debt-equity ratios (see equation (5.5)). Using equation (5.5) above, asset betas can be estimated as a ratio of the change in the beta of levered equity to a change in debt-

[76] The beta of unlevered equity (or beta of firm's assets) is an unobservable variable because almost all firms contain debt of one kind or another (that is, they are levered).

equity ratio. In that setting " a constant asset beta" implies that a change in debt-equity ratio brings about a proportional change in a beta of levered equity.

5.4.2.2 Data and methodology used to test stationarity of beta of assets

In this study I estimate the asset beta as the slope coefficient resulting from regressing asset returns on the relevant market proxy returns. Since the objective is to assess the impact of corporation tax reform on systematic risk, I use profits before tax to define returns[77]. Specifically, I use two (2) accounting profit variables namely, *earnings before interest and taxes, EBIT* (item 1300 in Datastream) and *Pre-tax profits, PTP* (item 154 in Datastream) to define return on each firm's assets. These return variables are scaled by *Total Capital Employed, TCE* (item 322 in Datastream) and *Total Assets, TA* (item 392 in Datastream). The scaling serves two purposes; first, to reduce the effects of heteroskedastic resulting from using absolute values, which are size-dependent, and second to give a sense of definition of return popularly used in the literature. Values of all variables (or data items) used in this study are annual data drawn from Datastream.

To proxy for the market portfolio I use an *equally weighted portfolio* of all 114 firms having non-missing data for the 1980-1999 period. Beta of assets is then estimated as a ratio of covariance of return on asset with return on assets for an equally weighted portfolio to the variance of return on assets for a portfolio. A portfolio was used in this case because there was no relevant data for the whole market. Out of all shares listed in FTAll share index only 114 firms have relevant data for this test. The following equation is estimated:

$$RET_{jt} = \alpha + \beta_1 RMPROXY_t + \varepsilon_{jt} \qquad (5.11)$$

Where RET_{jt} is the variable (*EBIT/TA, EBIT/TCE, PTP/TA or PTP/TCE*) for company j at time t, $RMPROXY_t$ is the variable (as above) but for the market proxy or index. α, β_1, are parameters to be estimated with β_1 standing for beta of assets.

The use of regression dictates the beta of assets for 1982 to be the first possible beta to be estimated[78]; thus for each company, asset betas were estimated for each of 18 years, 1982-1999 by using a kind of recursive regressions. According to this method the number of observations used to estimate 1982's beta is only 3 (1980-1982) whereas for the estimation of 1983 beta the number of observations used is four. The number of observations used to estimate the more recent betas keep on increasing until the last beta (i.e. that of 1999) is estimated by using all observations. This brings in a possible bias in estimated parameters in that some betas (particularly the first few betas) are estimated by using relatively few observations. To avert this problem another test of stationarity is employed in which all observations are used in the estimation and a dummy variable is included in a model to measure whether the beta in the first period is statistically different from the betas of assets for other periods. The following model is used to implement the test;

$$RET_{jt} = \alpha + \beta_1 RMPROXY_t + \beta_2 RP_t * RMPROXY_t + \varepsilon_{jt} \qquad (5.12)$$

Where RET_{jt} is the variable (*EBIT/TA, EBIT/TCE, PTP/TA or PTP/TCE*) for company j at time t, $RMPROXY_t$ is the variable (as above) but for the market proxy or index, *RPt* is a dummy variable defined such that *RPt* = 0 in 1980-1982 and 1

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[77] Defining return in this way enables the analysis to be free from the impact of taxes since the analysis involves the impact of tax reforms on systematic risk.
[78] This is because the regression analysis involving two independent variables needs at least three observations for each variable.

elsewhere. α, β_1, β_2 are parameters to be estimated with β_1 standing for beta of assets. The parameter β_2 stands for an average shift in β_1 over time. On average, the value of β_2 is expected to be equal to zero if asset betas are constant over time.

5.4.2.3 Empirical tests and results: The stationarity asset betas

5.4.2.3.1 Recursive regression (or year by year) estimation procedure.

To test the stationarity of asset betas over time I first estimated asset betas for each of 18 years from 1982 – 1999 inclusive for each company using equation (5.11) above. In a strict sense, the estimated asset beta is considered constant if its value remains statistically the same for all years 1982-1999. However, in this study its value in a particular year is considered to be statistically equal to the average asset beta over all other years if that beta deviates insignificantly from the average value of betas for all 18 years. More specifically, an asset beta in a particular year is considered constant if it lies within a 95% confidence interval of the mean of all betas. Table 5.1 presents some descriptive statistics of asset betas estimated by using equation (5.11) above together with the percentage of betas that lie within the 95% confidence interval of mean. First column shows the return variables used in the estimation procedure as explained previously. The second and third columns report mean and median values respectively. Columns 4 and 5 of table 5.1 report the percentages of betas that deviate insignificantly from mean and median values respectively. To estimate the values reported on columns 4 and 5, first the percentage of betas that lie within the specified confidence interval for each company is calculated and then the average of these percentages is calculated. The estimated betas in each year together with the descriptive statistics of their respective deviations are not reported. However, the conventional tests of significance (t-tests that mean deviation is equal to zero *versus* mean deviation is not equal to zero) of these deviations for each variable show that they are statistically insignificant.

The estimated mean value of asset beta is one as expected. Note that betas of assets are estimated by using an equally -weighted portfolio as a market portfolio and principally, the mean value has to be one. The median values reported on column 3 show that estimated asset betas across the variables range from 0.871 to 1.066 when *total assets (TA)* values are used to scale the values of variables. The difference of estimated values across the variables are however insignificant. On average 94% (93%) of periodic asset betas deviate insignificantly from the mean (median). 95% of asset betas estimated by using *EBIT/TCE* lie within 95% confidence interval of mean indicating that, on average, most of the estimated asset betas deviate insignificantly from the mean. For the asset beta estimated using *EBIT/TA* an average of 93% of the observations lie within 95% confidence interval. The respective figures for betas estimated using *PTP/TCE* and *PTP/TA* are 95% and 94%. Similarly, the percentages of insignificant deviations from the median values are reasonably high for each variable (greater than 91%). Thus, the results show that on average betas of assets are statistically stationary.

5.4.2.3.2 Alternative approach to test the stationarity of asset betas-the use of a dummy variable methodology

As explained before, the approach used in sub-section 5.4.2.3.1 may suffer from estimation bias. To ensure that the results above are reliable at least for the data set used in this study, equation (5.12) is estimated for each company for each of the four return variables. The test of statistical significance of the estimated value of β_2 was conducted using the same approach as the one used in 5.4.2.3.1 above. The descriptive statistics of the estimated value of β_1 and the summary of results of the tests of beta stationarity are presented on Table 5.2 at the end of the chapter

The results show that the estimated average value of asset beta (the value of β_1 estimated from equation (5.12)) is one as expected. The median value of the estimated asset betas across the return variables ranges from 0.54 to 0.84. Generally, the estimated median values are less than those estimated from equation (5.11). For example the estimated median for *PTP/TCE* using equation (5.11) is 0.871 while that estimated using equation (5.12) is 0.536. This is not a surprise since the estimated values of β_2 are, on average, positive (though statistically insignificant), showing an upward shift in the estimated asset betas. The results also indicate a significant level of stationarity. On average 75% of estimated coefficients of a dummy variable estimated by using *EBIT/TA* are statistically insignificant (equals to zero) implying that for 75% of all companies I do not reject the assertion that beta of assets are constant over time. A similar argument can be made for values estimated using other variables except that the percentage of companies for which the null hypothesis of stationary beta of assets is not rejected is slightly lower. In all four return measures used at least in 68% of all companies I do not reject the hypothesis that asset betas are constant at a 5% level of significance. This is yet further evidence to show that asset betas (or beta of unlevered equity) are, on average, constant over time. These results imply that a model like the one used by Hamada (1972) and Ramchand and Sethapakdi (2000) can be used to assess the impact of a change in a particular variable without worrying on whether the change in equity beta is influenced by a change in the beta of assets.

5.5 The impact of reforms on systematic risk: General assessment.

5.5.1 Introduction

As mentioned earlier the main objective of this chapter is to investigate the impact of the corporation tax reform of 1984 on the systematic risk of a company; and consequently to provide evidence that corporation tax is a significant determinant of systematic risk. On the basis of the risk-return trade off (equation (5.3a)) and on the assumption that financial markets reward investors for taking on systematic risk, ceteris paribus, levered equity betas should be negatively related to the corporation tax rate. Furthermore, re-arrangement of Modigliani and Miller (1963)'s valuation model and using a relationship between beta of levered equity and that of an unlevered firm as shown in Hamada (1972), the following testable relationship between beta of levered equity and corporation tax rate exists:

$$\beta_L = \beta_U \left[1 + (1 - T) \frac{D}{S_L} \right] \qquad (5.13)$$

From the equation 5.13 above, ceteris paribus, a negative relationship between beta of levered equity and corporation tax rate is expected.

5.5.2 Estimation of variables used in the analysis

Systematic risk (measured by beta) is traditionally estimated from the market model, by regressing return on a security on a return on market portfolio. Note that market return used in estimation of the market model is calculated from return index for the whole market (i.e. FTAll shares index). The choice of this market proxy is to allow comparison of the results with other similar studies. Most studies used return on broad market index. Since beta of assets and that of equity are applied in one equation, there is a potential bias that two different market proxies were used in their estimation. My equity betas were calculated for 197 firms out of them 114 used to test stationarity of beta of assets. I therefore consider 114 firms used to test stationarity of beta of assets to satisfactorily represent my equity beta sample. The 114 firms are expected to show the general behaviour of beta of assets. The return on a security is basically the return on company's equity and the return on the market is return on a market index like the FT ALL Share Index, FTSE100 Index or any other relevant market proxy. Annual returns for each company were calculated by using total return indices (item RI obtained from Datastream). To calculate return on firm j at year t the following formula was used.

$$R_{jt} = \log_e\left(\frac{RI_{j_t}}{RI_{j_{t-1}}}\right) \qquad (5.14a)$$

Where R_{jt} is return on firm j in year t and RI_{jt} is return index for firm j at year t as drawn from Datastream. To proxy the market portfolio, I use FT ALL Share Index and its return is calculated using the following formula:

$$R_{mt} = \log_e\left(\frac{RI_{mt}}{RI_{mt-1}}\right) \qquad (5.14b)$$

Where R_{mt} is return on FT All Shares Index and RI_{mt} is return index for the FT All Shares Index at time t as drawn from Datastream. I decided to use FT All Share Index because my sample firms were drawn from the FT All Shares index. The systematic risk (beta) of each company is estimated using annual data for each of the 23 years (1977-1999) and two beta variables (*csbeta, and overall beta*) were estimated. The variable "*csbeta*" is cross sectional beta calculated as the arithmetic mean of annual betas over all 23 years (1977-1999) for each company. The variable "*overall beta*" is a market model beta estimated for each company using annual equity returns for all 25 years, 1975-1999.

In order to calculate the above-mentioned variables, the following regression equation was estimated to determine beta, β for each stock for each period.

$$R_{jt} = \alpha_j + \beta_j R_{mt} + \varepsilon_{jt} \tag{5.15}$$

Where R_{jt} is return on company j at period t, and R_{mt} is return on market portfolio. The symbol ε stands for error term, whereas parameters α_j, β_j represent an intercept term and the beta of company j respectively. By using regression analysis, the systematic risk (beta) is basically estimated using the following formula:

$$\beta_j = \frac{Cov(R_{jt}, R_{mt})}{Var(R_{mt})} = overall\ beta \tag{5.16}$$

Where $Cov(R_j,R_m)$ is covariance of R_j with R_m and $Var(R_m)$ is variance of the market returns. The following formula was used to calculate the beta variable, *csbeta* mentioned in last sub-section.

$$csbeta_j = \frac{\sum_{t=1}^{T} \beta_{jt}}{T} \tag{5.17}$$

Where T is total number of periods (in this case T= 23 years (i.e. for years 1977-1999)). β_{jt} is periodic beta estimated using market model for each year from 1977 to 1999. Note that the beta for 1977 is estimated by using 3 data points and that a number of data points (observations) used to estimate betas for other years increases over time. Thus, *overall beta* of a company is a beta calculated using all data points, (which is equal to beta for 1999 for that company).

5.5.3 Empirical results: Descriptive statistics for variables used to estimate market model and estimated equity beta variables.

The descriptive statistics for all variables used in the estimation of the market model and beta variables as defined in the last sub-section are given in table 5.3. Generally, the estimated betas are greater than one indicating that the *average stock* (which is equivalent to an equally weighted portfolio) is more sensitive to macro-economic changes than the market (see table 5.3).

The average estimated *csbeta* is relatively lower (mean value 1.110) than *overall beta* (mean value = 1.166). From the formulas used to estimate these beta variables, the difference between *overall beta* and *csbeta* indicates that most of the estimated periodic betas are lower than the estimated beta for 1999. The mean and median values of all two beta variables are slightly greater than 1 indicating that on average an equally weighted portfolio formed by using these stocks is more sensitive to the economy-wide shocks than FT All Share index.

5.5.4 Empirical results: Estimated equity betas around the corporation tax reform period.

In order to assess the general impact of corporation tax reforms on systematic risk, the behaviour of estimated beta around the reform period was analysed. Table 5.4 presents mean and median values of the estimated beta around the corporation tax reform. Three sub-periods are considered in this analysis: a period "*before*" the reform (1981-1983), the period of reform (i.e. "*during*") and a period "*after*" reform (1988-1990).

The results (presented on table 5.4) show a slight decline in systematic risk (beta) following the reform. The mean value of estimated equity beta declined by 4.25%, from 1.036 to 0.992 while the median value declined from 1.008 to 0.970 (a decline of 3.77%). As shown on table 1.1 the reform involved a reduction in statutory corporation tax rate successively from 52% in 1982/83 to 35% in 1986/87. If the relationship between beta and "statutory" corporation tax rate implied by equations (5.3a) and (5.13) above does exist one should expect a corresponding increase in beta. However, it is not the statutory corporation tax rate that affects returns but rather is the effective corporation tax rate. It should be noted that the 1984 corporation tax reform involved the reduction of statutory corporation tax rate and abolition of first year and initial capital allowances. These changes have an offsetting effect on corporation tax liability. A reduction in corporation tax rate affects corporation tax liability negatively whereas the withdrawal of first year and initial allowances affect it positively through increasing the taxable profits. Thus, the final impact of the 1984 reform on corporation tax liability and consequently on the effective corporation tax rate depend on relative significance of these changes to a particular company. Following the 1984 reform, the average effective corporation tax rate for companies analysed in this study increased by approximately 4% (from about 20% to 24%). Other things remaining constant, this increase in effective tax rate should lead to a decrease in beta of equity. Note that equity beta increased after the reform. This might have been caused by the decrease in effective corporation tax rate. The evidence presented by Bond et al (1993) show that investment, especially in manufacturing sector, declined after the reform and this might have affected profits negatively and consequently led to a decrease in effective tax rate. However, no analysis on the changes in investment in assets affected by the reform have been conducted in this thesis. Furthermore, no attempt was made to isolate the effect of change in corporation tax from that resulting from abolishing initial and first year capital allowances.

When analysing the impact of corporation tax reform on beta, it is important to control for the effect, if any, of the behaviour of beta over time. As mentioned earlier equity betas may be non-stationary over time. Various forms of non-stationarity of beta have been documented in the literature. In this study I employ a form of non-stationarity suggested by Faff et al (1992). Thus, in the next section, beta-generating processes are considered and the impact of corporation tax on systematic risk is tested.

5.5.5 Non-stationarity of equity beta and the impact of Corporation tax reform on systematic risk.

Finance theory proposes the concept of a risk-return trade off. The concept implies that a high-risk venture, ceteris paribus, is associated with high expected returns. By using proposition 2 in Modigliani and Miller (1963) the risk-return trade off concept suggests a negative relationship between systematic risk and corporation tax rate. It is also well documented that equity betas are not stationary.

To analyse the impact of a particular time-related event in a situation whereby the variable analysed is not stationary over time one needs to test and control for the non-stationary behaviour (if any) of a variable (beta in this case). Before I analyse the impact of reform on beta I first test for non-stationarity behaviour (if any) of beta estimated using my sample data. To achieve this endeavour, I assume that beta varies according to an AR (1) process, a method used in Faff et al (1992) and presented in equation (5.9). By re-writing equation (5.9), the following econometric model can be estimated.

$$\beta_{jt} = b_0 + b_1\beta_{jt-1} + \ell_{jt} \tag{5.18}$$

Where b_0 (which is similar to $(1-\rho)\overline{\beta}$ in equation (5.9)) is the intercept term and b_1 (which is similar to ρ in equation (5.9)) is the autoregressive parameter. The term ℓ_{jt} is the residual or error term.

The model above does not focus on the factors that determine beta. While it is possible that beta may vary according to an AR (1) process, at some point in time changes in the fundamental determinants may cause beta to change in a particular direction. I argue that corporation tax is one of the determinants of systematic risk and therefore a change in effective corporation tax rate will lead to a change in systematic risk. To assess the impact of corporation tax on systematic risk I use equation (5.18) and include a dummy variable, which isolates the impact of corporation tax reform on beta. The following econometric models for both portfolio and individual companies are considered:

$$\beta_{jt} = b_0 + b_1\beta_{jt-1} + b_2 RP_t + \ell_{jt} \text{ - for individual firms} \tag{5.19a}$$

$$\beta_{pt} = b_0 + b_1\beta_{pt-1} + b_2 RP_t + \ell_{pt} \text{ - for portfolio} \tag{5.19b}$$

Where beta of a portfolio, $\beta_{pt} = \sum_{j=1}^{N} w_{jt}\beta_{jt}$ and N = 197.

