UNIVERSITY OF SOUTHAMPTON

SOUTHAMPTON MANAGEMENT SCHOOL

Accounting and Finance Department

The Effect of Taxation on Implied Cost of Equity Capital in the UK – an analysis of Real Estate Investment Trusts

BY

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ABSTRACT

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THE EFFECT OF TAXATION ON IMPLIED COST OF EQUITY CAPITAL IN THE UK- AN ANALYSIS OF REAL ESTATE INVESTMENT TRUSTS

Previous literature which has examined taxation and implied cost of equity capital has by necessity focused on tax paying firms. There are no studies which investigate what happens to the cost of equity capital when companies change their tax status. The introduction of the Real Estate Investment Trusts (REITs) in the UK in 2007 provides such a setting. It allows estimation of implied cost of equity capital for UK REITs both pre and post conversion to examine the relationship between taxation and the cost of equity capital using a significant change in taxation.

This study will investigate whether the tax status of REITs has an effect on their implied cost of equity capital, and whether the existing models of implied cost of equity capital can be applied in the UK. These issues were empirically tested using implied cost of equity estimated by four different models.

The results suggest that the REITs exemption from corporation level tax is associated with a significant increase in their implied cost of equity capital for levered REITs after conversion date, the majority of the variables employed are consistent with the existing literature, and the implied cost equity estimation models have produced reasonable estimations concluding that these models are valid for UK firms.

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Academic Thesis: Declaration of Authorship

I, **MOHAMED HOUSSAM ALKADDOUR** declare that this thesis and the work presented in it are my own and has been generated by me as the result of my own original research.

"The Effect of Taxation on Implied Cost of Equity Capital in the UK – an analysis of Real Estate Investment Trusts"

I confirm that:

1. This work was done wholly or mainly while in candidature for a research degree at this University;
2. Where any part of this thesis has previously been submitted for a degree or any other qualification at this University or any other institution, this has been clearly stated;
3. Where I have consulted the published work of others, this is always clearly attributed;
4. Where I have quoted from the work of others, the source is always given. With the exception of such quotations, this thesis is entirely my own work;
5. I have acknowledged all main sources of help;
6. Where the thesis is based on work done by myself jointly with others, I have made clear exactly what was done by others and what I have contributed myself
7. Either none of this work has been published before submission, or parts of this work have been published as: [please list references below]:

Signed:

Date: 19-3-2012

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"I am deeply indebted to all of you"

Chapter One: Introduction and the rationale of the study

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1.1 The background and motivation of the study

Tax literature frequently investigates the effect of investor and corporate taxes on capital structure, price of equity, firm value and managerial decisions. These studies in the literature have led to inconclusive results. Some of the conflict can be attributed to variations in underlying assumptions while the limitations in research design and measurement are a further source of this variation.

In the finance literature, capital structure is considered as a puzzle because there is not one specific theory which explains why firms use debt financing and what determines the optimal size of this debt in firms' capital structure.

Modigliani and Miller (M&M hereafter) have introduced a set of influential papers (1958, 1963, and Miller 1977) which paved the way for the capital structure theories to be created. In 1958, Modigliani and Miller indicate that in a perfect capital market with absence of taxes, a firm's value is independent of its capital structure (and implicitly its dividend policy) while their second paper (1963) has introduced the impact of the corporate tax. This paper (1963) shows that if interest is deductible and dividends are not, then the firm's optimal capital structure will be 100% debt.

Miller (1977) considered the effect of personal taxes to the leverage controversy. Keeping the original M&M (1958 and 1963) assumptions, Miller predicted that when interest is taxed at the investor level more highly than share income, either dividend or capital gain, this will cause debt holders to demand a higher pre tax rate of return in compensation. In equilibrium this required premium will offset the firm level tax deduction on interest and therefore the value of the firm will not be affected from a tax perspective by the level of debt.

Since M&M (1958) a large volume of papers have examined the concept of an optimal capital structure. These studies include Baxter (1967), Ross (1977), Myers and Majluf (1984), and Myers (1984) have relaxed the assumptions of the M&M's theory.

More recently researchers have focused directly on determinants of firms' cost of equity capital. Initially historical or ex post costs were examined, more recent developments in methodology have allowed expected or ex ante costs of equity to be used. Many studies such as Fama and French (1997) and Elton (1999) conclude that estimating the cost of equity capital using the realised returns has proven disappointing in many regards, Fama and French (1997) state that ex post costs are "unavoidably imprecise".

This thesis will investigate the influence of taxation on capital structure using, to avoid the limitation of ex post measures, ex ante implied cost of equity capital estimates. These are estimated using forecasted earnings (Gebhardt, Lee, and Swaminathan 2000). The thesis will focus on the introduction in the UK in 2007 of Real Estate Investment Trust (REITs). REITs have a unique taxation feature in that they do not have to pay corporate taxes subject to meeting specific conditions. These include having to distribute 95% of their taxable income as dividends. The absence of a corporate tax charge eliminates a significant debt financing benefit, the interest tax deductibility (no tax shield). Within this environment, it will be very interesting to study the effect of the REITs' tax status on their implied cost of equity capital pre and post conversion into REITs status in January 2007.

1.2 The study's importance, problem statement, and contribution

1.2.1 The importance of the study

This thesis is going to investigate whether the firm level taxes are reflected in cost of equity capital for UK REITs. Under specific restrictions, REITs are exempt from corporation tax. (See chapter two)

Consequently, REITs are not able to obtain a corporation tax deduction on their debt interest while other companies do. As a result, the optimal capital structure for REITs may not contain any debt (because the cost of debt is not deductible for tax purpose) but this is not the case in real world where the financial statements of most of UK REITs contain debt as part of their capital structure.

While there are studies that have estimated implied cost of equity capital for tax paying firms, there are no studies which investigate whether the corporate tax exemption is

reflected in REITs cost of equity. Thus, estimating implied cost of equity capital for UK REITs (pre-post the change in the tax status) and other non-REITs UK property firms and a sample of UK non property firms can provide a useful method of evaluation whether cost of equity estimators are valid.

1.2.2 The problem statement

In other words, the main purpose of this thesis is to answer this question about how does taxation affect firms' cost of equity capital.

This question will include three specific issues: the validity of the existing models of implied cost of equity capital for a UK setting, the consistency of these implied costs of equity estimates, and testing the relationship between taxes (corporate and investors levels) and the cost of equity capital for REITs over the period prior to and post conversion to REIT status (see chapter five for more details).

To answer these questions, a set of research hypotheses are constructed and tested based on the capital structure literature.

1.2.3 The contribution to the knowledge

REITs are an interesting area to investigate tax and capital structure generally and implied cost of equity capital especially because of its unique tax status and that it is relatively young and still evolving. While there are studies which have estimated implied cost of equity capital for tax paying firms, there are no studies which investigate whether the corporate tax exemption is reflected in REITs cost of equity.

The findings of the thesis contribute towards a better understanding of the impact of corporate taxation on firms' cost of equity capital and the contribution of the thesis will be mainly in taxation. The unique REIT setting allows the testing of tax related hypothesis because firms' tax rate can be observed without significant error which is not the case for non REIT firms. The thesis shows clear evidence of an increase in the cost of equity following the effective abolition of the tax deduction for debt interest.

A secondary finding is that the degree of consistency between the various costs of capital estimates is lower than in the USA. This may be due to differences between the countries e.g. differences in the properties of analyst forecasts, an important input into the estimates, or changes due to the passage of time, the estimates in this thesis are for a later period than

those in the US literature. In more detail the thesis's empirical results can be summarised as following:

Models' explanatory power

The cost of capital is modelled on three sub-samples of UK firms, non-property firms, property firm and REITS. The results indicate that the adjusted R^2- for the non-property, property and REIT samples are 11.64%, 23.20% and 54.13% respectively. These values, although lower than those in USA literature, do indicate that the USA based costs of capital estimations apply reasonably in a UK setting.

Taxes and implied cost of capital

There is a positive relationship between leverage and the implied cost of equity capital and leverage level in non-property and property firms suggest risk increasing considerations outweigh any tax interest deduction benefits. However, in the absence of an interest tax deduction, the REITs' costs of equity were higher. As a result, the REIT exemption from corporation level tax is associated with an increase in their implied cost of equity capital for levered REITs.

The results regarding the effect of differential investor level taxes indicate that in the majority of cases there is a significant relationship between the yield and firms' implied cost of equity capital. In the absence of taxation considerations one would expect a negative, due to signalling consideration, or an insignificant relationship. Consequently it can be concluded that relative levels of investor level taxation is associated the cost of equity.

1.3 The methodology of the study

1.3.1. The sample

The sample of this thesis consists of three categories of UK firms REITs, other non REITs property firms, and sample of non-property firms. All UK REITs, pre and post conversion to REIT status, were included in the sample and their data were collected from 2000 until 2009. All other non REIT property firms also were included for the same period. The random sample of non property UK quoted firms as a benchmark to validate the implied cost of equity capital estimation models. These above firms are listed in London Stock Exchange Main Market. The thesis's sample of firms is ninety nine (58 non property firms, 23 property firms, and 18 REITs).

1.3.2. The empirical framework

The implied cost of equity capital will be estimated using four models as developed by Gebhardt, Lee, and Swaminathan (2000), Claus and Thomas (2001), Gode and Mohanram (2003) and Easton (2004). These costs of equity will be used both individually and in their average during the empirical study. While the independent variables will be as following: leverage, dividend policy, personal and corporate taxes, and other market risk proxies.

1.3.3. The data

Most of the thesis's data has been downloaded from the DataStream online database such as the firms' daily stock prices, UK market index (FTSE all shares), the firms' monthly market value, long term debt, actual earnings per share, UK Treasury Bills risk-free rate, and the book value of equity. The rest of data has been obtained from the Institutional Brokers' Estimate System (hereafter I/B/E/S) such as forecasted earnings per share for at least two years ahead and the consensus long-term growth earnings per share forecasts.

1.4 The structure of the study

The structure of the reminder of this thesis is as follows:

Chapter Two

In this chapter, the main features of UK tax system, the UK REITs regime, and the characteristics of this kind of firms will briefly be explained.

Chapter Three

In this chapter, the main theories on capital structure, and the effects of various factors, though concentrating on taxes on the cost of equity capital will be examined.

Chapter Four

In this chapter, the different approaches in estimating implied cost of equity capital will be reviewed and discussed in detail.

Chapter Five

In this chapter, the research hypotheses will be formulated in the light of one of capital structure determinants (taxes) and the characteristics of implied cost of equity capital. The research methodology to test the hypotheses and the required data to answer the research question will be discussed.

Chapter Six

This chapter will present the UK property market performance (REITs and non-REITs property companies) then the results of the thesis empirical framework and evaluate the research findings within theoretical literature.

Chapter Seven

This chapter will draw the conclusions; will consider limitations, and will make suggestions for future investigations.

1.6. Conclusion

The background and motivation of the study, the importance of the study, methodology of the study, the contribution of the study, and the structure of the thesis have been briefly discussed. The following chapter will briefly highlight the main features of UK and USA tax systems and the UK REITs regime.

Chapter 2: The United Kingdom tax system and real estate investment trusts

Chapter Two: The United Kingdom tax system and real estate investment trusts

2.1. Introduction

This chapter will be divided into two main parts. The purpose of the first part will be to provide a brief summary of the UK tax system, its elements, the tax rules regarding different types of income, and a comparison with the US tax system in some aspects related to the cost of capital. The purpose of second part will be introducing Real Estate Investment Trusts, understanding of their special characteristics especially their tax status and its effects on their cost of equity capital, legal regulation for this industry, UK legal conditions on conversion to REIT status, and UK tax treatment for REIT companies and its effects on all parties.

Taxes can be defined as a compulsory levy imposed by the government on various kinds of incomes for various types of taxpayers. These taxes are usually collected by using special rules related to each kind of taxes; these rules are usually known as the tax system (Lymer and Oats, 2007).

Taxation is usually used by the government as a financial tool to support and fund its public spending and to influence individual or corporations' behaviour as well as to the following purposes:

- Manage the whole economy by controlling the inflation levels, its trade balance with the other countries, and the nature and location of business projects by using tax policy as incentive where sometimes the government gives some projects in some industries in certain areas a tax reductions to support these industries and to increase the investment level in these industries or in certain areas; and
- Provide public goods like defence and education system (Lymer and Oats, 2004).

To meet the purposes of this chapter, it will consist of two main sections; the UK tax system and the UK REITs and each of them will be divided into subsections. The reminder of this chapter will be organized as following: the sections (2.2), (2.3), and (2.4) will briefly introduce the UK tax system for investor income taxes, corporation taxes and

capital gain tax. These aspects will be compared with the US tax system in some aspects related to the core of this thesis. These taxes can have a significant influence on a firm's capital structure and its financing policy generally and the cost of equity capital especially. The sections (2.5), (2.6), (2.7) will briefly introduce the theoretical and legal framework for the UK-REITs vehicle.

2.2- UK tax system

Before April 2005, UK tax system was administered by two Government departments, H.M. Inland Revenue (Inland Revenue) and H.M. Customs and Excise (Customs and Excise). The Inland Revenue's board consisted of four executive members. These were appointed by the Treasury which is managed by the Chancellor of the Exchequer and three non executive members. The Board's authority to manage the tax system and collect taxes is directly received from the Crown (James and Nobes, 2000).

To manage the UK tax system, the Inland Revenue's board divided the UK into several semi-autonomous executives which are administered by a Regional Chief Executive.

The Inland Revenue's duties included managing the following parts of the tax system:

- Income tax;
- Corporation tax;
- Capital gains tax;
- National insurance contribution;
- Inheritance tax;
- Stamp duties;
- Child benefit;
- Working tax credit and child tax credit; and
- Other smaller duties including student loan's repayments and the national minimum wage rules' supervision (Lymer and Oats, 2007).

The second Governmental department was H.M. Customs and Excise and its duties included managing the following parts of the tax system:

- Customs duties;
- Excise charge;
- VAT system; and
- Other taxes not managed by the Inland Revenue, for example the landfill tax, the climate change levy and insurance and passenger duties.

In the 2004 Budget speech, a significant change in the organization of the administration of the UK tax system was announced by the then Chancellor of the Exchequer, Gordon Brown. This involved merging the Inland Revenue and Customs and Excise into one body. Initially, they have worked separately for a year under a common management structure. Finally, on April, 18th 2005 the new body was born and it is now known as HM Revenue and Customs.

The purpose of this thesis is not describing a government department or its duties the focus of this part is on the UK tax rules which relate to the investors' and firms' income to investigate their potential impact on the cost of equity capital.

2.2.1. Personal income tax

In 1799, Income Tax was introduced by the then Prime Minister William Pitt and since then it has been changed many times. This thesis will not review these changes or the reasons which caused them as it is going to examine the impact of income tax rates on the financing decisions generally and on the cost equity capital especially.

To study any kind of taxes at any level three major aspects should be considered. These aspects are the income's definition (taxable income), the allowable tax deductions and the bands and tax rates. These aspects will be defined in examining the UK's income tax:

a- Definition of income

An individual's taxable income for fiscal year, the fiscal year in UK runs from 6 April to the following 5 April, would include following items as appropriate:

- Employment earnings;
- self-employment income and non incorporated businesses;
- property income (rents or Real Estate Investment Trust companies' distributed income);
- Jobseeker's allowance;
- Retirement pensions;
- Bank and building society interest; and
- Dividends on shares.

Most of the personal taxes which are generated from the employment earnings are deducted at source (Pay As You Earn or PAYE)[1]. Here, the employer deducts the income tax and national insurance from their employees' taxable income and give them the net value and transfer the tax to Revenue & Customs.

The aims PAYE can be summarized as following:

- Improve Government's cash flow;
- Reduce the amount of bad debt (Lymer and Oats, 2004).
- Most income from means tested social security benefits, such as Child Benefits and income from certain savings products, such as National Savings Certificates and Individual Savings Accounts are tax exempt. Most non means tested benefits are taxable at appropriate rates, such as, the basic state pension (Adam and Browne, 2006).

b- Deductions from taxable income

An individual's taxable income can be subject to two kinds of deductions:

- Deduction from income's charges which is deducted from the total income to get the statutory total income.
- Deduction for a personal allowance which is defined as the part of the person's income which exempts amount of yearly income (personal allowance) from the total statutory income before tax to conclude his final taxable income (Finney, 2005).

The recent levels of personal allowance are shown in table 2.1 below.

Table (2.1) Annual personal allowances in UK

Type of allowance/ per year (£)	2006-07	2007-08	2008-09	2009-10-11	2011-12
Aged under 65	5,035	5,225	6,035	6,475	7,475
Aged 65–74	7,280	7,550	9,030	9,490	9,940
Aged 75 or over	7,420	7,690	9,180	9,640	10,090

Source: HM Revenue and Customs, http://www.hmrc.gov.uk/rates/it.htm.

[1] PAYE: UK scheme (introduced in 1944) by which both income tax and national insurance contributions due from employees is collected by employers and is paid over by the employers to the HM Revenue and Customs.

Before April 2000 there was Married Couples' Allowance which every married couple was entitled to claim, after that date this allowance has been canceled. The only exception from this cancellation was for the couples who were already aged 65 or over at that date. The tax treatment of the Married Couples' Allowance after April 2000 was administered through reducing an amount of the final tax liability instead of increasing the personal allowance (in 2006–07 this amount was £606.50 and £613.50 for those aged 65 or over and 75 or over respectively) (Adam and Browne, 2006).

c- The tax rates

After defining the personal income and deducting the personal allowance, the UK tax system for personal income tax applies a system of bands and tax rates on taxable income. This system of bands and tax rates are consist of three tax rates progressively applied on taxable personal income. Table 2.2 presents the income bands and tax rates for each band where the first band is subject to the starting rate of 10% (20% in 1998-99), the second band is subject to the basic rate of 20% (22% in 2007-2008) and the third band, if the taxable income above the second band is subject to the higher rate of 40% (40-60% in 1987-88). Starting from 2008-09 the starting rate (10%) applied only to savings income. An aadditional rate of 50% has been applied starting from 2010-2011 on the income over £150,000.

Table (2.2) The UK Income tax bands and rates

Taxable income	2006-07 (£)	2007-08 (£)	Tax Rate (%)	2008-09 (£)	2009-10 (£)	2010-11 (£)	2011-12 (£)	Tax Rate (%)
Starting rate	0–2,150	0-2,230	10	0-2,320	0-2,440	0-2,440	0-2,560	10 for savings
Basic rate	2,150–33,300	2,231-34,600	22	2,321-34800	0-37,400	0-37,400	0-35,000	20
Higher rate	Over 33,300	Over 34, 600	40	Over 34, 800	Over 37,400	37,401-150,000	35,001-150,000	40
Additional rate		Not applicable	Not applicable	Not applicable	Not applicable	Over 150,000	Over 150,000	50

Source: HM Revenue and Customs, http://www.hmrc.gov.uk/rates/it.htm.

2.2.1.1 UK Interest income

Generally the investor level taxes, on savings and dividend incomes are subject to different tax rates. Interest is received as a return on the investor's savings and this interest can be earned from a variety of sources including:

- Banks and Building Societies current, internet, and deposit accounts;
- Government stocks, gilt edged securities or gilts;
- UK authorized unit trusts and open-ended investment corporations;
- National Savings & Investments products where tax is deducted at source (First Option Bonds and Fixed Rate Savings Bonds); and
- National Savings & Investments products where no tax is deducted, such as Pensioners' Guaranteed Income Bonds or Easy Access Savings Account or where the first £70 of interest from an Ordinary Account is exempted, accumulated interest on Savings Certificates including index-linked certificates, and interest on Children's Bonus Bonds (HMRC home page, 2007, pp 15)[2].

For any gift which produces pre-tax income of more than £100 a year, if the gift was given to under 18 years old, such as a gift from a parent to a child, the adult donor must include the income into their return.

Interest or dividends or bonuses is excluded from taxable income if it is from exempt investments such as Individual Savings Account and Personal Equity Plans. If an investor has invested in a bank or building society which pays an alternative finance return or profit share return, not interest, this return should be included in their income. For tax purpose, the interest should be included at the gross amount, pre-tax amount, because usually a bank or building society pays their customers net interest, after tax at 20%. The gross amount can be calculated as follow: gross amount = the received interest *125/100. Interest on savings is taxed at 10% in the starting rate band and 20% in the basic-rate and 40% in the higher-rate band and 50% above the higher rate band (HMRC home page, 2007)[3].

[2] Available at: http://www.hmrc.gov.uk/worksheets/sa210.pdf.
[3] Please see http://www.hmrc.gov.uk/worksheets/sa210.pdf for more details.

2.2.1.2 Dividend income

Up until 6th of April 1999, investors' dividend and saving incomes had the same tax treatment but after that date dividend income became subject to its own special tax rules. Dividend income is now treated according to the investor's taxable income limits. Shareholders usually receive dividend vouchers, either if it is paid directly into their bank account or to their investment broker which shows their shares in the company, the dividend rate, the tax credit and the dividend payable.[4] Dividend income from UK shares will be taxed at three different income tax rates depending on whether investors' overall taxable income (after allowances) falls within or above the basic or higher rate income tax limits. These tax rates are, 10% up to the basic rate limit (£35,000), 32.5% up to the higher rate limit (£150,000), and 42.5% above the higher rate limit.[5]

Dividend tax will be offset by a dividend tax credit which reduces the effective rate to 0%, 25%, and 36.1% respectively. In other words, the taxpayers if basic-rate will not pay tax on their dividends; they will pay only 25% on their dividends above the basic rate limit and below the higher rate limit. Above that they pay 36.1%. The aim of the tax credit is to avoid paying tax twice on the same profit, corporation tax and income tax. If an individual receives non UK dividends from which foreign tax has been deducted, this after tax foreign dividend is included in the taxable income.

When calculating which tax band different income sources fall into, dividend income is treated as the top slice of income, followed by savings income, followed by other income. It is estimated that there will be 29.5 million taxpayers in 2006–07 14% of them will pay tax at only the starting rate, 74% at the basic rate, and 12% at the higher rate. Income tax is forecast to raise £144.0 billion in 2006–07 (Adam and Browne, 2006).

[4]The total of all dividend payments (not including tax credits) should be declared in the tax return form.
[5] The higher rate limit has been applied starting from 2010-11.

2.2.2 Corporation tax

UK corporation tax was introduced in 1965.[6] Corporation tax is levied on UK resident companies' profits, public corporations and unincorporated associations wherever these profits were generated. While non UK resident companies' profits will only be liable to UK corporation tax if these companies trade in the UK through a UK based Permanent Establishment i.e. branch or agency (Lymer and Oats, 2007).

As mentioned before there are three major aspects that should be considered, income definition (taxable income), the allowable deductions and the bands and tax rates. Theses aspects will be defined in examining the UK's Corporation tax.

a- Definition of the corporation income

A corporation's income usually includes the incomes from trading and investment and capital gains. For REITs, the taxable income is only the non-ring fenced (income which is not related to the rental activities) while rental income business is exempt.[7]

b- Deductions from the corporation income

There are many deductions available such as the current ordinary expenditure, such as wages, materials and interest payments while capital expenditure such as on buildings and machinery plant is not (James and Nobes 2000).

Firms can claim Capital Allowances to deduct their assets' depreciation which will reduce their taxable profits over several years by a proportion of capital expenditure (Adam and Browne, 2006). Capital Allowances vary according to the type of capital expenditure as follows:

- Plant and machinery expenditure may be 'written down' on a 25% declining balance basis (Adam and Browne, 2006). [8]
- Industrial buildings and hotel expenditure is written down on a straight line basis of 4% per year (Lymer and Oats, 2004). [9]

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[6] Before 1965 companies were subject to income tax as individuals.
[7] the tax treatment for REIT will be part of next chapter.
[8] In 2006-07, small and medium companies have 50% allowance in the first year for their expenditure
[9] The expenditure on commercial buildings may not be written down at all.

• Research and Development expenditure (R&D) has favorable tax treatment where it can be completely deducted from taxable profits. [10] R&D tax credits are designed to increase the private sector's innovation activities. Activities which directly contribute to achieve scientific or technological advances are considered as R&D. (HMRC home page, 2005). There are two schemes which can be applied to the firm's R&D depending on its size:

- **Small or medium company scheme, introduced in April 2000; and**
- large company scheme, introduced in April 2002.

These schemes allow firms to deduct more than 100% of their qualifying current expenditure on R&D from their taxable profits. Large firms can deduct 125% and 150% for small or medium firms (Adam and Browne, 2006, and HMRC home page, 2007)[11].

b- The bands and tax rates

Over last 25 years, two major reforms have been made to the UK corporation tax system: The first reform was in 1984, where the main corporation tax rate was reduced from 52% to 35%, reduced later to 33% in 1991–1992, and more generous deductions for capital investment were introduced. For example, 100% first-year allowances for investment in plant and machinery were introduced. These were later reduced to 25% annual writing-down allowances. The second reform was in 1997 when the Labour government introduced a change to the way dividend income was treated in the hands of certain tax-exempt shareholders. They were now unable to reclaim the value of their dividend tax credit. At the same time there was a reduction in the main corporation tax rate from 33% to 30 %, the standard rate, and from 24% to 19% for the small size firms (Adam and Browne, 2006).

In April 2000, the government introduced lower rate of 10% for firms which have taxable profits of less than £10,000, subsequently reduced to zero per cent. As a result, most of the self-employed individuals registered as firms to reduce their tax liabilities.

In April 2004, the government canceled the zero rate for distributed profits, this has removed some of the tax advantage but at a cost of greater complexity; and so in December 2005, also the zero rate was canceled for retained profits. As a result, this cancellation take the rules back to before April 2000, with the standard small firms' rate applying to all

[10] R&D expenditure for tax purposes is defined as expenditure which takes place when a company seeks to achieve an advance in science or technology.
[11] Please see http://www.hmrc.gov.uk/randd/randd-taxcredit.pdf for more details.

firms with profits up to £300,000, regardless of their dividend policy (Adam and Browne, 2006). Recent rates for "small" firms are shown on table (2.3).

Table (2.3) The UK bands and Rates of corporation tax, 2006–07

Profits (£ p.a.)	Marginal tax rate 2006 (%)	Average tax rate 2007 (%)	Average tax rate 2008 (%)	Average tax rate 2009 (%)	Average tax rate 2010 (%)
0-300,000	19	19	21	21	21
300,001-1,500,000	32.75	19–30	28	28	26
1,500,000 or more	30	30	28	28	26

Sources: HM Revenue and Customs, http://www.hmrc.gov.uk/rates/corp.htm

Payments date

Before April 1999, firms paid their total tax bill nine months after the end of their financial year except the firms which distribute their earnings to shareholders as dividends. These firms had to pay Advance Corporation Tax (ACT) when paying a dividend; the ACT was then deducted from the total tax bill due nine months after the end of their financial year. After April 1999, ACT was withdrawn apart from certain transitional arrangements. Now large firms have to pay their corporation tax in four equal quarterly payments on the basis of their estimated liabilities for their financial year. The first payment is made six months into the financial year while small and medium-sized firms still pay their total tax bill nine months after the end of their financial year (Adam and Browne, 2006).

2.2.3 Capital gains tax

In 1965, the then Chancellor of the Exchequer James Callaghan introduced a Capital Gains Tax which is levied on gains arising from an asset's disposal by individuals and trustees. Firms' capital gains are subject to corporation tax (Lymer and Oats, 2004).

The capital gain can be defined as the difference between an asset's selling price and its original purchase price. Based on this definition, it can be seen that a capital gains can arise from an increase in market value that does not necessarily rise from the using the asset in production. The gain can arise from one of several sources: when the general price level increases, inflationary gains; when the firm accumulates its net earnings prior to

distribution as a dividend so a share's price will increases reflecting these earnings; relative asset scarcity may lead to an increase in prices and when the firm undertakes risky investments and those investments succeed (HMRC home page, 2010)[12].

As mentioned before there are three major aspects which should be considered in examining the capital gain tax:

- definition of taxable capital gain;
- deductions in calculating taxable capital gains; and
- tax rates of capital gain tax.

a- Taxable capital gain

The taxable capital gain can be defined as the difference between an asset's value when it is sold, or given away etc. and its value when originally bought or inherited etc. (Adam and Browne, 2006).

Capital Gains Tax is levied on the "chargeable person" who may be one of the following:

- An individual, either UK resident or ordinarily resident during the tax year in which an asset's disposal occurs regardless of the place of disposal. i.e. whether in or outside UK;
- Personal representatives who inherit assets at the date of death at their market value at the same date. In this case, the Capital Gains Tax will arise when the personal representatives make a subsequent disposal;
- Partners in business, if chargeable assets are disposed of by the partnership, the partners will be individually liable to Capital Gains Tax based on the proportion to their share of the capital gain (Lymer and Oats, 2007).

Certain persons may be exempt from Capital Gains Tax, these include the following:

- Charities which use the gains for charitable aims;
- Approved superannuation funds;
- Local authorities;
- Registered friendly societies;
- Approved scientific research associations; and
- Investment trusts and authorized units (Lymer and Oats, 2004).

[12] Please see http://www.hmrc.gov.uk/cgt/intro/basics.htm for more details.

b- Deduction from the taxable capital gain

The taxable capital gain can be reduced by allowance which will exempt it or part of it from the capital gains tax. This exempt amount is deducted from the total capital gain to obtain the taxable capital gain. This allowance is £10,600 for individuals, personal representatives, and trustees for disabled people and £5,300 for other trustees in 2011–12 (HMRC home page, 2011) [13].