Under the assumption that beta follows an AR (1) process and corporation tax is one of determinants of systematic risk, the coefficient of RP_t is expected to be negative. The empirical results obtained after estimation of model (5.19b) above are summarised in Table 5.5.

Table 5.5 shows the estimated parameters of model (5.19b) for a portfolio beta. The results show a significant decline in systematic risk (t-value = -4.35). The estimated value of b_1 is statistically significant at 5% (p-value is 0.017). In testing the stochastic process that generates beta, I find that the estimated value of b_1 is statistically different from one. Note that the true value of b_1 is required to be one for beta to have a fixed and defined variance[79]. Thus, to test whether beta is generated by a stationary or non-stationary stochastic process, I test the null hypothesis that the true value of b_1 is one against the alternative hypothesis that the true value of b_1 is less than one. The estimated t-value is -11.38, which falls far outside the acceptable Dickey-Fuller critical value[80] (which is approximately -3.333). The result implies that I should reject the presence of a unit root at 5%. The results also provide evidence that beta is not generated by a non-stationary process. This essentially means that the mean, variance and covariance are constant over time regardless of the actual time at which the measure is computed. Thus, the significant shift in beta following reform is not attributable to a non-stationarity behaviour of beta but rather is fully attributable to the impact of other factors on systematic risk. Other things remaining constant, the inclusion of a dummy variable RP_t in a regression equation (5.19b) isolates the impact of reform on beta. The results show that the estimates of b_2 are predominantly negative indicating a decrease in beta due to a change in the effective corporation tax rate. The estimated parameters using model (5.19a) for individual stocks provide similar evidence. Model (5.19a) is estimated for each stock and a method similar to that used in the analysis for portfolios was employed to test the same null hypothesis. The percentage of the companies for which the hypothesis is not rejected were recorded. The values (not reported) show that for 58.4% of all firms used in this study the hypothesis of non-stationarity of beta generating process

[79] For details see Gujarati, D.N .,1995, Basic Econometrics, 3rd ed., McGrawHill International editions, 713-724.

[80] The critical value of Dickey-Fuller test was taken from Greene, W.H "Econometric Analysis" 2nd ed., Prentice Hall; chapter 19, page 565.

is rejected at the 5% level of significance. This implies that on average betas are generated by stationary stochastic processes. Concerning the impact of corporation tax reform on systematic risk, (as assessed from the estimation of model (5.19a)), 62.4% of all firms used in this study reported a decline in systematic risk following the reform although only for a few of them were the declines statistically significant. Thus, in general I can argue that corporation tax is a major determinant of systematic risk and that the corporation tax reform of 1984 led to a decline in systematic risk.

In analysing the impact of corporation tax reform on equity beta it is important to control for the potential effects other variables might have on beta. Thus, in order to justify the assertion that the corporation tax is one of the determinants of systematic risk and that corporation tax reform of 1984 led to a decline in beta, a formal analysis of the relationship between beta and its theoretical determinants is conducted. The impact of other variables on systematic risk (beta) using both time series and cross sectional analyses will be covered in the following sub-sections.

5.6 The theoretical determinants of systematic risk (beta) and the impact of the 1984 corporation tax reform

Corporate finance theory suggests a number of factors that may influence the systematic risk (beta) of a company's equity. Some of the factors have been empirically tested to determine their statistical significance as determinants of systematic risk. In this section a total of nine (9) factors will be analysed and their relationship with beta will be explained and tested. Equity betas are considered to be a function of a set of variables, as follow:

$$\beta = f(ETR, LEV, ROA, MV, FR, GR, RRISK) \qquad (5.20)$$

The description of explanatory variables and their relationships with systematic risk are given in the following subsection.

5.6.1 Description of the variables and their relationships with systematic risk (beta)

5.6.1.1 Effective tax rate, ETR

This is a ratio of sum of taxation paid (Datastream item 433) and deferred corporation taxes (Datastream item 161) to the adjusted total operating profit (Datastream item 137). The relationship between effective tax rate and systematic risk depend on how quick firms adjusted their debt-equity ratios in response to the 1984 reform. Under the assumption that firms do not respond to the news about changes in corporation tax immediately by changing their debt-equity ratio, the corporation tax rate is expected to be negatively related to returns and consequently negative related to systematic risk (see equation (5.3a) or (5.13)). On the other hand, if firms respond immediately to the changes in corporation tax rate by adjusting their leverage ratios, a positive relationship between corporation tax rate and systematic risk may be observed. It should be clear at this point that the adjustments to the debt-equity ratios should be based on economic advantages. The implication of how quick firms responded to the 1984 reform is that if firms did not respond immediately to the announced changes, one can analyse the impact of the changes in effective tax rate by assuming that debt-equity ratios were constant. Alternatively, if firms responded immediately to the changes by adjusting their debt-equity ratios, the appropriate approach would be to assume that debt-equity ratios were not constant. Given the differences in tax positions of firms and extent of distortions brought by the pre- 1984 reform corporation tax system to each firm, the relationship between *ETR* and equity beta is not obvious. As noted in chapter 3 and 4, some firms were likely to have increased their borrowing (and hence their debt-equity ratios) during the transition period in order to take advantage of capital allowances. For some firm however, there was no incentive to borrow and they mighty have reduced their debt-equity ratios to reflect unattractiveness of debt induced by the reform immediately. The overall effect depends, among other things, on which group of firm was dominant. To assess the impact of reform on beta by employing a time series model I need to introduce a multiplicative dummy variable, $RP_t \times ETR_{pt}$ where $RP_t = 1$ during the reform period and zero elsewhere. The coefficient of $RP_t \times ETR_{pt}$ shows the change in coefficient of ETR induced by reform and is expected to be significantly negative if the corporation tax reform led to a decrease in systematic risk. The same negative relationship between beta and *ETR* is expected when changes in the value of the variables around the reform period (rather than value at a particular date) are used in cross sectional regression.

5.6.1.2 Leverage ratio, LEV

Leverage ratio is basically a debt-equity ratio (a capital structure variable). In this study debt-equity ratio is the ratio of total loan capital (Datastream item 321) to market value of equity (Datastream item MV). The relationship to be tested in this study emanates from the fact that asset betas are determined as the weighted averages of betas of debt and equity betas. The weights are calculated as a ratio of debt to the sum of book values of debt and equity capital and a ratio of equity to the sum of book values of debt and equity capital for debt and equity respectively. The above relationship can be summarised in the following equation:

$$\beta_A = \left(\frac{E}{E+D}\right) \times \beta_E + \left(\frac{D}{E+D}\right) \times \beta_D \qquad (5.21a)$$

Where $\beta_A, \beta_E \, and \, \beta_D$ are asset beta, equity beta and beta of debt respectively. E and D represent equity and debt respectively. By re-arranging equation 5.21a above, the relationship between equity beta and debt-equity ratio is represented as follows.

$$\beta_E = \beta_A + \frac{D}{E}(\beta_A - \beta_D) \qquad (5.21b)$$

Using (5.21b) above debt-equity ratio is positively related to beta of equity (a measure of systematic risk). The use of debt financing firm's activities increased the variability of earnings available to equity holders and hence systematic risk. The studies by Hamada (1972), Badhani (1997) and Ramchand and Sethipakdi (2000) propose a positive relationship between beta of equity and leverage. Thus, ceteris paribus, a positive relationship between beta and *LEV* is expected.

5.6.1.3 Return on Assets, ROA

Return on assets is estimated as a ratio of adjusted total operating profit (Datastream item 137) to total assets (Datastream item 392 or TA). The relationship between return on assets and systematic risk to be tested in this study is derived from Badhani (1997). Badhani derived a model (equation (5.6)) that shows a positive relationship between leverage and beta of levered equity. It should be noted that the relationship presented by equation (5.6) ignores corporation tax and therefore the analysis above holds only in a world without corporation tax. If I include the effect of corporation tax in Badhani (1997)'s analysis, the relationship between beta of levered equity, β_L and beta of unlevered equity, β_U and leverage, L is represented by equation (5.22) below (see appendix 5.2 for details).

$$\beta_L = \frac{1-T}{1-L}\beta_U \tag{5.22}$$

Where T stands for corporation tax rate and other variables are as defined previously.

This extension is important in my study in two ways. Firstly, it reflects the real world situation because most firms operate in economies in which corporate profits are taxable. Thus, to analyse the effect of leverage (which to some extent is influenced by the corporation tax) on beta without corporation tax, to me is to miss an important bit of a real world phenomenon. Secondly, my study focus on the impact of corporation tax reform on systematic risk, therefore, to have a tax variable in the model is necessary.

It is argued in some studies that a change in corporation tax has no immediate effect on leverage (see for example Lasfer (1995)). If this argument is true, I can analyse the effect of T on β_L using equation (5.22) by assuming that both L and β_U are constants. In such a situation there will be a negative relationship between T and β_L so long as L lies between 0 and 1. More specifically a change in levered equity beta caused by a change in corporation tax rate is less than zero. That is:

$$\frac{\partial \beta_L}{\partial T} = \frac{-\beta_U}{1-L} < 0 \quad for\, 0 \le L < 1 \tag{5.23}$$

This show for example that if corporation tax increase (which is advantage since the value of tax shield will increase) will lead to a decline in systematic risk if that increase in tax will have no impact on leverage.

However, on the other hand, a significant number of both theoretical and empirical studies show that corporation tax is one of the major determinants of capital structure and thus, has a profound impact on the debt-equity ratio. Thus, by using equation (5.22) and expressing L as a function of T, the relationship between β_L and T is given as follows:

$$\beta_L = \frac{(1-T)(r_e - i + iT)}{r_A - i - r_A T + iT}\beta_U \tag{5.24}$$

Where r_e is return on levered equity, i is interest (borrowing) rate, r_A is return on assets and T is corporation tax rate. From equation (5.24) I can show that a change in T is positively related to a change in beta of equity of a levered common stock. More specifically, a change in β_L with respect to T is shown as:

$$\frac{\partial \beta_L}{\partial T} = \frac{i}{r_A - i}\beta_U \tag{5.25}$$

Therefore, so long as the rate of return on assets is greater than the borrowing rate (and this is almost always the case, otherwise it is irrational to borrow and invest in risky assets) and they are both positive, a change in corporation tax rate T is positively related to a change in systematic risk β_L. (A formal derivation of equation (5.25) is shown on Appendix 5.2). Theoretically positive coefficients of *ROA* (or r_A) in regression analysis are supported in the literature. Previous studies show that *ROA*, at any time t, is positively related to leverage ratio; and since leverage is positively related to beta, the same relationship is implied between *ROA* and beta. However, using equation (5.25) above and assuming that the change in beta around reform period is caused by the change in corporation tax, then the coefficient of ROA in cross sectional regression involving the changes in variables around the tax reform period is likely to be negative.

5.6.1.4 Market value of equity, MV

Market value is estimated as the natural logarithm of market value of equity (Datastream item MV). The relationship between *MV* and systematic risk (beta) is adopted from Brenner and Smidt's (1977) non-stationarity model of beta. According to their study, beta at time t is inversely related to market value, *MV* at time t-1. The relationship suggests that small firms' returns are more volatile relative to market returns due to their inability to absorb economic shocks. The opposite is true for large firms, which tend to have more stable return. Thus, from equation (5.8), a negative relationship between size and equity beta is expected.

5.6.1.5 Risk of real assets, RRISK

The risk of real assets is defined as the standard deviation of return on net tangible assets. Return on net tangible assets is defined as the ratio of adjusted total operating profits (Datastream item 137) to net tangible assets (Datastream item NTA). In a non-stationarity model of Brenner and Smidt (1977), the risk of real assets is assumed to be constant over time and consequently a change in beta results only from a change in market value. The implicit assumption in Brenner and Smidt (1977) model as presented by using equation (5.8) above, is that factors which affect market value have no impact on risk of real assets. I argue that factors that cause changes in MV in most cases have an effect on the risk of real assets as defined above. Consequently, the effect of a particular factor on market value will have an impact on return on real assets as well. Since beta represents systematic risk (a component of total risk), a change in the risk of real assets would be positively related to a change in systematic risk. Thus, a positive relationship between *RRISK* and beta is expected.

5.6.1.6 Financial risk, FR

Financial risk is defined as the variations in earnings available to shareholders (,Datastream item 625) which are not explained by variations in net operating income (Datastream item 154). It is given as one minus the ratio of standard deviation of earnings available to shareholders to standard deviation of net operating income. Thus, FR is defined, symbolically as follows:

$$FR = 1 - \frac{\sigma_{EAS}}{\sigma_{NOI}} \qquad (5.26)$$

Where EAS is earnings available to shareholders and NOI is net operating income. The symbol σ stands for standard deviation.

The relationship between *FR* and beta is adopted from Kale et al's (1991) study, which provide evidence of a non-linear relationship between business risk and optimal debt. Since debt is positively related to beta, I can argue that a similar relationship exists between business risk and systematic risk (beta). Most studies assume that the nature of business operations for most firms remain unchanged, i.e. the volatility of net income (or equivalently the financial risk) is attributable to other financing related sources. Financial risk is positively related to beta and if there is a non-linear relationship between financial risk and systematic risk, the coefficient of financial risk squared, *FRSQ* is expected to be negative.

5.6.1.7 Growth in earnings, GR

The variable *GR* is the growth rate in earnings available to shareholders (Datastream item 625). It is estimated as the natural logarithm of the ratio of earnings available to shareholders at time t to earnings available to shareholders at t-1. The relationship between growth in earnings and beta to be tested in this study is drawn from Hamid et al (1994). In their study, Hamid et al (1994) used a market model and Gordon's valuation model to show that the covariance of earnings' growth rate with beta is positive (see equation (5.7)). This conclusion suggests that any decision which leads to an increase in the growth of earnings will lead to an increase in systematic risk and vice versa. More specifically, this implies that the change in corporation tax in 1984, which aimed at reducing the tax burden to corporations, will lead to an increase in after-tax earnings and this will have a positive effect on systematic risk. Other things remaining constant, this implies that systematic risk is positively related to *GR*.

5.6.2 Empirical test and results: A time series analysis

In order to test the relationship between beta and the variables described in section 5.6.1 above, I start by employing a time series linear regression model. Specifically, the following regression model is estimated by using annual data for a total of 197 companies over the period of 23 years, 1977-1999.

$$\begin{aligned}\beta_{pt} &= b_0 + b_1 ETR_{pt} + b_2 RP_t \times ETR_{pt} + b_3 LEV_{pt} + b_4 ROA_{pt} + b_5 MV_{pt-1} \\ &\quad + b_6 FR_{pt} + b_7 FRSQ_{pt} + b_8 GR_{pt} + b_9 RRISK_{pt} + \varepsilon_{pt}\end{aligned} \tag{5.27}$$

Where the *b*'s are parameters to be estimated and ε_{pt} is the error term (residual systematic risk of a portfolio) at t.

For each variable a total of 23 annual observations for an equally- weighted portfolio were used in estimation of the coefficients. The estimated coefficients of each variable were obtained and used to test the above hypothesised relationships. It is important at this time to mention that the estimated value of b_2 (from equation 5.27) is the only parameter, which uniquely tests the impact of corporation tax on beta. A significantly negative value of b_2 is expected if corporation tax is one of the determinants of systematic risk and if the corporation tax reform of 1984 had a negative effect on systematic risk. The estimated coefficients and test statistics used to test statistical significance of each coefficient are presented on Table 5.6.

Table 5.6 shows that the estimated coefficient of *ETR* (0.138) is significantly positive at 5% (p-value is 0.022). This result shows that even after controlling for other determinants of systematic risk, *ETR* continues to influence systematic risk. The results also support the view that corporation tax is positively related to debt-equity ratio and consequently is positively related to beta. It also implies that firms adjusted their debt-equity ratios rather immediately to reflect a change in corporation tax structure. In other words the results show that the corporation tax reform of 1984 affected the sensitivity of return on equity relative to the return on market index. Thus, although the reform applied to all firms in the UK, the perceived impact was different for each individual firm. This is possibly because firms had different tax positions. The results show that the estimated value of b_2 is significantly negative as expected. The estimated coefficient (–0.433) is statistically significant at any level of significance (p-value is virtually zero). This provides evidence that the corporation tax reform led to a decline in systematic risk. The estimated coefficient of *LEV* is positive as expected (0.198) but is statistically insignificant at conventional levels. One possible explanation of insignificance of estimated coefficient of *LEV* is that most of the effects of *LEV* on beta suggested in the literature emanate from corporation tax. Since the coefficient of *ETR* is positive and significant, the insignificance of *LEV* is not a surprise. Thus, I can argue that generally, *LEV* is positively related to systematic risk. The estimated coefficient of *ROA* is positive and statistically significant at 5% (p-value is 0.017). This supports a view that firms continue to borrow (hence higher leverage ratio over time) so long as *ROA* is greater than borrowing rate (see equation 5.3 above). Given the positive relationship between leverage and beta, the same relationship between *ROA* and beta should exist. The estimated coefficient of *MV* is negative as expected although it is statistically insignificant (the estimated coefficient is –0.0057 with a p-value of 0.300). Thus, statistically I reject a non-stationary model of beta as proposed by Brenner and Smidt (1977) at 5% although the sign of estimated coefficient is negative as expected. The possible explanation of the weak negative relationship between *MV* and beta is that most of factors that determine MV also determine beta and therefore the effect of *MV* on beta may have been manifested through other variables. For example, it is empirically evident that beta is positively related to leverage; the empirical results in chapter three also show that a change in leverage is negatively related to a change on value, implying that beta should be inversely related to value. Thus, a weak negative relationship may be due to the fact that most of the effects of *MV* on beta have been absorbed by other relevant variables like leverage. The negative relationship between beta and value is supported by both a traditional and a bankruptcy costs argument of capital structure.