To isolate the inflation component of any gain from taxation, the UK government introduced Indexation Allowance in 1982. This indexation allowance was applied to all items of allowable cost, excluding incidental disposal. It was designed to compensate for increases in the Retail Price Index from March 1982 or from the month in which the asset was acquired, if later, until the month in which the disposal took place. The allowance was withdrawn for individuals with effect from April 1998 (Adam and Browne, 2006).

In Finance Act 1998, Capital Gains Tax was reformed for individuals, trustees and personal representatives by replacing the indexation allowance with taper relief which reduces the chargeable amount on a gain by a given percentage depending on the type of asset and the length of ownership (Lymer and Oats, 2004).

The above Finance Act distinguished between business assets and non-business assets where business assets have a more generous rate of taper relief. Business assets can be defined as an asset, excluding shares which is owned for a trade or profession carried on by the asset holder or a qualifying company. A business asset includes an asset which is exploited wholly or partly for a trade carried on by individuals, or personal representatives. From April 2004, the asset's owner does not have to carry on the trade concerned (HMRC home page, 2006)[14].

The aim of taper relief related change is to promote enterprise, reward risk-taking and encourage long-term investment (HMRC home page 2006) [15]. The taper system reduces the Capital Gains Tax according to the length of asset's holding period. The maximum holding period for non-business assets is ten years while for business assets is two years.

[13] Please see http://www.hmrc.gov.uk/rates/cgt.htm for more details.
[14] Please see http://www.hmrc.gov.uk/research/cgt-final-report26.pdf, for more details.
[15] Please see http://www.hmrc.gov.uk/research/cgt-final-report26.pdf, for more details.

Table (2.4) presents the taper relief system rates for the business and non business asset's taxable gains. Taper relief does not apply to disposals before 6 April 1998 or after 6 April 2008. (HMRC Home page, 1999)[16]

Table (2.4) Taper relief system rates

	Gains on business assets		Gains on non-business assets	
Holding period years	Chargeable gain (%)		Chargeable gain (%)	
	Disposals before 6 April 2000	Disposals between 6 April 2000 and 5 April 2002	Disposals on or after 6 April 2002	
1	92.5	87.5	50	100
2	85	75	25	100
3	77.5	50	25	95
4	70	25	25	90
5	62.5	25	25	85
6	55	25	25	80
7	47.5	25	25	75
8	40	25	25	70
9	32.5	25	25	65
10 or more	25	25	25	60

Source: http://www.hmrc.gov.uk/manuals/cgmanual/CG17904.htm

The non-business assets' holding period was reduced from ten to four years in the 2000 Budget and down to its current level in the 2002 Budget. The regime is more generous for business assets than for non-business assets (Chennells, Dilnot, and Roback, 2000).

c- Tax rates of capital gain tax

Capital gains are generally subject to tax when they are realized on the asset's sale rather than as accrued. Taxable capital gains are subject to income tax as if they were savings income, treated as the top slice of income. Capital gains are taxed at 10% below the starting-rate limit, and the details are shown in table 2.4. Usually most capital gains are subject to (20%) 40% tax rate for the (individuals) firms. Theses rate have been reduced in 2008 to (18%) and 28% respectively.

[16] Available on: http://www.hmrc.gov.uk/news/budget/cgtsummary.pdf.

Table (2.5) Taxable capital gains

Taxable capital gain 2006-07	Taxable capital gain 2007-08	Tax Rate % 2006-07-08	Tax Rate % 2008-11
Below starting rate band 0-2150	Below starting rate band 0-2230	10	18
Between starting- basic-rate band 2150-33400	Between starting- basic-rate band 2230-34600	20	18
Over basic rate band 33400	Over basic rate band 34600	40	28

Sources: HM Revenue and Customs, http://www.hmrc.gov.uk/rates/.htm

Capital Gains Tax is not charged at death where the deceased's estate will not be liable for tax on any increase in the estate's market value prior to death with the heirs acquiring the assets at their market value at the date of death (Lymer and Oats, 2004).

Usually Capital Gains Tax' is a small proportion of total government receipts but its importance arises from its usage as an anti-avoidance measure. This tax discourages wealthier investors from converting a large part of their income into capital gains to reduce their tax liability (Adam and Browne, 2006).

2.3 Review of United States tax system

The purpose of reviewing the US tax system is its relevance in explaining and evaluating US based academic papers. Their results need to be considered in the context of the US tax system.

2.3.1. The US Treasury Department

The history of the US Treasury Department started during the troubles of the American revolution (1774), when the continental Congress at Philadelphia discussed how to fund the War of Independence against Great Britain but in that time the Congress did not have the power to levy taxes or time to collect them. Nor was there a tangible basis for securing funds from foreign investors or governments so to solve this problem the Congress decided to issue paper money in the form of bills of credit. On September 1789, a permanent institution for the management of government finances, the Department of US Treasury was created (Department of US Treasury, 2005)[17].

2.3.2 US Tax system and personal tax

Like the UK tax system, the US tax system for income tax operates through a system of "brackets" and tax rates applied to taxable income, after deducting a "Minimum Tax Exemption" or personal allowance. Individuals are liable to pay tax on their income according to five brackets each one with its own tax rate.

a- Minimum tax exemption (personal allowance)

The Economic Growth and Tax Relief Reconciliation Act of 2001 (EGTRRA 2001) increased the alternative minimum tax exemption (personal allowance) from $33,750 to $35,750 for single, from $45,000 to $49,000 for married taxpayers filing joint returns, and half that amount for married taxpayers filing separate returns for taxable years 2001-2004. These personal allowances became 47,450$ for single, 72,450$ for joint married, and 36,225$ for married separately in 2010 (Department of US Treasury, 2007c).

[17] Available on http://www.treas.gov/education/history/brochure/index.shtml

b- Tax rates bracket

The EGTRRA 2001 divided the tax rate for first tax bracket 15% for personal income tax rate into two tax rate brackets of 10% and 15%. The 10% tax rate bracket is applied to the first $6,000 of taxable income for single taxpayers and married taxpayers filing separate returns (increased to $7,000 for 2008 and later), and the first $12,000 of taxable income for married taxpayers filing joint returns (increased to $14,000 for 2008 and later). Taxable income above these allowances which was taxed at the 15% rate under 2001's law will continue to be taxed at the 15% tax rate. Under EGTRRA 2001, the 10-percent tax rate bracket would be eliminated when tax rates return to their pre-EGTRRA levels after taxable year 2010 [18] (Department of US Treasury, 2001). Also the EGTRRA 2001 reduced the tax rates in the four tax rate brackets higher than 15 %; from 28%, 31%, 36%, and 39.6 % into 25%, 28%, 33%, and 35% respectively. These reduced tax rates had been applied over a period of six years in four steps according to the following table[19]:

Table (2.6) US Personal tax rates

Taxable year	28% rate reduced to	31% rate reduced to	36% rate reduced to	39.6% rate reduced to
2001	27.5%	30.5%	35.5%	39.1%
02 – 03	27%	30%	35%	38.6%
04 – 05	26%	29%	34%	37.6%
06 – 2010	25%	28%	33%	35%

Sources: http://www.ustreas.gov/rates.shtml

[18] The Economic Growth and Tax Relief Reconciliation Act 2003 left The 10-percent tax rate in effect for taxable years beginning after 2010

[19] The Economic Growth and Tax Relief Reconciliation Act of 2003 accelerated the income tax rate reduction scheduled for 2004 and 2006 to 2003 so the 27-percent rate (2002-03) would be reduced to 25 percent; the 30-percent rate would be reduced to 28 percent; the 35-percent rate would be reduced to 33 percent; and the 38.6-percent rate would be reduced to 35 percent.

US Capital gains Tax

Individuals are taxed on the sales of their assets and thus capital gains are subject to tax when they are realized rather than as they are accrued. In 2003 the capital gains tax rate was reduced from 20% to15%. The aim of reducing this investors level tax is to reduce the effect of the double taxation of corporate profits, see below, and to promote economic growth (Dhaliwal, Li and Krull, 2007).

2.3.3 US Tax system and corporate income tax

Firms' profits are taxed once through the corporate level income tax and then again when these profits are received by shareholders as dividends or realized as capital gains. The double taxation can lead to very high tax rates on investors' income earned through firms. This high tax rates can cause economic distortions consequently the US administration tried to remove this double taxation of corporate profits in the Job and Growth Tax Relief Reconciliation Act 2003 (JGTRR) which reduced capital gains and dividend tax rates. The aim of JGTRR is to avoid the following significant economic distortions (Department of US Treasury, 2003c)[20]:

- Double taxation will encourage the firms to employ debt more than equity in its capital structure because the interest payments are deductible while equity returns, dividends and retained earnings are not. In this case, the high bankruptcy risks associated with debt will increase the cost of equity capital;

- Double taxation will make the unincorporated entities, such as partnerships and limited liability firms, more preferable because they are not suffering from the double tax;

- Double taxation will affect firms' dividend policies because firms will prefer to retain its earnings rather than distribute them due to the high dividends tax rate relative to capital gains. As a result, the firms' management will have less pressures on its investments choices because it does not need external fund; and

[20] available on http://www.treas.gov/press/releases/kd3761.htm

- Double taxation will encourage firms to engage in transactions which minimize their tax liability such as share repurchases rather than to pay dividends, these transactions will distribute their earnings at reduced capital gains tax rates. (Department of US Treasury, 2003b)[21]

It can be noted that by eliminating double taxation it reduce the tax role in corporate investment decisions, increase the firm's payout ratio by decreasing the tax bias in favour of retained earnings, and increase the level of investment by reducing the cost of capital (Department of the Treasury 2006b)[22]. To achieve this aim, the tax authority is to integrate the corporate and individual income taxes so that firm earnings will be taxed once. Firms would be permitted to distribute non-taxable dividends to their shareholders to the extent that those dividends are paid out of income taxed at the corporate level previously (Department of the Treasury 2003b). [23]

2.4. Summary

The first part of this chapter was divided into two sections, the first sections briefly introduced UK tax system and the government tools to apply this tax system generally and Income Tax; Corporation tax; and Capital Gains Tax especially due to their potential important effect on firm' capital structure. The second section reviewed the main features of the US tax system relating to Income Tax; Corporate Income Tax and Capital Gains Tax. This review of the US tax system will help in explaining and evaluating US based academic papers. Their results need to be considered in the context of the US tax system. The next part of this chapter will consider UK Real Estate Investment Trusts.

[21] available on http://www.treas.gov/press/releases/reports/bluebook2003.pdf

[22] http://www.treas.gov/press/releases/reports/report%20on%20econ%20of%20cap%20gains%20%20dividends%203.14.06.pdf will provide more details.

[23] This will be effective for distributions made on or after January 1, 2003, with respect to corporate earnings after 2000. see footnote 20 for details.

2.5. Real estate investment trusts

2.5.1 Introduction

The aim of this part of the chapter is to describe and analyse; the special characteristics of the Real Estate Investment Trusts (REITs) industry; the government regulations for this industry; UK legal conditions over conversion to REIT status; and the UK tax treatment of REIT companies and its effects on all parties.

In UK, REITs regime was launched on 1st January 2007 by Finance Act 2006. The aim was to overcome a number of weaknesses in the property market, which resulted in it operating inefficiently and thereby failing to realise its full potential for productivity growth for the UK economy. The legislation aims to avoid the double taxation which is an important factor affecting the choice between direct and indirect property investment. At that time, nine of the thirty eight UK property firms listed on the main market of the London Stock Exchange converted into REIT status and another seven had done so by September 2007 and now there are eighteen REIT firms.[24]

These REITs together represent most of the UK market capitalisation of the property sector. At the same time as firms committed to conversion, a significant number did not, due to an inability to meet the legalisation requirements for REIT status and or unwillingness to change the business model to fit these requirements[25].

To serve the aim of this part of the chapter, the theoretical and legal framework for this industry will be discussed in details.

[24] See http://www.bpf.org.uk/en/reita

25 Available on: http://www.hmrc.gov.uk/pbr2006/pbrn3.htm

2.5.2 The characteristics of the UK REIT industry

UK Real Estate Investment Trusts are a new type of property investment vehicle which were launched in the UK after successfully being introduced in other key markets including US, Australia, Belgium, Canada, Japan, Germany and France. To understand the nature of REITs, some characteristics of REITs global market will be examined.

The global REIT market capitalization has grown from US $608 billion in mid-2006 to a US $764 billion by mid-2007 (Global Real Estate Investment Trust report, 2008). Growth in Asia and the inclusion of the UK sector has been instrumental in this growth which has more than offset the contraction in the US REIT market started in 2006 leading to a drop to $604.7 billion by mid 2008 as a result for the spreading of credit crisis. The growth is due to their favourable tax status.

Tables (2.7) and (2.8) present the number of REITs in other markets and brief idea about their characteristics and restrictions.

From the perspective of the individual investors, the main advantages of UK REIT status are:[26]

1- liquidity (investors are able to buy and sell their quoted investments like a Real Estate Investment Trusts easily) and they will pay relatively low charges compared to buying property directly (stamp duty on direct property is up to 4%, whereas buying shares in a UK REIT will only be subject to stamp duty of 0.5%);
2- high income distribution. UK Real Estate Investment Trusts must distribute to shareholders at least 90% of their profits arising from tax-exempt property rental activities;
3- a spread of their investments, this diversification will reduce their portfolio's risk;
4- tax transparency, a tax-efficient nature where investors will avoid double taxation, there will be no corporation tax on their gains arising from the disposal of tax-exempt properties and tax payable only on their income dividends.

From the perspective of the government, the effect of REIT companies on its economic policy can be summarized as following:

1- it will get conversion charge of 2% of the market value of their rental properties from the existing property companies and groups wishing to convert to UK REIT status;

[26] Available on: http://www.hmrc.gov.uk/budget-updates/06dec11/old.pdf.

2- encourage more retail investors to invest in a wider range of property investments, thereby increasing the supply of rented accommodation, avoiding many risks associated with owning a single building managing tenants; and
3- Manage the UK property market by imposing legal conditions which must be met by firms wishing to convert to REIT regime such as residency in the UK and fully listed company status and other conditions. These issues will be discussed in more detail below (HMRC, 2008b)[27].

From the perspective of the REIT firms, the benefit of UK REIT status compared to alternatives such as structuring as a unit trust or open-ended investment companies is not only the exemption from corporation tax but also avoiding the liquidity challenges associated with property. For the latter pair a significant proportion of funds held cannot be directly invested in property, in case investors want to sell their interest. Liquidity is not an issue with UK REITs, since investors can buy or sell easily tradable units. Shareholders in UK REITs can hold their shares in tax-efficient 'wrappers' like ISAs, SIPPs, or child trust funds, as well as personal pensions. Also REITs will be able to carry on other activities, subject to an upper limit, that are not property investment for tax purposes. These will form part of its "residual business" (HMRC, 2004 b)[28].

[27] Available on: http://www.hmrc.gov.uk/pbr2008/rn-complete.pdf
[28] Available on: http://www.hmrc.gov.uk/budget-updates/06dec11/old.pdf.

Table (2.7): The number of REITs in other markets

Global region	Country	2008	2007	2006
North America	United States	148	169	253
	Canada	33	26	33
Europe, Middle East, and Africa.	Netherlands	8	7	9
	Belgium	14	17	13
	Germany	2	n/a	n/a
	France	48	42	30
	Turkey	13	15	n/a
	United Kingdom	19	14	n/a
	South Africa	6	7	7
Pacific	Australia	64	58	58
	New Zealand	8	10	6
Asia	Japan	42	41	38
	Hong Kong	7	7	4
	South Korea	6	6	11
	Malaysia	13	13	11
	Singapore	20	16	11
Total		451	448	484

Table (2.8): The REITs' characteristics and restrictions in other markets

Country	Organizational rules	Income and asset rules	Distribution rules	Leverage restrictions
Australia	-There is no minimum / maximum shareholder requirement. -If an undertaking purely passive property holding, the REIT is taxed as a flow-through vehicle (i.e., the net income of the trust is taxed in the hands of the unit-holders upon distribution, not at the level of the trust). Otherwise the REIT is taxable as a domestic company (e.g., if engaged in property management / redevelopment / speculation).	-In order to be eligible for flow-through taxation treatment, widely held Australian property. - Trusts must not directly or indirectly carry on a 'trading business' (i.e., a business that does not consist wholly of an eligible investment business). -the trust must invest either directly in land (inside or outside Australia) for the primary purpose of deriving rental income, or in real estate trusts or companies that themselves invest in land primarily to derive rental income. -Investments in loans and derivatives are also permitted.	-There are no minimum distribution requirements. -Usually Australian REIT distributes all its taxable income.	• The thin capitalization rules apply if the Australian REIT is either foreign controlled (either five or fewer foreign entities own 50% or more of the Australian REIT, or a single foreign entity owns at least 40% of issued units) or the Australian REIT controls a foreign entity.
France	-No shareholder may hold, directly or indirectly, 60% or more of the share capital. -Under the Finance Bill for 2005, rental income from the sub-leasing of property leased by a REIT under finance lease arrangements entered into from 1 January 2005, and gains realized from the disposal of rights pertaining to such finance lease arrangements, may be exempt from French Taxes.	-Assets pertaining to ancillary activities (e.g., real property trading) are not eligible for the REIT regime and must not exceed 20% of the REIT's total assets. -There is a 50% maximum limit on assets leased under finance lease arrangements. -Under the Finance Bill for 2005, certain assets not previously eligible for the REIT regime were made eligible (i.e., immovable property rented to third parties and financed under a finance lease arrangement entered into as of 1 January 2005).	-At least 85% of the REIT's rental income must be distributed annually -At least 50% of the REIT's capital gains must be distributed within two years. -100% of dividends from REIT subsidiaries must be redistributed by the REIT within a year.	-There is no specific thin capitalization or long-term debt restrictions aimed at the REIT. -Related-party debt exceeds 1.5 times the net equity.
Germany	-No investor is allowed to directly hold 10% or more of the shares, or hold shares with more than 10% of the voting rights. -At least 15% of REIT joint stock corporation's shares must be held on a "distributed" (free float) basis, except that at	-At least 75% of the REIT's gross earnings must be derived from renting, leasing, letting and disposing of real estate. -At least 75% of the REIT's total assets (after deducting dividends and reserves)	The REIT must distribute at least 90% of its distributable profits shown in the annual accounts for the current year.	The REIT's borrowings may not exceed 55% of the market value of its real estate assets.

	least 25% of its shares must be held on a "distributed" basis at the time of its IPO.	must comprise immovable assets		
Japan	No investor may own 50% or more of the units. REITs are generally formed as corporations rather than as trusts.	It must not hold 50% or more of the equity in other companies.	At least 90% of the J-REIT's distributable income must be paid as dividends to satisfy the requirements for the dividends paid deduction.	All loans must be borrowed from qualified institutional investors. No special restrictions for long-term debt.
South Africa	REIT are taxed (like all other trusts) at a tax rate of 40%.	Capital profits are to be reinvested and cannot be distributed to unit holders	There are no minimum distribution requirements for REITs.	REITs are permitted to gear to levels of up to 30% of the value of the underlying assets.
USA	-In a US-REIT, there must be 100 or more shareholders. -Five or fewer 'individual' shareholders cannot hold more than 50% of value. -Ownership of the REIT must be evidenced by transferable shares.	-At least 75% of the REIT's gross income annually (excluding prohibited income) must come from real estate related sources. - At least 95% of the REIT's gross income annually (excluding prohibited income) must come from real estate related sources plus passive sources such as dividends and interest. -The REIT asset tests must be met quarterly	At least 90% of REIT taxable income must be distributed annually.	There are no specific restrictions on REITs.

2.5.3. Government regulation of REITs firms

The Government started its consultation to introduce a REIT regime in 2004 by publishing a number of consultation papers because it recognized the importance of healthy and stable property market for its economy for both individuals' long term investments and as a production factor for its economy's commercial sector.

The introduction of REIT was subject to the constraint of no overall cost to the Exchequer. To offset the overall reduction in Exchequer receipts because of the corporation tax exemption, it levied a charge on companies wishing to join the UK-REIT regime equal to 2% of the gross value of the assets, which the company intend to include in the tax-exempt "ring fenced" activities. The aim of levy is to ensure revenue neutrality for the long-term public finances. Other costs and benefits relating to the administrative implications of introducing UK-REIT legislation will be considered next paragraphs (HMRC, 2006 b).[29]

2.5.3.1 The aim of the UK REIT regime

The REIT regime has the following aims and potential benefits:

1- Encouraging retail investors and smaller institutions to invest in the commercial property sector through a diversified savings portfolio, avoiding the potential risks, large capital expenses or tax inefficiency; (HMRC, 2008 b) [30]

2- Improving the supply of good quality, well maintained, and competitively priced accommodation, as a more efficient utilisation of financing sources allows for greater investment which will create many benefits for business. Owners who occupy their commercial property will find that increasing the supply of commercial property managers will allow companies to release property assets to professional building managers and allow them efficiency gains from specialisation in their core business;

3- Improve the UK economy through increasing the efficiency in the location of investment resources and a rebalancing of debt and equity in the financing of property firms.

4- Encourage institutions such as pension funds, insurance companies, and mutual funds to invest in REITs rather than their direct property investment and for them to

[29] Please see http://www.hmrc.gov.uk/pbr2006/pbrn3.htm.
[30] Available on: http://www.hmrc.gov.uk/pbr2008/rn-complete.pdf.

use REITs as a highly liquid investments rather than keeping cash; (HMRC, 2008 b)[31]

5- Improve the private rented sector management through the large institutions' involvement. Developers also will to bring forward more housing supply to the private rented sector with UK-REITs there to act as willing purchasers;
6- Tax transparency (tax payable only on dividends);
7- Regular and relatively high yield returns which is due to the negative relation between the liquidity and the risks;

REITs' transaction costs are lower than buying property directly, stamp duty on direct property is up to 4%, whereas this duty in a UK REIT is only 0.5% (HMRC, 2004 b)[32].

2.5.3.2 The costs of the UK REIT regime

It will be difficult to estimate the administrative costs in detail, but these costs relate mainly to the monitoring costs, the firm's income and assets, and the composition of the firm's shareholders. The aim of these costs is to make sure that the regime's requirements will be met continuously. The REIT regime administrative costs, to HM Revenue and Customs can be fall into the following sources (HMRC, 2008 b)[33]: costs arising from the changing the corporation tax self- assessment forms; costs arising from the changing to the systems for the transfer of electronic data; and Costs arising from introducing a new certification form which UK REITs would complete alongside their annual corporation tax self assessment return. This new form will show that UK REITs had met the REIT regime obligations.

HM Revenue and Customs' ongoing costs will arise from monitoring the compliance with UK-REIT obligations within the self-assessment regime. These costs include preparing and issuing Guidance material (internal guidance manuals and training carried out before the introduction of the regime). It is not expected to observe any impact on the income tax self-assessment return for individuals (HMRC, 2004b)[34]. As REIT companies must be listed in the stock market there are additional costs imposed for this listing.

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[31] Available on: http://www.hmrc.gov.uk/pbr2008/rn-complete.pdf.
[32] Available on: http://www.hmrc.gov.uk/budget-updates/06dec11/old.pdf.
[33] Available on: http://www.hmrc.gov.uk/pbr2008/rn-complete.pdf.
[34] Available on: http://www.hmrc.gov.uk/budget-updates/06dec11/old.pdf.

2.5.4. Conditions for UK-REIT status

A potential UK-REIT company has to carry on a property rental business, either in the UK or overseas for UK tax purposes. UK-REIT companies must also meet the qualifying conditions which can be classified into three categories which will be discussed in details later.

From an administrative aspect, a company which seeks to become a UK-REIT has to send a notice in writing to HM Revenue & Customs before the beginning of the first accounting period during which a company wishes to be treated as a UK REIT (HMRC, 2006 b).[35]

As a consequence, a REIT company will be exempt from paying corporation tax on its profits and gains from its investment business as long as the various REIT regime conditions are met. The company will need to go through other procedures in order to meet the initial and on-going conditions for REIT status. For example, if it is not already listed, the company has to seek admission of its shares to trading on the London Stock Exchange's Main Market for listed securities and to the Official List of the UK Listing Authority (UKLA), a division of the Financial Services Authority. Even if it is already listed, the company may need to adjust its articles of association and even its share structure to satisfy the conditions for a REIT regime.

2.5.4.1 The qualifying conditions of the REIT regime

As stated above the qualifying conditions can be classified into three categories company conditions, business conditions and the balance of business conditions:

1- Company conditions

A UK-REIT company must meet the following conditions on a company level:

- To be UK tax resident only;
- Not an open-ended investment company;
- Its shares must be listed on London Stock Exchange (not AIM);

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[35] Available on: http://www.hmrc.gov.uk/pbr2006/pbrn3.htm..

• Not a "close" i.e. controlled by five or fewer investors company, unless it has a collective investment scheme limited partnership as a participator;

• To have only one class of ordinary shares unless they are non-voting fixed-rate preference shares; and

• Do not have any borrowings, on which the company makes excessive payments or dependent on the performance of the company's business or assets (HMRC, 2006 b).[36]

2- Business conditions

UK-REIT firms can operate in two kinds of business or activities the first is the property rental business which is the tax-exempt "ring fenced" business, the second is the other taxable businesses, "non- ring fenced". The property rental business carried on by the UK-REIT must: (HMRC, 2005 b)[37]

• include at least three rental properties;

• not include property which represents more than 40 % of the value of the rental portfolio;

• result in at least 90% of the business' rental profits earned in the relevant accounting period be distributed as dividend by the company on or before the filing date for the company's tax return; and

• none of the properties of the rental business may be the owner-occupied by the REIT company or group.

3 -The balance of business conditions

In relation to the balance of the tax-exempt business and the taxable business of the REIT, there are two conditions which must be met by UK-REITs: (HMRC, 2006 a)[38]

• At least 75% of the REITs total income must arise from its property rental business in the relevant accounting period (the Profit Test). Total income is defined as profits before tax and exclude realised and unrealised gains and losses on the disposal of properties and items that are outside the ordinary course of the UK-REITs business; and

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[36] Available on: http://www.hmrc.gov.uk/pbr2006/pbrn3.htm..

[37] Available on: http://www.hmrc.gov.uk/research/reviewing legislation6.pdf

[38] Available on http://www.hmrc.gov.uk/research/cgt-final-report26.pdf

• The value of the REITs assets in the property rental business must be at least 75% of the total value of all its assets at the beginning of relevant period as valued in accordance with International Accounting Standards (the Asset Test).

The UK-REIT regime allows groups to seek REIT status. The conditions and provisions are applied either to the group's holding company or to the group as a whole. The group's financial statements should be submitted to HMRC by holding company in respect of the group accounting period. For the purposes of taxation of chargeable gains, a group REIT is treated the same as a single REIT company. The group is defined as the holding company which must be UK resident, and it 75% subsidiaries (HMRC, 2006 b).[39]

There are two further important restrictions, not conditions, which do not affect REIT status but they can result in additional tax charges. These relate to shareholding and financing costs:

1- Maximum shareholding

The REIT must avoid paying a dividend to any shareholder who owns 10% or more of the shares or controls 10% or more of the voting rights in the REIT (directly or indirectly). If it does make such a dividend, a tax charge will be levied and be applied to the whole of the distribution to that company and not just the excess (HMRC, 2004 b)[40]. The aim of this restriction is to avoid a situation whereby a non-UK shareholder, resident in a country with a double-taxation agreement with the UK, receives a dividend from a UK-REIT and, because of the size of shareholding, is able to avoid or substantially reduce the tax withholding under the UK-REIT regime.

The REIT should examine its Memorandum and Articles of Association and make any necessary changes to avoid paying a distribution to such a substantial shareholder. This can be achieved by:

1- a dividend strip transaction, where the counter-party would not be beneficially entitled to 10 % or more of the dividends; or

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[39] Available on: http://www.hmrc.gov.uk/pbr2006/pbrn3.htm..

[40] Available on: http://www.hmrc.gov.uk/budget-updates/06dec11/old.pdf.

2- Establishment of a trust to hold the dividends for a person who is not a substantial shareholder – unless or until the shareholder ceased to be a "Substantial Shareholder" (HMRC, 2004b)[41].

A company which is considering changing its Memorandum and Articles of Association may need to call an extraordinary general meeting to obtain the necessary shareholder approval. Shareholders need to be fully informed of the effect of the conversion to UK-REIT on their own tax affairs (Luck, Cant, and May 2008).

2- Financing-cost ratio

In any accounting period after joining the UK REIT regime, the ratio of a firm's rental profits from the tax exempt business (profits before deducting the tax, interest costs, and capital allowances and losses brought forward from a previous accounting period) to its financing costs must not be less than 1.25:1. If the firm does not meet this ratio a tax charge will be levied based on the amount of the financing costs which take that ratio to 1.25:1 or more. Therefore, a REIT can employ debt in its capital structure but a tax charge can be raised to the extent the finance-cost ratio is breached (HMRC, 2005 b)[42]. The purpose of the ratio is to prevent a UK-REIT being highly leveraged, or at least subject to high financing costs which reduce the amount of profits available for distribution to shareholders (Luck, Cant, and May 2008).