I also conduct a test to determine whether the relationship between beta and financial risk is linear or non-linear. As such two variables, *FR* and *FRSQ* were introduced to test a non-linear relationship between beta and business risk proposed by Kale et al (1991). For non-linearity to exist, I expect the sign of the estimated coefficient of *FR* to be positive and that of *FRSQ* to be negative. However, my results show that the estimated coefficients of *FR* and *FRSQ* are both positive although they are statistically insignificant. These results support the view that financial risk is positively related to beta possibly due to the positive relationship that exists between leverage and financial risk and implies that borrowing increases financial risk by increasing the volatility of return on equity hence increased systematic risk.

The estimated coefficient of *GR* is positive as expected. This indicates that growth in earnings is positively related to beta. This is theoretically true if the market model (or CAPM) holds; growth in earnings reflects an increase in return similar to an increase in return due to an increase in beta under CAPM setting. The estimated coefficient, however, is statistically insignificant (the estimated coefficient is 0.008 with a p-value of 0.408).

The estimated coefficient of *RRISK* is positive and highly significant (the estimated coefficient is 0.0139 with p-value of 0.006). This result implies that risk of real assets is positively related to systematic risk. This implies that most firms do diversify their portfolios in the sense that a large proportion of their total real asset risk is actually market risk. The changes in total risk in such a situation should be positively related to changes in systematic risk.

In summary, as mentioned before, a set of these variables were included in the model as control variables. Specifically, the objective is to show that *ETR* influences systematic risk in a direction consistent with the adjustment to capital structure required in responding to a change in corporation tax. The results provide evidence that firms adjust their debt-equity ratio immediately following the release of information concerning a change in corporation tax structure (see a positive coefficient of *ETR* on Table 5.6). This result supports empirical evidence provided by Okzan (2001). Out of seven variables used as determinants of systematic risk, only the coefficients of effective tax rate, return on assets and risk of real assets are statistically significant. The signs of estimated coefficients of all other variables are as expected although the coefficients are statistically insignificant. Furthermore, the downward shift in estimated coefficients of *ETR* (i.e. a negative coefficient of RP_t x ETR_t) reflects the negative impact the corporation tax reform of 1984 had on systematic risk.

5.6.3 *Empirical test and results: A cross sectional analysis*

In order to test the impact of corporation tax reforms on systematic risk using a cross sectional regression analysis I use a set of seven (7) explanatory variables namely, *ETR, LEV, ROA, MV, FR, GR,* and *RRISK*. Note that in this section I use "the changes" in variables determined by subtracting the values of variables before the reform from their respective values after the reform. Note also that from a set of explanatory variables used to estimate the time series model I omit two variables *FRSQ* and *RPt×ETR*. The variable *FRSQ* (*FR squared*) was introduced to capture non-linear relationship between financial risk (*FR*) and systematic risk. Given the fact that I use changes in variables to estimate cross sectional regressions, a variable *FRSQ* is irrelevant. On the other hand a variable *RPt×ETR* was introduced in the time series model to capture the impact of corporation tax reform on systematic risk.

In this cross sectional regression analysis, I use changes in the values of the variables around the reform period so the impact of reform on systematic risk is assessed through the coefficient of two variables, *ETR* and *ROA*. The estimated coefficients of both *ETR* and *ROA* are expected to be significantly negative if the hypothesis that corporation tax reform influenced beta negatively holds. The negative coefficient of *ETR* is expected due to the fact that the effective corporation tax rate is inversely related to return and consequently negatively related to systematic risk. On the other hand a negative coefficient of *ROA* is derived from equation (5.24) above. The model and results for the cross sectional regression are presented on Table 5.7. The estimated coefficient of *ΔETR* is negative (-0.257) as expected and significant at 5% (p-value = 0.012). This supports the argument proposed in this study that *ETR* is one of the determinants of beta and that corporation tax reform of 1984 lead to a decline in systematic risk. The estimated coefficient of *ΔROA* is also negative (-1.304) as expected and statistically significant at 5% (p-value = 0.010). This implies that a change in beta around the reform period is negatively related to *ROA* as provided theoretically in equation (5.25) above. The results imply that as *ROA* increases (decreases) the impact of change in corporation tax on systematic risk decreases (increases).

The results shown on table 5.7 show further that the signs of the estimated coefficients of *LEV, FR,* and *RRISK* are positive as expected, although only that of RRISK is statistically significant at 5%. This indicates that all three variables *LEV, FR* and *RRISK* are positively related to systematic risk. The sign of estimated coefficients of *MV* and *GR* are inconsistent with the hypothesised relationships but they are all statistically insignificant. Specifically the negative coefficient of *MV* rejects the non-stationarity model of beta as suggested by Brenner and Smidt (1977). The results suggest that the factor(s) that lead to a change in market value in a particular direction also lead to a change in systematic risk in the same direction. In this case, ceteris paribus, a change in *MV* due to a change in the effective corporation tax rate resulted in a change in systematic risk in the same direction. On the other hand, a negative coefficient of *GR* rejects the assertion made by Hamid et al (1994) and suggests that companies that experienced decreases in growth rate of earnings experienced increases in systematic risk and vice versa.

Thus, although the results do not provide empirical evidence to support the relationship between systematic risk and all variables as hypothesised in the literature, it is evident that corporation tax influences systematic risk and that the corporation tax reform of 1984 led to a decrease in systematic risk.

5.7 Summary and conclusion

In this study, I determine whether or not corporation tax is one of the fundamental determinants of systematic risk (beta) by analysing the impact of the corporation tax reform of 1984 on systematic risk. I use both accounting and market data to show that the effective corporation tax rate has a significant impact on systematic risk. I utilise both time series and cross sectional analyses to analyse the impact of the corporation tax reform of 1984 on systematic risk and provide empirical evidence that the corporation tax reform of 1984 led to a significant decline in systematic risk. I also provide evidence to support the view that systematic risk is positively related to leverage, return on assets, financial risk, earnings growth and the risk of real assets. The findings also show that firms adjusted rather quickly their capital structure in response to changes in their effective corporation tax rates. This is consistent with the findings by Okzan (2001) who found that UK firms have target capital structures and that they adjust rather quickly towards their optimal capital structures.

The empirical findings so far suggest the corporation tax reform of 1984 had some effects on firms' financial policy. The also suggest that firms responded in some ways to the corporation tax reform of 1984 by changing their borrowing and/or leasing behaviour. Whereas one can view the changes brought about by the 1984 reform as justifying rational response, it is also possible that for some reasons, some firms did not responded accordingly. The corporate governance theory suggest that a response of firm's management to a particular information, whether rationally good or bad, depends on whether the interests of managers are aligned to that of shareholders or not. The theory suggest that one way of aligning the interest of managers to that of shareholders is to allow managers to own a particular proportion of equity shares of the company they manage. This theory shows that, the performance of a firm is related to the managerial equity ownership. In the following chapter I investigate whether the responses of managers to the 1984 corporation tax reform are related to the equity ownership of the firms they manage. Particularly, investigate whether the changes in variables hypothesised to be significantly affected by the reform are associated with managerial ownership.

Table 5-1: Mean and median values of estimated beta of assets and the test of their stationarity over time.

The Table below shows the descriptive statistics of estimated beta of assets and the test of its stationarity over time. The values are estimated using regression equation 11 for which an equally weighted portfolio is used to proxy the market. Last two columns show the average of percentages of observations that lie within a 95% confidence interval.

Variable	Mean	Median	% of betas which deviate insignificantly from	
			Mean	Median
EBIT/TCE[a]	1.000	0.886	95	93
EBIT/TA[b]	1.000	1.066	93	91
PTP/TCE[c]	1.000	0.871	95	94
PTP/TA[d]	1.000	0.997	94	93

a The variable EBIT/TCE is the ratio of Earnings Before Interest and Taxes (EBIT) to Total Capital Employed (TCE)
b The variable EBIT/TA is the ratio of Earnings Before Interest and taxes to Total Assets (TA)
c The variable PTP/TCE is the ratio of Pre-tax profits (PTP) to Total Capital Employed(TCE)
d *The variable PTP/TA is the ratio of Pre-tax profits (PTP) to Total Assets (TA)*

Table 5-2: Descriptive statistics of estimated asset betas and the test statistics for their stationarity over time

The table below shows mean, median, Q1 and Q3 of estimated beta of assets. Mean, median, Q1 and Q3 of estimated beta of assets, β_1 are presented on columns 2 to 5 respectively. Column 6 presents the percentage of estimated value of β_2, which lie within a 95% confidence of mean. The null hypothesis being tested is that β_2 is equal to zero versus the alternative hypothesis that β_2 is not equal to zero.

Variable	Mean	Median	Q1	Q3	% of estimated value of β_2 which is insignificant at 5%
EBIT/TCE[a]	1.000	0.679	0.171	1.362	75
EBIT/TA[b]	1.000	0.763	0.251	1.484	75
PTP/TCE[c]	1.000	0.536	0.091	1.574	68
PTP/TA[d]	1.000	0.839	0.13	1.613	69

a The variable EBIT/TCE is the ratio of Earnings Before Interest and Taxes (EBIT) to Total Capital Employed (TCE)

b The variable EBIT/TA is the ratio of Earnings Before Interest and taxes to Total Assets (TA)

c The variable PTP/TCE is the ratio of Pre-tax profits (PTP) to Total Capital Employed(TCE)

d The variable PTP/TA is the ratio of Pre-tax profits (PTP) to Total Assets (TA)

Table 5-3: Descriptive statistics of return on security, return on market and equity beta variables estimated by using a market model.

The following table shows the descriptive statistics of return on security return on market and variables for equity betas estimated by using market model Two equity beta variables are considered: csbeta and overall beta. *Overall beta* is equity beta estimated from market model using returns for all 25 annual data points while *csbeta* is the cross sectional average of equity betas estimated for each company in each of 23 years (1977-1999). *ROEWP* is return on an equally weighted portfolio of all 197 firms used whereas *ROM* is return on market portfolio (i.e. return on FT All Shares Index).

Variable	Mean	Median	Q1	Q3	SE(Mean)
ROEWP	0.162	0.163	0.049	0.297	0.031
ROM	0.174	0.169	0.081	0.253	0.022
csbeta	1.110	1.037	0.748	1.432	0.047
overall beta	1.166	1.005	0.831	1.465	0.037

Table 5-4: The average values of estimated equity betas for periods around the corporation tax reform.

The table below shows the average values of estimated equity betas for periods around corporation tax reform of 1984. The first column presents the sub-periods of interest covered in this analysis. The second and third columns present the mean and median betas respectively. Mean beta is calculated as an arithmetic average for a respective sub-period and median beta is a median value of estimated beta for a sub-period.

Sub-period	Mean value	Median value
Before	1.036	1.008
During	0.992	0.970
After	1.065	1.007
% Change (i.e. during-before)	-4.25%	-3.77%

Table 5-5: The coefficients estimated to test the process generating beta and the general impact of reforms on systematic risk (beta) for an equally weighted portfolio.

Variable	Coefficient	SE(mean)	T-value	P-value (significance)
Intercept	0.846	0.076	11.12[a]	0.000
β_{pt-1}	0.186	0.072	-11.38[b]	0.017
D_t	-0.066	0.015	-4.35[c]	0.000
R-squared	69.5%			

a. *The calculated T-value tests the significance of intercept term.*
b. *The calculated T-value tests the hypothesis that the coefficient of βt-1 is 1 against the alternative that it is less than 1.*
c. *The calculated T-value tests the significance of coefficient of a dummy variable.*

Table 5-6: The estimated coefficients for the variables hypothesised to influence systematic risk (beta) of a company and their test of significance-Time Series

The estimated coefficients for variables hypothesised to influence systematic risk (beta) of a company and the test statistics calculated to test the statistical significance of estimated coefficients. Column 1 shows the variables used in the model. Columns 2-5 present estimated coefficients, standard errors of estimates, T-values and P-values respectively. The T-values are estimated to test the statistical significance of estimated coefficients.

Variable	Coefficient	Standard error	T-value	P-value
Intercept	0.913	0.067	13.65	0.000
ETR	0.138	0.052	2.64	0.022
D_t×ETR	-0.433	0.071	-6.12	0.000
LEV	0.198	0.124	1.60	0.136
ROA	0.866	0.313	2.77	0.017
MV	-0.006	0.005	-1.08	0.300
FR	0.008	0.006	1.42	0.182
FRSQ	2.87 –6[a]	4.17 –6[b]	0.69	0.504
GR	0.008	0.009	0.86	0.408
RRISK	0.014	0.004	3.33	0.006
R-Squared	88.1%			

a. Stands for $2.87\text{x } 10^{-6}$
b. Stands for $4.17\text{x}10^{-6}$

Table 5-7: Cross sectional estimates of coefficients estimated to test the impact of corporation tax reform on systematic risk.

The model used to test the impact of reforms is written as follow:

$$\Delta\beta_j = b_0 + b_1\Delta ETR + b_2\Delta LEV_J + b_3\Delta ROA_J + b_4\Delta MV_J + b_5\Delta FR_J \\ + b_6\Delta GR_J + b_7\Delta RRISK_J + \varepsilon_J \quad (5.28)$$

The symbol Δ before the variable shows that a value used in estimation is the change calculated as the value of a variable after reform minus the value of a variable before reforms. The descriptions of other variables are as given previously. Column 1 shows the variables used in the model. Columns 2-5 present estimated coefficients, standard errors of estimates, T-values and P-values respectively. The T-values are estimated to test the statistical significance of estimated coefficients.

Variable	Coefficient	Standard error	T-value	P-value
Intercept	0.024	0.038	0.63	0.527
ΔETR	-0.257	0.102	-2.52	0.012
ΔLEV	0.042	0.050	0.84	0.402
ΔROA	-1.304	0.501	-2.60	0.010
ΔMV	0.037	0.025	1.47	0.143
ΔFR	0.00043	0.00106	0.40	0.686
ΔGR	-0.008	0.007	-1.07	0.284
ΔRRISK	0.189	0.091	2.08	0.039
R-Squared		10.1%		

APPENDIX 0-1: GRAPHS SHOWING THE BEHAVIOUR OF ROA,ETR AND BETA OVER TIME

Figure 0-1: The Median Beta of Assets for each variable used in estimation

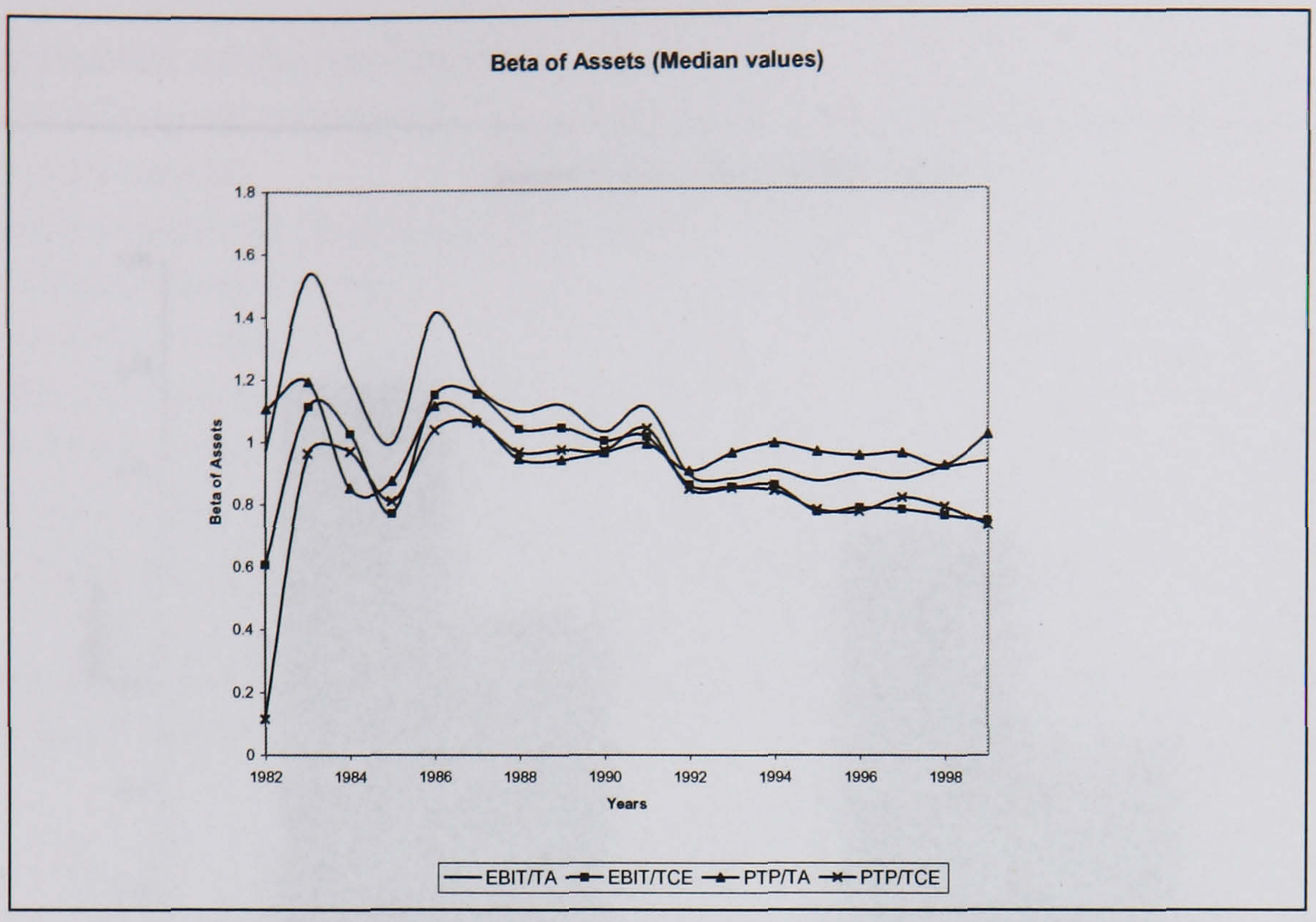


Figure 0-2: Relationship between beta, ETR and ROA

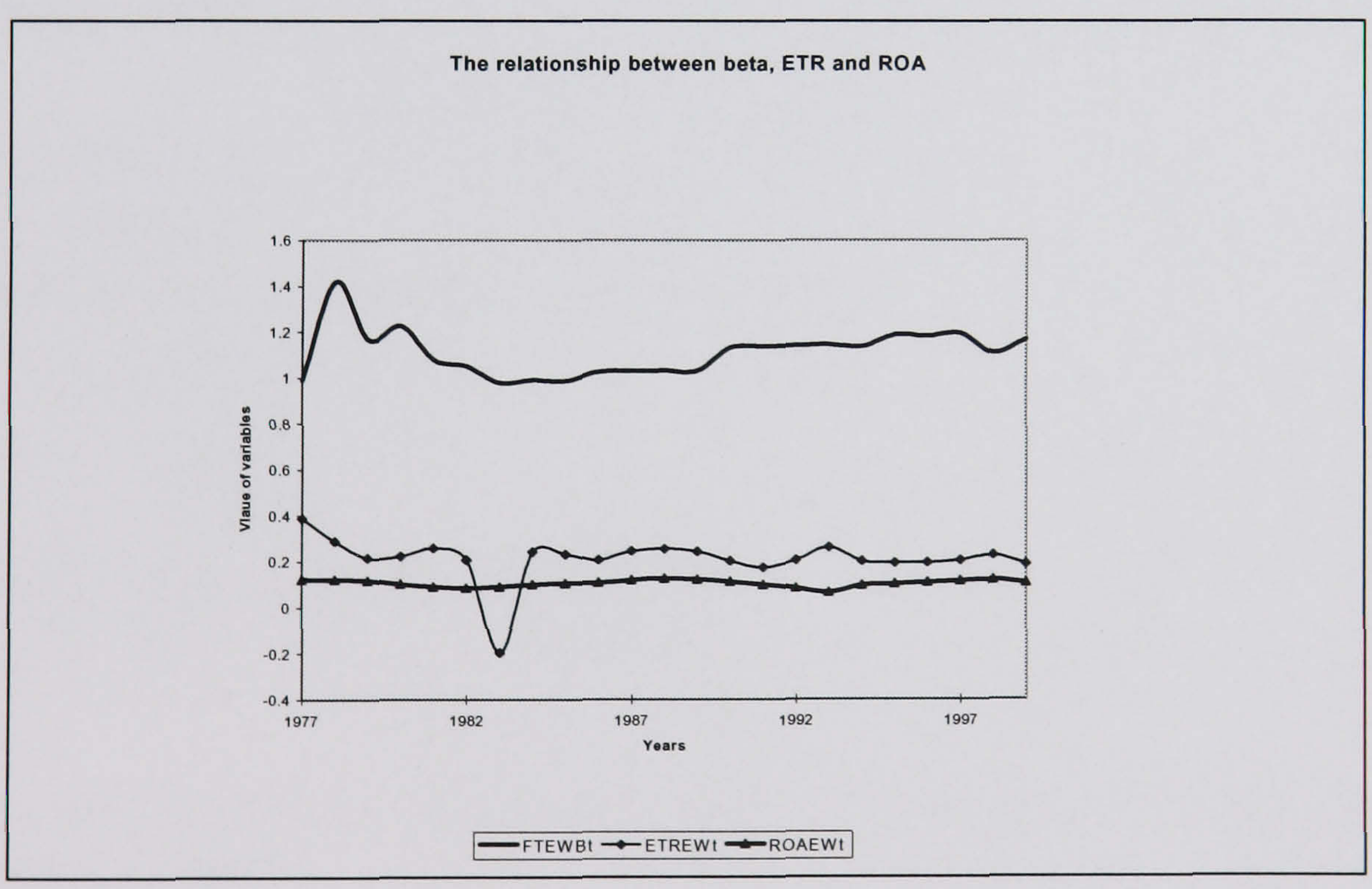
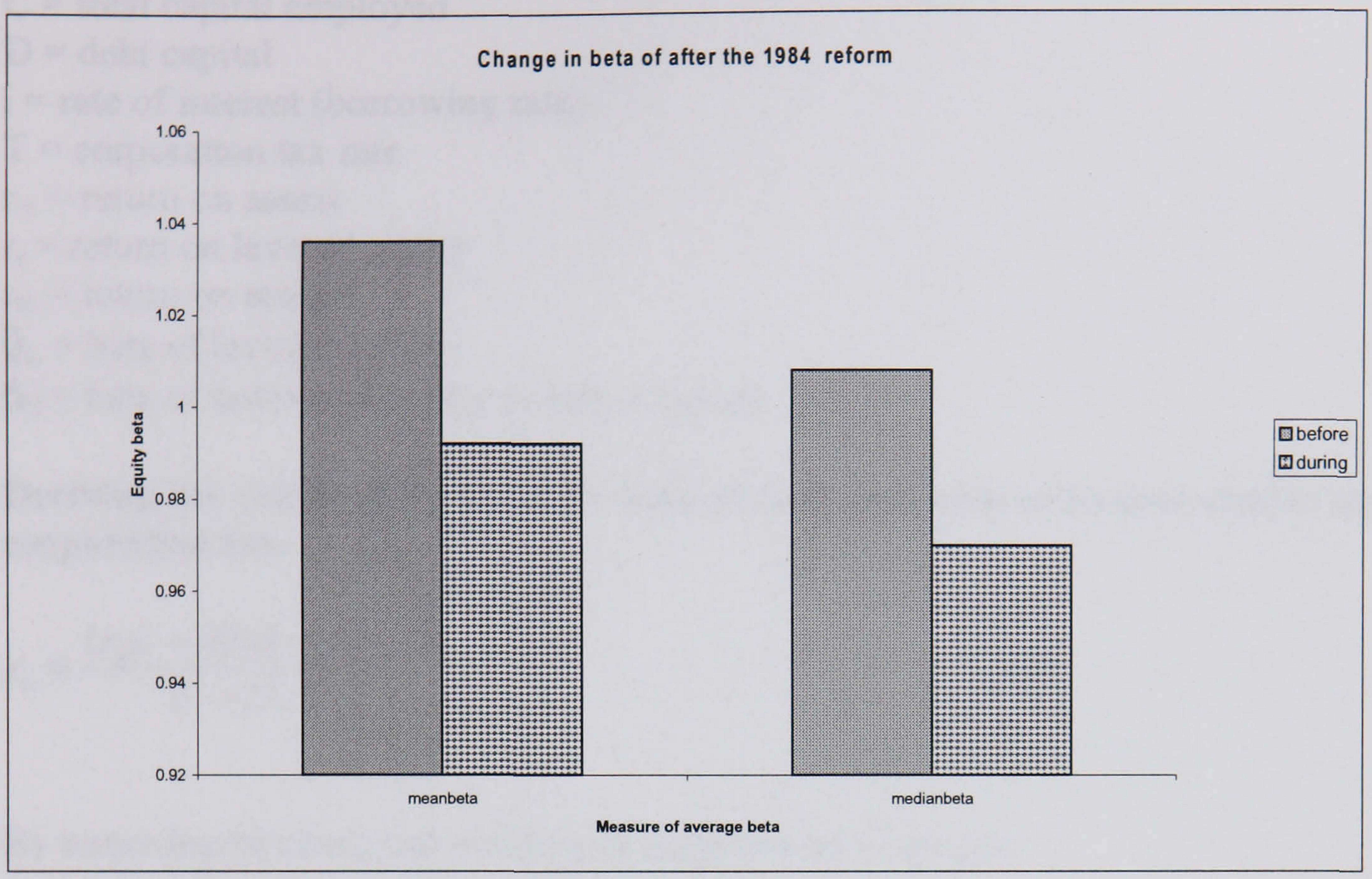


Figure 0-3: Histogram to show the change in systematic risk during reform



APPENDIX 0-1: EXTENSION OF BADHANI (1997) TO SHOW THE IMPACT OF A CHANGE IN CORPORATION TAX ON SYSTEMATIC RISK

Description of the variables
C = total capital employed
D = debt capital
i = rate of interest (borrowing rate)
T = corporation tax rate
r_A = return on assets
r_e = return on levered equity
r_m = return on market
β_L = beta of levered equity
β_U = beta of unlevered equity or beta of assets

Deriving the relationship between beta of asset and beta of levered equity under corporation tax.

$$r_e = \frac{(r_A C - iD)(1-T)}{C-D} \qquad \text{(i)}$$

By removing brackets and dividing through out by C we get:

$$r_e = \frac{r_A(1-T) - i\,{}^{D}\!/_{C}(1-T)}{1-{}^{D}\!/_{C}} \qquad \text{(ii)}$$

Letting L = D/C, we can write the formula for beta of levered equity as follow:

$$\beta_L = \frac{Cov(r_e, r_m)}{Var(r_m)} = \frac{Cov\left[\left(\frac{r_A(1-T)}{1-L} - \frac{iL(1-T)}{1-L}\right), r_m\right]}{Var(r_m)} \qquad \text{(iii)}$$

Assuming that i is independent of r_m we have:

$$\beta_L = \frac{Cov\left(\frac{r_A(1-T)}{1-L}, r_m\right)}{Var(r_m)} \qquad \text{(iv)}$$

$$\beta_L = \frac{(1-T)}{(1-L)}\beta_U \text{ where } \beta_U = \frac{Cov(r_A, r_m)}{Var(r_m)} \qquad \text{(v)}$$

Using equation (ii) and substituting L for D/C we can write L in terms of other variables as follow:

$$L = \frac{r_e - r_A(1-T)}{r_e - i(1-T)} \qquad \text{(vi)}$$

Substituting the value of L from (vi) into (v) and removing the brackets we arrive at the following expression:

$$\beta_L = \frac{r_e - i + 2iT - r_eT - iT^2}{r_A - i + iT - r_AT}\beta_U \qquad \text{(vii)}$$

By using quotient rule, the partial derivative of β_L with respect to T is given as follow:

$$\frac{\partial \beta_L}{\partial T} = \frac{i}{r_A - i}\beta_U \qquad \text{(viii)}$$

6 MANAGERIAL OWNERSHIP AND RESPONSES OF MANAGERS TO THE CHANGES IN CORPORATION TAX: EVIDENCE FROM UK CORPORATION TAX REFORM OF 1984

6.1 Introduction

The relationship between corporation tax and the capital structure of a firm is well documented and was covered in chapters two and three. Modigliani and Miller (1963) show that in the presence of corporation tax a firm value increases as debt is added to the capital structure. However, the extent to which this occurs is limited by other factors like bankruptcy and agency cost of debt (see for example Brealey, Myers and Marcus (2001). The increase in value according to Modigliani and Miller (1963) emanates from the corporate tax shields provided by interest payments. The argument suggests a positive relationship between debt (or interest payments) and firm value.

Other studies (see for example DeAngelo and Masulis (1980a) and Dammon and Senbet (1988)) show that the presence of other non-debt tax shields (especially those related to investments) will mean that debt should be employed only to shield that part of taxable corporate profit not shielded by non-debt tax shields. These studies suggest the existence of an optimal capital structure, which depends on the trade off between "substitution effect" and an "income effect" of non-debt tax shields. In all these cases, the value of a firm will increase only if managers follow a particular course of action. That is for firm value to increase managers need to take deliberate decisions whether to invest, to arrange for optimal finance mix etc.

Some of the decisions which may potentially add value to the firm may be less favoured by managers simply because they add pressure on them or because they affect company's operations. To have a value adding course of action is one thing and for managers to follow/adopt that course of action is another. The fact that public firms are managed by people who do not own them brings about the possible conflict between managers and owners. For example, Jensen and Meckling (1976) suggest that managers deviate from shareholder wealth-maximisation by consuming perquisites when they do not have an ownership stake in the firm. According to agency theory debt finance is likely to mitigate any conflict between managers and shareholders emanating from improper uses of firms' resources[81]. Accordingly, Lasfer (1995) suggests that firms are expected to set their capital structures in such a way that the potential conflicts of interest between firms' stakeholders are minimised. Thus, literature suggests that the conflicts between managers and shareholders can be avoided (and therefore the market value of the firms increased) if managers own a high proportion of equity and/or if firms use debt finance (e.g. Lasfer (1995), Jensen and Meckling (1976)).

Regarding the possible source of value, Jensen (1986) points out that debt reduces the amount of free cash flows available to managers for consumption of perquisites by committing the firm to pay out cash. Thus, debt finance creates an incentive to work harder and to make decisions that enhance firm value. Therefore, there is possibility of positive relationship between debt and market value based performance measure. Just as managers can use debt to signal their commitments to generate cash flows enough to pay off debt obligations, Leland and Pyle (1977) argue that managers use ownership stakes to signal to markets that they have projects of a high quality. The implication of Leland and Pyle (1977) is that

[81] It should be noted that agency theory is wide and it covers all the potential conflicts between different parts which have interest of any kind in the firm including managers, shareholders, bond holders, creditors, employees, other suppliers of capital and materials etc. The agency conflict that is

there is a relationship between managerial ownership and firm value. In their study, Jensen and Meckling (1976) suggested a positive linear relationship between performance and managerial ownership. However, other recent studies suggest a non-linear relationship between managerial ownership and firm's performance (see for example Mock, Shleifer and Vishny (1988), McConnell and Servaes(1990), Keasey and Short (1999), Hillier, Davies and McColgan (2002)). A non-linear relationship between managerial ownership and performance is based on the convergence and entrenchment effects of managerial ownership. The argument is that at a lower level of managerial ownership the interests of shareholders are aligned with that of managers resulting in an increase in performance. At the intermediate level, managers become entrenched and use company resources for their own benefit and this has negative effect on their company. On the other hand, at the highest level of managerial ownership, once again the interests of managers converge with that of shareholders and consequently firm performance increases. The recent empirical evidence both in the US and UK suggest the presence of both convergence and entrenchment phenomena although they differ in convergence and entrenchment levels of managerial ownership[82]. The interesting questions to be asked at this stage are "What is the relation, if any, between debt usage and managerial ownership? Is there any relationship between performance and debt employed by firm? Does managerial ownership influence the responsiveness of managers to a particular value

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assumed to be resolved by equity ownership is between managers and shareholders. Thus, this analysis to a large extent simplify the agency theory by holdings all other possible conflicts constant.

[82] It should be noted that to date there is no consensus on the relationship between managerial ownership and performance. Demsetz and Villalonga (2001) for example find no significant relationship between ownership structure and performance - their study yield evidence for the endogeinity of ownership structure.

adding information? Is there any difference between performance of firms partially or totally owned by managers vis-à-vis those not owned by managers?

In this study I integrate the corporate governance and capital structure issues by investigating, among other things, how managerial ownership influenced the responsiveness of firms to the corporation tax reform of 1984. In particular this study tests the documented non-linear relationship between managerial ownership and performance. The reason behind this test is to establish whether there is evidence (in my data set) that managerial ownership is related to performance in a way that theory suggests. This is important because if for example managers are actually entrenched, they may do nothing in response to the corporation tax reform of 1984, when value maximisation objective suggest that they should do something. In such a case the changes in debt-equity ratios did not necessarily reflect the movement towards optimal level. Thus, this study also explores whether managers cum owners and other managers differ in ways in which they respond to economic news. I also test whether and how the likely impact of the corporation tax reform of 1984 is related to managerial ownership.

The empirical results support the non-linear (cubic) form of relationship between managerial ownership and performance. The estimated coefficients of managerial ownership, its square, and its cubic terms have expected signs and are all statistically significant. The estimated coefficients for the control variables included in a non-linear model used to test the relationship between managerial ownership and performance are particularly striking. The estimated coefficient of size variable is negative; it therefore supports the view that small firms are associated with high performance and vice versa (see for example Fama and French (1993)). The results also show that both growth opportunities and liquidity are positively related to performance, whereas firms with high performance measures tend to have relatively low debt-equity ratios.

The results also support the argument that changes in the debt-equity ratio due to the corporation tax reform of 1984 are negatively related to changes in managerial ownership. Furthermore, my results provide empirical evidence to show that the documented decline in investments in fixed assets due to corporation tax reform was related to managerial ownership. Specifically the results show that changes in investments in fixed assets are negatively correlated with managerial ownership.