2.5.5. UK Listing authority (UKLA) listing rules

The UKLA Listing Rules distinguish between two kinds of property firms with shares admitted to trading on the London Stock Exchange. These kinds are property trading firms and the property investment firms. Property trading firms require a three year track record before their shares can be admitted to listing. Property investment firms do not need such track record. The existing listed property firms do not need any formal approval from the UKLA to convert to REIT status. Non-listed property firms, either property trading or

[41] Available on: http://www.hmrc.gov.uk/budget-updates/06dec11/old.pdf.
[42] Available on: http://www.hmrc.gov.uk/research/reviewing legislation6.pdf

property investment firms, which seek REIT status must apply the UKLA Listing Rules to be listed (HMRC, 2008b)[43].

In 2006, the Listing Rules were reviewed in relation to all types of investment entities at the same time Revenue and Customs was preparing to introduce the REIT regime. This review was not motivated by the proposed REIT regime but it did take the proposed REIT regime into account. The aim of the listing review was to create a single, principles based, listing regime which can be applied to all types of investment entities. The listed property trading firms and property investment entities, REIT or non REIT, will still be subject to the additional requirements under the new Listing Rules. For example, listed property trading firms have to publish their investment policy and the firm's directors should have sufficient experience while property investment entities must provide an additional asset valuation report to their annual accounts if they invest 20% of their assets in property (FSA, 2006). These changes to the Listing Rules will not affect firms which decide to remain as, or become, listed property trading firms with REIT status. Firms which are seeking admission with a three year track record as a trading firm should follow this listing rules for new entrants (FSA, 2006).

2.5.5.1The UKLA's disclosure and transparency rules

In 2007, a new transparency rule "Disclosure and Transparency Rules" were introduced by UKLA. These new rules apply to all REITs and to their shares which are admitted for trading on the London Stock Exchange Main Market. These rules are mainly related to the publication of periodic financial reports and introduce obligations on shareholders to disclose major shareholdings. They replace similar provisions in the Companies Act 1985 and implement the European Transparency Directive which requires the shareholders who acquire or dispose of voting shares in a main market to notify the firm about the proportion of their voting rights. This is relevant to REITs because of the 10% ownership threshold (HMRC, 2006 b). These transparency rules are designed to support REITs on the type of mechanisms to employ to prove that the REIT has made reasonable steps to prevent breaching the 10% maximum shareholding limit (FSA, 2006).

[43] Available on: http://www.hmrc.gov.uk/pbr2008/rn-complete.pdf.

2.5.6. Tax treatment for REITs

2.5.6.1. Asset valuation

The REIT legislations require the use of International Financial Reporting Standards (IFRS) in the preparation of REITs' financial statements. Before considering the REITs' tax treatment, it will be useful to refer to the inconsistent use of accounting standards throughout the world in relation to REITs. This variance in the application of accounting standards can affect the volatility of firm's earnings, profitability and comparison of REITs globally. According to IFRSs, REITs can apply two approaches in evaluating their investment properties. These approaches are the "fair value" approach, as used in European countries, Hong Kong and Australia or the "cost basis", i.e. initial cost plus capital expenditure since acquisition. This approach is used in US, Canada, and Japan.

If a REIT firm has selected the fair value approach, any increase or decrease in asset values will be recorded through the Income Statement, this can result in significant increase in earnings volatility. Generally, property values have increased, therefore the fair value approach will result higher asset values compared to the cost basis approach in the balance sheets and also higher profitability in the income statement.

The application of the UK-REIT regime will result in many tax consequences for Revenue & Customs, REIT firm and shareholders compared with other types of listed firms. These consequences are summarized below.

2.5.6.2. Entry charge

To ensure that the application of REIT regime will not result any overall revenue loss for the Exchequer, an entry charge is levied. The entry charge is 2% of the gross market value of the property involved in the property rental business at the beginning of the first accounting period for which a firm becomes a REIT. Consequently, the potential REIT's latent capital gain at the date of conversion will be extinguished. The entry charge will be collected in four quarterly instalments at the same time as corporation tax is payable, generally starting six months after the beginning of the first accounting period. Alternatively, firms are allowed to spread this charge over four years but they have to pay a 2.19% interest charge.

If a REIT firm decides to leave the UK-REIT regime within ten years of joining it must give notice to Revenue and Customs and dispose all of its tax exempt business assets within two years of the leaving date or be subject to a deemed disposal of that property.

2.5.6.3. Company operating requirements

To meet REIT regime conditions, the firm is deemed to have disposed and repurchased the assets to be used in the tax-exempt business at market value. The firm's chargeable gain or loss which arising on the deemed disposal will be ignored for tax purposes.

For corporation tax purposes, the firm must distinguish between the ring fenced tax exempt property rental business and the taxable non-ring fenced business, which is taxed in the ordinary manner carried on by the firm or group. It must be able to make the distinction before, during and after joining the REIT regime. The firm is not able to set off the profits and losses of the tax exempt and non-tax exempt businesses.

As mentioned before, REIT firms must distribute at least 90% of its income arising from property rental business, excluding capital gains or loss, after deducting the basic rate of UK income tax (20%). This excludes any payments to authorized investment funds, approved investment trusts, UK corporates, and certain pension funds. The REIT firm must deduct 20% tax rate on its property income distributions to all overseas shareholders. The tax levied on overseas shareholders may be reclaimed if their country has a Double Tax Agreement with the UK.

REIT firms can distribute the income arising from the disposal of properties or reinvest this income within two years to keep it as ring fenced asset for the "Balance of Business Assets" test as describe earlier. In the case of converting to a REIT or when a REIT purchase a property, capital allowances are deemed to transfer to the REIT at tax written down value. If a REIT firms develops properties which are then sold within three years of any development activities being conducted, these properties will be subject to tax. Developed properties can be defined as any property whose cost of development exceeds 30% of the fair value of the property's acquisition cost. The disposal of such a property which is used for non-eligible business will be taxable while those which maybe used wholly or partially for eligible business maybe partially exempt.

Regarding the tax effects on shareholders, REIT distributions, termed Property Income Distributions (PIDs) and distributed capital gains arising from tax-exempt property) are treated as UK property income in the hands of the shareholders for UK tax purposes. When a REIT firms distributes dividends from non-ring fenced business these payments will be treated as a normal dividend.

Before making a distribution, the REIT will deduct basic rate income tax at 20% from the property income, except in respect of tax-exempt investors. Based on the investor's income tax rate, the investor either pays a higher tax rate, a further 20% as property income tax at 40% or pays the basic tax rate which is already deducted by REIT. The aim of this tax treatment of property rental business is to make sure that the returns of REIT investors are taxed at the same way as for returns from a direct holding in property (HMRC, 2005b)[44].

2.5.6.4 Sanctions and loss of REIT Status

REIT status can be lost, with subsequent, penalties if certain conditions or regulations are breached by the REIT. These breaches include:

1- Failure to meet the 75% asset test. This could result in the following depending on the breach's severity:

- the breach can be considered minor if assets percentage was less than 75% but more than 50%, two breaches are allowed in any 10 year rolling period before issuing a formal a notice by HM Revenue and Customs;
- The breach will be considered major if asset percentage was less than 50%. In this case Revenue and Customs can issue a notice with the affect that the REIT rules will not be applied in the current and future years.

2- Failure to meet the profit distribution obligation, it could result in a 30% tax charge which will be levied based on the distribution's shortfall.

3- Failure to meet the 10% shareholding level, it could result a 30% tax charge which will be levied based on the amount equivalent to a dividend paid to a corporate shareholder.

4- Failure to meet the 1.25:1 profit to financing-cost ratio, it could result in a tax charge which will be levied based on the excess of profit to financing costs.

[44] available on: http://www.hmrc.gov.uk/research/reviewing legislation6.pdf

2.7. Background to UK REIT industry

It will be useful to observe some of the feature of the REIT market in order to place it in its context. After 1st January 2007, the starting date of the UK REIT regime, nine listed property firms converted immediately to REIT status and six companies shortly afterwards. During 2008 the population of UK-REITs grew slowly, with only five new REITs resulting in 20 REIT by the end of 2008. This number dropped to 18 at the end of 2009 due to merging two REITs. During 2007 the industry continued to attract significant investment inflows into the commercial and residential property markets from retail investors.

With the increased interest in conversion to REIT status, at the end of 2006, the share prices of listed UK property companies increased significantly with all companies trading at or above their net asset values. However, after REIT establishment on 1 January 2007, share prices have fallen significantly.

During 2008, there was a downward trend in UK property valuations which lead to low share prices in UK-REITs. UK-REIT continued to trade at 30% to 40% below net asset value which lead to increase speculation of potential mergers and acquisitions. However, this downward trend was also reflected in non-REIT UK property companies. This suggests it is caused by general market performance rather than the REIT or non-REIT sector specifically. Market Beta (B) is the best indicator to measure share price volatility by measuring sensitivity of shares price to fluctuations in the general stock market. With beta value less than one, this reflects less risk of movement in REITs' stocks relative to movements in the broader equities market

During 2007, UK REITs had a high volatility with mean beta value of 1.11 compared to the value in the previous incarnations as property businesses and equity stocks. The value decreased to 0.85 in 2008. This volatility may follow from financing structure (global REIT Report, 2010)[45]

In 2007, the REITs' debt levels both globally and in UK were high with average leverage level measured as debt relative to total assets at 40.29% globally and 32.78% in the UK

45 See http://www.ey.com/Publication/vwLUAssets/Global-REIT-report-2010-Against-all-odds/$FILE/Global_REIT_report_2010_Against_all_odds.pdf.

compare to 34.24% in 2006 globally. This growth in REITs' debt levels may be due to the low interest rates. However in 2008, the cost of debt increased as a result of the credit crisis (REIT Report, 2008)[46].

In line with downward trend in UK-REITs' stock price movements during 2007, UK-REITs dividend yields increased). In the current financing environment where debt costs are relatively high, firms are less likely to distribute profits to shareholders unless obliged to do so under the UK-REIT regime. There were also operational changes in the early years. In 2008, it was announced by the UK's largest REIT (Land Securities) that it was to de-merge into separate specialist REITs when market conditions are suitable. It can be concluded from this announcement that there is possible trend for UK-REITs to specialize in one specific property sector (in 2000-03 there was a similar trend in Australian REITs) (REIT Report, 2008)[47].

2.8. Conclusions

The aim of this chapter is to briefly describe the UK and US tax system and in particular the specific taxes which may affect firms' capital structure and their cost of equity capital (such as investor level and corporation level taxes). The second part of this chapter described and analyses the special characteristics of the UK Real Estate Investment Trust (REIT) regime, the legal regulations for this sector, and the conditions over converting to REIT status, and the UK tax treatment of REIT companies and its effects on all parties.

Due to the fact that REITs represent most of the UK market capitalisation of the property sector, investigating the effects of their unique tax status pre and post conversion on their cost of equity capital will be interesting and important topic because this industry is relatively young and still evolving. While there are studies which have estimated implied cost of equity capital for tax paying firms, there are no studies which investigate whether the corporate tax exemption is reflected in UK-REITs cost of equity.

46http://www.boersefrankfurt.de/DE/MediaLibrary/Document/REITs/Global_Real_Estate_Investment_Trust_Report_2008_Ernst_and_Young.pdf for more details.

47http://www.boersefrankfurt.de/DE/MediaLibrary/Document/REITs/Global_Real_Estate_Investment_Trust_Report_2008_Ernst_and_Young.pdf for more details.

Chapter Two: The UK tax system and REITs

The unique tax status for REITs will help in studying the impact of dividend taxes on firm valuation because it avoids some of the complications encountered in previous empirical works by exploiting institutional characteristics of REITs such as their limited discretion over dividend policy and the relative transparency of REIT assets.

The REITs are exempt from corporate income taxes but must limit their activities to owning and managing portfolios of real estate assets and must pay out 90% of their taxable income as dividends. In addition, tax rules significantly restrict the activities REITs undertake, so management has less impact on the value of a REIT than it has for typical industrial corporations.

In next chapter, the main capital structure theories and the capital structure's determinants will be explained to design the theoretical framework.

Chapter Three:

Capital structure, cost of equity capital and Taxes

Chapter Three: Capital structure, cost of equity capital and taxes

3.1 Introduction

After reviewing the UK tax system and REIT industry features and UK-REIT regime, the aim of this chapter is to describe the firms' capital structure theories as introduction to explore the cost of equity capital estimation models. Therefore, understanding the capital structure in general and REITs' capital structure in particular and the factors which affect capital structure in detail will be crucial to estimate their cost of equity capital. These factors include investors and corporate taxes, agency costs and signalling.

Investor and corporate tax levels can be considered as an important factor on the capital structure in general and especially firm's financing decisions and cost of capital. Therefore this thesis will measure the influences of changes in tax status on REITs' implied cost of equity capital.

The structure of this chapter will be as follows after this introduction. Section 3.2 will present a brief background of capital structure's importance. Section 3.3 will present the main capital structure theories and the cost of equity capital. Section 3.4 will present the factors which can affect capital structure generally and consider the effect of investor and corporate level taxes on REITs' capital structure and cost of equity capital. Section 3.5 will present the potential effect of non-debt tax shields on capital structure. Finally section 3.6 will provide a brief conclusion about the main factors which will be considered in calculating the cost of equity capital for UK REITs.

3.2. The importance of capital structure and the cost of capital

Investors can have many kinds of cash flows claims in respect of their investments. For instant, debt-holders will obtain contracts which promise them fixed schedules of interest in the future in exchange for their cash now while shareholders will obtain distributed, retained, and residual earnings. Also, shareholders have voting rights whereas bondholders

have do not except for some kinds of indenture provisions in the bond which may restrict the decision making of shareholders (Vernimmen *et al.* 2005).

In addition to these two basic kinds of cash flows claims, there are others e.g. those relating to the holders of warrants, leases, preferred stock, and nonvoting stock and convertible debentures. Due to the various types of risks which are faced by each category of the investors, each category will require a different expected rate of return to provide the firm with necessary funds. This required rate of return can be defined as the investor's opportunity cost of investing his scarce resources elsewhere in opportunities with same risk class. To understand the cost of capital, it is critical to recognize the fact that shareholders will decide whether to accept or reject new projects. Their criterion is based on the fact that the projects should increase their expected utility of wealth on a risk-adjusted (Vernimmen *et al.* 2005).

A firm's value depends on tangible and intangible factors, tangible factors such as cash flows and intangible factors such as management's expertise and goodwill. Based on the types of managerial decision making activity, tangible factors can be classified into three different types of decisions, investment decisions, financing decision and dividend decisions. The investment decisions, relate to the assets or investments which the firm should invest in and is partly related to the type of firm's industry. Financing decisions answers the question about how cash which will be needed to fund the desired investments will be obtained. This includes the critical analysis of the different sources of firm's available in the market and their relative advantages and disadvantages. The dividend decisions which answer the question about the earnings' proportion which will be distributed to shareholders and its distribution's frequency. The dividend decisions can be considered an important element in the determining and timing of net cash flows (Vernimmen *et al.* 2005).

It is clear that the relationships between these decisions and firm's value will depend on the role of financial markets in this valuation. For example, to say that project X has investment viability (investment decision) analysts must estimate its future cash flows and its cost of capital. This estimation to a large extent depends on the operational and information efficiency of financial markets. Also financing and dividend decisions are affected by financial markets' influences. So the management must recognize the mechanism of the relation between dividend policy and firm's market value. In the case of

financing decisions, management must decide the capital structure i.e. levels of debt or equity to increase a firm's value and recognizing the cost of each decision (Titman, 2002). As a result, recognising the relationship between the different decisions and firm's value is crucial. This result stated by Titman (2002, pp 104):

"... Market conditions, which are determined by preferences of individual and institutions that supply capital can have an important effect on how firm raise capital"

Based on the theoretical literature, it was found that taxes affect a choice of capital structure. The review of tax effects starts with the Modigliani and Miller (1958) framework. This assumes the presence of perfectly competitive capital markets and initially assumes no taxation. Then taxes at both corporate and personal level are introduced into the discussion of the effect of tax on the capital structure.

Under specific assumptions, Modigliani and Miller (1958) show that firm's capital structure is irrelevant for successful operating in the competitive efficient capital markets and for its financing decisions. Capital structure theories after Modigliani and Miller (1958) have tried to prove how capital structure is relevant by relaxing the Modigliani and Miller (1958) assumptions. The next sections will summarise the literature which has focused on the impact of taxes and other factors on capital structure and cost of equity capital.

3.3. The theories of capital structure

A firm's capital structure can be defined as the way which is used to fund the firm's assets through equity, debt, hybrid securities, or some combination of two (all) of them. In other words, the firm's capital structure is the composition of its liabilities and equity. In the financial literature, capital structure is considered as a puzzle because there is no a specific theory which explains why firms use debt financing, and which determines the optimal size of this debt in firms' capital structure (Vernimmen *et al.*2005).

The theory of Modigliani and Miller (1958, 1963) can be considered as the most important capital structure theory. This theory relies on assumptions which were relaxed later deriving other theories in capital structure. These theories will be explained in details later. Under an assumption of certainty, Modigliani and Miller argue that a firm will invest until its marginal yield will be equal to its marginal cost of bonds (interest). In this case the maximization of firm's profits and market value will be the criterion of the rational decision and the cost of capital will be equal to the cost of debt. In a world of uncertainty, researchers attempt to consider the uncertainty by either subtracting a risk discount from the expected yield or adding risk premium to the market rate of interest. In this case the comparison between the risks, adjusted yield, and the market rate of interest will be the criterion of the rational decision. In Modigliani and Miller (1963) and Miller (1977) they went a step further by introducing the tax effect on capital structure.

3.3.1 Modigliani and Miller theories

a- Modigliani and Miller (1958)

Modigliani and Miller introduced a set of influential papers which paved the way for the capital structure theories starting by their papers in (1958), (1963), and Miller (1977). In 1958, Modigliani and Miller introduced their theory which assumed that the capital market is perfect. They assumed there is no transaction or financial distress costs or taxes, no information asymmetry, there is one borrowing interest rate for firms and individuals, and the independence of investment and financing decisions. Beside their assumption about the capital market perfection, Modigliani and Miller (1958) also set the following assumptions: ccapital structure and operating cash flows are independent; perpetual cash flows, no growth; and no agency costs; and

They defined the firm's business risk as the standard deviation of its operating income (EBIT), and firms with similar level of risk can be classified in a homogeneous risk class. Based on the above assumptions MM 1958 concluded two important propositions:

MM (1958) proposition 1:

They started from the definition of firm's value as the capitalization of firm's net earning before interests and taxes (EBIT) at rate (r_{SU}) which is the rate of return required on an un-levered firm's existing common stocks:

$$V_L = V_U = \frac{EBIT}{WACC} = \frac{EBIT}{r_{SU}} \qquad (3.1)$$

Where: L (U) refers to levered (un-levered) firm, V refers to the firm's value, and WACC refers to weighted average cost of capital.

Their conclusion from equation (3.1) was the firm's value is independent of its capital structure. This means that firm's weighted average cost of capital is completely independent of its capital structure and this average is equal to the cost of equity which should be paid for un-levered firm.

Based on the above argument, MM (1958) conclude their first proposition which stated: (MM, 1958, pp 266)

"*The market value of any firm is independent of its capital structure and is given by capitalizing its expected return at appropriate rate according to its risk class*".

MM (1958) proposition 2:

They argue that the cost of equity for levered firm (r_{SL}) is equal to the cost of equity of un-levered firm, (r_{SU}), plus a risk premium. This risk premium is function to the differential between the debt's cost and equity's cost for un-levered firm and the debt's amount.

$$r_{SL} = r_{SU} + Risk\,\Pr emium$$

$$r_{SL} = r_{SU} + (r_{SU} - r_d)\frac{D}{S} \qquad (3.2)$$

Where: D (S) refers to market value of firm's debt (equity) and r_d refers to the cost of debt. (Modigliani and Miller, 1958)

Modigliani and Miller argue that increasing the level of leverage will not add any value because the benefits of additional debt will be accompanied by an increase in the risk burden. This risk burden will be shifted between the shareholders into debt-holders while the total risk will be conserved. With no taxes, they conclude that a firm's value and its weighted average cost of capital will not be affected by its capital structure (Modigliani and Miller, 1958; see also Brigham et al., 1999).

Based on the above argument, MM (1958) conclude their second proposition which stated:

"*The cost of equity for a leveraged firm is equal to the cost of equity for an un-leveraged firm, plus an added premium for financial risk*". *(MM, 1958, PP268)*

It is clear that the first MM (1958) proposition is true in a perfect capital market while in a real world perfect capital market is just an assumption so firms' value will be affected by its capital structure for many reasons. These reasons include taxes, bankruptcy costs, agency costs, and information asymmetry. The necessity to study these imperfections has encouraged the researchers to develop many theories by relaxing MM assumptions such as trade-off theory and Pecking Order theory which will be explained at in detail later.

b- Modigliani and Miller theories [1963]

One of the crucial criticisms of MM (1958) is that they ignore the impact of corporation tax on the firm's cash flow where firms work in economies with corporate tax rules. These tax rules allow the deduction of interest payments from taxable income. This means that after tax income for the investors of levered firms will be higher than the after tax income for the investors of un-levered firms. To correct their previous paper, MM 1963 introduce the impact of corporate taxes on a firm's cash flow. They conclude that leverage will increase the firms' value as a result of interest deductibility from the taxable income. Similar to their first paper, they derived two propositions:

MM (1963) proposition 1:

This proposition states that the value of any levered firm will be equal to the value of un-levered firm with the same risk class (V_U) plus the gain obtained from debt in the firm's capital structure. This gain will be obtained from the debt's tax saving which is equal to the corporate tax rate (Tc) multiplied by the amount of debt the firm's capital (D):

$$V_L = V_U + T_c * D \qquad (3.3)$$

Where V_L and (V_U) are the value of the levered (un-levered) firm.

MM (1963) proposition 2:

This proposition states that the cost of equity for a levered firm will be equal to the cost of equity of un-levered firm with the same risk class plus a risk premium. The amount of this premium will depend on the differential between the costs of equity and of debt for an un-levered firm, the level of leverage employed, and the corporate tax rate:

$$R_{SL} = R_{SU} + (R_{SU} - R_d) * \frac{D}{S} * (1 - T_C) \qquad (3.4)$$

Where:

R_{SL} And (R_{SU}) are the cost of equity for levered (un-levered) firm;

$\frac{D}{S}$ is the firm's debt to equity level;

R_d is the cost of debt; and

T_C is the corporations' level tax rate.

Equation (3.4) reflects the impact of corporate taxes on the cost of equity capital where this tax reduces debt costs. Based on this result, it can be concluded that their first proposition will confirm the positive relationship between the firm's value and its leverage. (Modigliani and Miller, 1963; see also Brigham et al., 1999)

c- The Miller model (1977)

Modigliani and Miller (1963) only introduced the effect of corporate tax on the cost of equity capital and firm value while the personal taxes have been ignored. To include the effect of personal taxes into the MM (1963) analysis, Miller (1977) constructed a new model, under the assumptions of MM (1963) model. This revised model states that the value of un-levered firm can be defined as follows:

$$V_U = \frac{EBIT(1-T_C)(1-T_S)}{R_{SU}} \qquad (3.5)$$

Where:

V_U is the value of the un-levered firm;

EBIT is earning before deduct the interests and taxes;

T_S and T_c is the personal and corporate tax factors; and

R_{SU} is the cost of equity for un-levered.

The equation (3.5) shows in the right side the firm's operating income after deducting the corporate income taxes and personal income taxes. When divided by un-levered firm cost of equity capital this gives the firm value. It can be noted, after keeping other things constant that the personal taxes reduce firm's value (Brigham et al., 1999).

The argument of Miller (1977) was supported in the literature based on the definition of the levered firm's annual cash flows. This income can be divided into the bondholders and the stockholders after considering both corporate and personal taxes. In other words, the levered firm's cash flows (CFL) can be expressed in equation (3.6):

(CFL = Net Cash Flow to stockholders + Net Cash Flow to bondholders)

$$CFL = (EBIT - di)(1-T_c)(1-T_s) + di(1-T_d) \qquad (3.6)$$

Where, (di) is the annual interest payment (bondholders' income), (T_c) is the corporate tax rate, (T_s) is the personal tax rate on equity income, and (T_d) is the personal income tax rate on debt income. The equation (3.6) can be rearranged as follows:

$$CFL = (EBIT)(1-T_c)(1-T_s) - di(1-T_c)(1-T_s) + di(1-T_d) \qquad (3.7)$$

It is clear that the first right hand term in equation (3.7) is identical to cash flow of an un-levered firm after deducting the taxes. While, the second and third right hand term in equation (3.7) reflects the effect of leverage, the cash flows associated with debt financing. By discounting the cash flows in equation (3.7) using the required rate of return of the capital providers, the value of the levered firm can be expressed in equation (3.8):

$$V_L = \frac{(EBIT)(1-T_c)(1-T_s)}{R_{SU}} - \frac{di(1-T_c)(1-T_s)}{R_d} + \frac{di(1-T_d)}{R_d} \qquad (3.8)$$

It is clear that the first right hand term in equation (3.8) is identical to the un-levered firm's value (V_U). Rearranging equation (3.8) by taking $\frac{i(1-T_d)}{R_d}$ as a common factor gives equation (3.9):

$$V_L = V_U + \frac{di(1-T_d)}{R_d}[1 - \frac{(1-T_c)(1-T_s)}{(1-T_d)}] \qquad (3.9)$$

It can be noted that the term [$\frac{di(1-T_d)}{R_d}$] equals to the market value of debt (D) so the equation (3.9) will become as following:

$$V_L = V_U + [1 - \frac{(1-T_c)(1-T_s)}{(1-T_d)}]D \qquad (3.10)$$

According to Miller (1977), equation (3.10) provides an estimate of the value of levered firm after considering both corporate and personal taxes (Miller, 1977). It can be concluded that:

1- The Miller (1977) model will return to the MM (1963) model when the term in brackets $[1 - \frac{(1-T_c)(1-T_s)}{(1-T_d)}]$ is replaced by (T) as shown in equation (3.11).

$$V_L = V_U + TD \qquad (3.11)$$

2- The Miller (1977) model will return to the MM (1958) model when $T_c = T_S = T_d = 0$ as shown in equation (3.12).

$$V_L = V_U \qquad (3.12)$$

3. The Miller (1977) model will return to the MM (1963) model when $T_S = T_d = 0$, the as shown in equation as shown in equation (3.13).

$$V_L = V_U + T_C D \qquad (3.13)$$

d- Criticisms of the MM (1958), (1963) and Miller (1977) models

Brigham et al. (1999) argue that the Modigliani and Miller models and Miller model can be criticised on many points. These points can be summarised as following:

1- Brokerage costs. Modigliani and Miller (1958) and (1963) and Miller (1977) have ignored brokerage costs. They argue that changing the firm's capital structure from levered to un-levered is costless, while in practice brokerage and other transaction costs exist.

2- Modigliani and Miller (1958) and (1963) and Miller (1977) have assumed that both corporations and investors can borrow at the risk free rate, while in practice most individuals' investors borrow at higher rates than both large corporations and the risk free rate.

3- Miller (1977) has found that the equilibrium would be reached when the tax benefit from debt is the same for all firms and this tax benefit is constant for an individual firm regardless of its debt used. While in practice, the tax benefits from debt vary between firms.

4. Modigliani and Miller (1958) and (1963) and Miller (1977) have ignored the costs relating to financial distress, and also have ignored agency costs. Furthermore, they have assumed that the information about the firm's prospects is identically available for all market participants which may be incorrect in real world.

3.3.2 Capital structure theories after MM theories

As mentioned above, Modigliani and Miller (1958) suggested that the market value of any firm and its cost of capital are completely independent of its capital structure after assuming that there are no taxes, transaction costs, information asymmetry, and bankruptcy costs. Accordingly, there is no optimal capital structure. After that, many researchers have expanded the MM (1958) propositions by relaxing their assumptions. Such studies as Baxter (1967), Ross (1977), Myers and Majluf (1984), and Myers (1984) have relaxed the "imperfections" of the logical structure in the MM's theory. These imperfections in the MM's theory have been explained in the criticisms of the MM (1958), (1963) and Miller (1977) models above.

Consequently, capital structure researchers have tried to understand how firms choose their capital structure, and whether there is an optimal capital structure. These efforts can be classified into the following approaches (Weston, 1989):

1- the existence of taxes and bankruptcy costs in real world will make the debt relevant (trade-off theory);

2- the existence of asymmetric information between managers and investors in real world will provide a signalling opportunity (asymmetric information theory); and

3- the confliction between various parties involved will affect the mix of debt and equity in the firm's capital structure (agency cost theory). These capital structure theories will be discussed in detail in the following paragraphs.

1- Trade-off theory

Trade-off theory has been created when some researchers have relaxed MM's (1958) assumption about the absence of bankruptcy costs. According to the trade-off theory, the optimal capital structure for any firm will be obtained when the net tax advantage of debt financing balances off the increased leverage costs like bankruptcy cost. In other words, firms' debt ratio should be increased until the marginal benefit of employing more debt equals the marginal cost of employing it, and the firm's optimal capital structure point will be located where the net benefit of employing debt is zero.