The rest of the chapter is organised as follows. Section 6.2 provides a summary of relevant literature on relationship between managerial ownership and performance. Data and variables are described in section 6.3. Hypotheses and empirical methodology are outlined in section 6.4. Section 6.5 presents empirical results and section 6.6 provides a summary and concluding remarks for the chapter.

6.2 Literature review

Many corporations are not run by the people who own them i.e. they are run by managers who operate as agents on behalf of the owners. As stressed by Berle and Means (1932), when managers hold little equity in the firm and shareholders are too dispersed to enforce value maximisation, corporate assets may be deployed to benefit managers rather than shareholders. Such managerial benefits can include shirking and perquisite taking, but also encompass pursuit of such non-value-maximizing objectives as sales growth, empire building, and employee welfare. According to Jensen and Meckling (1976), the costs of deviation from value-maximization decline as managerial equity ownership rises. As their stakes rise, managers pay a larger share of these costs and are less likely to squander corporate wealth. According to the convergence-of-interest hypothesis proposed by Jensen and Meckling (1976), market value increases with managerial ownership. In other words, Jensen and Meckling (1976) suggest that managers with small levels of ownership fail to maximise shareholder wealth because they have an incentive to consume perquisites.

Murphy (1985) analyses the relationship between corporate performance (as measured by realised returns and sales growth) and managerial remuneration packages. Using data on publicly-held corporations in the Fortune 500 and employing regression analysis, Murphy (1985) concludes that firm performance is strongly and positively related to managerial remuneration packages (which include salary + bonus and stock options). These results partially support Jensen and Meckling's (1976) proposition that managerial equity ownership aligns the interest of managers to that of owners.

Morck et al (1988) also use a sample Fortune 500 companies, the same data source as that used by Murphy (1985) to investigate the relationship between managerial ownership and market value of the firm as proxied by Tobin's Q. Using board ownership to proxy for managerial ownership, the paper provides empirical results which show a non-linear relationship between managerial ownership and performance. Particularly they show that Tobin's Q rises as ownership increases from 0% to 5%, falls as ownership increases further from 5% to 25% and then continue to rise as ownership rises beyond 25%. The interpretation of Morck et al (1988) findings is that at the level of managerial ownership between (0%-5%) and above 25% Tobin's Q increases due to convergence of interest between managers and owners. On the other hand at the intermediate levels (i.e. between 5%-25% inclusive) performance decreases as managerial ownership increases reflecting the entrenchment of the management team.

McConnell and Servaes (1990) provide some evidence to support Morck et al. (1988). In a larger and more diverse sample, they report a significant quadratic relation between managerial ownership and corporate value. As ownership increases, so does performance. However, after ownership levels of approximately 50% in 1976 and 40% in 1986, firm value declines. Their interpretation is that the increasing performance at the lower levels of managerial ownership is attributed initially to increased managerial incentives but with an entrenchment effect functioning at higher levels of insider ownership (see also Hillier, Davies and McColgan (2002)).

Dahya, McConnell and Travlos (2002) analyse the relationship between firm performance and top executive change and the association between the composition of the companies' shareholdings and market value of its share using UK data. Their results suggest that the ownership structure of a firm plays an important role in determining the effectiveness of internal managerial control mechanisms. Other striking findings of the Dahya et al (2002) paper are as follows: First, when executive equity stake exceeds 1% managers appear to become almost invulnerable to pressures of internal control procedures. Second, the probability of forced departure is positively related to levels of institutional share ownership in the firm and negatively related to the existence of dual chief executive officers (CEO), the size of the firm and prior share performance.

Himmelberg, Hubbard and Palia (1999) analyse the determinants of managerial ownership and investigate the link between ownership and performance. The paper shows that firms are governed by a network of relations representing contracts for financing, capital structure, and managerial ownership and compensation, among others. They argue that for any of these contractual arrangements, it is difficult to identify the correspondence between the contractual choice and firm performance whether measured by accounting rates of return or Tobin's Q. This is because contractual choices and performance outcomes are endogenously determined by exogenous and only partly observed features of the firm's contracting environment. Himmelberg et al. (1999) finds that a large fraction of the cross-sectional variation in managerial ownership is explained by unobserved firm heterogeneity. This unobserved heterogeneity in the contracting environment, the paper argues, has important implications for econometric models designed to estimate the effect of managerial ownership on firm performance.

Cho (1998) examines the relationship among ownership structure, investment and corporate value. The paper explores how ownership affects value and hypothesises that the structure of ownership affects corporate value through its effects on investments. Using a cross section of Fortune 500 manufacturing firms, the study finds a significant relation between insider ownership and corporate value. The empirical results also show a non-monotonic relationship between insider ownership and investment and concludes that ownership structure affects investment and therefore corporate value. In analysing the interdependence between insider ownership, investment and corporate value, Cho (1998) finds no evidence that managerial ownership had a causal effect on firm value but finds that investments significantly influence value.

Faccio and Lasfer (1999) investigate whether high managerial ownership entrenches managers through the creation of a board structure that is unlikely to monitor. Using the UK data on managerial ownership and board structure, the study finds that, on average, managerial ownership in the UK is lower than that reported in the US. Furthermore, the empirical results support the entrenchment hypothesis through the management's control of the board. However, as in Cho (1998), Faccio and Lasfer (1999) find that managerial ownership does not have impact on firm value.

Short and Keasey (1999) extend the US based literature to the UK to see whether the difference in governance systems in these two countries can show up in the levels at which management become entrenched. They also investigate the relationship between managerial ownership and performance by using both accounting-based and market-based measures of performance. Using the sample chosen from all UK firms quoted on the Official List of the London Stock Exchange for 1988-1992, their empirical results confirm that UK management becomes entrenched at higher levels of ownership than their US counterpart. Furthermore, the empirical results confirm the general finding of the US literature of non-linear relationship between firm performance and managerial ownership.

Palia and Lichtenberg (1999) re-examines the relationship between managerial ownership and firm performance using productivity measurements. By assuming a Cobb-Douglas production function, the paper uses managerial ownership as an argument in estimating firm's production function. Using a large sample of manufacturing firms, the paper provides empirical evidence that the changes in managerial ownership are positively related to the changes in productivity. Palia and Lichtenberg (1999) also find higher sensitivity of changes in managerial ownership to changes in productivity for firms who experience greater than the median change in managerial ownership.

Steiner and Chen (2000) use a non-linear simultaneous equations model to investigate the relationship between managerial ownership, analyst coverage and firm value. They argue that both managerial ownership and analyst coverage, serving an internal and external monitoring function respectively, enhance firm value. The empirical results show a diminishing substitution effect between managerial ownership and analyst coverage and a decreasing marginal value for managerial ownership. Furthermore, Steiner and Chen (2000) find evidence to support both alignment and entrenchment effects in the relationship between managerial ownership and firm performance as measured by Tobin's Q. Generally, the studies analysed show the relationship between managerial ownership and performance. The empirical evidences support both alignment and entrenchment effects in the relationship between managerial ownership and performance. The literature also suggests that firms with higher managerial ownership have a greater sensitivity to value adding information (see Palia and Lichtenberg, 1999).

6.3 Description of data and variables

6.3.1 Data

The sample was chosen from UK firms quoted on the Official List of the London Stock Exchange for the period 1981-1987. The managerial and institutional ownership data were collected manually from London Stock Exchange Official Annual Yearbooks. The data on performance and other control variables were drawn from the online Datastream facility. Initially the managerial and institutional ownership data were collected for each year in the sample period (see the descriptive statistics of this basic sample on Table 6.1). The fact that this study focuses on the relationship between managerial ownership and other variables of interest around the tax reform period conditioned my sample size and time frame. Consequently for a firm to be included in a sample it had to be quoted on the London Stock Exchange and have data on all variables of interest for all seven years covered in this study. I also restrict the sample to non-financial companies, which reduces the final sample to 348 firms. The descriptive statistics of the final sample are given on Table 6.2.

6.3.2 Variables

The measure of performance, perf, (or Tobin's Q)[83] used in this study was estimated by using the following formula:

$$\text{Perf} = \frac{MVE + \Pr eferred\ shares + Debt}{Total\ Assets - Current\ Liabilities}$$

Where

MVE = the market value of equity (Datastream item "mv")

$Debt$ = the book value of total debt (Datastream item 321)

$Preferred\ shares$ = total preference shares (Datastream item number 306).

$Total\ Assets$ = the total assets (Datastream item number 392).

$Current\ liabilities$ = the liabilities of the firm payable within one year (Datastream items number 389)

The literature on performance describes the relationship between performance and a set of variables. Thus, in order to make this study comparable to other related studies, the following variables were included in a regression model.

Size (SIZE)

It is argued in the literature that size has a potential impact on performance. For example, Short and Keasey (1999) argue that larger firms may find it easier to generate funds using both internal and external sources due to the reduced financing constraints. Furthermore, Short and Keasey (1999) show that the economies of scale that accompany size enables firms to create entry barriers and thereby are able to enjoy associated beneficial effects on performance. The variable, *SIZE* is measured as the natural logarithm of a firm's total assets. According to Short and Keasey (1999) size is positively related to performance. However, in general, the sign of the relationship between performance and size should depend on how well firm's management can make worthwhile decisions and be able to increase firm value relative to capital employed.

Growth (GR)

Growth is linked to performance and financial structure (Short and Keasey, p.92). As a firm grows, it needs more financing and this has an impact on the firm's capital structure. Since markets respond to good news about the company positively, a good financing arrangement leads to an increase not only in a firm's total assets but also in its market value. More specifically, using performance as estimated in this study it can be argued that as firm grows and managers respond to the growth need

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[83] This comprehensive measure of performance is adopted from a study by Hillier, Davies and

of the firm optimally, a firm value (represented as numerator in equation) will increase more than book value of employed capital (the denominator) hence higher performance. It is therefore important to control for the effect of growth on performance. Thus, a positive relationship between market based performance and growth is expected.

Research & Development (RD)

A company that spends on *RD* is likely to discover potential profitable projects and consequently experience growth not only in its assets but also in its market value. Thus, including *RD* in the regression accounts for any possible increase in firm's market value resulting from its expenditure on *RD*. The variable *RD* is estimated as a ratio of expenditure on *RD* to total assets. Assuming that the company that spends more on RD actually discover and undertake profitable projects, a positive relationship between performance and *RD* expenditure is expected.

Liquidity (LIQ)

Liquidity is estimated as the ratio of total cash and cash equivalent to total current liabilities. Cash is considered to be a non earning asset therefore holding a lot of cash relative to current cash needs may send a bad signal to the markets and may result in a decline in market value. On the other hand cash and cash equivalents indicate a good financial health and a possible positive effect on market value. Although it is difficult to ascertain a direction of the relationship, it is important to control for the impact of liquidity on performance. My opinion is that more cash and

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McColgan (2002).

cash equivalent is generally good to the company and therefore a positive relationship between liquidity and performance is expected.

Debt-equity ratio (DE)

Debt-equity ratio is estimated as the ratio of total loan capital to market value of equity. This variable is included to controls for the possible impact of debt holders (or lenders) on performance. In motivating this variable Short and Keasey (1999) point out that lenders can exert a significant influence on managers' operational behaviour and consequently on performance. Furthermore, debt may be used by managers to signal their intention to attain a certain level of performance that will enable them to pay off any debt obligation. Thus, debt may be used to resolve the conflict between managers and shareholders through a reduction in consumption of perquisites and hence it should increase the value of firm's equity. However, during the period covered in this study, a decrease in debt-equity ratio is expected since debt has become less attractive due to the corporation tax changes effected through the corporation tax reform of 1984. Furthermore, the expected decline in investments after the 1984[84] corporation tax reform brings in the possibility of a decrease in debt (and therefore debt-equity ratio) since debt is only issued to finance profitable investments. A negative coefficient is therefore expected.

6.4 Empirical Methodology and Hypotheses

The primary objective is to test whether managerial ownership contributes to performance through making decisions which are likely to increase the market value of the firm. In other words, the study aims to test whether the responsiveness of a

[84] The study by Bond et al (1993) shows that there was a significant decrease in investment especially in manufacturing sector

management team to the release of pertinent information depends on the proportion of company's equity held by managers.

To be able to give empirical evidence, I first test the convergence and entrenchment theories documented in the literature (see for example Morck et al (1988), McConnell and Servaes (1995), Short and Keasey (1999), to mention only few). In this respect I employ OLS regressions to test the cubic form of relationship between performance and managerial ownership. Following the study by Hillier, Davies and McColgan (2002) I test the following model.

$$Perf = a + b_1 DO + b_2 DOSQ + b_3 DOCUB + b_4 SIZE + b_5 GR + b_6 RD + b_7 LIQ + b_8 DE + \ell \quad (6.1)$$

Where *DO* stands for directors' ownership (or simply managerial ownership. *DOSQ* and *DOCUB* stand for quadratic and cubic term of *DO* respectively[85]. Other variables are as defined in section 6.3.2. The above model basically tests hypothesised relationship between managerial ownership and performance. Three managerial ownership variables *DO, DOSQ* and *DOCUB* are included to capture entrenchment and alignment effect in the relationship between managerial ownership and performance. As explained in the literature the model assumes that at relatively lower levels of managerial ownership, managers' interests converge with that of shareholders (hence a positive coefficient of *DO*). On the other hand, at intermediate levels managers become entrenched (hence a negative coefficient of *DOSQ*) whereas at very high levels of managerial ownership managers behave almost as shareholders and a convergence of interests re-emerge again (hence positive coefficient of

[85] The use of cubic form of the relationship between ownership structure and performance reflect the graphical relationship suggested in earlier studies. If the relationship follow the documented pattern of alignment-entrenchment-alignment then three managerial ownership terms included should capture that relationship.

DOCUB). A number of control variables are also included in the model to capture their effects on performance as discussed in section 6.3.

Assuming that markets are informationally efficient, and that firms employ market based performance measures, the performance of a firm should reflect the market's correct interpretation of the quality of decision(s) made by managers. Under that assumption, good decisions by managers will lead to good firm performance and vice versa. Thus, if managers' interests converge with that of shareholders, managers are expected to react to pertinent information in a way that enhances value. This study focuses on the information contained in the corporation tax reform of 1984. Thus, given the theoretical arguments on the impact that corporation tax reforms had on firm, the following broad relationships are hypothesised.[86]

First, managerial ownership is related to changes in investment in fixed assets. Recall that the corporation tax reform of 1984 involved, among other things, a reduction of statutory corporate tax rate and abolition of first year and initial capital allowances. Thus, investments in fixed assets, which used to have a positive net present value due to capital allowance, are likely to be unattractive after the reform and therefore a decrease in investments of fixed assets[87] is expected. However, the realisation of the expected change in fixed assets will depend on whether managers share the same view and whether they will respond accordingly. That is whether the investment in fixed assets actually changed after the reform it all depend on whether managers are entrenched or not. Results show that there are relatively few companies whose managerial ownerships fall under entrenchment level. This suggests that most

[86] For more details of the impact of the corporation tax reform of 1984 see Edward (1984), Devereux (1988), and Moon and Hodges (1989).

of firms will experience the decreases in investment in fixed assets. Thus, a negative correlation between managerial ownership and the changes in investments in fixed assets is expected.

Secondly, managerial ownership is negatively related to the changes in debt-equity ratio due to the corporation tax reform. As show on chapter one and three, the corporation tax reform of 1984 reduced the attractiveness of debt by reducing the statutory corporate tax rate from 52% to 35%. Although first year and initial capital allowances were also abolished (which increase importance of interest payments as tax shield), the effect of reducing the tax rate is expected to dominate in long term because the first year allowance apply only to new investments in assets. Thus, the coefficient of *DE* in model 6.1 is expected to be negative.

6.5 Empirical results

6.5.1 Relationship between managerial ownership and performance

As mentioned earlier, my initial empirical work is to test the relationship between performance and managerial ownership. The test is implemented by running OLS regressions for each of the seven years covered in this study to test model 6.1 as described in section 6.4. However, to save space, only the results for two years, 1982 and 1986 are presented here. Table 6.3 presents the results for the basic model (model 6.1) for both years. Panel A of table 6.3 shows the results for 1982 and panel B shows results for 1986.

The results support the non-linear relationship between managerial ownership (*DO*) and performance (perf). More specifically, the estimated coefficient

[87] In fact the government argument for reform was that there are lot of investments which do not produce satisfactory cash flows but they become viable only because there existed capital allowances.

of *DO* is positive and significant at 5% for 1982 (p-value = 3.4%) as expected, suggesting a convergence of interests at lower level of managerial ownership. The estimated coefficient of *DOSQ* is negative (and statistically significant for 1982) whereas that of *DOCUB* is positive (and statistically significant at 10%) as the theory suggests. These results suggest that managers become entrenched at intermediate levels of equity ownership and may divert firms' resources towards satisfying their own needs (hence decline in performance). On the other hand as the equity ownership by managers increase to higher levels, managers' interests tend to converge with that of external shareholders and managers focus on maximising firm's value (which leads to an increase in performance)[88].

Table 6.4 presents results for the model similar to model 6.1 in all respects except that the dependent variable for regression on 1982 data is calculated as the average of performance before the reform (i.e. 1981-1983). The dependent variable used for 1986 regression is calculated as average after reform (i.e. 1985-1987). The results as presented on table 6.4 show that statistical significance of estimated coefficients of *DO, DOSQ, DOCUB* increase when the averages are used instead of the actual data for a particular year (compare column 5 of table 6.3 with column 5 of table 6.4). Particularly, the estimated coefficients of *DO, DOSQ,* and *DOCUB* are statistically significant at 5% level. In addition to supporting the cubic form of relationship between performance and managerial ownership, these results suggest

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These investments are likely to be dropped if capital allowances are abolished.