Modigliani and Miller (1963) introduced the effect of corporate taxes on firms' value. They found a positive relationship between debt levels and firm value. Based on this conclusion, they state that firms optimal capital structure will be obtained at a 100% debt level but this level will be accompanied with an increasing shareholders' rate of return required to compensate them for the increase in their risk.

It is clear that MM's (1963) conclusion is not realistic due to the overleveraging effects. Firms' with high leverage ratio in its capital structure has to pay larger fixed interest these high expenses will decrease its earnings and may cause financial distress for it. Trade-off theory has been clearly explained by Kraus and Litzenberger (1973). They state that the balance is between financial distress's costs and debt's tax deduction.

Based on the notion that a firm usually finances its capital by employing debt and equity, the debt amount should balance the firm's costs and benefits of debt. In other words, this theory states that increasing the firms' debt level will increase the debt's marginal cost and will decrease the marginal benefit of issuing more debt. So to optimize their overall value, firms have to focus on these trade-off relationships when determining their capital structure (debt to equity ratio).

To explain the balance between the financial distress costs and the debt interest tax deduction, Miller (1977) states that this relation is akin to the balance between horse and rabbit content in a stew of one horse and one rabbit. Miller argues that taxes are larger and are more confirmation than bankruptcy costs. So, he argues that the debt's level observed is lower than what should be if the trade-off theory is true.

To test his hypothesis about the positive relationship between leverage and the failure's probability, Castanias (1983) obtains his data for 36 lines of business and by using linear regression analysis then he examines the sign of the above relationship. The results have confirmed the positive relationship between leverage and bankruptcy's probability. He concludes that firms which have a high level of leverage in their capital structure have a high failure rate. As a result, Castanias finds that indirect bankruptcy costs are not predictable, so the bankruptcy costs should be excluded. Altman (1984 and 2002) went further by dividing bankruptcy costs into direct and indirect costs. He defines direct costs as the costs which can be measured, for example lawyers' costs and other administrative costs while, defines indirect costs as the costs that can be only expected like a loss of profits. To estimate the size of the above indirect bankruptcy costs, Altman measures bankrupt firms' abnormal profits (loss) as failure date approaches. His argument is based on the fact that indirect bankruptcy costs are not only limited to firms which fail, but also firms which survive. Firms with a high probability of bankruptcy can suffer from these costs. He also refers that indirect bankruptcy costs include customer wariness and/or additional customer restrictions like preferring cash payments. To measure the firm's indirect bankruptcy costs, Altman compares the estimation of the expected profits for up to three years before the bankruptcy with actual profits (losses). He compares the expected bankruptcy costs' present value with the present value of the expected benefits from debts cost. Altman finds that the expected present value of bankruptcy costs for many failed firms is bigger than the present value of the expected benefits from debt. Also, he shows that many failed firms had significant bankruptcy costs, sometimes exceeding 20% of

firm's value measured just before bankruptcy. As a result, Altman proves the importance of bankruptcy costs in determining firms' capital structures.

To investigate the influence of indirect bankruptcy costs on firm's capital structure, Kwansa and Cho (1995) measured indirect bankruptcy costs for ten bankrupt restaurant firms then compare the trade-off between debt tax savings and the financial distress cost. Their results show that indirect bankruptcy costs are significant in absolute terms. Specifically, if indirect bankruptcy costs amount is more than the amount of debt tax savings the firm will be close to bankruptcy. As a result, they conclude that the above trade off can be used as an early warning for financial distress.

As summary, the trade off theory focuses on the benefits and costs of issuing debt and states that the optimal leverage ratio will maximize the firm's value. This ratio can be obtained when the benefits' marginal value associated with debt offsets the increase in the costs' present value associated with issuing more debt (Myers, 2001). Although the trade off theory may empirically explain differences in leverage ratios between industries, it could not explain differences within the same industry (Besley and Brigham, 2005).

3.3.2.2. Asymmetric information theory

This theory is related to the question about who has more information about a firm, the managers or investors. The simple answer is that managers have more information than the investors due to their direct relation with firms' activities and accounts. Based on the above fact, researchers study this theory by using two approaches the first approach has been introduced by Ross (1977) and Leland and Pyle (1977). They argue that a firm's policy of issuing debt and/ or equity will be considered as signal of information issued from insiders managers to outside investors (signalling theory). The second approach has been introduced by Myers and Majluf (1984) and Myers (1984). They argue that the firms' use of internal and external funds is not random but is hierarchically. Managers will not issue new equity if they have retain earnings or could issue debt because investors will conclude from an issue of equity that firm's equity is either fairly priced or overpriced. Based on above approaches, two theories can be derived from the asymmetric information theory, the signalling theory and the pecking order theory.

3.3.2.2.1 The pecking order theory

The asymmetric information theory of capital structure assumes that firms' managers have accurate information about the characteristics of the firms' return stream, which is not available for the common investors (Harris and Raviv, 1991).
The Pecking Order theory of capital structure was introduced by Myers (1984) and Myers and Majluf (1984). They show that firms' managers will be unwilling to issue more equity in case of they feel that it is undervalued in the market and investors will be also aware of this issuance. Investors may have an unfavourable reaction to this issuance because they will suppose that the firms' equity is currently fairly or overpriced.

Myers and Majluf (1984) argue that issuing new under-priced equity to finance new projects will transfer wealth from existing shareholders to new investors. Therefore to avoid this wealth transfer, firms' managers will reject the project even if it has a positive net present value. To avoid this underinvestment, they suggest that firms should employ other financing sources such as, retained earnings and debt to finance their new projects. In other words, the firm's internal funds and debt will be surpassed to equity. Myers (1984) refers to this way in finance as a pecking order theory, which states that there is a type of sequence in financing preferential options where firms will fund their new investment by using, first internal funds via retained earnings, then with debt, and finally with issuing new equity.

Myers (1984) shows that the variation between some firms' inconsistent financing policy and the prediction of trade off theory, such as the negative relation between profitability and leverage, is due to the hierarchically using for internal and external funds. In other words, he states that the negative relation between profitability and leverage is simply due to the fact that profitable firms have higher levels of internal funds so they are less dependent on external funds (debt or new equity). This conclusion is consistent with the pecking order theory of capital structure.

Drobetz and Fix (2003) show that less profitable firms tend to borrow more debt to avoid the cost of the equity floatation. They conclude that the pecking order theory relies on managerial incentives rather than the cost of funds. Also, Nuri (2000) argues that the pecking order theory relies on managers' motivations, rather than on the valuation

principles in capital market, and it does not explain how the leverage ratio is affected by the taxes, bankruptcy costs, and flotation costs.

Myers and Sunder (2000) do not consider that the pecking order theory is the best description to determine optimal firm's capital structure but they consider it as a good tool to describe some capital structure features. Goyal and Frank (2003) argue that the pecking order theory failed where it should hold, especially in case of the existence of information asymmetry in small firms.

3.3.2.2.2 Signalling theory

This theory was introduced by Ross (1977) who relaxed the symmetric information assumption in MM's (1958) theory. This theory is based on the fact that the firms' choices of capital structure will signal information from insiders who have more information to outside investors. Ross shows that investors may recognise any increase in debt's level as a signal of higher quality because firms' managers increase leverage only if the firm is able to pay the interest and/or the firm has investment opportunities which need more funds than internal sources. If investors recognize that this is the case they will react positively to debt issuing announcement. Myers (2001) argues that investors may recognise issuing new shares as good news if it reveals growth opportunities with positive Net Present Values or bad news if investors recognise that managers are issuing overvalued equity.

3.3.2.3 Agency costs theory

Agency costs refer to the costs which arise from using an agent (management) to act on behalf of the principal (shareholder and debt-holder). As explained before, if there is an information asymmetry between shareholders and management this is a simple example of agency costs. The problem arises from a conflict in the self-interests of shareholders, debt-holder, and management and will cause the firm's agency costs. Whereas, shareholders' interest is to increase their wealth, on the other hand, the interests of management might be to increase their personal power and wealth which may not meet the shareholders' interests. The information asymmetry can create the agency problems of agent's moral hazard and adverse selection. These agency costs can be divided according to their sources into two main kinds:

1- The costs of employing the agent, this includes the risk generated from the agent using the firms' resources for their own benefit not shareholders' benefit; and

2- The costs of monitoring techniques, generated from using different monitoring techniques to mitigate the costs of employing the agent. The simplest example of these costs is the costs of producing the firm's financial statements. Due to their potential effects on the firm's capital structure, these costs will be explained in details later.

The core idea of the agency cost theory is the firm's optimal capital structure can be obtained by minimising the conflict between firms' stakeholders. In their influential study about an agency cost theory, Jensen and Meckling (1976) state that the relationship between a principal and an agent can be defined as:

"We define an agency relationship as a contract under which one or more persons (the principal(s)) engage another person (the agent) to perform some service on their behalf which involves delegating some decision-making authority to the agent" (Jensen and Meckling 1976, p 308).

The firm's stakeholders (principal) are not able to completely observe the managers' actions (the agent) and also the managers have greater amount of information so they have to restrict managers' self-interest or abnormal activities by designing an appropriate system to motivate managers, this will incur firm's monitoring costs.

Jensen and Meckling (1976) state that there are two kinds of conflict of interest. The first is between shareholders and managers and the second between shareholders and debt holders. The costs which are caused by these conflicts are usually known as the "equity agency cost" and "debt agency cost" respectively.

To investigate the impact of agency costs on a firm's capital structure, Jensen and Meckling (1976) argue that the firm's optimal capital structure can be obtained by balancing off the debt's costs and benefits. In other words, the firm's mangers can arrive at the optimal capital structure point if they choose the right amount of debt and equity which minimises the agency costs generating from the above conflicts. Hams and Raviv (1991) state that most agency theory studies start from these two above conflicts, the equity agency cost and debt agency cost.

3.3.2.3.1 Equity agency cost

The conflict of interest between shareholders and managers is a direct example of the principal-agent problem. This conflict can be attributed to many reasons such as:

1- the fact that managers hold less than 100% of the firm's residual claims so they will not earn the entire benefits from their profit enhancing activities and in the mean time they will incur the costs of these activities.

2- the fact that the shareholders cannot completely monitor the manager's activities to decide the activities which increase their wealth.

Usually, managers try to expand the firm's size but this expansion will reduce the shareholders' wealth if it is done by investing in negative Net Present Value projects. So to restrict the managers' access to firm's free cash flow, shareholders will ask the managers to issue debt. The debt issuing may reduce the conflict between managers and shareholders because it will encourage the managers to work harder, demand fewer bonuses, and improve their investment decisions quality to be able to pay the interests when they are due (Jensen and Meckling, 1976).

To investigate the effect of issuing debt on the probability of bankruptcy, Jenson (1986) argued that issuing debt will reduce the conflict of interest between managers and shareholders because increasing the debt's level will increase the cash outflow and reduce the available free cash to managers to spend on activities which may decrease the firm's

value for example, spending cash to increase their bonuses or making inefficient investment decisions. Also, Myers (2001) concludes that there is positive relationship between the debt levels and the efficiency of a firm's operations.

Harris and Raviv (1990) include the disagreement over operating decisions as another reason to explain the conflict of interest between shareholders and managers. For example, to avoid losing their jobs, the managers prefer to continue operating even if shareholders prefer the firm's liquidation. To do so, the managers will reduce the conflict of interest by issuing debt but this solution can lead to the liquidation if the firm's cash flows are not enough to pay the debt's cost when it is due. They conclude that there is positive relationship between the debt's level and the probability of bankruptcy. Harris and Raviv also find that managers have limited willingness to provide the investors any information which may lead to liquidation decision and losing their jobs. As a result of the above reason, Harris and Raviv believe that the investors use debt to monitor management's performance, and check its ability to earn the cost of the firm's capital, pay the cost of debt and equity for the principle. As a summary, they conclude that the firm's optimal capital structure can be obtained by trading off the value of using debt as a source of information against the bankruptcy cost.

Based on the Harris and Raviv (1990) explanation of the conflict of interest, Stulz (1990) considered potential disagreement over operating decisions but had a different explanation for the effect of issuing more debt on this disagreement between managers and shareholders. He states that debt issue will reduce the conflict of interest based on the fact that the managers will meet the shareholders' interest by investing all funds even if paying out more of the firm's surplus cash. So, employing high debt levels will reduce the firm's free cash flow and will reduce the available funds which can be used by managers to execute new investment opportunities. Stulz concludes that the optimal capital structure can be obtained by trading off the debt's benefit and cost.

Jensen and Murphy (1990) examine the relationship between the wealth of both the chief executive officers (CEOs) and shareholders based on the fact that shareholders want CEOs to choose which projects are worthy and which are not by comparing the expected return with the expected cost of each project. They state that CEOs give their private gains more attention than operating activities. Jensen and Murphy provide alternative hypotheses which are consistent with the relationship between pay and performance. By analysing the performance pay and top management's incentives for their sample, the results of Jensen

and Murphy's study show that there is no significant relationship between CEOs' wealth and shareholders wealth.

3.3.2.3.2 Debt agency cost

Harris and Raviv (1991) show that the conflict of interest between shareholders and debt holders can be attributed to the following fact, the debt contracts usually allow the firm's shareholders to choose new projects. Um (2001) distinguishes between failing and successful projects with regards to the debt holders. In the case of failing projects the debt holders according to the debt contract will bear the cost of the failure because of their limited liability, while in the case of successful projects the shareholders will earn most of the profits which are above the face value of the debt. Based on the above fact, the shareholders' interests are to invest in very risky projects even if they are firm value decreasing.

Myers (1977) argues that if the firm's possibility of bankruptcy is high in near future the firm's shareholders will not invest more capital even in firm value-increasing project even if its risk is low. He concludes that this behaviour occurs because the shareholders will bear most of the investments costs while the value may accrue to debt holders.
Harris and Raviv (1991) state that

"There are two possible investment projects: a safe, positive NPV project and a risky, negative NPV project". (Harris, 1991, p 304)

They argue that the safe projects of any firm should earn enough to repay their debt while the risky projects of any firm should earn enough to repay their debt only if the projects are successful. Harris and Raviv assert that safe and risky projects can be financed by debt and the firm's interest rate will be low, if it convinces the debt holder that its investments are safe projects. However, they argue that the firm's default history is the only way for debt holder to monitor the firm's actions and investing in safe projects and not defaulting is the only way for the firms to gain good reputation.

Jensen and Meckling (1976) show that if the risky project fails so debt-holders will bear the cost and will not paid in full because they have limited liability this will encourage the shareholders to accept risky projects even if they are value decreasing.

Graham and Harvey (2001) state that shareholders will get the investment return above the debt's cost and the repayments, and according to the debt's contract the debt holders have limited liability if the project failed and will not be paid in full, so shareholders prefer to invest in very risky projects. Regarding to this idea, Harris and Raviv (1991) state,

"The cost of the incentive to invest in value-decreasing projects created by debt is borne by the equity-holders... This effect, generally called the 'asset substitution effect', is an agency cost of debt financing" (Harris, 1991, p 301)

As a result, debt holders either will reduce their funds or will require higher rate of returns for their cash. However, Green (1984) suggests that convertible debt can reduce the problem of the asset substitution. This problem arises when the firm accept a project which is riskier than the debt holders would prefer so this convertible debt will give the debt holders an option to share in the gains if the risky project is successful.

Consistent with Jensen and Meckling (1976), Myers (1977) conclude that the conflict of interests between shareholders and debt holders will lead the shareholders to encourage managers to reject profitable projects (the underinvestment problem). In other words, if the expected project's returns are high enough to be considered as a profitable project, but these returns are not big enough to consume cost of capital in this case shareholders will not gain anything due to debt holders' rights to get the positive payoff. As a result, shareholders may encourage the firm's managers to reject more value increasing projects due to larger debt's levels.

As mentioned above, under investment problems arise when a safe positive NPV is rejected by managers because the value may accrue to debt holders at the cost of shareholders and over investment problems arise when risky projects with negative NPV are accepted by managers because equity value will increase at the cost of debt holders. Parrino and Weisbach (1999) argue that under investment problems likely occur more in the firms which have volatile cash flows, while overinvestment problems often occur for firms which have stable cash flows.

Michaelas (1998) conclude that the rejection of some profitable projects can be caused by both the asset substitution and underinvestment problems and this rejection is due to the payoffs' distribution to the capital providers.

Westerfield *et al.* (2004) summarise the agency cost of debt as following; the debt's existence in firm's capital structure will create the conflict of interests between shareholders and debt holders. As a result, shareholders will tend to follow selfish strategies which cause the firm's debt agency cost to increase. These strategies will decrease the firm's value and may be an incentive to take large risks, and toward underinvestment.

3.3.2.4. Market timing theory

The market timing theory was introduced by Baker and Wurgler (2002) to explain choice of capital structure by arguing that the long term capital structure is just a result of manager's attempts to time equity issuance in line with the firm's high market valuation. This theory state that firms which usually have a high growth and investment opportunities also have high market values and these firms will prefer to issue equity rather than debt and this tendency will decrease the leverage ratio. The notion behind this conclusion is that the negative relationship between the firm's market values and the costs of adverse selection will show firm's high growth associated with the opportunity to issue equity at an advantage. Baker and Wurgler (2002) suppose that the ratio of equity market value to book value will reflect the firm's investment opportunities.

Based on the above assumption, the market timing theory confirms the negative relationship between the ratio of equity market to book value and the firms' debt to equity ratio. This relationship means that past market valuation has a significant negative influence on firm's debt to equity ratio. Their sample confirms that issuing equity finance is preferred even rather than retained earnings. As summary, they reject the trade off and pecking order models and state that their result is due to the fact that firms' current debt to equity ratio is a cumulative outcome of previous attempts to time the market.

In other words, the market timing theory of capital structure is based on the stock market condition where according to this theory the firms will prefer to issue equity when stock market conditions are favourable and issue debt when the stock market condition are unfavourable. Graham and Harvey (2001) state that most CFOs agreed that the prior movement of stock price and the awareness of under- or over-valuation of firms' stock have a crucial impact on their financing decision about external funding.

Regarding the nature of capital structure changes and whether these changes are permanent, Baker and Wurgler (2002) argue that trade off theory state that these changes are temporary and firms revert to the long term optimal capital structure over time while the pecking order or the market timing theories do not have a similar implication.

The previous part of this chapter has reviewed capital structure theories starting from Modigliani and Miller (1958) who first argued the relationship between the financing policy and the value of firm. Since then, many papers have tried to expand Modigliani and Miller (1958) theory by relaxing their assumptions. Researchers have employed the capital structure's theories (trade-off, asymmetric information theory, agency costs, and market timing) to explain variation in leverage across firms. All capital structure theories state that firms choose their leverage level based on the balancing of the debt's benefits and costs. Although the above capital structure theories have some overlapping implications, they provide useful predictions to explain observed capital structure choices.

3.3.3. The regulatory status and capital structure of REITs

Based on the above capital structure theories, the REITs' capital structure from the perspective of REIT regulatory nature will be explained.

As mentioned in the second chapter, REITs have a unique regulatory status so that most capital structure literature has ignored them. Due to the potential effects of leverage on REITs' implied cost of equity capital, this part of the thesis will investigate the REITs' capital structure and cost of equity capital in light of previous theories.

UK-REITs do not pay corporate taxes if they meet some conditions such as distributing 90% of their taxable income as dividends. This condition invalidates two significant benefits of debt financing, the interest tax deductibility (no tax shield), and if debt levels are reduced consequently, then the effect of debt servicing in reducing free cash flow' and related agency cost will be limited. According to the trade off theory, REITs should have little debt in their capital structure. The only potential restriction for 100% equity capital is that asymmetric information between shareholders and managers will cause valuation discounts. As a summary and according to the trade off theory, the REITs' optimal capital will contain relatively low debt's level (Feng, Ghosh and Sirmans, 2003).

Practically, REITs suffer severely from the information asymmetry because the underlying asset transparency is imperfect. For example, to analyse a REIT's assets an analysts will

require specialist knowledge about the economic trends locally, comparable properties and complex funding arrangements. This knowledge is not always available to REITs' shareholders; it is particularly difficult to assess the property transactions' fair market values due to the heterogeneous illiquid nature of the properties. The REIT information asymmetry problem will grew with the restrictions on their income sources and investment options. For example, UK REITs must earn (75%) of their income from real estate activities and US REITs must keep their acquisitions and combinations in the real estate sector. (Campbell, Graham and Harvey 2001)

"The REITs' regulations will make managers less vulnerable to the discipline of the takeover market, and render the board weak. Weak monitoring allows opportunistic managers to reveal less information" (Feng, Ghosh, and Sirmans, 2003, p10).

Based on this case, Feng Ghosh, and Sirmans (2003) predict that REITs will finance their investment using internal sources first and if they need more capital they will use debt before issuing equity. This conclusion is consistent with the pecking order theory by Myers (1984) and suggests the there is a negative long term relationship between debt levels and market to book value ratio.

REITs have relatively low level of free cash and retained earnings due to the high payout requirement (95% in UK) so they have to rely on debt in their financial policy more.

To explain the conflicts between issuing equity despite the high potential adverse selection costs in REITs, Baker and Wurgler (2003) argue that the adverse selection costs vary over time and across firms and industries so the managers will try to benefit the investment opportunities by issuing equity at a favourable time. They note that some opportunities for timing equity issues may arise as result of irrational investors' bids which abnormally increase REIT share prices to high levels. Based on above reasons for REITs, the low adverse selection costs opportunities are not relatively frequent. However, they find that the conclusion of the market timing theory, a long term negative (positive) relationship between the ratio of market to book value and debt's level(equity issues), is suspicious for REITs.

By following REITs' IPOs, Feng, Ghosh, and Sirmans (2003) analyse REITs' financing policy to investigate how REITs' capital structure is affected by their regulatory provisions in the process of attracting investment capital. Their data does not provide any sign of

regression to a long term optimal capital structure i.e. trade off theory. They note that there is positive relationship between the REITs' market to book ratio and leverage ratio. In contrast to the financing decisions of non regulated firms, they find that REITs with high market valuation and high growth opportunity issue debt to finance their investments. To explain this conflict, they state that this conflict is due to REITs special regulatory environment. More specifically, although REITs can not obtain any tax benefits from debt financing it is preferred rather than equity to raise funds due to the high information asymmetry induced adverse selection costs compared to the potential financial distress costs (Feng, Ghosh, and Sirmans, 2003).

Based on the above literature, it can be concluded that the REITs' tax status deprives them from obtaining the tax benefits of debt financing. The strict legal requirement for REITs status such as the high payout distribution reduces the free cash flow's agency cost but this restriction will force REITs to rely on external funding sources to finance their capital. This reliance on external funding with the information asymmetry problem (shareholder & manager) will make the market valuation unknown. A REIT's shareholders will not be able to monitor the managers' activities due to the nature of property assets (illiquid and less transparent). The restriction on the sources of earnings (75% of UK REITs' earnings must arise from rental activities) will make the information asymmetry problem worse.

Finally, the ownership limits restriction (less than 10% in UK) will not encourage institutional investors or other large investors to take over a REIT requiring managers to disclose full REIT information. As a result, agency costs will exist and any equity issue will be discounted by the market because the opportunities to sell equity are rare, according to market timing theory. Based on this argument REITs will prefer debt financing rather than equity and the pecking order theory rather than the market timing theory.

For the UK, Bond and Scott (2006) have examined the trade-off and pecking order theories on a sample of 18 UK listed real estate firms over the period 1998-2004. Their results can be summarized as follows: when the property firms need external funds, debt will be the most likely source; the pecking order theory dominates the trade-off theory. They note in contrast to previous papers the pecking order performs best among small firms, not subject to large information asymmetries and also find that property firms higher leverage than other types of industrial firm. As a summary, they conclude that real estate financing belong to the capital

structure framework in which information asymmetries are the engine of the firms' financing behaviour.

To investigate the determinants of capital structure in 308 UK real estate companies over the period 1998-2004, Westgaard et al (2008) used panel data regression on both the trade-off and the pecking order theories. Their results show that there are a number of significant factors affecting the UK real estate firms' capital structure. These factors are the profitability, tangibility, and firm size which are positively related to leverage, while earnings variability is negatively related. They attribute the significant positive relation of profitability, which is inconsistent with the capital structure literature, in both the trade-off and the pecking order theories to the large adjustment costs in UK real estate industry. Table (3.1) summarizes the theories of capital structure and REITs.

Table (3.1) Theories of capital structure and REITs

Theory	Impact Variables	Debt and M/B ratio	UK-REITs' Regulation
Trade-off: The (long term) optimal capital structure will be obtained by trading off the benefits of debt financing against the financing costs.	-The interests' Tax-deductibility (Bankruptcy costs) will encourage having high (low) debt levels. -The interest payments will reduce free cash flow, and mitigate agency costs. A high debt levels will induce shareholder value-maximizing managers to reject profitable investments to avoid transferring their wealth to debt-holders.	Firms with high M/B ratio have low free cash flow and tend to be risky. As a result, high M/B firms rely on low debt ratios to avoid financial crisis in a downturn. The long term optimal capital structure can be obtained by adjusting capital structure to changes in M/B ratio. So, there is no long term relationship between M/B and capital structure.	UK REITs are exempt from corporate taxes if 95% of their earnings are distributed as dividends this rule will decrease their free cash flow. Loss of tax-deductibility and low free cash flow will lead to low debt ratios. *Conclusion: Trade-off theory predicts low debt ratio for all UK-REITs, regardless of their M/B ratios. The long term adjustment to optimal capital structure holds.*
Pecking Order: Management relies on issuing debt to avoid the potential valuation discount associated with equity issues. This theory predicts a positive relation between M/B ratio and debt ratio, but, without determining long-term optimal capital structure.	- The Information asymmetry between shareholders and managers implies preference for debt over equity.	Firms with high M/B require investment capital. They will issue debt to avoid issuing discounted equity. As a result, They will have high debt ratios. Alternatively, firms with high M/B rely on low debt ratios to create slack such that they can avoid issuing equity if and when they need funds in the future. This strategy requires having high free cash flow and retained earnings.	Due to the difficulties in evaluating the real estate assets, the UK-REITs will prefer to fund their investment using debt, or retained earnings. The 95% payout restriction will result a low free cash flow in REITs. In conjunction with discount on equity issues due to information asymmetry and adverse selection, low free cash flow implies REITs should issue debt to raise funds. *Conclusion: Low free cash flow and the evaluation's difficulties for REITs' assets and investments will lead to high debt ratios.*
Market Timing: Managers issue equity capital when its cost is low. This theory predicts a negative relation between M/B and debt ratio, but there is no optimal capital	- The Information symmetry between shareholders and managers will lead to adverse selection costs in equity issues. These costs vary across time and across firms. The extremely high	If high M/B ratio means low adverse selection cost, then managers can take advantage of high M/B ratio to time equity issues. Extreme value of M/B refers to extreme investor expectations. These extreme valuations can be exploited	UK-REITs must earn 75% of their earnings from real estate activities. As a result, their investment options will also be restricted mainly to real estate sector. Finally, no single shareholder can own more than 10% of the REITs' equity. Restricting operations to the

structure.	expectations by irrational investors periodically cause *equity to be mis-priced* rendering cost of equity abnormally low.	by managers through issuing equity when M/B ratios are high.	same sector denies managers the opportunity to get inter industry experience which shrinks their job market. This induces managers to collude against hostile takeovers. Ownership restriction (10% shareholding) will reduce the ability of shareholders to monitor and will allow managers to withhold or conceal material information. *Conclusion: Opportunities to time equity issuance are relatively scarce.*

3.4 Investor and corporate taxes, capital structure and the cost of equity capital

3.4.1 Introduction

As mentioned in first part of this chapter, the impact of corporation and personal taxes on firm's future earnings and capital structure has been investigated by Modigliani and Miller (1963) and Miller (1977). They expand their previous proposition, capital structure irrelevancy by considering the impact of corporate taxes on the firm's value. Miller (1977) introduced the impact of personal taxes into the analysis. Based on the above influential papers, a long stream of studies has investigated the taxes' effects on firms' capital structure and cost of equity capital.

In this part of the thesis, the taxation effects will be explained by highlighting the influence of corporate (firm level) and on personal (investor level) taxes on capital structure and cost of equity capital.

3.4.2 Corporate taxes and capital structure

Modigliani and Miller (1963) show that firm value can be calculated as the sum of the discounted expected net future cash flows. The net future cash flows consists of two parts, the pure investment related net future earnings i.e. net future earnings for an equivalent unlevered firm and the pure debt related net future earnings i.e. the debt tax shield. In other words, there is positive relationship between a firm's value and the level of debt employed in its capital structure. Based on their results in perfectly competitive markets with taxes, a firm's optimal capital structure will be at 100% debt. This level of capital structure is not supported in the real practical world, firms' capital structures do not consist of 100% debt.

Modigliani and Miller (1963) amazing conclusion about the relationship between capital structure, firm value, and corporation tax has paved the way for more research on the factors which determine optimal capital structure and the relationship between the capital structure and firm's value.

The potential impact of taxation on firm value and its financial policy has been investigated by Patterson (1985). He defines the levered firm's value as the value of the equivalent un-levered firm plus the risk adjusted, present value of the tax shield associated with using the debt. His model indicated that the optimal level of debt is a function of the corporate tax rate and operating risk. He concludes that there is a negative relationship between firm value and debt level. As result, Patterson (1985) indicated that the tax effect on leverage depends on the size of the expected leverage and operating risk. Based on his results, he states that the optimal level of debt is zero. These results are not supported in practice because firms use debt in their capital structure despite the prediction that the value maximising level of debt is zero. To explain this conflict, Patterson argues that this conflict may be due to misspecification in measuring variables, sample bias, and/or there are other management aims rather than value maximisation.

Mayer (1986) investigates the role of corporate tax relief exhaustion in determining a firm's optimal financing and investment decisions. He argues that increasing the firm's deductible activities to get low taxable income will reduce its effective corporate tax rate but will increase the bankruptcy costs. He constructs a stochastic model to establish the effective marginal tax rate in the presence of tax losses carried forward. This model takes into account the investors' tax characteristics and the determinants of the demand for funds. He shows that the optimal capital structure can exist and the cost of capital is very sensitive to the firm's current taxable earnings. As a summary, the firm's optimal capital structure is determined by the trade off between the tax advantages and bankruptcy risks associated with debt.

In a subsequent study, MacKie-Mason (1990) showed that corporate tax significantly affects a firm's financing choice between debt and equity. To explain the relationship between tax shields and debt policy, two features of the US Corporate Tax attributes, tax loss carry forward and investment tax credit, have been employed using a sample of US firms. Their argument is based on the significance of tax shields' effect on the marginal tax rate on the interest deductions. They conclude that tax loss carry forwards effect is larger than investment tax credit on the expected marginal tax rate on interest payments. Each dollar of tax loss carry forward shields a dollar of interest deductions from tax. Regarding the investment tax credit, they conclude that it does not have significant effect on marginal tax rates because there are firms that have high investment tax credits and which are quite profitable. They conclude that the above two tax shields have different predicted effects on

the firm's financing policy. In summary, they support the hypothesis which states that firms' debt finance desirability at the margin increases with firms' effective marginal tax rate on deductible interest payments.

Givoly et al (1992) investigate the corporate tax effects on capital structure using the US Corporate Tax Reform Act (1986). By employing a cross sectional regression, they provide evidence which supports the tax theories of capital structure. More specifically, their results show the significant role of the corporate taxes and non-debt tax shields in determining a firm's capital structure. They find that personal income taxes have an impact in financing policy. These results are consistent with Miller (1977) and Mayer (1986).

In a subsequent study, Shum (1996) investigated the tax impact on financing policy using methodology similar to Givoly et al (1992). Using Canadian data, she investigated the asymmetric corporate taxes' implications on a firm's financing policy. She used the Canadian tax provision which allows the carrying of loss backward and forwards. In summary, Shum (1996) empirical results confirmed the significant effect of corporate taxes on the firm's financing policy.

Graham (1996a) investigated the relationship between incremental debt and the simulated firms' marginal tax rate predicting that this relation was positive. The marginal tax rate was calculated using a model which integrated the tax deduction effects and tax credits. By using incremental debt financing decisions, he constructed a model to capture the relationship between debt and taxes. Using the large sample of US firm data, his empirical results indicate that firms which have a high marginal tax rate have more incentives to issue debt, relative to the firms with low marginal tax rate. As a result, there is positive relationship between the marginal tax rate and debt financing. His empirical results also refer to the significant variation in marginal tax rates across firms, industries, and time. Graham's results regarding firms with net operating losses show that firms do not respond as much to the debt tax incentive when they have net operating loss carry forwards relative to when they do not.

Graham (1996b) analysed and compared popular corporate marginal tax rate proxies. Based on the marginal tax rate definition as the present value of current and predicted future tax paid on each additional income unit earned today, Graham (1996b) estimated ten proxies for corporate marginal tax rate. Then he estimated the perfect foresight marginal

tax rate which defined as the marginal tax rate when taxable income for the next 15 years is known with certainty (Graham, 1996b).

To evaluate the proxies' predictive ability, Graham ran a series of regressions to measure how well the estimated perfect foresight marginal tax rate is predicted by these proxies. His results indicate that the simulated marginal tax rate is the best corporate marginal tax rate proxy. If the simulated marginal tax rate is not available it can be relied on other proxies such as trichotomous variable, statutory marginal tax rate, and taxable income variable. The trichotomous variable can be defined as:

"the trichotomous variable equal to, i) the top 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". (Graham, 1996b, pp199)

The statutory marginal tax rate can be obtained by applying the statutory tax rate on contemporary taxable income. Finally, the taxable income variable can be defined as a dummy variable which is equal to one if taxable income is positive and zero otherwise (Graham, 1996b). Graham (1996b) also investigated whether non-simulated proxies give any additional information but his results indicate that these proxies provide very little incremental information. To determine the best proxies with regard to their incremental information, he regressed the perfect foresight rate on all nine proxies altogether, except the simulated rate. His findings indicate that most proxies give some information but the overall fit, using the nine proxies altogether, has improved only by less than one per cent compared with the regression which used just the simulated rate. Finally, Graham concludes that the simulated tax rate is the best marginal tax rate proxy.

Consistent with this result, Graham, Lemmon, and Schallheim (1998) rely on taxable income before (after) considering the financing costs to develop a simulated marginal tax rate. The aim of this (before) tax rate is to estimate the potential tax benefit of debt as if the firm had no debt. They find that leverage is positively (negatively) related to the simulated marginal tax rate before (after) financing. They argue that the before financing estimate is more likely to capture the tax benefit from the firm's existing debt.

Fama and French (1998) investigated the relationship between firm value, dividend tax, and debt by using cross-sectional regressions after controlling for firm profitability. Their

model introduced taxes as an important factor affecting firms' financing policy. Similarly to Modigliani and Miller (1963), they assumed that firm market value is equal to the market value of un-levered no-dividend firm with the same pre-tax net cash flows plus the value of tax effects with respect to expected dividend and interest payments. Inconsistent with the literature, their results indicate that a negative (positive) relationship between leverage (dividend tax) and firm value. In agreement with Miller (1977) who argued that the personal tax disadvantages of debt offsets its corporate tax advantage, Fama and French rely on this analysis to interpret the sign of the debt coefficient. In light of the potential relationship between debt and other control variables, they considered that this negative relationship between leverage and firm value is due to a proxy effect. More specifically, Fama and French consider that the negative slope on the leverage variable can be attributed to the imperfect control for profitability information associated with debt. After controlling for the potential profitability effects, the relationship between leverage and firm value was tested again but the results also showed the same negative relationship and no sign of any net tax benefit to debt. In summary, Fama and French concluded that dividends and debt convey information about profitability missed by a wide range of control variables. This information about the profitability hides the tax effects of financing decisions.

In summary, all of above studies suggest there is a positive association between marginal tax rates and debt financing policy. These results suggest that firms will use debt as long as they expect to generate profits high enough to utilise debt tax shields. Based on this result, it can be concluded that the optimal capital structure should be a high debt level. In practice, firms' debt level is far less than one. This contradiction between theory and practice is due to many reasons such as personal tax on the debt income. Personal tax affects debts' marginal prices and consequently the amount of issued debt. As a result, firms' management should analyse the debt-holders' tax position when considering debt policy decisions. In the next part a summary of some studies that consider the impact of personal tax on debt financing will be highlighted.

3.4.3 Personal income taxes and capital structure

By introducing the investor tax effects on share prices and firm value, Miller (1977) paved the way for many studies which investigate the relationship between share prices, cost of equity capital and investor level taxes (dividend and capital gain taxes). After more than three decades since Miller (1977), researchers in this area do not have a consensus opinion about this potential effect. These studies test the hypothesis that share prices capitalise investor level taxes on dividends. If share prices incorporate dividend taxes, then the investor level taxes will affect the firm's cost of equity capital.

To show the personal tax disadvantage of early dividend payments, Masulis and Trueman (1988) introduced differential personal tax rates. They design their model under the assumption of perfectly competitive capital market conditions. Then they assume two kinds of securities: tax-exempt pure discount municipal bonds and un-levered firm equity with its dividends distributions taxable at the marginal personal income tax rate.

Their results indicate that investors whose incomes are not subject to the marginal personal tax rate tend to hold either municipal bonds or equity shares based on the comparison between their personal tax rate and the marginal tax rate. The investors with lower (higher) personal tax rate rather than the marginal tax rate will hold equity (municipal bonds). While holding municipal bonds and/or equity will not make any difference for the marginal investors. They also show that the investors in higher tax brackets will benefit from dividend deferral, and their rate of return required for project acceptance will be lower under internal financing than under external financing. They conclude that firms' investment decisions will depend in part on the source of finance.

Masulis and Trueman (1988) state that shareholders will unanimously support the external fund for new investments as long as these investments increase their wealth (add value). This unanimous on the external fund criterion may not be available on the firm's investment criterion under internal fund due to the dispersion of shareholders' tax brackets. In summary, shareholders' tax position should be considered by managers in choosing a firm's financing policy. This means that the firm's capital structure will be affected by both corporate and personal income tax structures.

One of the earliest studies to analyse the association between REIT capital structure and value was Howe and Shilling (1988). They investigate the impact of new REITs security offerings' announcements on their stock price. Based on the fact that REITs do not pay corporation taxes, they state that the net tax gain associated with debt is clearly negative for a REIT, under the trade off theory. This negative reaction to debt issues is consistent with the pecking order theory which state the issuing equity (debt) will convey a negative (positive) signal that firm is over (under) valued and does not have enough free cash flows (that it able to earn sufficient profits to repay its debt and interests). Papers such as Mikkelson and Partch (1986), and Eckbo (1986) find that firms issuing debt will be faced with non-positive to significantly negative reactions. Contrary to these studies, Howe and Shilling (1988) find that the share price reactions to issuing debt (equity) were positive (negative). These results were interpreted as weak support for the signalling theory.

Poterba (1989) states that changes in expected personal tax rates will affect the yield spread between long-term taxable and tax-exempt bonds. To examine this affect, he estimated a marginal investor's tax rate proxy. He argued this proxy exploits the pre tax yields on differentially taxed assets of equivalent risk to identify the implicit tax rate on interest income for the marginal investor. His results show that this proxy includes a significant error due to its sensitivity to the studied period where the tax rate was volatile during one decade from 34.1%, with a standard deviation of 2.5%, to 17.1%, with a standard deviation of 9.2%.[48]

Graham (1999) investigates the magnitude by which the personal taxes' disadvantages offset the benefits of issuing debt. The implication of this offset is that a tax-induced, firm-specific optimal capital structure should not exist. Graham (1999) focuses on the personal taxes' effects on making the firm's financial decisions. His results show that the personal tax burden on interest income is relatively higher than burden on equity income due to capital gains which have favourable tax treatment (lower tax rate), and shareholders may avoid pay tax on their equity income if their dividends have been retained.

After controlling for the personal taxes' impact, he utilizes cross-sectional regressions and finds that there is positive relationship between the debt usage and tax rates. These results

[48] As a result and to avoid the sensitivity limitation in the Poterba (1989) measure, the thesis will assume that the marginal investor in a firm's debt is a fully taxable individual and set (Td) equal to the top marginal tax rate on ordinary income which is 40% in the UK.

reflect the strong tax impact on firm's capital structure but this impact is affected by the proper estimation of simulated marginal tax rates and a careful adjustment for personal tax penalty. This strong impact on the capital structure has been detected when he employ the firm-specific data to the personal tax penalty (such as dividend pay-out ratio). Also the results show that firms with high tax rate have higher debt to equity ratio than firms which have lower tax rate. Graham (1999) provides evidence against Miller's (1977) conclusion (no tax-induced optimal capital structure). The implication of Graham's (1999) results reflects the importance of adjusting for marginal personal tax rates in analysing the corporate tax's effects on firm's financial policy.

3.4.3.1. Dividend and capital gains taxes and implied cost of equity capital

A series of researchers investigated the impact of dividend tax on share prices by testing the dividend tax capitalisation hypothesis. The importance of this research arises from it identifying the determinates of firms' cost of equity capital. The dividend tax impact on the share prices will also be reflected in the firm's cost of equity capital. To study the relationship between firms' cost of equity capital and the investor level taxes, this thesis will divide the studies into two sets based on the method used to calculate the cost of equity capital. Both sets are consistent in terms of the positive impact of the dividend taxes on required returns and this impact is decreasing in institutional ownership.

The first set of papers has used realised ex post returns as a proxy for the required return while the second set estimates an ex ante measure. The first examines the association between ex post returns and dividend yield by testing whether high dividend tax rate, comparing with capital gain tax rates, will cause an increase in shareholders' required rate of return.

These studies such as Litzenberger and Ramaswamy (1979, 1980, and 1982) find that a firm's return is positively related to the dividend yield. Their results support the dividend tax capitalisation hypothesis. However, Black and Scholes (1974) did not detect this relationship between return and dividend yield. Miller and Scholes (1982) and Blume (1980) examined methodological issues which could explain these early studies' results. These methodological concerns have been addressed by Naranjo, Nimalendran and Ryngaert (1998), Ayers, Cloyd and Robinson (2002), and Dhaliwal, Li and Trezevant (2003). Their evidence is consistent with the dividend tax capitalisation hypothesis.

Dhaliwal, Li and Trezevant (2003) investigate whether the dividend tax penalty can be capitalized into the shares' prices. They defined the dividend tax penalty as the potential tax burden on dividends due to the difference in tax rates between dividend income and capital gains. The theory is that this dividend tax penalty will increase the cost of equity capital. Based on Fama and French's (1998) paper, they employed firms' dividend yield as a proxy to capture the tax penalty in conjunction with the level of institutional firm ownership. This level is a proxy for the marginal investor's tax status, low-tax or high-tax investor. The size of this dividend tax penalty is a function of the firm's dividend policy and its ownership structure. Their sample includes about 21,000 US firms during the period from 1989 to 1998. They conclude that firms' dividend yield has a positive impact on its common stock return (return premium) which is decreasing with higher levels of institutional and corporate ownership. These findings are consistent with the dividend tax penalty being integrated into the share return. In summary, these papers support the hypothesis that dividend tax penalty is capitalized into shares prices.

The main critique of the above studies is that all of them have employed realised returns to examine dividend tax on stock returns because ex ante required returns were not readily available. Accounting and finance researchers have developed new methods to estimate the ex ante required return/implied cost of equity capital. For instance, Botosan (1997), Botosan and Plumlee (2002), Gebhardt, Lee, and Swaminathan (2001) (hereafter GLS), Claus and Thomas (2001) (hereafter CT), and Gode and Mohanram (2003) (hereafter GM) have employed various versions of the dividend discount model and the residual income model to estimate the implied cost of capital. These papers will be studied in detail in the next chapter. Based on the above developments in the implied cost of capital's estimation methods, the second set of papers has been introduced to test the effect of dividend taxes on share price, cost of capital and firm value.

Dhaliwal, et al. (2005) investigated the dividend tax effect on firms' implied cost of equity capital. They examined this effect by estimating firms' implied cost of equity capital using an ex-ante approach as first step. In the second step, the relationship between the firms' implied cost of equity capital and a measure of the tax-penalised portion of dividend yield was investigated to test for dividend tax capitalisation hypothesis. The results of Fama and French (1997), Claus and Thomas (2001) (CT), Gode and Mohanram (2001) (GM), and Gebhardt, Lee and Swaminathan (2001) show that using historical ex post returns to

estimate implied cost of equity capital produce imprecise risk estimates. For example, Gebhardt, Lee and Swaminathan (2001) (GLS) find that the average annual risk premium using ex post returns and ex ante from 1979 to 1995 was 6.2% and 2%–3% respectively. Because of this large difference between the ex ante and ex post risk premium measures and because the ex ante required return is more relevant to the theoretical literature which tests dividend tax capitalisation. Based on these ex ante advantages, Dhaliwal et al. (2005) followed the GLS, CT and GM methodology in estimating the implied cost of equity capital. Theoretically, there is a positive relation between dividend tax rates and the required return. At the same time, there is a negative relation between the required return and the dividend information or signalling content. They investigated the association between the implied cost of equity capital and the tax-penalised portion of dividend yield as a device to isolate the dividend tax effects.

Based on Poterba and Summers (1985), they define the dividend yield tax penalized portion as the product of dividend yield and tax rates on dividends and capital gains across five time periods. After testing the above relation between the cost of equity capital and the tax-penalised portion of dividend yield, they tested whether this relation varied with cross-sectional differences in investor tax attributes. Their argument is based on the notion that institutional investors have relatively favourable tax treatment on their dividends (Dhaliwal et al., 2003). Based on this notion, they investigate whether the effect of the tax-penalised portion of dividend yield on the cost of equity capital is decreasing in institutional ownership. Their results supported the dividend tax capitalisation hypothesis. More specifically, a positive relationship between firm implied cost of equity capital and the tax-penalised portion of dividend yield was detected for all implied cost of equity capital estimation models. This relationship decreases in total institutional ownership.

Gentry et al. (2003) investigate dividend tax impact on the US REIT share prices. This potential effect was tested by employing REITs' institutional characteristics which help in avoiding some of the limitations of previous empirical studies. They choose the following REIT characteristics: dividend policy, this policy is specified by regulation; share repurchases, which do not provide any tax advantages compared with dividends; the market value of REITs' assets; and REIT tax status. Their results indicated that REIT value is positively affected by their assets' tax basis. These results support the hypothesis which suggests that investors will capitalize their future dividend taxes into their share prices.

Hodgkinson et al. (2006) investigated the response of UK tax-exempt investors to the changes in the UK dividends tax legalisation (1997) for repayment of tax credits on dividends. In particular, they highlight the trade off between the availability of dividend tax credit repayments and transaction costs. Their study examined the UK tax-exempt shareholder sector which assisted in determining the tax status of UK marginal shareholder. They find that the change in the UK dividend tax legalisation was associated with changes in UK tax-exempt shareholders' investment strategies. Their results show that tax exempt investors' transaction costs are significant when compared with the reduction in the potential tax benefits of holding shares of high dividend tax credit firms. Consequently, tax exempt investors sought to maximise after tax returns rather than tax benefits.

3.5. Non-debt tax shields, capital structure, and the cost of equity capital

It can be noted that the above papers did not consider in detail the impact of non-debt tax shields on optimal capital structure. So it will be useful to highlight this effect. Miller's (1977) framework has been extended by DeAngelo and Masulis (1980a) to include the effect of non-debt tax deductions on debt equilibrium levels. They assert that the debt equilibrium levels can be measured if realistic assumptions about the corporate tax structure are made. They show that the debt tax shield can be substituted by positive non-debt corporate tax shields. Consequently the relative debt and equity market prices will adjust until reaching the debt equilibrium level for each firm. This optimal debt equilibrium will exist due to debt's expected marginal personal tax disadvantage while positive tax shield substitutes mean that the expected marginal tax benefits are negatively related to the level of debt.

DeAngelo and Masulis' (1980a) conclusion about the interior equilibrium is based on assumption that investment level is constant. The relationship between the investment levels and the debt level has been ignored. This assumption will not hold if the firms have desired investment levels where they will borrow or issue new equity to raise funds to finance this level. A large portion of the non-debt tax shield is the depreciation which is a function of the investment level and this affects the optimal debt level. As a result, the debt corporate tax shield is not totally offset by personal tax disadvantage due to the presence of non-debt tax shields. However, they could not estimate the benefit of non-debt tax shield. They concluded that in equilibrium, the firm should equate the expected tax benefit of an additional dollar of debt with the expected tax cost to its investors.

In his study to measure the tax shield value, Fernandez (2002) showed that the difference in firm value due to debt issuance is not the debt tax shields' present value but the difference between the present value of the unlevered firm's taxes and the present value of the levered firm's taxes. He defines the present value of the levered firm's taxes as the present values of two separate cash flows each with their own risk. After addressing the tax riskiness for the levered and unlevered firms, he shows that in perpetuity, the required return to tax in the unlevered (levered) firm is equal to the required return to equity in the unlevered (levered) firm. He shows that the tax shield value is the present value of the product of multiplying the debt, the tax rate and the required return on unlevered equity; all

discounted at the unlevered cost of equity minus the growth rate. If the growth rate is constant in perpetuity then the tax shield value is equal to the debt value multiplied by the tax rate. If it is not constant, growing perpetuity, the tax shield's value will be lower than the value which is suggested by Myers (1974) and Modigliani and Miller (1963).

Fernandez (2002) concludes that the available literature's methods to measure the tax shields' value may produce inconsistent results. In the case of a growing perpetuity for example, using the cost of debt to discount tax shields, such as by Myers (1974) and Brealey and Myers (2000) or using the risk-free rate, as in Modigliani and Miller (1963) may produce lower cost of equity estimations for levered firms relative to the unlevered firms. Alternatively, using the required return to unlevered equity to discount tax shields as by Harris and Pringle (1985) and Ruback (2002)) may result in tax shield values that are too low.

In an analysis of UK firms, Bennett and Donnelly (1993) examined 433 firms over the period from 1981 to 1984. Their analysed six explanatory variables: non-debt tax shields, size, profitability, growth, earnings volatility and assets structure and three leverage variables: total debt, short-term debt and long-term debt. Their results show that there is positive (negative) relationship between the total debt ratio and earnings volatility, size and assets structure and importantly, non-debt tax shields, and profitability. Their results also show that some differences are detected when the debt's sub-components have been employed.

In a subsequent similar UK study, Ozkan (2001) investigates the impact of five explanatory variables; non debt tax shields, size, growth, liquidity and profitability on leverage ratios. Importantly, he finds that there is negative relationship between the leverage ratio and non-debt tax shields and also with growth, liquidity, and profitability while a positive relationship between firm size and leverage ratios has been detected.

3.6. Conclusion

The firm's capital structure is considered as a puzzle because there is no one specific theory which explains why firms use debt financing and what determines the optimal size of this debt in firms' capital structure. A firm's capital structure can be defined as the way which is used to fund the firm's assets through equity, debt, hybrid securities, or some combination of two (all) of them.

Modigliani and Miller theories (1958, 1963, and Miller 1977) paved the way for the capital structure theories to be created. Under specific assumptions, Modigliani and Miller (1958) show that firm's capital structure is irrelevant for successful operating in the competitive efficient capital markets and for its financing decisions. Capital structure theories after Modigliani and Miller (1958) have tried to prove how capital structure is relevant by relaxing the Modigliani and Miller (1958) assumptions.

Under an assumption of certainty, Modigliani and Miller argue that a firm will invest until its marginal yield will be equal to its marginal cost of bonds (interest). In this case the maximization of firm's profits and market value will be the criterion of the rational decision maker and the cost of capital will be equal to the cost of debt. In a world of uncertainty, researchers attempt to consider the uncertainty by either subtracting a risk discount from the expected yield or adding risk premium to the market rate of interest. In this case the comparison between the risks, adjusted yield, and the market rate of interest will be the criterion of the rational decision. In Modigliani and Miller (1963) and Miller (1977) they went a step further by introducing the tax effect on capital structure and cost of capital. They show that if interest is deductible and dividends are not, then the firm's optimal capital structure will be 100% debt. Miller (1977) considered the effect of personal taxes to the leverage controversy. Miller predicted that when interest is taxed at the investor level more highly than share income, either dividend or capital gain, this will cause debt holders to demand a higher pre tax rate of return in compensation. In equilibrium this required premium will offset the firm level tax deduction on interest and therefore the value of the firm will not be affected from a tax perspective by the level of debt.

Chapter Three: Capital Structure, COEC, and Taxes

Modigliani and Miller (1958) assume that there are no taxes, transaction costs, information asymmetry, and bankruptcy costs. Accordingly, there is no optimal capital structure. After that, many researchers have relaxed the MM assumptions.

Consequently, capital structure researchers have tried to understand how firms choose their capital structure, and whether there is an optimal capital structure. These efforts produce the following theories in real world: the existence of taxes and bankruptcy costs will make the debt relevant (trade-off theory); the existence of asymmetric information between managers and investors will provide a signalling opportunity (asymmetric information theory); and the confliction between various parties involved will affect the mix of debt and equity in the firm's capital structure (agency cost theory).

As mentioned in the second chapter, REITs have a unique regulatory status so that most capital structure literature has ignored them. Due to the potential effects of leverage on REITs' implied cost of equity capital (the core of the thesis), the REITs' capital structure and cost of equity capital have been investigated in light of previous theories. Feng, Ghosh and Sirmans (2003) predict that REITs will finance their investment using internal sources first and if they need more capital they will use debt before issuing equity. This conclusion is consistent with the pecking order theory by Myers (1984).

The various components of capital structure faced by various types of risks each component will require a different expected rate of return to provide the firm with necessary funds. This required rate of return can be defined as the investor's opportunity cost of investing his scarce resources elsewhere in opportunities with same risk class. To understand the cost of capital, it is critical to recognize the fact that shareholders will decide whether to accept or reject new projects. Their criterion is based on the fact that the projects should increase their expected utility of wealth on a risk-adjusted basis (Vernimmen *et al.* 2005). Understanding firms' capital structure and the factors which affect them will be crucial to estimating their cost of equity capital in this thesis.

The literature shows that there is a corporate tax advantage of debt and its size depends on both the personal and corporation tax system. Also that non-debt tax shields, especially those related to investments levels, affect debt levels and reduce the effect of personal tax disadvantage and reduce the cost of equity capital. The cost of equity capital is an important factor in the firm valuation process and it can be calculated in using many ways

and between realised or forecasted data. The consequences of using these different approaches and data in estimating the cost of equity capital will be discussed in detail in the next chapter.

Chapter Four

Estimating the implied cost of equity capital (ICEC) for REITs

Chapter Four: Estimating the implied cost of equity capital (ICEC) for REITs

4.1 Introduction

The main objective of this chapter is to explain and analyse the various approaches that can be used to estimate the cost of equity capital for Real Estate Investment Trusts (REITs) effectively.

It is known that there is an opportunity cost for firm's capital, the firm's cost of capital. This opportunity cost is equal to the return which can be earned from an alternative investment at the similar level of risk. To meet the expectations of its capital providers, the firm should use the cost of capital to evaluate the feasibility of its new investments or projects. The cost of capital can be defined as the minimum rate of return which the firm can earn on its existing assets and still meets its capital providers' expectations.

As explained in Chapter three, a firm's capital structure refers to the mixture of long-term debt, preferred equity and common equity. A firm's capital structure can be more complex if its capital comprises of other subcategories such as warrants or options. Each component of a firm's capital structure has its own specific cost, which depends mainly on its respective risk level.

In practice, determining a firm's cost of debt or preferred equity is relatively straightforward because issuing debt or preferred stock means that there is a specified stream of future payments which are contractually due to the holder of the security. In this case, the market rates for bonds and preferred stock of a similar risk level can be relatively easily identified in the market. If the promised future payments and the current market price of a security become available, the calculation of the expected return to debt or preferred equity holders will be relatively easy. The calculation of the expected return for common equity is much more complex. Before explaining the estimation of cost of equity capital, an important distinction must be made between historical costs of equity, i.e. ex post and expected cost of equity i.e. ex ante. The ex post measure is based on a comparison of share price performance and dividends verses the long-term risk-free rate. The ex ante rate is calculated by estimating the future equity related cash flows of the company and then solving for the discount rate that equates the present value of those cash flows with

the current share price. The return on common equity can be divided into two components; dividends, and changes in market value, i.e. capital gains or losses.

The expected return cannot be directly observed, so that current and historical market (book) data must be employed to estimate the cost of capital. Historically, there are two approaches which have been employed to estimate a firm's ex ante cost of equity capital:

(1) Models which attempt to measure the cost of equity as a premium over some observable market rate (Benchmark Approach), and

(2) Discounted cash flow model such as the Gordon Growth Model and other models (Present Value Approach).

This chapter will be structured in the same way. The first part will discuss Benchmark Approaches which recognize that the cost of equity should be related to a benchmark return in the capital markets. Although that these approaches are relatively easily employed by measuring the cost of equity as the sum of the current risk free rate and the equity risk premium, plus or minus subjective company specific risk adjustment(s) but these approaches do not supply guidance about the magnitude or degree of the difference between a firm's cost of equity and the benchmark rate, this point will be discussed later. The second part will highlight the Present Value Approaches which estimate the cost of equity capital as the rate that equates the current price with the present value of future cash flows. These approaches avoid the assumption that the past premiums will be replicated in the future but they are generally criticised in that they are sensitive to the assumed earnings/dividend growth rates (Elton, 1994).

4.2 Benchmark approaches for estimating cost of equity capital

4.2.1 The capital asset pricing model

Capital market theory divides the total risk of holding equity into two components: systematic risk (market risk) and unsystematic risk (unique risk, residual risk, or specific risk). Market risk is the uncertainty of a firm's future returns due to the return's sensitivity to variability in the market returns as a whole. Unsystematic risk is a function of the characteristics of the individual company, its industry, and type of investment and it is not related to variation in returns in the market (Pratt, Reilly, and Schweihs, 2000). The Capital Asset Pricing Model (CAPM hereafter) was the first theoretical model used to estimate how a firm's return should differ from an observable market rate (Elton, Gruber, and Mei 1994). The model addresses the structure of the risk premium which should be added to the risk-free rate of return (Benchmark) to get the required rate of return (the cost of equity). The CAPM shows that the risk premium is a function of the security's market risk only while unsystematic risk can be easily diversified as discussed in the next section (Sharpe, 1964).