[88] As noted earlier, the view that ownership structure drives performance is not a consensus to all scholars. For example Faccio and Lasfer (1999), Cho (1998) and Demsetz and Villalonga (2001) find no significant relationship between managerial ownership and performance. The recent evidence of endogeinity of ownership structure suggest that the evidence is probably shifting to non-systematic relationship between ownership structure and performance.

that probably an average performance measure should be used in investigating the relationship between performance and its documented influencers.

The level of ownership at which convergence of interests or entrenchment occurs is not very clear from this study because the graph is not smooth. However, by using the final sample and cross sectional analysis, there is evidence of a positive relationship between managerial ownership and performance up to managerial ownership levels of 11% then a notable negative relation up to managerial ownership levels of 30%. The relationship at a level of ownership above 30% is not well defined graphically but performance generally increases with an increase in managerial ownership.

Using the basic sample data, average performance increases with average managerial ownership until 17.7% managerial ownership level, it then it declines up to 20.2% and final it increases slightly at managerial ownership level above 20.2% (see also figure 6.1). On the other hand, the observed relationship between institutional ownership and performance over the period covered by this study (i.e. time series analysis) mirrors the reported relationship between ownership and performance (see figure 6.2). That is, the performance increases with equity ownership at relatively lower levels of ownership, decreases at intermediate levels ownership and then increases at higher levels of equity ownership. Average performance increases with average institutional ownership until the later reaches 43%, it then decreases until the 45% level of institutional ownership and finally increase as institutional ownership increases above 45%. The results support the functional form of the relationship between performance and managerial ownership as suggested by Morck et al. (1988) and Short and Keasey (1999). Thus, management move from alignment, to entrenchment, and to alignment as their equity ownership in the firms they manage increase.

6.5.2 Relationship between performance and debt-equity ratio

As mentioned previously, the objective of this study is to relate the performance of a company (as measured by Tobin's Q) with the managerial action taken in response to the release of pertinent information. Knowing the theoretical prediction of the impact of the corporation tax reform of 1984 on capital structure variables (i.e. debt-equity ratio), the idea is to test whether the decreases in debt-equity ratio following that reform are related to managerial ownership. Agency theory suggests the inverse relationship between managerial ownership and the changes in debt-equity ratios. The relationship emanates from the relationship between debt and performance. Literature shows that debt mitigates the conflict between managers and shareholders as it reduces management discretion to consume excessive perquisites and hence should increase the value of firm's equity. The agency theory literature does not indicate the amount of debt that is necessary to enhance firm's performance. On the other hand the tax argument suggests that optimal debt exists in that firm can only borrow to an extent that there will be enough profit to shield from corporation tax. Assuming that the optimal level of debt implied in tax argument of capital structure is enough to mitigate conflict between managers and shareholders, the expected decrease in debt-equity ratio should on average reflect the convergence of interests of managers to that of shareholders and consequently a negative relationship is expected. However, the extent of decrease in debt-equity ratio due to corporation tax reform should, in principle, reflect the extent to which corporation tax reform distorted the optimal debt-equity ratio. Thus, even if managers' interests are aligned to that of external shareholders there will be only minor adjustment if only minor distortion occurred.

The empirical results are given on Table 6.3, 6.4 and 6.5. The 9th row in each panel of Tables 6.3 and 6.4 shows the coefficients of debt-equity ratio (*DE*) estimated by using model 6.1 shown previously. All estimated coefficient are negative as expected and are statistically significant (see the last column in each panel). Note that the results on *DE* ratio given on Tables 6.3 and 6.4 are more robust because the relation between performance and debt-equity ratio is analysed together with other variables that are considered to be important determinants of performance. On the other hand the results given on Table 6.5 are obtained after analysing the relationship between performance and each variable individually. Columns 2 and 3 (last row in each panel) of Table 6.5 show the correlation coefficients and corresponding p-values for debt-equity ratio and performance measure.

During the period covered in this study (i.e. 1981-1987) there is a negative relationship between debt-equity ratio and performance measures. Assuming at this time that managers work for the best interests of shareholders, a good decision on any relevant area of the company should lead to improved performance. In this study, on average, the corporation tax reform of 1984 made debt unattractive and therefore the decision to reduce debt in a company's capital structure should be associated with an increase in market-based performance measures. A significantly negative correlation coefficient between *DE* and *Perf* (-0.171, p-value =0.001) reported on panel A of Table 6.5 implies that the decline in debt-equity ratios induced by the reform was associated by an increase in performance. Assuming that a decrease in debt-equity ratio resulted from a deliberate action by managers, a negative correlation between *DE* and *perf* provides empirical evidence to support the argument that on average, managers whose interests are aligned with those of shareholders respond to information in a way that increase performance. It should be noted that a general conclusion as the one made above need analyses of more variables that are related to performance and managerial ownership. However, as mentioned above, a decrease in debt-equity ratio following corporation tax reform of 1984 is associated with an increase in performance. The relationship between performance and change in debt confirm the hypothesised relationship. Again a change (or simply a decrease) in debt-equity ratio due to reform is associated with higher performance. The reported correlation coefficient is –0.141 and is statistically significant at any conventional level of significance (p-value = 0.009).

Panel C, last row of column 2 and 3 of table 6.5 reports the correlation coefficient and corresponding p-value between the changes in performance and the changes in debt-equity ratios. As in previous cases, the reported correlation is negative but is statistically insignificant (correlation = -0.065, p-value = 0.231). Since managers may take a number of course of actions at the same time, the changes in debt-equity ratios may as well be the results of other aspects not related to the reform. Thus, the insignificance of the above correlation coefficient may be explained by the fact that only a portion of the change in performance is associated by a change in debt-equity ratios.

6.5.3 The relationship between managerial ownership and debt-equity ratio

The relationship between managerial ownership and debt-equity ratio depends on which theory is dominant: convergence theory or entrenchment theory. The working assumption here is that the capital structure decision (i.e. whether to adjust debt-equity ratio or not) depends on the documented relationship between managerial ownership and performance. At the level of managerial ownership where managers are entrenched, a change in debt-equity ratio might not benefit managers and therefore a decline in performance is a possibility. On the other hand, if managers' interests are aligned to that of shareholders, a change in debt equity ratio necessarily should lead to higher performance because the adjustment should be towards an optimal level.

In this study managers who operate in the best interest of shareholders are expected, on average, to take decisions that will lead to a decrease in debt equity ratio. A priori, the sign of the relationship will depend on the dominant managerial ownership level. At "entrenchment levels" any sign is a possibility since the adjustments to debt-equity ratio are aimed at benefiting managers and not shareholders. Furthermore, it should be noted that a particular decision could benefit both managers and external shareholders. On the other hand, at "convergence levels" corporate finance suggests a negative sign. Thus, responsible managers should adjust their debt-equity ratio downwards! The empirical results given on Table 6.5 (Row 3 of Panel A) show the significant negative correlation between debt-equity ratio (*DE*) and managerial ownership (*DIR*) (correlation coefficient = -0.108, p-value = 0.045). Thus, on average, the firms with higher managerial ownership have lower debt-equity ratios and vice versa.

The correlation between managerial ownership and change in debt-equity ratio following corporation tax reforms is positive and significant (correlation = 0.108, p-value =0.046). This result should be interpreted with caution! The result suggests that the high managerial ownership is associated with large change in debt-equity ratios and vice versa. This should not be always the case because even if we assume that managers' interests are aligned to that of shareholders at a higher level, the reduction in debt-equity ratios required to restore the optimal debt-equity ratio does not necessarily need to be large. In general terms the management team whose interests are aligned to that of shareholders at either low or high levels of equity ownership may need small or large adjustment to their debt-equity ratio to attain the optimal level and consequently any sign of correlation coefficient may results. However in the UK firms were operating at higher levels of leverage and given that most of equity ownership by managers were at low levels, the positive correlation might have picked that phenomenon.

Changes in managerial ownership are negatively correlated with the changes in debt-equity ratios, although the correlation coefficient is not statistically significant. Given that there is a significant decrease in debt-equity ratios due to the reform, a negative correlation is consistent with the view that the increases in the equity ownership by managers increase the alignment of managers' interests with that of other shareholders. However, whether the changes in managerial ownership will bring the corresponding change in performance depends on the level of managerial ownership before the change. For example, if the relationship between managerial ownership and performance move from alignment-entrenchment-alignment then, if the change will shift managers from alignment to entrenchment level then there should be a decrease in performance. The opposite is true.

6.5.4 The relationship between managerial ownership and investments

Managerial ownership is related to investments in that if managers operate for the best of company, then they will engage in investments that maximise the value of shareholders' equity. Some studies in corporate governance theory suggest that there exist levels of managerial ownership at which managers' interests converge to that of owners and other levels at which managers become entrenched[89]. The empirical studies in both UK and US provide evidence in favour of the theory, although they differ in convergence and entrenchment level.[90] Like in any other decision, managers whose interests are aligned with those of shareholders are expected to act on investment-related information in a way that maximises the company's value.

The information used in this study relates to a change in corporate tax structure. The reduction or abolition of first year and initial capital allowances, as deductible items for corporation tax purposes, meant that some investments in assets mostly affected by the reform, will prove to be relatively unattractive and possibly have negative net present values. As a consequence, there is likely to be a reduction in investments in such assets. Since having more assets in a company is not a bad thing to self-centred managers, the decrease in assets is likely to be related to managerial ownership. Specifically, the changes in investment in assets due to reform are likely to be related to managerial ownership. Bond, et al (1993) analysed

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[89] Other studies fail to provide full support of the reported relationship (see for example Demsetz and Villalonga (2001)

[90] For the details on entrenchment and convergencelevels in the US see Mork et al (1988) and MCConnell and Servaes (1990); the corresponding reference in the UK are Faccio-Lasfer (1999) and Short and Keasey (1999).

the impact of capital allowance in investments in the UK and showed that there was significant decrease in investments after the reform (see also Edward (1984), Devereux (1988) and Moon and Hodges (1989)).

In this study I first test whether there is a decrease in investment in assets (both total and fixed) and then test whether and how the changes in investments in assets are related to managerial ownership. Table 6.5 provides the empirical results to support the argument that reform led to decreases in debt-equity ratios and investments in fixed assets. This conclusion is based on the reported decrease in debt-equity ratios following the reform. Panel C of table 6.5 shows that changes in performance are negatively correlated with changes in debt-equity ratios. The decreases in debt-equity ratios were associated with increases in performance. This is consistent with the view that market interprets good decisions positively. Similarly, the changes in fixed assets are positively correlated with changes in performance. Again an increase in investment in fixed assets is associated with increase in performance. As, discussed earlier, the increase in investment in fixed assets is consistent with the view that value-maximising managers brought forward profitable investments to take advantage of capital allowances; and market responded positively. It should be noted that the results on changes in variables reported on Table 6.5 are effectively the changes occurred during the reform. Data limitation hindered the analysis of the impact of reform to extend beyond 1987.

Initially the test is conducted to analyse a general relationship between managerial ownership and investments. The results are summarised in panel A, last two columns, row 3 of Table 6.5. The results show that there is a negative significant correlation between managerial ownership and investments in both total assets and fixed assets. The respective correlation coefficients of –0.297 and –0.271 are all highly significant (i.e. p-value is equal to zero in each case). Thus, the higher the managerial ownership, the lower the investments (in both total assets and fixed assets) and vice versa. On its own the negative correlation between managerial ownership and investments does not make much economic sense. Why should a low percentage of equity ownership by managers be associated with large investments in assets? Even if managers work for the best interests of shareholders any asset acquired should meet a certain evaluation criteria and therefore the amount of assets should be independent of managerial ownership. Thus, investments should be related to performance to be economically meaningful.

The correlation between investment and performance is negative and significant (see Table 6.5, panel A, column 4 and 5, last row). Since total assets can be used to proxy size, the relation between investment and performance may be attributed to the size effect. Most literature in asset pricing shows that small firms tend to outperform large firms (see for example Fama-French (1993, 1998)). Thus, the negative correlation between managerial ownership and investments in assets (total and fixed) emanate from the relationship between assets and performance in that managerial ownership is positive correlated to performance. The correlation between managerial ownership and the changes in investment in assets is negative and significant as expected.

The correlation coefficient between managerial ownership and change in total assets (fixed assets) is –0.111 (-0.117), with p-value = 0.041 (0.031). It is argued that the corporation tax reform led to a decrease in otherwise positive NPV projects. Other things remaining constant its impact on shareholders' wealth is a possibility.

The results, shown on panel B, last row of last four columns of table 6.5, show that the decrease in investment in assets is associated with a decrease in shareholders wealth and consequently to the overall performance (see a significant positive correlation coefficient between performance and change in investments in assets). The observed cross-sectional relationship between managerial ownership, investment and performance partly supports the findings by Cho (1998); that is, generally investments in fixed assets are related to performance and indirectly to managerial ownership.

6.6 Summary and Conclusion

In this chapter corporate governance theory is integrated with corporate finance to test (initially) the documented relationship between managerial ownership and performance. I then tested whether the expected changes in capital structure and investment due to the corporation tax reform of 1984 were related to managerial ownership in a manner predicted by both corporate finance and corporate governance theories. Theoretical and empirical studies on corporate governance propose a non-linear relationship between managerial ownership and performance of the firm. Specifically, this study tests the cubic form of the above-mentioned relationship; that is, it tests whether management moves from alignment, to entrenchment, and then to alignment as their equity ownership in a firm increase.

The empirical results support the cubic form of the relationship between managerial ownership and performance as suggested by Morck et al. (1988), McConnell and Servaes (1990) and by Short and Keasey (1999). Given the empirical evidence on the presence of alignment and entrenchment effects, and that the entrenchment occurs only in small range of ownership, I test whether the changes in capital structure and investments due to reform of 1984 observed in the firms are related to managerial ownership.

Corporate finance theory suggests that corporation tax is one of the fundamental determinants of leverage and to a large extent determines the attractiveness of investments (especially in fixed assets). The deductibility of interest payments and capital allowances for corporation tax purposes and the availability of non-debt tax shields suggest the existence of optimal capital structure (see for example DeAngelo and Masulis (1980a) and Dammon and Senbet (1988)). Furthermore, the deductibility of capital allowance for some assets reduce the effective price of those assets (capital allowance is deducted at year zero of investment) and therefore increase their attractiveness.

The corporation tax reform studied in this thesis involves, among other things, the reduction of statutory corporation tax rate from 52% to 35% and abolition of first year allowance on plant and machinery and initial capital allowance on industrial buildings, which used to be 100% and 75% respectively.

The implications of such reform, among others, are as follows: First, debt will become relatively unattractive and consequently a decline in debt-equity ratio is expected. Second, the effective cost of some assets will relatively increase and investments in such assets are likely to decline. A decrease is expected because some of the projects that used to have positive NPV before the reform (and therefore accepted and implemented) may turn out to be unattractive. Although a change in investments is expected, the direction and significance of such change depend on the availability of profitable opportunities and the magnitude of NPV for such assets before the reform. That is, if companies on average have profitable opportunities (projects with relatively large NPV) the NPV of such projects may remain to be positive even after the reform and therefore, other things remaining constant, there may be an increase (or no change) in investment after the reform.

The empirical results show that change in managerial ownership is negatively related to change in debt-equity ratio. The interpretation of that finding is that, firms that experienced increase in managerial ownership experienced decreases in their debt-equity ratios and vice versa. This is not always the case because the adjustment to debt-equity ratio should, in principle, reflect the distortion made by the reform. In fact the decreases in debt-equity ratios were expected whether managerial ownership increased or decreased so long as new managerial ownership is within the alignment level.

Concerning the impact of reform on investments, the results show the expected negative significant relationship between managerial ownership and the change in investments in fixed assets. Also results show that performance is positively correlated with changes in investments in fixed assets. Thus, the relationship between performance and managerial ownership may be considered to emanate from deliberate investment decisions by managers. In other words I can argue that the relationship between performance and managerial ownership depends on the way managers reacted to pertinent information, which in turn depends on whether managers operate at the best interest of shareholders (convergence theory) or they operate the company to fulfil their own self-centred desires (entrenchment theory).

Table 6-1: The Descriptive Statistics for Managerial & institutional ownership for 1981-1987-Basic sample

	1981	1982	1983	1984	1985	1986	1987
Panel A: Managerial Ownership(%)							
Mean	24.7	20.2	17.1	17.4	17.3	19.6	17.7
Median	24.0	0.0	0.0	0.0	0.0	13.2	11.3
Stdev	24.3	23.8	23.2	23.2	22.2	22.5	20.9
Min	0.0	0.0	0.0	0	0.0	0.0	0.0
Max	85	85	90.0	90	86.0	87.2	86.0
N	535	945	1087	1261	1027	658	656
Panel B: Institutional Ownership(%)							
Mean	45.6	44.1	45.1	43.4	43.6	37.9	38.5
Median	41.2	36.6	38.5	31.6	33.9	29.9	29.9
Stdev	22.6	24.6	25.8	26.5	26.7	21.5	23.6
Min	7.2	7.1	5.6	6.4	7.3	7.2	9.9
Max	99.6	99.9	99.9	99.9	99.9	99.9	99.9
N	176	339	354	439	431	299	321

Notes:
Data on managerial and institutional ownership represent the proportions of equity shares held by individuals who manage the firm and other companies. Data were collected manually from London Stock exchange Official annual yearbooks for all seven years. A company is included in the calculation of the above descriptive statistics if it have data on either managerial ownership or institutional ownership for at least one year. The descriptive statistics were obtained by using Minitab.