4.2.1.1 The underlying assumptions of CAPM

The CAPM offers a theoretical framework for how certain relationships would exist if certain assumptions are met. Although not all assumptions are met in the real world, the CAPM provides a reasonable economic model for estimation of the cost of capital. The fundamental assumption of the CAPM is that the risk premium is a function of the share's systematic risk. The theory behind this assumption is based on the notion that investors hold common stocks in large, well-diversified portfolios. Under that assumption, investors will not receive compensation for the unsystematic risk because they can diversify it (Ramchand and Sethipakdi 2000). Other assumptions are:

1- Investors are risk averse so they seek to hold efficient portfolios (fully diversified);
2- All investors have identical investment time horizons and identical expectations about expected rates of return and capitalization rates;
3- There are no transaction costs and no taxes;
4- The same rate for lending and borrowing rate is identical; and
5- The market has perfect divisibility and liquidity.

Obviously, the application of the CAPM in valuation of closely held businesses, business interests, or investment projects will depend on the extent to which the above assumptions are or are not met in the real world. For example, the perfect divisibility and liquidity assumption can be accepted for publicly traded stocks while it will not for privately held companies (Ross, 1977).

Although these assumptions are not realistic in real world, the CAPM paved the way for capital structure theories. Under the above assumptions, the CAPM states that an asset's expected return is a function of its market risk (beta). This idea can be formally expressed by equation (4.1).

$$E(R_i) = R_F + \beta_i[E(R_M) - R_F] \qquad (4.1)$$

Where:

$E(R_i)$: The expected return on asset i

R_F: The risk-free rate of return

$E(R_M)$: The expected return on the market portfolio

β_i: The asset's sensitivity to returns on the market portfolio, equal to $Cov(R_i, R_M)/Var(R_M)$

Equation (4.1) consists of two components (1) a risk-free rate of return (Benchmark) and (2) the market risk premium i.e. the expected return on the market minus the risk-free rate. The CAPM leads to the conclusion that the equity risk premium is a linear function of the security's beta.

Over a long period of time a number of studies have challenged the validity of the CAPM in explaining observed returns. For example, empirical studies have indicated that realized returns on smaller companies were substantially greater than the returns predicted by CAPM, see for example Fama and French (1993, 1996) and Lally (1995). This implies a relationship between firm size and its return. In this context, Ibbotson Associates (2002) comments on this relationship:

"One of the most remarkable discoveries of modern finance is that of a relationship between firm size and return. The relationship cuts across the entire size spectrum but is

most evident among smaller companies, which have higher returns on average than larger ones". (Ibbotson Associates 2002, pp117)

As a result of CAPM, the cost of equity capital depends only on the systematic risk so small firm shares will have returns in excess of those implied by their systematic risk (beta) (Pratt and Grabowski, 2008). Using systematic risk as the only risk measure which is considered by the investors is based on the assumption that unsystematic risks can be eliminated by holding a perfectly diversified portfolio of risky assets. This assumption is not feasible for investors in closely held companies. Therefore, the cost of capital for these companies may require other risk elements to be considered. If so, the cost of capital should be adjusted for unsystematic risks (Breeden, 1989). The CAPM can be modified to capture the size effect and company unsystematic risk as follows.

$$E(R_i) = R_F + \beta_i[E(R_M) - R_F] + RP_s + RP_u \qquad (4.2)$$

Where:

RP_s : Risk premium for small size; and

RP_u : Risk premium for unsystematic risk.

However, soon after the CAPM was developed researchers like Roll (1977), Breeden (1989), Basu (1983), Banz (1981), Reinganum (1981), Rosenburg et al. (1985), Chen et al. (1988) and Bhandari (1988) began to find inaccuracies in pricing some securities and to question the general applicability of the theory. A criticism of empirical estimations of CAPM is that the pure-form equation almost always has an intercept above the risk-less rate. So, CAPM systematically understates (overstates) the true cost of equity capital for any stock having a beta below (above) one (Elton, 1994).

As mentioned above, the CAPM model has been investigated by a large number of papers (like Roll (1977) and Rosenburg et al. (1985)) but this thesis will concentrate on the papers which investigate it in a REIT setting.

Using a conditional CAPM for a sample of REITs during the period 1995 - 2003, Najand, Lin and Fitzgerald (2006) studied whether REIT investors received a superior risk/return trade off. They find that REITs' returns are larger than the market's return with an average abnormal annual return of 2.25% and also find that beta's volatility (σ_β) is relatively low

at 0.24. Based on this result, it can be concluded that the abnormal return's impact on cost of equity capital in real estate industry is relatively larger than in other industries.

In summary, most of the REITs' studies have been done from the perspective of analysing their returns with reference to general stock market returns. The results of these studies, most of them are US based papers, vary but their findings generally suggest that REIT risk-adjusted returns were superior to those of other stocks between mid 1960s – early 1980s. Since mid-1980s stock market portfolios were superior to REIT returns (Pratt and Grabowski, 2008).

As mentioned above, CAPM model adds a single risk premium to the risk-free rate to estimate the cost of equity capital. This method may produce incorrect estimations because the cost of capital maybe affected by more than one risk premium, as discussed above. As a result, multiple factors models such as Arbitrage Pricing Theory (APT) have been developed.

4.2.2 The Arbitrage pricing theory

Arbitrage Pricing Theory (APT) is a multivariate extension of CAPM. It was proposed by Ross (1976). In the APT model, the cost of capital for any investment depends on its sensitivity to each of several systematic risk factors. Although these risk factors are not specified by the APT model. Applications of the APT consider only widespread macroeconomic nature risk factors e.g. the unanticipated change in, for example, inflation, and risk premium and industrial production growth. Most researchers consider the APT model to be a better model than the CAPM in its informational content and explanatory power for the expected rates of returns Brinson et al. (1986), Berry, Burmeister, and McElroy (1988), Chen (1983), and Chen, Roll, and Ross (1986).

The APT model can be formally expressed by equation (4.3).

$$E(R_i) = R_F + (\text{Risk\_premium})_1 + (\text{Risk\_premium})_2 + \ldots + (\text{Risk\_premium})_k \qquad (4.3)$$

Where:

$E(R_i)$ Expected rate of return (cost of capital);

R_f = Rate of return on a risk-free security

Risk_premium_1 = Factor sensitivity$_1$ * Factor risk premium$_1$

Factor sensitivity is the asset's sensitivity to a particular risk factor relative to the market average sensitivity to that factor (after holding all other factors constant).
Factor risk premium is the factor's expected return in excess of the risk-free rate.

Fama and French (1993) three-factor model is an example of the APT model which incorporates company-specific attributes. It will be discussed in detail subsequently. Another example is Burmeister, Roll, and Ross (1994) model which employ macroeconomic factors. Similar macroeconomic factors were employed by Chan, Hendershott, and Sanders (1990) for REITs.

As with the discussion of CAPM, this thesis will concentrate on papers which examined REITs. A large number of studies have attempted to investigate the relation between REIT returns and market-level factors. These studies reveal the impact of certain variables such as inflation and interest rates on estimating REIT returns and cost of equity capital.

Titman and Warga (1986) employed CAPM and APT to examine the risk-adjusted performance of REITs. The aim of their study was to examine the accuracy of APT in measuring the risk-adjusted returns especially after recognizing the sensitivity of REIT returns to inflation and interest rates. Their sample consisted of 36 REITs listed on the NYSE and AMEX during the period 1973-1982. They examined the returns by applying both CAPM and APT models. They employed two forms of the CAPM, the CRSP Value-weighted index and Equally-weighted index as the market proxy. They examined two types of multiple-index models. The first included a portfolio of long-term government bonds along with the Equally-weighted or Value-weighted market portfolio in a two-factor model. The second model included five-factor portfolios which were designed to mimic changes in inflation, interest rates and any other macroeconomic variables that generate returns on capital assets.

Their results reveal a difference in estimating REITs performance between the single-index and multiple-index models. They note that the performance measures for the models that included the Value-weighted index as a benchmark portfolio are higher than the performance measures for models that include either the Equally-weighted index or the five-factor analysis portfolios. However, the five-factor model and the single-factor model (CAPM) that employs the Equally-weighted index as its benchmark portfolio generate similar performance measures figures. Titman and Warga (1986) failed in attributing the

above mentioned difference to the additional factors. They concluded that both models, the CAPM and APT, were not powerful enough to provide reliable evaluation of the investment performance of REITs portfolios.

Chan, Hendershott and Sanders (1990) examine the notions that not only are REITs a safe hedge against inflation but they also provide substantial risk-adjusted excess returns. Their sample consists of monthly returns for eighteen to twenty three REITs traded during the period from 1973 - 1987. To evaluate the relative riskiness of REIT returns, they utilise both the CAPM and the APT. They choose the same macroeconomic factors which are employed by Chen, Roll and Ross (1986). These variables include (1) industrial production growth, (2) change in expected inflation, (3) unexpected inflation, (4) the difference between the returns on low-grade corporate bonds and long-term Treasury bonds, and (5) the difference in the returns between the long-term Treasury bonds and the one-month T-Bill rate. They concluded that using a simple CAPM framework shows evidence of excess REIT returns over the study period, especially in 1980s. However, this effect is eliminated when using the multifactor APM which shows that three factors are consistently associated with REIT and general stock market returns: changes in risk, term structures and unexpected inflation. They conclude as a result of the negative relationship with unexpected inflation that REITs are not a hedge against unexpected inflation.

McCue and Kling (1994) examine the relationship between the macro-economy factors and commercial REITs returns. They employed monthly returns of the NAREIT Composite index for the period from 1974 - 1991. They used four factors as proxies for the macroeconomic variables, prices; the Consumer Price Index, short-term nominal interest rates (the three-month Treasury Bill rate), output (the Federal Reserve's Industrial Production Index), and investment (the McGraw Hill Construction Contract Index). They concluded that 60% of the variation in equity REIT returns can be explained by the macro-economy factors. The relative contribution of macroeconomic variables employed in their model was as follow: nominal interest rates explained about 36% of the total while the price, output, and investment variables explained very little of the total variation in returns.

Expanding the work of Titman and Warga (1986) and Chan, Hendershott and Sanders (1990), Chen, Hsieh and Jordan (1997) utilised APT to explain observed REITs returns by assessing the ability of two empirical implementations of APT, the factor loading model and the macro variable model. Their comparison of these two models was for the continuously listed REITs in NYSE during 1974 - 1991. This condition of continuous

listing resulted in their sample including different number of REITs. Therefore they divide the studied period into three six-year periods: 1974 – 1979, 1980 – 1985 and 1986 – 1991.

For the macro-variable model, they employed the following variables: the unanticipated inflation rate, the change in expected inflation, the unanticipated change in term structure, the unanticipated change in risk premium, and a market index residual derived from regressing the market index on the other four macro-variables. They conclude that the five-factor macro-variable model was superior in explaining REITs returns for two of the three time periods 1980 – 1985 and 1986 – 1991 while, in the first period 1974 -1979, they could not reject their hypothesis about of equal performance of the factor loading and macro variable models. They found that the macro-variable model is also superior when the three periods are considered together for REITs continuously listed over these periods. Regarding their variables, they found that the coefficients of the unanticipated inflation rate, the unanticipated change in term structure, and the market residual are significant at 10% level in 1980 – 1985 and 1986 – 1991 while none of them were significant in the first period 1974 -1979. As a result, in the first period both models have equal performance.

Chen, Hsieh, Vines and Chiou (1998) investigated whether the common factors prevailing among ordinary equities are able to explain the cross-sectional variation in REIT returns. Unlike previous studies which examine the relative performance of REITs by using only time-series returns, this study used cross-sectional tests to explain differences in the returns across various assets in a specific time period. Four different pricing models were employed to explain the returns of REITs. The first was the CAPM and the other three were multi-factor models which employed different number and type of explanatory variables.

These multi-factor models are; the firm-specific variable model; in this model the variables should reflect the unique attributes of each individual REITs such as firm size and book to market equity ratio; the macroeconomic variable model; in this model they employed the same economic variables as used by Chen, Hsieh and Jordan (1997); and the combined model; in this model they employed all the variables used in the first two models. Their results indicated that the market beta's coefficient is not significantly different from zero. In other word, they conclude that the market index does not contribute in explaining cross-sectional variation of REIT returns, and therefore they rejected the CAPM.

They conclude also that firm size is significantly priced among REITs over time and this significance held in the combined model. The book to market equity ratio is not significant in both the firm-specific variable and combined models. Regarding their macroeconomic variables, they concluded that these variables are generally insignificant in REITs pricing, except the unanticipated change in term structure. Their macroeconomic variable model shows that the risk premium is negatively significant at the 5% level but this significance does not remain in the combined model. In summary, Chen et al (1998) concluded that none of the macroeconomic variables are significant in explaining the cross-sectional variation of REITs' returns in the combined model.

In general the results of using multifactor APT model to examine macroeconomic factors vary widely depending on the REIT sample and the time period studied so choosing the appropriate macroeconomic factors will be crucial. Overall, the multifactor model (APT) is more effective at predicting REITs' returns than the single-factor CAPM. (Chen (1983), Brinson et al. (1986), Chen, Roll and Ross (1986), and Berry, Burmeister and McElroy (1988))

4.2.3 Fama and French model

The core of the Fama and French (1990) model (FFM) is based on the finding that a security's expected return depends on the sensitivity of its return to the market movement and to the returns on two portfolios meant to capture two additional risk factors captured by the return of "small minus big" "SMB" portfolio and market to book ratio "high minus low" HML portfolios (Fama and French, 1997).

The SMB portfolio refers to the difference between the realised returns on a "small" stocks' portfolio and a "big" stocks' portfolio, classified according to their equity capitalization. The SMB portfolio captures the size premium included in historical returns of common equity. As mentioned, many papers indicate that the realized returns on smaller companies have been greater than predicted returns over a long period of time. (Berk, 1995)

The HML portfolio refers to the difference between the returns on a portfolio of a "high" book to market equity ratio and a "low" book to market equity ratio. The HML portfolio captures the relative distress factor in returns. Firms with low stock prices and high book to

market ratio will be expected, by the market, to have poor earnings prospects and higher cost of equity capital than firms with strong earnings prospects (Fama and French, 1992). The cost of equity equation of the Fama-French Model is the following:

$$r_i = R_f + B_{i1}[E(R_m) - R_f] + B_{i2}[E(SMB)] + B_{i3}[E(HML)] \qquad (4.4)$$

Where:

r_i : Cost of equity for firm i;

R_f : Risk free rate of interest (20 years Treasury Bonds);

B_{i1} The sensitivity of stock i return to the market return (beta);

$E(R_m)$ Expected return on the market;

B_{i2} & B_{i3} : The sensitivity of stock i to the return of a portfolio that mimics SMB and HML respectively;

$E(SMB)$ & $E(HML)$: Expected return on a portfolio that mimics SMB and HML respectively.

The results of their initial study (1992) indicate that the CAPM beta does not contribute in explaining the average returns on NYSE, AMEX, and NASDAQ stocks over period studied 1963-1990. Whilst, their two additional risk factors SMB and HML are statistically significant predictors of returns over the same period.

Fama and French (1993) expanded their 1992 paper in three ways; firstly by expanding the set of asset returns, where they included bond returns in addition to common stocks returns. They assumed that in integrated markets the single model should also explain bond returns. Secondly by expanding the set of variables which explain returns, where they include term-structure variables to the size and book to market variables. They assumed that in integrated markets the variables that are important in bond returns may help in explaining stock returns due to the overlap between the return processes for bonds and stocks, and vice versa. Finally by expanding the approach to testing asset-pricing models, where they used the time-series regression approach instead of the cross-section regressions. The notion behind this change is that the time-series regression approach is more appropriate than the cross-section regressions because it is difficult to add bonds to the cross-section regressions where the explanatory variables like size and book to market equity have no obvious meaning for bonds.

Regarding common stocks returns, Fama and French (1993) found similar results to their previous paper, Fama and French (1992). For bonds returns, Fama and French (1993) found that the two term-structure factors, a term premium and a default premium, capture most of the variation in the bond returns. In summary, they concluded that there are at least three stock market factors (see equation 4.4) and two term structure factors in returns. Stock returns have shared variation due to the three stock market factors, and they are linked to bond returns through shared variation in the two term structure factors, term premium and a default premium. These two term structure factors have produced the common variation in the returns on government and corporate bonds and the only exception is the low-grade corporate bonds.

Fama and French (1997) employ both the CAPM and the FFM to examine the cost of equity for 48 industries, including Real Estate (excluding REITs) for the period 1963-1994. They used four-digit SIC codes to form their industry groups, and because REITs and real estate companies have different SIC code, they include REITs in a general Finance industry. To create their two specific risk factors, HML and SMB, six value-weighted portfolios were constructed on base of intersections between two sizes and three books to market equity groups. They calculate the monthly value-weighted returns on these six portfolios. Then they defined SMB as the difference each month between the simple average of the returns on three small-stock portfolios (S/L, S/M, and S/H) and the same average for the three big stock portfolios (B/L, B/M, and B/H). This method in generating the SMB portfolios is designed to isolate the influence of the book to market equity factor and focusing instead on the different returns behaviours of small and big stocks (Fama and French, 1993).

In the same way, the HML is defined as the difference each month between the simple average of the returns on the two high book to market equity portfolios (S/H and B/H) and same average for the two low book-to-market equity portfolios (S/L and B/L). This method in generating the SMB portfolios seeks to isolate the influence of the size factor in returns. The correlation between the two portfolios was very low which suggest they succeeded in isolating the two effects. Their findings indicate that there are large differences between the CAPM and the FFM in estimating the cost of equity. For the five-year estimates, the difference between CAPM and FFM figures was more than 3% for 15 industries and more than 2% for 19 industries. These differences were attributed to the SMB and HML risk factors (Fama and French, 1997). Their results for the rest of 48 industries show that the industries which have coefficients close to zero have produced similar results to the

CAPM, e.g. Food, Machinery, Electrical Equipment, Building Materials and Insurance and also show that CAPM and FFM have produced significantly lower estimate for the cost of equity for health industries and high technology industries. This result is most likely due to strong negative risk loadings on the HML factor. The FFM shows that these industries have a strong growth prospects as a result they have relatively low costs of equity capital.

Finally, CAPM and FFM have produced significantly higher estimate for the cost of equity for many industries including Real Estate which are at least 2% higher than those obtained using the CAPM. More specifically, Real Estate's cost of equity premium was estimated to be 5.99% and 11.16% using the CAPM and FFM respectively. The difference is due to the low beta of real estate assets, this result is consistent with REITs studies which apply APT, see Chen (1997) and the CAPM's limitations in predicting returns for real estate companies (Fama and French, 1997).

By employing UK data, Michou, Mouselli and Stark (2007) evaluate the various methods of estimating SMB and HML risk factors. They choose nine distinct methods which are employed previously to estimate the factors. They re-estimate them using the same methodology over the period from July 1980 to April 2003. They run various tests on the SMB, HML and the market factor to investigate whether the estimated factors capture the risk effects. They conclude that using different ways to estimate the SMB and HML risk factors may produce different characteristics for the factor time series. The recommend that care must be taken in using empirical precedent to estimate these factors in the UK. Further, their results did not provide clear evidence about the ability of various estimations of SMB and HML factors to capture risk. The results provide little evidence about the ability of the three factor model completely to capture the risk in UK. They conclude that the appropriate estimation of normal (abnormal) returns in the UK needs further research.

Gregory, Tharyan, and Huang (2009) create alternative factors to the Fama-French Momentum portfolios and factors for the UK market. They start from the note of Michou, Mouselli and Stark (2007) about the absence of freely downloadable equivalent to the data on Ken French's US website except the factors which are employed by Dimson, Nagel, and Quigley (2003). They employ nine UK studies to form portfolios on 30th September each year.

After constructing the factors and portfolios for the UK, they extend their tests to portfolios formed on differing bases. They refer to the caution which is expressed by Michou,

Mouselli and Stark (2007) on whether such factor models completely capture risk in the UK. They recommend that any tests of UK's long run abnormal returns should be based on characteristic-matched portfolios.

In summary, Fama and French's models can be considered as a multivariate extension of the CAPM by assuming that historical return is explained by company specific factors rather than just systematic risk (beta). The cost of equity can be estimated by aggregating risk premiums, one or more of them is usually subjective instead of grounded in a formal model such as the CAPM or APT. In other words, the cost of equity can be calculated as the sum of the current risk free rate and the equity risk premium, plus or minus subjective company specific risk adjustment(s). Therefore single factor models such as the CAPM are not sufficient for examining the relationship between risk and return on real estate-related assets. The literature indicates that REITs may have their own risk-return characteristics which differ from ordinary equities.

4.3 Estimating cost of equity capital using present value models

4.3.1 Discounted cash flows model (DCF)

To estimate the cost of capital using the discounted cash flows model, the equity present value, the market price of the stock, is already known. By solving the present value formula for the discount rate, the cost of capital can be obtained. Estimating the cost of capital by DCF model is easier for publicly traded firms as their current stock prices are available. For private companies an alternative measure such as using a similar firm or use of an industry average for firms in the same industry is required. This thesis will use only public UK firms.

Three present value estimation models will be examined. The first model is the general discounted cash flows model (DCF) where the cash flows can be defined as the stream of all cash flows available to equity holders. The second model is the dividend discount model (DDM) where the cash flows can be defined as the stream of available dividends for shareholders. The third model is the residual income model (RIM) where the cash flows can be defined as the net income, earnings after deducting the tax and interest expense, less a charge or contribution for capital stock used in generating the income (Pratt, and Grabowski, 2008).

These models are based on the assumption that the current stock price is the sum of the present values of the expected future returns to the investors, dividends and stock price change. There are two types of models to estimate cost of capital in applying the DCF method. The first is the single-stage model and the second, and potentially more accurate, is the multistage model.

4.3.1.1. Single stage DCF model

This model is based on the "Gordon growth" model developed by Gordon and Shapiro (1956) and Gordon (1962). The model's core idea is based on the assumption that dividends grow indefinitely at a constant rate. Based on the assumption of informationaly efficient prices, the model can be used to estimate a stock's expected rate of return by using the stock's existing price and its expected growth rate.

$$PV = \frac{NCF_0(1+g)}{r-g} \qquad (4.5)$$

Where:

r: Discount rate (cost of capital);

PV: Present value (Price);

NCF_0: Net cash flow (dividend) for period $_0$; and

g: Expected long-term consensus growth rate in net cash flow to investor.

The formula (4.5) can then be rearranged to solve for the cost of capital.

$$r = \frac{NCF_0(1+g)}{PV} = \frac{NCF_1}{PV} + g \qquad (4.6)$$

A limitation of the Gordon growth model is its assumption of constant perpetual growth in dividends.[49] To overcome this weakness, Gordon and Gordon (1997) developed a finite horizon specification of their growth model. They re-specify equation (4.6) in terms of earnings per share (EPS_{t+1}), earnings retention rates (rtr) and return on equity (ROE) to arrive at equation (4.7)

$$r = \frac{E_t(EPS_{t+1}) * (1-rtr)}{P_t} + (ROE * rtr) \qquad (4.7)$$

The expected dividends per share are equal to multiple of 1 minus the earnings retention rate and the expected earnings per share and growth are equal to a multiple of the earnings retention rate and ROE. To limit the effect of a constant ROE, they assume that ROE is set equal to r beyond year T then equation (4.7) can be rewritten as function of the firm's expected earnings to price ratio.

$$r = \frac{E_t(EPS_{t+1})}{P_t} or \rightarrow P_t = \frac{E_t(EPS_{t+1})}{r} \qquad (4.8)$$

$$P_t = \sum_{\tau=1}^{T} (1+r)^{-\tau} E(D_{t+\tau}) + (1+r)^{-T} P_T \qquad (4.9)$$

Where:

r: Discount rate (cost of capital);

$E_t(EPS_{t+1})$: is the firm's expected earnings; and

[49] Despite this model was employed in prior research such as Harris and Marston (1992) and Gordon (1993)

$E(D_{t+\tau})$: is the firm's expected dividends.

Equation (4.8) can be substituted for P_T in the dividend discount formula (4.9) yielding the finite horizon specification of the Gordon Growth Model (4.10).

$$P_t = \sum_{\tau=1}^{T} (1+r)^{-\tau} E_t(D_{t+\tau}) + [r(1+r)^{-T}]^{-1} E_t(EPS_{t+1+T}) \qquad (4.10)$$

Analysts' forecasts of dividends and earnings per share and the current price can be used to estimate the firm's expected cost of equity capital under the finite horizon Gordon growth model approach (Gordon and Gordon. 1997). Like all cost of equity capital estimation models, the Gordon growth model has a number of strengths and disadvantages. Because it depends on stable dividend growth rate, the Gordon growth model is appropriate for valuing stable dividend growth rate companies. Against this the results are very sensitive to the assumed growth rate and the Gordon growth model is not applicable to companies which do not pay dividends to their shareholders or which do not have stable dividends growth rate.

As mentioned later, this thesis will use analysts' forecasts of future earnings so the earnings growth estimates typically are for only the next two to five years and are not perpetual. Therefore, any use of these forecasts in a single-stage DCF model must be augmented with a longer-term forecast.

The Gordon growth form of the dividend discount model can be rearranged in order to express the cost of capital as a function of the P/E ratio, i.e. the P/E model (Easton, 2004):

$$\frac{P_0}{E_1} = \frac{D_1/E_1}{r-g} = \frac{1-b}{r-g} \qquad (4.11)$$

$$\frac{P_0}{E_0} = \frac{D_0(1+g)/E_0}{r-g} = \frac{(1-b)(1+g)}{r-g}$$

The underlying assumptions are the same as for the dividend discount model. The main difference between the dividend discount model and the P/E model is that the former is based on the growth of dividends while the latter on the growth of earnings. For this reason, the P/E model can be particularly useful when the company does not distribute dividends. This model will be explained in detail later.

4.3.1.2. Multi Stage DCF model

To reduce the reliance on a single growth rate, multistage models use more than one growth rate. Multistage models do not incorporate specific expected return amounts for specific years, but they do incorporate different growth rates for different expected growth stages. Two main factors determine the model's form, the number of growth stages, usually there are both two or three growth stages, and the length of each stage. Usually each stage is between three and five years long (Stowe, 2002). For example a three-stage model (over ten years) is given below:

$$PV = \sum_{n=1}^{5} \frac{[NCF_0(1+g_1)^n]}{(1+r_e)^n} + \sum_{n=6}^{10} \frac{[NCF_5(1+g_2)^{n-5}]}{(1+r_e)^n} + \frac{\frac{NCF_{10}(1+g_3)}{r_e - g_3}}{(1+r_e)^{10}} \qquad (4.12)$$

Where:

NCF_0: Net cash flow (or dividend) in the immediately preceding year;
NCF_5: Expected net cash flow (or dividend) in the fifth year;
NCF_{10}: Expected net cash flow (or dividend) in the tenth year;
g_1, g_2, and g_3: Expected growth rates in NCF (or dividends) through each of stages; r_e: Cost of equity capital (discount rate).

4.3.2 The Dividend discount model (DDM)

The Dividend Discount Model is the simplest present value approach to valuing stock. It is based on the shareholder's assessment of the associated cash flows. A shareholder who invests in a share will earn a stream of future cash flows as dividends and the retained earnings which are capitalised in the share market price at the date of any sale (Vernimmen et al. 2005). Therefore, share prices should reflect expectations about future dividends. To evaluate the share prices, finite and infinite valuation models have been developed, based on assumed share holding periods and forecasts dividends over a finite horizon, as well as the terminal value (Pratt, and Grabowski, 2008).

In the finite horizon model, one year for example, the value of any share today is the present value of the expected dividend plus the present value of the expected stock price in

one year. The finite horizon valuation model for any asset can be written for n years by the following equation:

$$V_0 = \frac{D_1}{(1+r)^1} + ... + \frac{D_n}{(1+r)^n} + \frac{P_n}{(1+r)^n} = \sum_{t=1}^{n} \frac{D_t}{(1+r)^t} + \frac{P_n}{(1+r)^n} \qquad (4.13)$$

The value of a share is the present value of the expected dividend (D) over n years plus the present value of the expected price (P) in n periods. To apply this model in valuation, investors use analysts' dividends forecasts which are made over finite horizons, usually two to five years, and then estimate the terminal price P_n based on one of a number of approaches. For example, to find the cost of equity capital for a five-year dividend forecast horizon (Stowe, 2002) assuming over next five years the annual dividend of a stock is expected to be 2.00, 2.10, 2.20, 3.50, and 3.75 respectively and further assume the stock price is expected to be 40.00 in five year's time, if the current value of the stock now is 34.76, the cost of equity can be found as follows:

$$34.76 = \frac{2.00}{(1+r)^1} + \frac{2.10}{(1+r)^2} + \frac{2.20}{(1+r)^3} + \frac{3.50}{(1+r)^4} + \frac{3.75}{(1+r)^5} + \frac{40.00}{(1+r)^5}$$

Solving the equation for r give r = 0.10 =10%

Instead of assuming a finite period, the infinite horizon valuation can be employed, and is defined as follows:

$$V_0 = \sum_{t=1}^{\infty} \frac{D_t}{(1+r)^t} \qquad (4.14)$$

In this general form of the dividend discount model, the stock's value is the present value of all expected future dividends (Gordon and Gordon, 1997). To use the infinite DDM, the difficulty of forecasting future dividends can be simplified by utilizing one the following two broad approaches. Firstly, by using one of several growth rate patterns to forecast the stream future dividends: these patterns are; a constant growth (the Gordon growth model), two stage growth rates (the two-stage growth model), and three distinct stages of growth (the three-stage growth model). The second approach to simplify the forecasting is to forecast dividends for a finite number of periods up to terminal point and then forecast either, the remaining dividends from the terminal point forward by using a constant

dividend growth rate, or forecast the share price at the terminal point. Share price can be estimated using for example, a multiple of forecasted book value or earnings per share as at that point. The DDM can be then used to estimate the implied cost of equity capital by solving the equation using the current price and forecast dividends.

4.3.3 Residual income valuation model

Residual income can be defined as the net income, i.e. earnings after tax and interest less a capital charge for the cost of equity. Residual income is sometimes known as economic profit, abnormal earnings, or economic value added (Stowe, 2002). A firm's income statement usually includes an interest expense as charge for the cost of debt capital but does not include a charge for the cost of equity capital. As a result, a firm can have positive net income but not earn more than the cost of equity capital. The estimated cost of equity capital must be deducted to arrive at residual income which reflects the cost of equity finance (Vernimmen et al. 2005).

Residual income models have been used to assess the individual stocks and to estimate measure accounting goodwill. These models are more useful than some other major present value models of equity value in explaining stock prices because residual income relies on both the amount of capital invested and its cost, and will provide information about a firm earning's sufficiency to cover the cost of equity *(*Pratt and Grabowski, 2008).

4.3.3.1. Residual income models and cost of equity capital

In the long term, there is positive relationship between the level of net earnings above the cost of capital and the equity market value. Firms which earn more than the cost of capital should sell for more than book value and vice versa (Vernimmen et al. 2005). It can be shown that residual income valuation models analyse equity value in two parts: current book value and the present value of expected future residual income. The intrinsic value of equity can be expressed as follows:

$$V_0 = B_0 + \sum_{t=1}^{\infty} \frac{RI_t}{(1+r)^t} = B_0 + \sum_{t=1}^{\infty} \frac{(E_t - rB_{t-1})}{(1+r)^t} \qquad (4.15)$$

Where:

V_0: **The value of a share at t = 0;**

B_0: is current book value of equity (per share);

Bt: expected book value of equity (per share) at any time t;

r: required rate of return on equity (cost of equity);

E_t: expected Earning per Share for period t;

RI_t: expected residual income per share, $RI_t = (E_t - rB_{t-1})$

The residual income per share in period *t* is the Earning per Share for period *t* minus the equity charge for the period. This is equal to the cost equity multiplied by the book value in at the start of the period. The residual income is positive when earnings per share exceed the equity charge for the period and vice versa.

4.3.3.2. Residual income models: advantages and disadvantages

To assess the residual income approach accurately, it is helpful to review its advantages and disadvantages. The advantages include the following points; the residual income model is relatively less sensitive to terminal value estimates relative to other present value models; some of the necessary accounting data is available; importantly the model can be applied to firms which retain their earnings and therefore do not pay a dividends and which have negative near future free cash flows; the residual income model will require analysts to focus on the amount of capital invested and its return which will highlight whether the firm is earning returns in excess of its cost of equity capital. While its disadvantages include the following points: some of the required accounting data may need significant adjustments in order to satisfy the assumption of the clean surplus relation; and it relies on the completeness of the firm's balance sheet (Pratt and Grabowski, 2008).

4.4 Estimation approaches in practice for the cost of equity capital

Three broad approaches can be used in estimating the cost of capital in practice. The first is a survey approach which is employed to survey subsets of investors, managers, and academicians to get their expectations about future equity returns. The second is historical returns approach which is employed to evaluate the equities returns in the past as an expectation of the future cost of capital. The third is implied cost of capital approach which is employed to estimate a forward looking rate of return. This approach is based on the market rates or prices on traded assets today. Due to its sensitivity to the personal views of the survey respondents, the first approach is not considered further in estimating the cost of capital in this thesis (Damodaran, 2008).

4.4.1 Estimating the cost of capital using historical returns (ex post)

Looking at past rates of return can be considered as one of the easiest ways to estimate the cost of equity. Some practitioners think that the historical realised returns approach is the best estimator of risk premium but in fact a forward looking approach is better in return estimations. This result is due to the large differences in the actual risk premiums which are observed in practice, with premiums ranging from between 3% and 12% (Damodaran, 2008). These differences in risk premiums are due to three reasons: difference in the estimation time periods, differences in risk free rates and market indices and differences in the method of averaging returns over time.

The point of contention between practitioners is to determine how far back in time to go in estimating the risk premium. To estimate historical risk premiums, some analysts use all available data and other analysts use data over shorter time periods e.g. twenty or ten years (Siegel, 1998). The notion behind using shorter periods is that the investors' risk aversion may change over longer time period or the market itself may have changed. Using a shorter period will provide a more update estimate (Siegel, 1998). A further issue is which risk free rate should be employed. Some analysts use either short term government securities (treasury bills) or long term government securities (treasury bonds). The notion behind using short term risk free rate is that Treasury bill is not sensitive to the changes in interest rates over time whereas the Treasury bond is. This argument is reliable if a single period

equity risk premium is considered. While if the time horizon is longer, the Treasury bond provides the more predictable returns (Damodaran, 2008).

A final point arises with the decision of how average returns are computed. This can be done either using the arithmetic average return or the geometric average. The arithmetic average computes the simple mean of a series of annual returns while the geometric average arrives at the compounded return. Many academics argue for the arithmetic average as the best unbiased estimate of the equity risk premium specially if the firm's annual returns are uncorrelated over time (Indro and Lee, 1997). Supporters of the geometric average argue that the empirical studies seem to indicate that returns are negatively correlated over time (Indro and Lee, 1997). Consequently, the arithmetic average return will overstate the premium. On other hand, using a single period in the asset pricing models to estimate expected returns over a long period e.g. five or ten years suggests that the estimation period may be much longer than a year. In this context, the argument for geometric average premiums becomes stronger (Indro and Lee, 1997).

In summary, estimating the cost of capital using the above average realised returns has been criticised on many grounds. For example, Fama and French (1997) conclude that these types of cost of capital estimates are "unavoidably imprecise." Three potential problems have been identified with risk premium computed from past realized returns: difficulties in identifying the right asset pricing model, imprecision in the estimates of factor loadings, and imprecision in the estimates of factor risk premium" (Gebhardt, Lee, and Swaminathan, 2001).

4.4.2 Practical estimation of the cost of capital using forecasted returns

To avoid the weaknesses of the realised returns approach, researchers employ the present value approach using consensus forecast returns to estimate the implied cost of equity capital. The next section will present the common models in estimating implied cost of equity capital using forecasted returns.

4.4.2.1 Discounted dividend model (DDM)

A. Claus and Thomas model (2001)

Claus and Thomas (2001) employ a version of the discounted dividend model, the "abnormal earnings model" to avoid the problems associated with the general dividend growth model such as its sensitivity to changing growth rates. They modified the discounted dividend model by using the abnormal earning instead of normal dividends and by using dividend growth model beyond the terminal value. They argue that relying on the abnormal earning will reduce the importance of assumed growth rate and narrow the allowable growth rates.

Claus and Thomas (2001) develop their model by starting from dividend growth model, which is special case of dividend discounted model introduced by Gordon 1962, which defines the implied cost of equity capital as the forward dividend yield plus the expected dividend growth rate in perpetuity for the market, as follows.

$$P_t = \frac{d_{t+1}}{(r_{gordon} - g_d)} \Rightarrow r_{gordon} = \frac{d_{t+1}}{P_t} + g_d \qquad (4.16)$$

Where:

P_t : The current price at the end of year t;

d_{t+1} : The expected dividend at the end of year t+1;

g_d : The expected dividend growth rate; and

r_{gordon} : The cost of equity capital estimated by the dividend growth model.

Claus and Thomas (2001) employed an economic dividend growth rate rather than the sell side forecasted growth rate (which is used in the dividend growth model) as a proxy for the expected dividend growth rate beyond the terminal period. In fact, the sell side forecast growth rate usually refers to the earning growth over next economic cycle, usually approximately five years, estimated by the market analysts. Studies which are based on this growth rate include Patel and Moyer (1997), Cornell (1999), Malkiel (1995) and Brigham et al. (1985). These are found to overstate rates because the sell side forecasted growth rate is optimistic relative to the realised earnings (Claus and Thomas, 2001). Claus and Thomas (2001) employ two growth rates: the first "G5" is the sell side forecast growth rate to

forecast earning per share for the third to fifth year ahead; the second rate "gae" is the forecast growth in abnormal earnings, measured as the difference between the risk-free rate and expected inflation rate to forecast the abnormal earnings beyond the fifth year.

To avoid bias in the sell side analysts' forecast growth rate, they adjusted these earnings by a forecast error. The error was estimated as the difference between the actual earnings and the median consensus earnings forecast for each firm. Their model can be defined as follows:

$$P_t = B_t + \frac{ae_1}{(1+r_{ct})} + \frac{ae_2}{(1+r_{ct})^2} + \frac{ae_3}{(1+r_{ct})^3} + \frac{ae_4}{(1+r_{ct})^4} + \frac{ae_5}{(1+r_{ct})^5} + \frac{ae_5(1+g_{ae})}{(r_{ct}-g_{ae})(1+r_{ct})^5}$$

(4.17)

Where:

P_t = Price per share of common stock;

B_t = Book value at the beginning of the year divided by the number of common shares outstanding at first of April of year t;

aei = Abnormal earnings calculated as $FEPSt+i - rct \cdot Bt$;

gae = Growth in abnormal earnings, calculated as Risk-free rate (rrf) – expected inflation rate; and

rct = Implied cost of equity estimate.

Contrary to earlier general accepted forecasts of an equity risk premium of 7 percent or more relative to the long-term risk-free rate, Claus and Thomas (2001) find that these estimates are too high, in at least for the period 1985-1998. The risk premium implied by market prices is only half as much, or less (Claus and Thomas, 1999a). In support of their view, they find that the estimated risk premium are remarkably stationary over the 12 year period examined, and are also remarkably similar to their ex ante estimates obtained for four other countries in their Claus and Thomas (1999).

In summary, Claus and Thomas (2001) estimate the cost of equity capital by employing the abnormal earnings growth rate and expected inflation rate controlling for the effects of analysts' optimistic earnings forecasts. They find their estimates show stability over the time and consistency with estimates in four other countries.

4.4.2.2 Residual income model (RIM)

A- Gebhardt, Lee, and Swaminathan (2001) model

Gebhardt, Lee and Swaminathan (2001) utilise a version of the discounted dividend model (DDM) using residual income to estimate a market implied cost of capital. They develop their model by starting from the dividend discount model (DDM) which defines the stock price as the present value of its expected future dividends based on all currently available information.

$$P_t = \sum_{i=1}^{\infty} \frac{E_t(D_{t+e})}{(1+r_e)^i} \qquad (4.18)$$

Where: $E_t(D_{t+e})$ is the expected future dividend for period t+i according to the information available at time t, and r_e is the cost of equity capital. By using the clean surplus relationship, the above equation can be rewritten as the reported book value, plus an infinite sum of discounted residual income (economic profits):

$$P_t = B_t + \sum_{i=1}^{\infty} \frac{E_t[(ROE_{t+i} - r_e)B_{t+i-1}]}{(1+r_e)^i} \qquad (4.19)$$

The value of a firm's share price P in (4.19) is expressed in terms of an infinite series. However, for practical purposes they specify a forecast "terminal value" estimate. Therefore, a two-stage approach has been used to estimate the intrinsic value: in the first stage, in this case 3 years, they use consensus earnings forecasts. In the second stage, beyond three years and up to terminal period, they use the median industry ROE by period t+3 as a growth rate for the firm's returns. Their implied assumption is that there is linear interpolation between the firm's ROE after period t+3 and the industry median ROE. In other words, they estimate the terminal value beyond period T by computing the present value of period T residual income as perpetuity. As a result, any growth in earnings or cash flows after year T is value neutral. Equation (4.19) becomes as follows:

$$P_t = B_t + \frac{FROE_{t+1} - r_{gls}}{(1+r_{gls})} B_t + \frac{FROE_{t+2} - r_{gls}}{(1+r_{gls})^2} B_{t+1} + TV \qquad (4.20)$$

Where:

$$TV = \sum_{i=3}^{T-1} \frac{FROE_{t+i} - r_{gls}}{(1+r_{gls})^{i}} B_{t+i-1} + \frac{FROE_{t+T} - r_{gls}}{r_{gls}(1+r_{gls})^{T-1}} B_{t+T-1}$$

Where:

P_t : Price per share of common stock;

B_t : Book value at the beginning of the year divided by the number of common shares outstanding at first of April of year t

$FROE_{t+1}$, and $FROE_{t+2}$: Forecasted Return on Equity for two years ahead (can be calculated by using two years ahead Forecasted earning per share as follows: $FROE_{t+i}$ = $FEPS_{t+1} / B_{t+i-1}$

They assumed that after the third year, $FROE_{t+i}$ is a linear interpolation to the industry median ROE.

T = Forecast horizon. T = 10

r_{gls} : Implied cost of equity estimate

Gebhardt, Lee and Swaminathan then investigate the relationship between various firm characteristics and cost of capital. They examine the cross-sectional relation between their equity risk premium results and fourteen firm characteristics. These characteristics cover five risk categories Leverage; Market Volatility; Variability and Predictability of Earnings; Liquidity and Information Environment and other Pricing Anomalies. Their sample is drawn for the period from 1979 to 1995 and consists of all U.S. companies.

In univariate tests, they conclude that many of these variables are significantly correlated with the implied risk premium. They conclude a positive relationship between implied risk premium and, company size, book to market ratio (hereafter B/M) and forecasted growth rates (hereafter Ltg), and a negative relationship with dispersion in analyst forecasts (hereafter Disp). Unexpectedly, they find a weak insignificant correlation between the implied risk premium and beta. These three significant characteristics are then used in a multivariate analysis. In this setting beta becomes significant and positive, though insignificant again when industry membership controls are used. As a result, beta has limited importance in the market's assessment of a stock's systematic risk. They conclude

that the best model to explain cross-sectional variations in the implied risk premium consists of the book to market ratio, the dispersion in analyst forecasts, the long-term consensus analyst growth forecast and the industry mean risk premium from the prior year. Their year by year tests show that the implied cost of capital which is obtained by using the previous year's multivariate regressions explains about 60% of the cross-sectional variation in the year's implied cost of capital.

In a subsequent similar study, Liu, Nissim and Thomas (2002) employ sell side analyst earnings forecasts. However, in estimating residual earnings, they assume that the ROE beyond the third year trends linearly to the industry median ROE up to the eleventh year and subsequently residual earnings are assumed to be constant in perpetuity thereafter.

Obviously, Liu, Nissim and Thomas (2002) and Gebhardt, Lee and Swaminathan (2001) have both used very similar methodologies, the only difference between them being the way in which ROE is estimated. Whereas Gebhardt, Lee and Swaminathan (2001) measure industry median ROE as the moving median of the previous ten year ROEs, excluding negative ROEs, while Liu, Nissim and Thomas (2002) measured the industry median ROE as the moving median of up to the previous 10 years of all ROEs, including negative values. The rational for excluding negative ROEs is that the population of profitable firms better reflects long-term industry equilibrium rates of returns. However, to dampen the influence of extreme values, both positive and negative Liu, Nissim and Thomas (2002) winsorized the industry median ROEs

B- Ohlson and Jüettner-Nauroth model (2003)

Ohlson and Juettner-Nauroth (2000, 2005) (hereafter OJN) begin with an alternative specification of the residual income model that relates a firm's share price to the cost of equity capital. They use forthcoming dividends per share and three measures of expected earnings; expected current earnings per share, short term earnings growth rate and long term earnings growth rate. Ohlson and Juettner-Nauroth concentrate on estimating the firm's value (equity prices) based on the cost of equity capital and other above factors. The Ohlson and Juettner-Nauroth (2000) model has been inverted by Gode and Mohanram (2003) to estimate the implied cost of equity capital as a function of the forecasted earnings per share to price ratio and the two measures of growth in expected earnings per share.

Gode and Mohanram (2003) exploit the OJN model attributes, such as using earnings directly instead of dividend beyond forthcoming year, not requiring forecasts of book values or return on equity and avoiding the assumptions about dividends per share and pay out ratio beyond the forthcoming year to estimate the implied cost of equity capital. Gode and Mohanram (2003)' estimates are then compared to those from Gebhardt, Lee and Swaminathan (2001) and Liu et al. (2002).

Similar to Gebhardt, Lee and Swaminathan (2001), Gode and Mohanram (2003) used three ways to evaluate the risk premium estimates. First, they tested for how the risk premium correlated with common risk factors, systematic risk, unsystematic risk, leverage, and size, book-to-market ratio and industry membership. The Gode and Mohanram (2003) result indicates that the OJN derived estimates are correlated with the independent variables in the expected direction. With respect to the comparative models, Gebhardt, Lee and Swaminathan (2001) exhibit the expected associations with the majority of independent variables in the pooled sample.

However, Liu et al. (2002) estimates are not as robust and often have the wrong sign. Gode and Mohanram (2003) attribute the variation between the comparative models to the sensitivity of including (excluding) negative ROEs in the measurement of the industry median ROE. Their results indicate that the Gebhardt, Lee and Swaminathan (2001) model outperforms the OJN model. The correlation between estimated and actual risk premium inferred by OJN and Gebhardt et al. (2001) models are 27.7% and 52.8% respectively. They attribute the variation between both models to the inclusion of the industry risk premium in the prior year (Gode and Mohanram, 2003).

Finally, they test the correlation between the ex ante risk premium and ex post realised returns. Their findings are consistent with the previous research showing low correlations between expected and realized returns (Elton, 1999). Regarding the relation between ex ante risk premium and future returns, Gode and Mohanram (2003) find it economically significant. But when they divide the firms into five portfolios grouped according to risk premiums, the results show that the Gebhardt et al. (2001) model outperforms the OJN model for one and two year-ahead returns though both models perform well in predicting three-year-ahead returns. Liu et al (2002) performs well only with one year ahead returns (Gode and Mohanram, 2003).

Gode and Mohanram employed the OJN model which can be expressed in equation (4.21) below.

$$P_t = \frac{FEPS_{t+1}}{r_{ojn}} + \frac{z_1}{(1+r_{ojn}) - \gamma}$$
$$z_1 = \frac{FEPS_{t+2} + r_{ojn} * DPS_{t+1}(1+r_{ojn}) - (1+r_{ojn})FEPS_{t+1}}{r_{ojn}} \qquad (4.21)$$
$$g_2 = \frac{(FEPS_{t+2} - FEPS_{t+1})}{FEPS_{t+1}}$$

Where:

$(1+r_{ojn}) \le \gamma \le 1$

By solving (4.21) for r an explicit estimate of r, the equation (4.22) was obtained below. (Gode and Mohanram, 2003)

$$r_{ojn} = A + \sqrt{A^2 + (\frac{FEPS_{t+1}}{P_t})\{g_2 - [(r_f - lteg)]\}}$$
$$A = \frac{1}{2}\{(r_f - lteg) + \frac{DPS_{t+1}}{P_t}\} \qquad (4.22)$$
$$g_2 = \frac{(FEPS_{t+2} - FEPS_{t+1})}{FEPS_{t+1}}$$

Where:

r_{ojn} : Implied cost of equity estimate

r_f : Risk-free rate

g_2 : Short term earning growth rate

$lteg$: long term economic growth

$FEPS_{t+i}$:Forecasted earnings per share for year $t+i$. $FEPS_1$ and $FEPS_2$ are equal to the one and two year-ahead consensus EPS forecasts at the beginning of year t. $FEPS_3$ is equal to the three year-ahead consensus EPS forecast when available, and $FEPS_2 \cdot (1 + lteg)$ when not available.

P_t : Price per share of common stock

$DPS_{t+1} = DPS_0$: Dividends per share paid during year $t-1$ or by using the payout ratio for year $t-2$ if the firm does not pay dividends (or suffers loss) in year $t-1$

The model requires $FEPS_{t+1} > 0$ and $FEPS_{t+2} > 0$

In summary, although the OJN model does not control for book value or industry profitability, Gode and Mohanram (2003) show that the market's perception of risk is reflected in the risk premium which is estimated using the OJN model. The other residual income valuation models (Gebhardt et al. (2001) and Liu et al. (2002)) show higher correlations in the regressions but the sign and significance of the some of the coefficients depend on the computation of industry profitability. Given the variation in the estimates generated by the various models the thesis will also employ models which consider the firms' book values and industry profitability.

C- Easton (2004) Model

Easton (2004) investigated whether models of earnings and earnings growth can be employed to estimate the cost of equity capital. He uses the price to earnings growth ratio (PEG) which is equal to the price-to forward earnings ratio divided by an earnings growth rate, to estimate the cost of equity capital. The price earnings (PE) ratio is usually used by analysts as a basis for stock recommendation. This basis depends on the notion that, ceteris paribus, a high (low) PE implies a low (high) expected rate of return, supporting a sell (buy) recommendation (Lynch, 2000).

However, as the next period's earnings may not be a sufficient indicator of the future earnings stream, an earnings growth rate indicator is used as well (Easton, 2004). Next period's earnings and the earnings growth rate are considered by the PEG ratio. As a result the stock will be fairly priced if its PEG ratio is equal to one, the recommendation being to hold the stock). If this ratio is considerably greater or less than one then recommendation will sell or buy the stock (Easton, 2007).

Easton (2004) shows how the difference between accounting earnings and economic earnings can reflect the role of accounting earnings in valuation. He argues that in short run, if next year's forecasted accounting earnings is equal to economic earnings, these earnings will be sufficient to estimate the expected rate of return. This would be equal to the inverse of the price to expected earnings (PE) ratio. If next year's forecasted accounting earnings is not equal to economic earnings but the abnormal growth rate in accounting earnings is assumed to be constant in perpetuity, these earnings will be sufficient to estimate the expected rate of return. In this case it would be equal to the square root of the inverse of the PEG ratio. In the case of inequality without stability in perpetuity for the abnormal growth in accounting earnings, an additional growth variable is

required to adjust the earnings forecasts in order to estimate the cost of equity capital (Easton, 2004) as follows:

"short-run forecasts of abnormal growth in accounting earnings and a variable that captures change in this growth beyond the forecast horizon may be used to adjust for the fact that analysts forecast accounting earnings rather than economic earnings" (Easton, 2004, pp76).

The Easton model is derived from OJN model equation (4.22) after assuming $(r_{rf} - ir) = 0$ i.e. no growth in abnormal earnings beyond the forecast horizon. The resulting formula is given in equation (4.23) (Easton, 2004).

$$r_{Easton} = \sqrt{\frac{FEPS_{t+2} + r_{Easton} FDPS_{t+1} - FEPS_{t+1}}{P_t}}$$

$$r_{Easton} = \frac{FDPS_{t+1}}{(2 * P_t)} + \sqrt[2]{\frac{(FEPS_{t+2} - FEPS_{t+1})}{P_t} + \frac{(FDPS_{t+1})^2}{(2 * P_t)^2}} \qquad (4.23)$$

Where:

r_{easton} : Implied cost of equity estimate

$FEPS_{t+i}$: Forecasted earnings per share for year t+i. $FEPS_1$ and $FEPS_2$ are equal to the one and two year-ahead consensus EPS forecasts at the beginning of year t.

P_t : Price per share of common stock

$FDPS_{t+1}$: Forecasted Dividends per share or using payout ratio

The model requires $FEPS_{t+2} > FEPS_{t+1} > 0$

In summary, the main elements of Easton (2004) model are similar to the residual income valuation models, which are discussed above but Easton tried to avoid the limitation of these models which rely on the clean-surplus assumption in the forecast of future book values and this assumption rarely holds as a practical matter. Easton's (2004) model considers differences in short-run earnings growth and thus it provides a ranking that is superior to the ranking based on PE ratios. But Easton (2004) model implicitly assumes that the short-run growth forecast also captures the long-run future.

4.5 Evaluate Different Approaches in Estimating the Cost of Equity Capital in Practice

Before assessing the different practical approaches in estimating the cost of equity capital, it will be useful to examine the attributes of an accurate estimation model. An accurate estimation model to obtain the implied cost of equity capital must be flexible, based on theoretical framework, easily employable by practitioners due to the cost of capital's importance for many parties, and produce accurate and stable results over time (Pratt and Grabowski, 2008). Unfortunately there is no one model that operates perfectly in every case, so users may accept a particular model if it produces reasonable results on a consistent basis.

Although a model can be theoretically correct it will not be valuable if it cannot be applied in practice. The choice of appropriate model to estimate the cost of equity will be critical in this thesis. The object of this assessment is to determine whether the models popular in the literature are appropriate to use in this thesis.

As discussed above there are two main approaches to estimating the cost of equity capital, the Benchmark Approach and the Present Value Approach. The Benchmark Approach consists of three models, the CAPM model, the APT model and the Fama and French model (1993). It was concluded that the CAPM cannot be used because the cost of capital is affected by more than one risk factor. The results of using multifactor APT models support this conclusion. Although the macroeconomic factors examined vary widely depending on the sample and the time period studied, the models are still more effective at predicting the cost of capital than the single-factor CAPM. The Fama and French (1993) model can be considered as a multi-factor CAPM and like the CAPM and APT it relies on historical realised returns which generally have a weak relationship with the future earnings as discussed above. As a result of the above critique, none of these bench mark models will be employed to estimate the cost of equity capital for UK companies in this thesis.

For the present value approach, three broad approaches were considered; free cash flow (DCFM), dividend (DDM) and residual income. Theoretically the dividend discount and residual income models are equivalent. The residual income model can be derived from the dividend discount model by substituting the clean surplus relation.

Chapter Four: Estimating ICEC

As explained above, equity value is the sum of the present value of forecast free cash flows or dividends up to a terminal point plus the present value of the expected terminal value of the equity. All the present value models are theoretically sound models but their recognition of value is different. The DDM and DCFM models forecast future earnings and find the value of stock by discounting them back to the present using the required return on equity. The RI model starts with a value based on the balance sheet, the book value of equity, and adjusts this value by adding the present values of expected future residual income. Although, the recognition of value is different between the present value models, the total present value, and implicitly the implied cost of equity capital, should theoretically be consistent (Pratt and Grabowski, 2008).

It is obvious that present value models can be derived from the same underlying theoretical model but can differ in their underlying assumptions about estimating the future earnings, cash flow, dividends, book value and residual income. So choosing the most appropriate models to estimate the implied cost of equity capital will depend on the identifying the most appropriate underlying assumptions (Easton, 2007).

In practice, estimating the future earnings, cash flow, dividends, book value and residual income depends on the available data and the degree of certainty. If the estimations were prepared using a full set of pro forma financial statements and at the same degree of certainty, the models should generate the same results. However, it may not be possible to achieve the same degree of certainty with each item. For example, if the company has negative earnings in the near term its forecasts for the terminal value may be less certain. In these circumstances, then using residual income model may be more appropriate because it is less sensitive to terminal value estimates (Pratt and Grabowski, 2008). On the other hand, the discounted dividend valuation model would be more appropriate for a firm with positive, predictable future earnings which either pays or does not pay dividends in estimating the implied cost of equity.

If the variation of estimates existed and the estimation models appear to be appropriate, the inconsistency may be due to the underlying assumptions in the models. For example, Ohlson (2000, 2005) queries whether the assumption of clean surplus holds in practice. He concludes it may not hold for the following reasons: clean surplus rarely holds on a per share basis, because any future equity transactions will change the number of shares outstanding; even on a total equity basis, for the residual income valuation model to hold on a total "dollar" basis, issuances and re-purchases of shares must be value-neutral from

the perspective of the new, future shareholders; and finally many accounting rules violate the clean surplus relationship. Further, the results of many studies, e.g. Abarbanell and Lehavy (2002), Bhattacharya, Black, Christensen and Larson (2004) and Johnson and Schwartz (2002) have indicated that there are significant differences between GAAP earnings and the analysts' earnings concluding that analysts' forecasts do not reflect comprehensive income (Ohlson, 2005). Based on these concerns Ohlson (2005) has advocated using the abnormal earnings growth valuation model.

In summary, due to the significant variation in the magnitude of the associations between the various implied cost of equity estimates and individual risk proxies, relying on one estimation model may produce misleading results if the specific model's attributes are correlated with the variable studied. Due to the absence of a consensus on the superiority of any particular model in estimating the cost of equity, this thesis will employ four alternate models and the mean of the four in estimating the cost of equity (Hail and Leuz, 2005). The four models are Gebhardt, Lee and Swaminathan (2001), Claus and Thomas (2001), Ohlson and Jüettner-Narouth (2000), and Easton (2004).

4.6. Conclusion

In this chapter various approaches of estimating the cost of equity capital for quoted firms have been investigated to address the shortage in the literature where there is no one model that operates perfectly in every case, so the users may accept a particular model if it produces reasonable results on a consistent basis.