Table 6-2: Descriptive Statistics for variables for period 1981-1987- final sample

The following table shows some descriptive statistics for variables used in this chapter. Fixed assets are actual values of Datastram item 339 whereas the description and estimation of other variables are as given in section 6.3. Company was included in the final sample if it have data for all variables for all seven years. A final sample, whose descriptive statistics are reported in this table consist of 348 companies.

Year	Parameter	DIR	DE ratio	Perf	Total assets +	Fixed assets +
1981	Mean	0.065	0.304	0.990	400.3	173.0
	Stdev[a]	0.165	0.510	0.808	1675.7	837.9
	Min[b]	0.000	0.000	0.069	0.323	0.06
	Max[c]	0.789	3.928	6.212	23093.0	11307.0
1982	Mean	0.065	0.343	0.977	468.3	204.0
	Stdev[a]	0.159	0.630	0.842	2017.0	1010.5
	Min[b]	0.000	0.000	0.063	0.321	0.015
	Max[c]	0.750	5.680	7.419	26155.0	13141.0
1983	Mean	0.062	0.340	1.181	522.0	224.8
	Stdev[a]	0.154	0.794	1.078	2196.5	1122.0
	Min[b]	0.000	0.000	0.058	0.359	0.054
	Max[c]	0.750	6.731	8.914	27041.0	14519.0
1984	Mean	0.056	0.323	1.144	603.4	262.0
	Stdev[a]	0.139	1.077	0.866	2656.7	1361.5
	Min[b]	0.000	0.000	0.042	0.425	0.044
	Max[c]	0.600	18.311	6.748	34057.0	17800.0
1985	Mean	0.054	0.267	1.279	603.4	260.0
	Stdev[a]	0.136	0.674	0.916	2435.1	1247.5
	Min[b]	0.000	0.000	0.047	0.89	0.119
	Max[c]	0.600	9.632	8.045	29799.0	15590.0
1986	Mean	0.051	0.175	1.652	678.5	278.7
	Stdev[a]	0.135	0.331	1.263	2605.6	1278.2
	Min[b]	0.000	0.000	0.049	0.69	0.089
	Max[c]	0.836	3.651	12.214	27927.0	15418.0
1987	Mean	0.047	0.114	2.365	719.0	300.9
	Stdev[a]	0.125	0.232	2.166	2509.8	1273.2
	Min[b]	0.000	0.000	0.062	0.828	0.083
	Max[c]	0.836	2.590	28.134	26475.1	15302.0

+Figures are in million pound sterling (£)
a The word stands for standard deviation
b The word stands for minimum value
c The word stands for maximum value

Table 6-3: The estimated coefficients of the model estimated to test the relationship between performance and its determinants using actual annual data

The estimated coefficients of the model estimated to test the relationship between performance measures and managerial ownership. The estimated model is given below:

$$Perf = a + b_1 DO + b_2 DOSQ + b_3 DOCUB + b_4 SIZE + b_5 GR + b_6 RD + b_7 LIQ + b_8 DE + \ell$$

The variables are as defined previously. The first column shows the name of the variables where the name "intercept" stands for "a" in the above model. The second column presents the values of estimated coefficients where as the third column shows the standard errors in estimating the coefficients. The column titled "T-Statistics" shows the t-values estimated to test the hypothesis that estimated coefficient is zero against the alternative hypothesis that the coefficient is different from zero. The last column shows the empirical p-values estimated to test the significance of estimated coefficients. Panel A shows the results for the model estimated by using 1982 data, where as panel B shows the results for the model estimated using 1986 data.

Panel A: Coefficients estimated by using 1982 data				
Variable	Est. coeff.	SE(Mean)	T-statistics	P-value
Intercept	1.214	0.354	3.430	0.001
DO	8.268	3.879	2.130	0.034
DOSQ	-33.800	16.080	-2.100	0.036
DOCUB	30.410	16.090	1.890	0.060
SIZE	-0.031	0.031	-0.980	0.326
GR	0.415	0.189	2.190	0.029
RD	1.991	2.911	0.680	0.494
LIQ	0.500	0.180	2.780	0.006
DE	-0.079	0.051	-1.570	0.118
R-squared	7.30%			
F-statistic	3.30			
Panel B: Coefficients estimated by using 1986 data				
Variable	Est. coeff.	SE(Mean)	T-statistics	P-value
Intercept	2.2263	0.6346	3.51	0.001
DO	3.038	4.653	0.65	0.514
DOSQ	-11.88	18.69	-0.64	0.525
DOCUB	7.47	17.8	0.42	0.675
SIZE	-0.04784	0.05402	-0.89	0.377
GR	0.4259	0.175	2.43	0.015
RD	-5.457	9.884	-0.55	0.581
LIQ	0.0867	0.1214	0.71	0.475
DE	-0.3726	0.1668	-2.23	0.026
R-squared	4.60%			
F-statistic	2.05			

Table 6-4: The estimated coefficients of the model estimated to test the relationship between performance and its determinants using average annual data

The estimated coefficients of the model estimated to test the relationship between performance measures and managerial ownership. The estimated model is given below:

$$\overline{Perf} = a + b_1 DO + b_2 DOSQ + b_3 DOCUB + b_4 SIZE + b_5 GR + b_6 RD + b_7 LIQ + b_8 DE + \ell$$

The dependent variable for the results shown on panel A is the average value of "*Perf1*" for period 1981-1983; where as the dependent variable for the results shown on panel B is the average value of "*Perf1*" for the period 1985-1987. Other variables are as defined previously. The first column shows the name of the variables where the name "intercept" stands for "a" in the above model. The second column presents the values of estimated coefficients where as the third column shows the standard errors in estimating the coefficients. The column titled "T-Statistics" shows the t-values estimated to test the hypothesis that estimated coefficient is zero against the alternative hypothesis that the coefficient is different from zero. The last column shows the empirical p-values estimated to test the significance of estimated coefficients. Panel A shows the results for the model estimated by using 1982 data, where as panel B shows the results for the model estimated using 1986 data.

Panel A: Coefficients estimated by using 1982 data				
Variable	Est. coeff.	SE(Mean)	T-statistics	P-value
Intercept	1.277	0.361	3.540	0.000
DO	8.775	3.955	2.220	0.027
DOSQ	-35.990	16.400	-2.200	0.029
DOCUB	32.390	16.410	1.970	0.049
SIZE	-0.029	0.032	-0.920	0.358
GR	0.473	0.193	2.450	0.015
RD	2.437	2.968	0.820	0.412
LIQ	0.484	0.184	2.630	0.009
DE	-0.099	0.052	-1.930	0.055
R-squared	8.20%			
F-statistic	3.70			
Panel B: Coefficients estimated by using 1986 data				
Variable	Est. coeff.	SE(Mean)	T-statistics	P-value
Intercept	3.343	0.635	5.270	0.000
DO	1.551	4.650	0.330	0.739
DOSQ	-7.540	18.680	-0.400	0.687
DOCUB	3.920	17.790	0.220	0.826
SIZE	-0.130	0.054	-2.410	0.017
GR	0.205	0.176	1.170	0.244
RD	-4.478	9.877	-0.450	0.651
LIQ	0.070	0.121	0.580	0.563
DE	-0.339	0.167	-2.040	0.043
R-squared	4.60%			
F-statistic	2.01			

Table 6-5: The relation between managerial ownership, capital structure, Investments and performance

Managerial ownership variable represents the percentage of equity shares owned by managers (DIR). Capital structure (DE) is represented by debt-equity ratio, Investment is proxied by total assets (INV-TA) and fixed assets (INV-FA). Panel A shows the relationship (correlation coefficients) of the variables using 1982 data. The choice of 1982 year is arbitrary; any other year before the corporation tax reforms of 1984 (i.e. 1981-1983) can be used and results are similar in that the same conclusion can be reached. Panel B shows the correlation coefficients of variables versus changes in variables following tax reforms. The change, denoted by a symbol Δ before the variable, is calculated by subtracting average of the variables before reforms (i.e. 1981-1983) from the average of variables after reforms (i.e. 1985-1987). Panel C shows the correlation coefficients of changes in variables. The columns labelled "corr" and "p-value" show the correlation coefficients and a measure of the significance of estimated coefficients (p-values[91]) respectively.

Panel A: Correlation coefficients: variables with variables						
Variable	DE		INV-TA		INV-FA	
	Corr	P-value	Corr	P-value	Corr	P-value
DIR	-0.108	0.045	-0.297	0.000	-0.271	0.000
PERF	-0.171	0.001	-0.218	0.000	-0.055	0.304
Panel B: Correlation coefficients: variables Vs change in variables						
Variable	Δ(DE)		Δ(INV-TA)		Δ(INV-FA)	
	Corr	P-value	Corr	P-value	Corr	P-value
DIR	0.108	0.046	-0.111	0.041	-0.117	0.031
PERF	-0.141	0.009	0.203	0.000	0.249	0.000
Panel C: Correlation coefficients of changes in variables						
Variable	Δ(DE)		Δ(INV-TA)		Δ(INV-FA)	
	Corr	P-value	Corr	P-value	Corr	P-value
Δ(DIR)	-0.081	0.136	0.033	0.543	0.050	0.357
Δ(PERF)	-0.065	0.231	0.100	0.065	0.018	0.744

[91] Thus, the p-value is calculated to test the hypothesis that estimated coefficient is zero against the alternative hypothesis that the coefficient is not equal to zero.

7 CONCLUSIONS AND SUMMARY OF FINDINGS

7.1 Conclusion

A focus of empirical research for about three decades after the publication of a celebrated paper by Modigliani and Miller (1958) has focused on issues related to corporate debt policy. These range from those related to an optimal debt policy through to the determinants of optimal capital structure. One of the central issues analysed, which is also one of the issue of interest in this thesis, is the impact of taxation on corporate debt policy. Theories of capital structure point to the relevancy of corporation tax in determining corporate debt policy. The main studies in this respect include Modigliani and Miller (1963), DeAngelo and Masulis (1980a), Dammon and Senbet (1988), and Okzan (2001). The empirical findings of studies on the relevance of the corporation tax on debt policy fail to fully support the tax-based theories of capital structure (see for example Bradley, Jarrel and Kim (1984)).

In my opinion, the failure to support tax-based theories of capital structure, among other documented reasons[92], is attributable to a failure to isolate the impact of corporate tax from the influence of other factors, which jointly determine capital structure. The process of isolating the effect of corporate tax on a firm's capital structure is not easy. However an analysis of its effect on capital structure around a period of a major tax change should shed light on its relevance as a determinant of capital structure.

In this thesis I use the corporation tax reform of 1984 to investigate the impact of corporation tax on debt-equity ratios, systematic risk and leasing in the

[92] Most of the studies attribute the failure to support tax-based theories of capital structure to methodological problems (see for example Givoly et al (1992)).

UK. I also investigate whether the responses of public firms to the 1984 reform are related to their respective ownership structures.

The results from this study strongly support a view [93]that tax-related variables are significant determinants of a firm's capital structure. The empirical evidence from this study suggests that an optimal capital structure exists and that firms adjust their capital structures towards the optimal levels. The reported decline in debt-equity ratio suggests that firms were adjusting their debt-equity ratios towards optimal levels. There is also evidence that the corporation tax affects both leasing and the systematic risk of a company. Although the theoretical model[94] suggests a positive relationship between change in beta of equity and change in debt-equity ratio, it was expedient to analyse the extent to which the changes in debt-equity ratios (which theoretically should be associated with changes in equity betas) were caused by a change in corporation tax. On the other hand, there is a relatively weak evidence that the responses of firms to the tax reform are related to their ownership structure. However, the finding from the study of the relationship between managerial ownership and the responses of firms to the corporation tax reform highlights important relationships between managerial ownership, investments, performance and changes in debt-equity ratios during the reform. A summary of findings for four empirical chapters (chapter three to six) is given in the next section.

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[93] See for example MacKie-Mason (1990) and Shum (1996)
[94] See for example Ramchand and Sethapakdi (2000)

7.2 Summary of findings

7.2.1 Chapter 3: The impact of corporation tax reform on leverage.

In this chapter I investigate the impact of corporation tax on debt-equity ratios by using a change in the corporation tax structure effected through the corporation tax reform of 1984. I use both cross sectional and time series analyses to analyse the relevance of the variables documented to be important in the determination of a firm's capital structure. Motivated by tax theories of capital structure in general and the corporation tax reform of 1984 in particular, I analyse the relevance of variables which are documented to be important determinants of capital structure. The variables analysed are the effective tax rate, non-debt tax shields, return on new investments, dividend yield, size, agency, bankruptcy, total investments and overall firm profitability. The focus of my study is on the tax – related variables namely *effective tax rate* and *non-debt tax shields*, the coefficients of which are expected to be significant if corporation tax is one of the fundamental determinants of a firm's capital structure. Specifically, I expect a significant positive relationship between the effective tax rate and debt-equity ratio and a significant negative relationship between non-debt tax shields and debt-equity ratio. The estimated coefficients in a cross-sectional regression model are 0.0086 and –0.0059 for the effective tax rate and non-debt tax shields respectively, and they are significant at 1% level.

In a time series regression model, I also include a dummy variable which isolates the impact of the corporation tax reform of 1984 on debt-equity ratios. Under the theoretical prediction that the corporation tax reform of 1984 made debt unattractive, a sign of the estimated coefficient of the dummy variable is expected to be negative. The coefficients estimated by using a time series regression model are 0.0351, -0.0351 and –0.0699 respectively for the effective tax rate, non-debt tax shields and dummy variable respectively. The estimated coefficients for the effective tax rate and dummy variables are significant at the 5% level, whereas that of non-debt tax shields is significant at 10%. These results support the theoretical predictions of the tax-based theories of capital structure. The implication of these results is that corporation tax reform of 1984 had a negative impact on debt-equity ratios of UK firms.

The impact of a reduction in the corporation tax rate and the abolition of the first year and initial capital allowances led to significant decreases in debt-equity ratios. These decreases imply that, on average firms reduced their borrowing or increased their equity or did both. In this study I did not analyse changes in equity, however the changes in debt show that, on average, there were annual decreases in net debt by 64% for the period after reform. This is a significant decrease when compared to an average annual increase of 9% for the period before the reform (see the last row of columns 2-4 of table 3.1). It is therefore possible that the decreases in debt-equity ratios were driven by the decreases in debt and not by the increases in equity.

The results also show that the taxable capacity of a firm matters in determining the optimal debt policy. Specifically, an inverse relationship between debt-equity ratios and non-debt tax shields implies that non-debt tax shields like depreciation, remuneration for directors and auditors etc, are substitute for corporate debt[95]. Thus to the extent that non-debt tax shields are available, the advantage to

[95] It is important to note that in the UK accounting depreciation is not treated as a deductible allowance for corporation tax purposes. Inland Revenue calculate capital allowances for corporation

corporate borrowing depends on the tax-loss provisions allowed for by the corporation tax system and the reliability of the company's future profits. Although there was a significant reduction in the tax advantage of debt there is still a bias in favour of debt[96]. For the corporation tax system to be neutral (i.e. it should have no effect on investments and should not be biased against or in favour of any form of finance), as it should be, the corporation tax rate needs to be equal to the basic personal income tax rate. The neutrality of the corporation system is important in that investment level in the economy will reflect the real increase in wealth since all investment undertaken are economically viable. In terms of forms of finance, neutrality of the corporate tax system eliminates discrimination of firms across different sources of finance. No form of finance that will be favoured and therefore no firm that will be disadvantaged if it have no access to that source. Thus, the 1984 reform did not bring about the expected neutrality in the corporation tax system. To the extent that debt became unattractive, there is a possibility that firms make use of non-debt tax shields to shelter taxable profits that were expected to increase due to the abolition of initial and first year capital allowances. The use of these non-debt tax shields may demand a closer look at these tax shields, which in the UK include director and auditors remunerations, depreciation and plant hire. This may increase the administrative costs and bring about a conflict between managers (directors) – who might propose higher pay under the umbrella of sheltering profits from tax and shareholders –who might think that directors' remunerations are not justified. On the

tax purposes and these figures are not publicly available. Neverthelessness, depreciation is the best proxy and it is used as one of the non-debt tax shields (see Okzan, 2001)

[96] As long as statutory corporation tax rate is higher than the basic rate of personal income tax, there is a bias in favour of debt (as a form of finance)

other hand a decline in demand for debt will have a negative impact on lending institutions profits and it may put a downward pressure on interest rates.

It should be noted that the tax treatment of depreciation in the UK is different from its treatment in the US. Reported accounting pre-tax profits in the US reflect more closely the taxable profits used by the US's Inland Revenue Service (IRS). In the UK, the Inland Revenue uses capital allowances (a figure which is not available to the general public- it is only available the Inland Revenue) which differs from accounting depreciation; consequently, the reported pre-tax profit is different from the taxable profit figure used to calculate corporate tax liability. Thus, a comparison of results from studies that use company account data between these two countries should be done with care. Nevertheless, pre-tax profit is the best proxy for taxable profit available in the UK company accounts.

7.2.2 Chapter 4: The impact of corporation tax reform on leasing

Chapter four investigates the impact of the reform on leasing in the UK and analyses the relationship between debt financing and leasing around the corporation tax reform period. Effectively, I test the relationship between debt financing and leasing by using a change in corporate tax structure effected through the corporation tax reform of 1984. Theoretical predictions show that debt and lease financing either substitutes or complement each other.

The tax motive for lease financing points to the deductibility of lease payments for corporation tax purposes (just like interest payments resulting from borrowing) and a possibility of relatively lower lease payments due to the sale of tax shields relating to depreciation to the lessor. More specifically, Myers et al (1976) argue that leasing allows a low tax company to sell tax shields to a higher tax company and suggest a negative relationship between the leasing activity of a company and its tax rate. The implication of this argument is that a change in a company's tax rate will have an impact on leasing irrespective of the relationship between lease financing and debt. Furthermore, since the literature points to differential tax positions as the primary rationale for leasing (see for example Mayes and Nicholas (1988)), the corporation tax reform is likely to alter the tax positions of companies and as a result their leasing activities are expected to change.

I simultaneously investigate the relationship between leasing and debt financing and the relevance of determinants of leasing, in the analysis that uses both leasing and non-leasing companies. The explanatory variables used in the OLS method and Censored model (Tobit) are the effective tax rate (a tax-related variable), debt ratio, size, liquidity and growth.

The results suggest that lease financing and debt are substitutes and that there is a negative relationship between the leasing activities of a company and its effective tax rate. The debt-to-lease displacement ratio is significantly less than one, indicating that there is no a one-to-one displacement between debt and lease. However, the results show that there is only a slight increase in the lease rates and a slight decrease in debt ratios (see table 4.4). The possible explanation of a small increase in lease rates is that during the 1984 reform period, it was advantageous to borrow due to the presence of incentives arising from capital allowances. It is therefore possible that a significant number of companies borrowed to take advantage of those incentives and used the borrowed funds to finance their profitable projects which ceased to be profitable after the reform. Given a bias of the pre-reform corporation tax system in the UK in favour of debt, it is likely that any impact of the 1984 reform on leasing was marginalised. By using the actual values of leases it is evident that leasing activities increased after the reform. This is consistent with my expectation on the impact of the 1984 corporation tax reform since debt and lease financing are substitutes and I expected reform to affect debt negatively. Another possible explanation of the small increase in lease rates is the introduction of SSAP 21, which reduced the attractiveness of finance leases. An analysis of the aggregate value of leased assets in 1980's as reported in Mayes and Nicholas (1988), suggests that an immediate effect of SSAP 21 was for companies to switch from using finance leases to operating leases. Therefore, firms that preferred to keep leasing commitments 'off balance sheet' might have switched from finance leases to operating leases. Unfortunately, data on operating leases are not publicly available in a way that is useful for this study[97]. However, given the percentages of the companies that were using operating leases, as reported in a survey by Mayes and Nicholas (1988) p. 64, there is greater chance that the use of the operating leasing increased after the 1984 reform.

Regarding the relative significance of the determinants of lease financing, results show that only size and the effective tax rate significantly determine leasing activities for the companies analysed. These results therefore support the tax motive for leasing as described in sections 4.2 and 4.5.4. The results also support the argument that small firms have less easy access to other forms of financing like borrowing or issuing new equity and consequently are more likely to finance most of their assets by using leasing arrangements. This finding suggests a need to make sure

[97] The UK firms are not required by regulatotory authority to report their operating leases activities.

that lease financing became more favourable to these firms. One possible way of making lease financing more favourable to small firms is to relax taxation and/or accounting rules. For example to allow small firms to write off the full cost of leased assets against taxable profits. This will reduce cost of capital and encourage investment undertaken by these firms.

An interesting result is that on average the debt-to-lease displacement ratio varies across industries. Empirical evidence shows that, on average, lease rates vary across industries. Industries that invest heavily on machinery seem to have a relatively higher lease rate. Results produced by using a Tobit model for the full sample (i.e. all firms whether they used lease or not) are similar to those for firms with non-zero lease rates except that the significance of the estimated coefficients increases. Furthermore, liquidity and growth variables appear to have an effect on decisions to lease or to buy an asset. These variables (i.e. liquidity and growth) failed to be significant under analysis involving non-zero lease rates, but became significant in an analysis involving the full sample. This is logical since one cannot argue, for example, on any impact of illiquidity on leasing without analysing the significance of a liquidity variable for both leasing and non-leasing firms. In all cases, the signs of the estimated coefficients are as predicted.

Variations of lease rates across industries suggest the need of regulator to promote leasing for less favoured sectors. As Adams and Hardwick (1998) suggested, it may be expedient for regulators to think of introducing different accounting and/or taxation rules that will be applicable to different industries.

It should be noted that this conclusion is based on a relatively small sample and that the period covered is unique in that reporting of finance leases was made mandatory. The small sample size used in chapter four reflects the fact that only few companies were willing to report their leasing activities during that period. It is therefore possible that these results have a feature that is unique. A similar study using a different sample period might come up with different conclusions. However, my results support the argument I made earlier that the corporation tax reform of 1984 had an impact on the leasing activities in the UK.

7.2.3 Chapter 5: The impact of corporation tax reform on systematic risk

In chapter five I analysed the impact of a change in corporation tax structure on systematic risk. A change in systematic risk originates from the argument that the corporation tax rate has an impact on cash flows used to determine return on equity. Consequently, a change in corporation tax rate is expected to have an impact on return on equity for an individual firm and consequently its systematic risk.

A number of issues are analysed ranging from the stationarity of asset betas to the relationships between systematic risk and a set of its determinants. A set of explanatory variables is described in section 5.6.1.

Results show that on average asset betas are stationary over time. This finding is important because it allows for changes in equity betas to be attributed to the impact of the corporation tax reform. Empirical findings on the general impact of the 1984 reform on equity betas show a decrease in average beta by 4.25% relative to its value before the 1984 reform. The results obtained by using regression analyses (both time series and cross sectional) show a significant decrease in equity betas following the reform. This implies that the reform led to a decrease in leverage and consequently to a decrease in the relative volatility of return on equity. This is consistent with the argument that there is a positive relationship between debt usage and systematic risk.

The results also provide evidence to support the view that systematic risk is positively related to leverage, return on assets, financial risk, earnings growth and the risk of real assets. The findings confirm the argument that firms have optimal capital structures and that they adjust their debt-equity ratios relatively quickly in response to a change in any of its fundamental determinants. In this study, the results show that the change in effective tax rate led to a change in systematic risk.

7.2.4 Chapter 6: Ownership structure and response of managers to the corporation tax reform

In chapter six, I integrate corporate governance theory with corporate finance theory in investigating whether firms' responses to the reform had anything to do with their ownership structure. The convergence and entrenchment theories of ownership structure suggest that an adjustment to the firm's capital structure towards an optimal level might be related to managerial ownership.

I use data for seven years (from 1981 to 1987 inclusive) to test the relationship between *managerial ownership, performance, debt-equity ratios and investments.*

Empirical results support the convergence and entrenchment theories in that a firm's performance increases with managerial ownership at low and higher levels of managerial ownership and decreases at intermediate levels. A similar pattern is observed when institutional ownership is used instead of managerial ownership.

In investigating the impact of the 1984 corporation tax reform on performance, I analyse the relationship between performance and debt-equity ratio. Results show that performance is negatively related to debt-equity ratios. This implies that, ceteris paribus, low debt-equity ratios are preferred to higher ratios, and consequently, low debt-equity ratios are associated with high performance. The coefficient of correlation between changes in performance and changes in debt-equity ratios during the reform period is negative as expected ($\rho = -0.065$) but statistically insignificant. It should be noted that a change in debt-equity ratio is not required to be large to have a significant change in performance. Rather, a change in debt-equity ratio should reflect a change necessary to attain an optimal debt-equity level and should be associated with a favourable change in performance. Since I expect a decline in debt-equity ratio, a negative correlation between performance and debt-equity ratio is satisfactory.

The results show further that on average firms with higher managerial ownership have lower debt-equity ratios. The estimated correlation between managerial ownership and debt-equity ratio is –0.108 and is significant at a 5% level. A similar relationship is reported in the analysis of changes in these variables induced by the reform. This finding is of interest to the suppliers of debt capital. Suppliers of debt capital may consider this fact in arranging debt contract and they may issue debt at less favourable terms to companies with higher managerial ownership which might discourage investment. On the other hand these findings confirm the presence of an incentive for firm's shareholders to make sure that directors own some equity shares.

Empirical results on the relationship between managerial ownership and investments show that there is a negative significant correlation between managerial ownership and investments in both total assets and fixed assets. The respective correlation coefficients are –0.297 and –0.271with a p-value equal to zero in each case. On its own, a negative correlation between managerial ownership and investments does not make much economic sense. A question that remains to be answered is why should a low percentage of equity ownership by managers be associated with large investments in assets? It is unlikely that consistently, lower equity ownership by managers will be associated with large investment in fixed assets. It is only rational to note that even if managers work for the best interests of shareholders any asset acquired should meet a certain evaluation criteria and therefore the aggregate value of a firm's assets should be independent of managerial ownership. Thus, investments should be related to performance to be economically meaningful.

The correlation between investments and performance is negative and significant. Since total assets can be used to proxy size, this relation may be attributed to the size effect. Most literature on asset pricing show that small firms tend to outperform large firms (see for example Fama-French (1993, 1998)). Thus, a negative correlation between managerial ownership and investments in assets (total and fixed) emanate from the relationship between assets and performance in that managerial ownership is positively correlated to performance. The correlation between managerial ownership and change in investment in assets is negative and significant as expected. The correlation coefficient between managerial ownership and change in total assets (fixed assets) is –0.111 (-0.117) with p-value = 0.041

(0.031). Since the reform led to a decrease in otherwise positive NPV projects, its impact on shareholders' wealth is a possibility. Results show that a decrease in investment in assets is associated with a decrease in shareholder wealth and consequently to the overall performance. Thus, generally an investment in fixed assets is related to the performance and indirectly to the managerial ownership.

The findings of the present analysis show that there is a relationship between firms' ownership structure and the way they responded to the corporation tax reform of 1984.

7.3 Contributions of this thesis

This thesis covers four major areas in the corporate finance. Consequently its contributions are spread in these four major areas and are summarised as follow.

- The analysis of the leverage, leasing, and systematic risk around the period of major change in corporation tax structure in the UK is unprecedented. The results produced in favour of the relevance of tax variables as factors that influence leverage, leasing and systematic risk are therefore likely to be more reliable.

- The use of both cross-sectional and time series analyses of the impact of the corporation tax reform on leverage and systematic risk in one study give more insight to the general understanding of relevance of tax-variables in capital structure. Most studies use only one method.

- Expedient and innovative definition of leverage variable is more focused on the effects of tax change on capital structure. Also the comprehensive definition of non-debt tax shields to include all deductible allowances reduces the impact, if any, of using only depreciation expense in the analysis. Since the figure that is publicly available for depreciation is not the one that Inland Revenue uses, to the extent to which these two figures are different, the analysis which uses only depreciation as a proxy for allowable capital allowances is likely to be more biased than the one which uses comprehensive measure of non-debt tax shields. Furthermore, the use of depreciation alone is likely to bring biased across companies which uses different production technology.

- The extension of recent UK studies on leasing to include more focused industrial analysis. Specifically I extend Adedeji and Stapleton (1996) model to show how the relationship between debt ratio and lease rate change across the sectors. Also show how the relationship between lease rate and effective tax rate vary across the sectors.

- Extension of systematic risk model (Badhani, 1997) enabled this study to show the impact of change in corporation tax rate on systematic risk. Most studies show how leverage is related to systematic risk and consequently they suggest positive relationship between change in leverage and change in systematic risk. In this study I recognise that change in leverage is influenced by many factors and consequently I isolate the change in beta caused by the change leverage induced by the corporation tax change. This allows me to suggest the testable hypothesis concerning change in beta induced by change in corporation tax. For example I formally show that a change in beta induced by change in corporation tax rate is a function of profitability of assets and borrowing rate of interest.

- Where as there is no consensus on the relationship between managerial ownership and performance, the evidence available show general relationship between performance and ownership structure. No studies that I know have tested the convergence or entrenchment theories around the event which is likely to affect performance significantly. It was therefore expedient to try to test these theories around the corporation tax reform. The methodology and the results from this study will help researchers to design the best way of testing the relationship between ownership structure and performance.

It is my expectation that the results of this thesis will give more insights to issues relating to capital structure, leasing, systematic risk and ownership structure. It is also expected that policy makers will be aware that tax changes affect more areas and to an extent that there is no efficient control mechanism, its impact may be huge, extending beyond affecting corporate investment and profitability.

7.4 Implications for future research, problems, and concluding remarks

7.4.1 Implications for future research

This thesis covered wide areas of both corporate finance and corporate governance theories. It focused primarily on the impact of the corporation tax reform of 1984 on a firm's debt-equity ratio. Specifically, I use the reform to investigate the significance of corporation tax as one of the documented variables that influence capital structure decisions.

The decision to use the corporation tax reform of 1984 is based on two reasons. The first reason is that the 1984 corporation tax reform is unique in the history of UK corporation tax reform in that the transition period was long enough for companies to re-arrange their investments and financing plans. This, among other things, allows one to analyse how quick firms respond to changes in capital structure variable(s).

The second reason is that the reform involved changes in tax-related variables that are considered to have a significant influence on the use of debt. Corporate financial theory considers corporation tax to be one of the most important variables that influence capital structure decisions. The failure to find its significance in some previous empirical studies is disturbing, and one of my objectives in this study is to try to explain why some empirical findings failed to find a significant corporation tax effect on capital structure decisions. My argument is that, if corporation tax is indeed an important variable that influences capital structure decisions, then a change in corporation tax effected through the 1984 corporation tax reform should be associated with significant changes in debt-equity ratios. Empirical results of my study support an argument that corporation tax influences capital structure decisions, and have the following implications for future research.

First, there is a need for investigating the significance of a particular variable during a period when there is a significant change in that variable. This is especially true for long-term infrequently changing variables like capital structure. Specifically, capital structure should not be expected to change unless there is a change in its determinants. Given the long-term nature of variables normally used as capital structure variable, it is less likely that a study aimed to analyse a particular variable using a randomly selected period will find any significant effect. A change in capital structure is an adjustment towards a target (or optimal) level and consequently, once an adjustment has been made any single variable is likely to insignificantly influence capital structure unless there is a distortion caused by a change in that variable.

Second, as a complement to this study it would be interesting to analyse the long-term capital raising activities of firms in the UK over the period covered by this study. Other things remaining constant, the pattern of debt and equity capital issues should reveal a change in the relative attractiveness of debt financing after the corporation tax reform of 1984.

Third, as mentioned above, the focus of my study is on the corporation tax reform of 1984. However, the corporate finance theories used suggest other variables that are equally interesting. For example, it would be interesting to investigate whether changes in personal income tax structure would have an impact on debt-equity ratios as predicted.

Fourth, using a similar argument to using the corporation tax reform, it might be worth analysing a change, if any, in the UK bankruptcy law and consequently investigate its impact on a firm's capital structure.

Fifth, the corporation tax reform involved a decrease in corporation tax rate and abolition of initial and capital allowances. The total effects on leverage, leasing and systematic were analysed in this thesis. However, deductibility of capital allowances is inherent feature of the tax system and may discriminate companies without or with small amount of capital allowances. The evidence of significant effect of both effective corporation tax rate and non-debt tax shields may be driven by sample bias. It will be more appropriate if a technique of separating the effect of change in corporation tax rate from that of capital allowances will be developed.

Last but not least, the developments in the financial markets (e.g. discovery of tradable financial instruments like financial derivatives) provide the possibility of re-evaluating the relevance of determinants of capital structure in the future. There is a chance that in future firms might use financial instruments that offer similar benefits to debt and equity to finance their activities. For example firms might finance their activities by issuing financial options on existing financial assets (instead of issuing traditional instruments like debt or equity). In that era, the relevance of capital structure decisions, the way is known today will need to be re-examined.

7.4.2 Problems and limitations

The main problems encountered in the analyses conducted in this thesis relate to data. Some of the variables that could have been used are not readily available. Good examples are the corporation tax paid and taxable profits. It could have been more reasonable to calculate the effective corporate tax rate by using the actual corporation tax paid, deferred taxation and taxable profits rather than using corporation tax charge, deferred corporation tax and pre-tax profits.

The fact that accounting data are available only on annual basis limited generalisation of the results from this study. For example in analysing systematic risk it is shown that the stationarity of beta vary with length of return estimation. It was therefore relevant to estimate beta using different period intervals like daily, weeks, etc. however the corresponding data on accounting variables are not available.

My desire to study the impact of corporation tax reform on leasing was some how hampered by availability of enough data on leasing prior to 1984. This is because the disclosure of leasing was not mandatory then. With few data for the firms which disclosed their leasing activity willingly, the analysis of the impact of corporation tax on leasing is not comprehensive as I could have liked it to be.

Finally, manual collection of data on ownership structure limited the number of years that could have probably produced the best and reliable results. The collection of data on managerial ownership for seven years was a time consuming exercise, yet a more meaningful analysis of the changes in the variables influenced by the corporation tax reform of 1984 as conducted in chapters three to six needed data for more than seven years.

7.4.3 Concluding remarks

The thesis has drawn from many areas of finance and used data from different sources. It is therefore my hope that this study has provided a wider understanding of the issues surrounding capital structure theories, data and methodology necessary to test corporate finance theories.

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