As discussed earlier there are two main approaches to estimating the cost of equity capital, the Benchmark Approach and the Present Value Approach. The benchmark approaches recognize that the cost of equity should be related to a benchmark return in the capital markets. The Benchmark Approach consists of three models, the CAPM model, the APT model and the Fama and French model (1993). It was concluded that the CAPM cannot be used because the cost of capital is affected by more than one risk factor. The results of using multifactor APT models support this conclusion. Although the macroeconomic factors examined vary widely depending on the sample and the time period studied, the models are still more effective at predicting the cost of capital than the single-factor

CAPM. The Fama and French (1993) model can be considered as a multi-factor CAPM and like the CAPM and APT it relies on historical realised returns which generally have a weak relationship with the future earnings. These models do not supply guidance about the magnitude or degree of the difference between a firm's cost of equity and the benchmark rate. As a result of the above critique, none of these benchmark models will be employed to estimate the cost of equity capital for UK companies in this thesis.

For the present value approach which estimate the cost of equity capital as the rate that equates the current price with the present value of future cash flows, three broad approaches were considered; free cash flow (DCFM), dividend (DDM) and residual income. Theoretically the dividend discount and residual income models are equivalent. The residual income model can be derived from the dividend discount model by substituting the clean surplus relation.

The present value models differ in their recognition of value. The DDM and DCFM models use forecast future earnings and find the value of stock by discounting them back to the present using the required return on equity. The RI model starts with a value based on the balance sheet, the book value of equity, and adjusts this value by adding the present values of expected future residual income (Pratt and Grabowski, 2008).

In practice, estimating the future cash flows, book value, and residual income depends on the available data and the degree of certainty. However, it may not be possible to achieve the same degree of certainty with each item. For example, if the company has negative earnings in the near term its forecasts for the terminal value may be less certain. In these circumstances, using residual income model may be more appropriate because it is less sensitive to terminal value estimates (Pratt, and Grabowski, 2008). On the other hand, the discounted dividend valuation model would be more appropriate for a firm with positive, predictable future earnings either pay or does not pay dividends in estimating the implied cost of equity.

If a variation of estimates occurs and the estimation models appear to be appropriate, the inconsistency may be due to the underlying assumptions in the models. Further, the results of many studies, e.g. Abarbanell and Lehavy (2002) and Bhattacharya et al. (2004) have indicated that there are significant differences between GAAP earnings and the analysts' earnings concluding that analysts' forecasts do not reflect comprehensive income (Ohlson,

2005). Based on these concerns Ohlson (2005) has advocated using the abnormal earnings growth valuation model.

Due to the significant variation in the magnitude of the associations between the various implied cost of equity estimates and individual risk proxies, relying on one estimation model may produce misleading results if the specific model's attributes are correlated with the variable studied. Due to the absence of a consensus on the superiority of any particular model in estimating the cost of equity, this thesis will employ four alternate models. These models are Gebhardt, Lee and Swaminathan (2001), Claus and Thomas (2001), Ohlson and Jüettner-Narouth (2000), and Easton (2004).

Chapter Five:

Hypotheses, methodology and data

Chapter Five: Hypotheses, methodology and data

5.1 Introduction

In this chapter, the research hypotheses are formulated. This chapter is divided into an introduction and conclusion and four sections. The first section briefly explains the purpose of this study and the stages of the research while the second section develops the research hypotheses based on the literature review; the third section provides a justification for the research methodology to test the hypotheses and the last section of this chapter will outline the required data to answer the research question.

Research philosophy can be defined as the belief about the way in which data about a phenomenon should be gathered, analysed and used. In social science such as accounting, two major research philosophies have been identified the positivist (scientific) and interpretivist (anti-positivist) (Galliers, 1991).

The positivists believe that reality is stable and can be observed and described from an objective viewpoint (Levin, 1988). They assert that phenomena should be isolated and that observations should be repeatable. The interpretivist argues that only through the subjective interpretation of and intervention in reality can that reality be fully understood. The study of phenomena in their natural environment is the key to the interpretivist philosophy, together with the acknowledgement that scientists cannot avoid affecting those phenomena they study.

The thesis's paradigm is positivism not interpretivism because it concerns in hypothesis testing rather than find a new theory. It also produces an accurate, objective, quantitative data rather than subjective qualitative outcomes. Finally, it generalises the results from the sample into the population rather than do that from one setting into similar one.

5.2 The purpose of the study

This study will investigate whether the tax status of REITs has an effect on their implied cost of equity capital. Under specific restrictions, REITs are exempt from corporation tax; these restrictions have been explained in detail in chapter two. Consequently, REITs are not able to obtain a corporation tax deduction on their debt interest while tax paying companies do. As a result, the optimal capital structure for REITs may not contain any or very little debt (Feng, Ghosh and Sirmans, 2003).

Chapter Five: Hypotheses, methodology and data

Previous studies, as reviewed in chapter three, which have examined taxation and implied cost of equity capital have, by necessity, focused on tax paying firms. There are no studies which investigate what happens to the cost of equity capital when companies change their tax status. The introduction of the REIT legislation provides such a setting. It allows estimation of implied cost of equity capital for UK REITs both pre and post conversion to examine the relationship between the cost of capital and capital structure in the context of a significant change in taxation. As a control, the implied cost of equity capital will be examined for samples of non-REIT UK property firms and UK non-property firms.

As mentioned in the first chapter, this thesis will answer the question of:

"How does taxation affect the relationship between firms' cost of equity capital and capital structure?"

Specifically, the thesis will answer the following sub-questions:

1- Can the existing models of implied cost of equity capital which have been tested on US data be used in a UK setting? Will these models correctly reflect the changes in firm level taxes? And are firm level taxes reflected in cost of equity capital for UK-REITs.?

2- Are the various implied costs of equity estimates consistent?

3- What is the relationship between corporate and investors levels taxes and cost of equity capital for REITs over the period prior to and post conversion to REIT status?

To answer these questions, the following section will present a set of research hypotheses which will be constructed and tested based on the capital structure literature.

5.3. Research hypotheses

5.3.1. Introduction

To achieve the purpose of this thesis and answer its questions, a number of hypotheses should be empirically tested. Theses hypotheses are designed according to the previous literature by developing Modigliani and Miller (1958) theories. This section will be divided into two parts; the first one will present the hypotheses which investigate the relationships between tax, capital structure and implied cost of equity capital while the second one will present the hypotheses which investigate relationships between implied cost of equity capital and firm risk proxies.

5.3.2. Tax, Capital structure and cost of equity capital

As mentioned in the first part of Chapter three, Modigliani and Miller (1958, 1963) and Miller (1977) introduced capital structure theory and the effect of taxes on capital structure. In this part of the thesis, the researcher is going to expand upon these studies to examine how corporate and investor level taxes and leverage can affect the firm's cost of equity capital. After their innovative paper Modigliani and Miller (1958), introduce the effect of corporate tax on the firm value. They showed the value of levered firm as the value of un-levered firm in the same risk class plus the gain from leverage. The gain from leverage arises from the tax saving due to interest deduction; the saving is defined as the product of the corporate tax rate multiplied by firm's debt. As a result of allowing for tax, they conclude that cost of equity for a levered firm is equal to the cost of equity of an un-levered firm at the same level of risk plus a risk premium. The magnitude of the risk premium depends on the differential between the costs of equity and of debt for an un-levered firm, the amount of financial leverage used and the corporate tax rate.

Miller (1977) went a step further by investigating the effects of both personal and corporate taxes on leverage and firm value. He modified MM (1958, 1963) models to include the personal tax under the same assumptions to arrive at the following equation:[50]

$$V_L = V_U + [1 - \frac{(1-T_c)(1-T_s)}{(1-T_d)}]D \qquad (5.1)$$

[50] For the derivation of equation (5.1) please see the first part of third chapter, equations (3.5) till (3.10).

This shows that the value of the levered firm is equal to the value of an all-equity firm, the first term on right hand, plus the gain from leverage, the second term (Miller, 1977). In equation (5.1) if the personal tax rate on equity income equal to the personal income tax rate on debt income ($T_s = T_d$) then the term in brackets will be equal to T_c and the equation becomes $V_L = V_U + T_c D$ as in Modigliani and Miller (1963). Miller (1977) argues that if in equation (5.1) the tax rate on equity income is zero, i.e. $T_s = 0$ and that $1 - T_d = 1 - T_c$ then the tax benefit from debt completely disappears and the valuation will revert back to Modigliani and Miller (1958) result i.e. $V_L = V_U$.

DeAngelo and Masulis (1980) argue that in equation (5.1) if $T_d < T_c + T_s (1 - T_c)$ then a tax benefit from debt will arise but it will be less than the amount predicted by Modigliani and Miller (1963).

Equation (5.1) can be extended based on the definition of the value of levered (un-levered) firms ($V_L = S_L + D_L$ and $V_U = S_U$) where S_L, S_U are the market value of equity for the levered and un-levered firm respectively. By substituting these expressions into equation (5.1) and rearranging, equation (5.2) is obtained:

$$S_L + D_L = S_U + [1 - \frac{(1 - T_c)(1 - T_s)}{(1 - T_d)}]D$$

This is equal to:

$$S_U = S_L + \frac{(1 - T_c)(1 - T_s)}{(1 - T_d)} D \qquad (5.2)$$

Base on the general definition of equity value as the present value of a perpetual stream of after corporate-tax future earnings capitalised at the appropriate rate cost of equity capital. Applying this definition for levered and un-levered equities will result the equations (5.3) and (5.4):

$$S_U = \frac{EBT(1 - T_c)}{r_u} \Leftrightarrow EBT(1 - T_c) = S_U * r_u \qquad (5.3)$$

$$S_L = \frac{[EBT - (i * D)](1 - T_c)}{r_L} \Leftrightarrow EBT(1 - T_c) = S_L * r_L + (i * D)(1 - T_c) \qquad (5.4)$$

Where: EBT = earnings before corporate tax, D = firm's debt, and r_L, r_U are cost of equity capital for levered and un-levered firms respectively.

After setting Equations (5.3) and (5.4) equal to $EBT(1 - T_c)$ and combining to obtain:

$$S_L * r_L + (i * D)(1 - T_c) = S_U * r_U \Rightarrow$$

$$r_L = \frac{S_U * r_U - (i * D)(1 - T_c)}{S_L} \Rightarrow \qquad (5.6)$$

$$r_L = \frac{S_U}{S_L} * r_U - i * (1 - T_c)\frac{D}{S_L}$$

By substitute Equation (5.2) into Equation (5.6), we obtain

$$r_L = \frac{S_L + \frac{(1 - T_c)(1 - T_s)}{(1 - T_d)}D}{S_L} * r_U - i * (1 - T_c)\frac{D}{S_L} \qquad (5.7)$$

By rearranging equation (5.7), equation (5.8) is obtained

$$r_L = r_U + (1 - T_c)[r_U * \frac{(1 - T_s)}{(1 - T_d)} - i]\frac{D}{S_L} \qquad (5.8)$$

Where: $\frac{D}{S_L}$ is the firm's debt-to-equity ratio. Equation (5.8) indicates that the firm's cost of equity capital is a function of corporate, investor level taxes and its capital structure. If in equation (5.8) tax is equal to zero, i.e. a world without taxes, equation (5.8) becomes as follows:

$$r_L = r_U + (r_U - i]\frac{D}{S_L} \qquad (5.9)$$

It is clear that equation (5.9) is equivalent to Modigliani and Miller (1958) expression for the cost of equity in the absence of taxes. As a result, it can be concluded that the expected yield of a share of stock will be equal to the appropriate capitalization rate r_U for all equity stream for a firm with the same business risk class, plus a premium related to financial risk which is equal to the product of the debt-to equity ratio and the difference between the all equity firm's cost of capital and the cost of debt.

Corporate tax

If corporate tax is introduced only without personal taxes into equation (5.8) then this will produce equation (5.10):

$$r_L = r_U + (1 - T_c)[r_U - i]\frac{D}{S_L} \qquad (5.10)$$

Equation (5.10) is equivalent to Modigliani and Miller (1963) for the cost of equity where the equity risk premium from leverage in equation (5.10), $[r_U - i]$, is smaller by a factor of one minus the corporate tax rate $(1 - T_c)$. As a result, the leverage related risk premium is decreased by the tax benefit from the debt interest deduction.

Investor level taxes

After introducing investor level taxes, the value of the tax benefit from debt depends on the marginal investor's relative tax rates on interest and equity income. Where, if the tax rate on interest income is greater than the tax rate on equity income, the value of the tax benefit from debt will be reduced and the equity risk premium associated with leverage will be increased.

Empirical predictions

To derive hypotheses as to how corporate and personal taxes affect the relation between the cost of equity and capital structure equation, the derivative of r_L with respect to $\frac{D}{S_L}$ in equation (5.8) will be taken as follows:

$$\frac{\partial r_L}{\partial D/S_L} = (1 - T_c)[r_U * \frac{(1 - T_s)}{(1 - T_d)} - i] \qquad (5.11)$$

Equation (5.11) represents the theoretical equity risk premium from leverage, the derivative will be positive as long as $r_U * (1 - T_s) > i(1 - T_d)$. As a result, it can be stated that the effect of leverage on the cost of equity is positive as long as the after tax return on

equity is greater than the after tax return on debt. Consistent with prior literature, the first hypothesis in the thesis will be:

Hypothesis I: ***Ceteris paribus, the cost of equity capital for all firms is increasing in leverage.***

To examine the relation between corporate tax and the cost of equity capital, the equity risk premium from leverage, the derivative of r_L with respect to $\frac{D}{S_L}$ and T_c in equation (5.8) is taken to give:

$$\frac{\partial^2 r_L}{(\partial {}^{D}\!/\!_{S_L})\partial T_c} = -r_U * \frac{(1-T_s)}{(1-T_d)} + i \qquad (5.12)$$

The derivative will be negative as long as $r_U * (1-T_s) > i(1-T_d)$. As a result, it can be stated that the effect of corporate tax on the cost of equity is negative as long as the after tax return on equity is greater than the after tax return on debt. This implies that equity risk premium from leverage is decreasing in the corporate tax benefit provided by the interest expense deduction. Consistent with prior literature, the second hypothesis in the thesis will be:

Hypothesis II: ***Ceteris paribus, the cost of equity capital for all firms is negatively related to the firms' level of corporation tax.***

To investigate the relation between investor level taxes and the cost of equity capital, the equity risk premium from leverage, the framework of DeAngelo and Masulis (1980) will be applied by utilizing $[\frac{(1-T_s)}{(1-T_d)}]$ as the measure for the personal tax disadvantage of debt. DeAngelo and Masulis (1980) argue that this ratio captures the relative pre tax rates of return demanded by debt and equity holders. They find this ratio is increasing in the personal tax disadvantage of interest income and multiplied by $(1-T_c)$ in equation (5.1)

gives the net gain to leverage. To determine the effect, the derivative of r_L with respect to $\frac{D}{S_L}$ and $[\frac{(1-T_s)}{(1-T_d)}]$ in equation (5.8) will be taken to obtain[51]:

$$\frac{\partial^2 r_L}{(\partial D/S_L)\partial[\frac{(1-T_s)}{(1-T_d)}]} = r_U * (1-T_C) > 0 \qquad (5.13)$$

Equation (5.13) indicates that the equity risk premium from leverage, the cost of levered equity, is increasing in the personal tax disadvantage associated with debt.

Consistent with prior studies such as Miller (1977) and DeAngelo and Masulis (1980), it can be stated that if the tax rate on interest income increases relative to the tax rate on equity income, bondholders will demand higher relative pre tax returns to have the same relative after tax earnings. This implies that the equity risk premium from leverage is increasing in the personal tax penalty on interest income.

Consistent with prior literature which supports the notion that the tax consequences of capital structure decisions are relevant to equity holders' expected returns, the third hypothesis in the thesis will be:

Hypothesis III: Ceteris paribus, the cost of equity capital for all firms is positively related to the level of investor taxes.[52]

Corporate tax for REITs

To investigate the effect of the corporate tax exemption for the UK-REITs' cost of equity capital, equation (5.12) will be used: prior to 1st January 2007 $T_c > 0$ and subsequently $T_c = 0$. Consequently, it is expected that if REITs have debt in their capital structure after January 2007, their cost of equity capital will significantly increase compared with their cost of equity before January 2007. On the other hand for REITs which do not have debt capital their cost of equity capital should not significantly change after January 2007. This argument can be considered as a specific case of the second hypothesis. The fourth hypothesis will be constructed as following:

Hypothesis IV: ***Ceteris paribus, UK-REITs' cost of equity capital will increase following their post 1 January 2007 exemption from corporation tax.***

[51] See Pratt and Grabowski (2008).
[52] Investor taxes include dividends and capital gains taxes.

5.3.3. Capital structure and implied cost of equity capital estimates

It was explained in chapter four that obtaining an infinite series of future cash flows is impossible in practice, therefore cost of capital estimation models rely on finite horizon, terminal value estimates. The definition of terminal value varies between the various estimation models. This thesis uses four alternate models as follows: Gebhardt, Lee and Swaminathan (2001) who assume that a firm's return-on-equity (ROE) reverts to the industry-level ROE beyond the forecast horizon; Ohlson and Jüettner-Narouth (2003) and Claus and Thomas (2001) consider that a firm's abnormal earnings growth reverts to an economy-wide level beyond the forecast horizon; and Easton (2004) who relies on the assumption of zero growth in abnormal earnings beyond the forecast horizon.

5.3.3.1. The reliability of cost of equity capital estimation models

To examine the relative reliability of the above employed estimation models, Botosan and Plumlee (2005) will be followed by comparing the implied cost of equity capital estimated in the four models. This will involve examining the correlations among the various measures and the association between cost and firm-specific risk factors. The aim of these tests is to investigate whether the estimates reflect any variation in ''true'' cost of equity capital are associated with firm-specific risk in a consistent and predictable manner. In other words, the criteria of this assessment are the extent to which these estimates are related with firm risk in a stable and meaningful manner and the correlations among them.

Studies which assess the implied cost of equity capital estimation models such as Botosan and Plumlee (2005) show that Gebhardt, Lee and Swaminathan (2001) is not consistently related to risk proxies. Guay, Kothari and Shu (2005) find that Gebhardt, Lee and Swaminathan (2001) is the best predictor of future realised returns. Limiting empirical analysis to just one measure may produce spurious results if particular attributes of the model are correlated with variables of interest. So the researcher agrees that using more than one model will provide more accurate results. Specifically, to mitigate the effect that the particular assumptions of a particular model might have on the thesis's results, the methodology of Hail and

Leuz (2005) will be followed by using the mean of the four implied cost of equity estimates in the empirical tests. Also the results for the individual cost of equity estimates will be presented to understand how the associations between leverage, taxes, and the cost of equity vary across the models.

To validate the thesis's cost of equity estimation models for UK firms, the empirical properties of these models have previously been tested on US data only, the models will be estimated on a random sample of non property UK firms and if the results are consistent with the literature, then it will concluded that these models are valid for UK firms.

To formally test their reliability two further hypotheses will be tested in respect of the cost of equity estimates. Firstly, that there are high positive correlations among the various estimates, and secondly, that the estimates are significantly related with firm risk proxies (such as taxes, leverage, market volatility, Fama and French risk factors, Book/Market ratio, long term growth in earnings, earnings variability, and information environment and liquidity). More formally, the fifth and sixth hypotheses will be:

Hypothesis V: ***Ceteris paribus, there are significant positive correlations between the various Implied Costs of Equity estimates.***

Hypothesis VI*: Ceteris paribus, there are significant correlations between the various Implied Cost of Equity estimates and the risk proxies for all firms.*

5.4. Research methodology

5.4.1 Thesis sample

The sample of this thesis consists of three categories of UK quoted firms: REITs, other non REIT property firms and a sample of non-property firms. All UK REITs, pre and post conversion to REIT status, were included in the sample and their data was collected from the period 2000 - 2009. The final number of REITs listed on London Stock Exchange Main Market is eighteen firms. All other non REIT property firms, i.e. remaining firms listed in the "Real Estate" industry sector were included for the same period. These property firms are also required to be listed on London Stock Exchange Main Market to allow comparable share price data to be obtained. The required data includes financial accounting information, daily share prices and I/B/E/S consensus earnings forecasts in order to calculate earnings' growth rates for use in the Implied Costs of Equity. The final number of non REIT property firms is twenty three.

A random sample of 75 non property UK quoted firms was drawn from London Stock Exchange's official list. The aim of including these non-property firms into the sample is to use them as a benchmark to validate the implied cost of equity capital estimation models absent any specific characteristics of property companies.

These non-property firms were required to meet the following criteria:

1- Fully listed on London Stock Exchange Main Market. The aim of this criterion is because REITs must be quoted in main market;

2- Firm has to have the necessary accounting data and stock daily prices from DataStream to be able to test the hypotheses;

3- Firm has to have a one-year-ahead and a two-years-ahead earnings-per-share forecast from I/B/E/S; and

4- Exclude any financial companies given their unique business and regulatory characteristics. Considering the above criteria, the resulting sample is fifty eight non property firms as result of the effect of data filter.

From the initial sample of 75 due to subsequent data restrictions a useable sample of 58 was obtained. Consequently, the total number of companies in the sample comprised became ninety nine UK firms, 58 non property firms, 23 property firms and 18 REITs.

5.4.2. Thesis model

The estimated model will consist of the dependent variable, the implied cost of equity capital and a range of independent variables. In turn the dependent variable will be the average implied cost of equity for the four methods and also these models will be individually used. The aim of using the average implied cost of equity is to avoid any effect of an individual model's implied assumptions. While the independent variables will be as follows: leverage, dividend policy, personal and corporate taxes, and other market risk proxies. [53]

5.4.2.1. Estimating implied cost of equity capital (dependent variable)

The four implied cost of equity capital estimation models will be Gebhardt, Lee and Swaminathan' Model, Claus and Thomas model, Ohlson and Jüettner-Narouth model, and Easton model.

1- Gebhardt, Lee and Swaminathan (2001)

Gebhardt, Lee and Swaminathan (2001) model will be employed in this thesis to estimate implied cost of equity. Following their methodology, a two-stage model has been constructed to estimate the implied cost of capital: in the first stage, the value of firm using consensus earnings forecasts has been calculated over a three year period. In the second stage, up to 6, 10, 15 and 18 years respectively, the industries' median ROE from period t+3 is used as the growth rate for the firm's returns. The implied assumption is that there is linear interpolation between the ROE period t+3 and the industry median ROE.

To compute an industry ROE, the stocks were grouped into one of the 22 industry classifications; one for REITs, one for property firms and twenty different categories as represented by the random non-property firms. The industry ROE is a moving median of

[53] These independent variables will be explained in next paragraph.

past ROEs over a five year period for all firms in the same industry after excluding the loss firms. Loss making forms are excluded on the basis that the population of profitable firms better reflects long-term industry equilibrium rates of returns (Gebhardt, Lee, and Swaminathan, 2001). The Gebhardt, Lee and Swaminathan (2001) model can be expressed in equation (5.14) below[54]

$$P_t = B_t + \frac{FROE_{t+1} - r_{gls}}{(1+r_{gls})} B_t + \frac{FROE_{t+2} - r_{gls}}{(1+r_{gls})^2} B_{t+1} + TV \qquad (5.14)$$

Where:

$$\text{TV} = \sum_{i=3}^{T-1} \frac{FROE_{t+i} - r_{gls}}{(1+r_{gls})^i} B_{t+i-1} + \frac{FROE_{t+T} - r_{gls}}{r_{gls}(1+r_{gls})^{T-1}} B_{t+T-1}$$

Then by solving the equation (5.14) for r_{gls}, the implied cost of equity can been estimated. This non-linear equation was solved using Maple (13) mathematical software which employs an iterative goal seeking process in order to calculate r_{gls}. The mean of annual Implied Costs of Equity (ICE) using the GLS estimation model are listed in Table (3) in Appendix (2).

2- Claus and Thomas (2001)

Claus and Thomas (2001) use a two-stage model to estimate the implied cost of equity. In the first stage, the value of the firm using consensus earnings forecasts has been calculated over a five year horizon. In the second stage beyond year five, the valuation is achieved by employing an abnormal earnings growth rate and expected inflation rate. Two growth rates have been employed: the first, G2, is the sell side forecasted growth rate in forecast earning per share for the third to fifth year ahead, this is used is the first stage calculation. The estimated second growth rate, *gae*, is the estimate growth in abnormal earnings. This is given as the difference between three-month UK Treasury Bills risk-free rate (*rf*) at the end of financial year and the UK expected inflation rate. Claus and Thomas (2001) model is measured in equation (5.15) below:

$$P_t = B_t + \frac{ae_1}{(1+r_{ct})} + \frac{ae_2}{(1+r_{ct})^2} + \frac{ae_3}{(1+r_{ct})^3} + \frac{ae_4}{(1+r_{ct})^4} + \frac{ae_5}{(1+r_{ct})^5} + \frac{ae_5(1+g_{ae})}{(r_{ct}-g_{ae})(1+r_{ct})^5} \quad 5.15)$$

[54] Please see page No. 125 for the variables' definitions

Then by solving the non linear equation (5.15) for r_{ct}, the implied cost of equity is estimated. As with the first model, the equation was solved using Maple (13) mathematical software. The mean of annual Implied Costs of Equity (ICE) using the CT estimation model are listed in Table (3) in Appendix (2).

3- Ohlson and Jüettner-Narouth Model (2000)

Ohlson and Jüettner-Narouth (2000) will be employed to estimate a third cost of equity. Replicating their methodology, a specification of the residual income model that relates share price to forthcoming dividends per share and expected earnings has been used to estimate the cost of equity capital. After calculating the sell side analysts' forecast short growth rate (g2), the economy wide factors are incorporated using the three-month UK Treasury bills risk-free rate (*rf*) at the end of financial year and the UK expected long term economic growth rate. Ohlson and Jüettner-Narouth (2001) model is measured in equation (5.16) below.[55]

$$r_{ojn} = A + \sqrt{A^2 + (\frac{FEPS_{t+1}}{P_t})\{g_2 - [(r_f - lteg)]\}}$$

$$A = \frac{1}{2}\{(r_f - lteg) + \frac{DPS_{t+1}}{P_t}\} \qquad (5.16)$$

$$g_2 = \frac{(FEPS_{t+2} - FEPS_{t+1})}{FEPS_{t+1}}$$

The STATA (10) software has been used to solve the equation 5.16 for r_{ojn}, the results are given in Table (3) in Appendix (2).The Stata command file is shown in Appendix (4).

[55] Please see page 129 for the variables' definitions.

4- Easton (2004)

Easton (2004) investigated whether models of earnings and earnings growth can be employed to estimate the cost of equity capital. He uses the price to earnings growth ratio (PEG) to estimate the cost of equity capital. Easton (2004) shows how the difference between accounting earnings and economic earnings can reflect the role of accounting earnings in valuation. The Easton model is derived from OJN model equation (4.22) after assuming $(r_{rf} - ir) = 0$ i.e. no growth in abnormal earnings beyond the forecast horizon.

Following Easton (2004) methodology, the model of earnings growth has been used to estimate the cost of equity capital using the information in the price to earnings growth ratio. Easton (2004) model is defined in equation (5.17)

$$r_{Easton} = \sqrt{\frac{FEPS_{t+2} + r_{Easton} FDPS_{t+1} - FEPS_{t+1}}{P_t}}$$

$$\Leftrightarrow \qquad (5.17)$$

$$r_{Easton} = \frac{FDPS_{t+1}}{(2 * P_t)} + \sqrt[2]{\frac{(FEPS_{t+2} - FEPS_{t+1})}{P_t} + \frac{(FDPS_{t+1})^2}{(2 * P_t)^2}}$$

The STATA (10) software has been used to solve the equation 5.16 for r_{Easton}, the results are given in Table (3) in Appendix (2).The Stata command file is shown in Appendix (4).

In summary, the dependent variable in the subsequent regression analysis will be both the individual estimates from each of four above models and then the mean implied cost of equity based on the four models. The aim of using the mean implied cost of equity is to avoid any potential distorting effects on any one model due to its specific assumptions.

5.4.2.2. Independent variables

Corporate and investor level taxes

A- Corporate tax

Equation (5.11) states that the effect of leverage on the implied cost of equity capital is a function of the firm's tax rate T_c. Usually; if a firm expects to have positive taxable income in near the future then the firm's tax rate T_c will be equal to the top marginal corporate tax rate. The literature review in this thesis showed that debt's level should be increasing in the firm's marginal tax rate. To measure the tax benefit from debt, proxies for a firm's marginal tax rate should be established based on both earnings pre and post interest costs. Firms with higher levels of debt will have less taxable income and this may reduce their marginal tax rate. This means that there can be negative relation between leverage and the marginal tax rate after financing (Graham, Lemmon and Schallheim, 1998).

To estimate firms' marginal tax rate, Graham (1996a) employs a simulated marginal corporate tax rate based on income before considering financing cost. He defines the corporate marginal income tax rate as the present value of current and expected future taxes paid on an additional dollar of income earned today. The empirical estimation of this rate was explained in chapter three. It was also explained in the second chapter that the UK tax system does not restrict the carry forward of tax losses by time unlike, for example, under the US tax system which applies a 20 year maximum carry forward. Consequently it is not possible to simulate an objective marginal tax rate for UK firms.

As an alternate proxy, Graham (1996b) used the statutory marginal tax rate obtained from applying the statutory tax rate on proxied contemporaneous taxable income and multiplied by a taxable income variable. This variable has a value equal to one if taxable income is positive and zero otherwise. Based on this approach in this thesis a dummy variable is used as the corporate tax rate proxy. This is equal to one if the firm pays corporate tax, i.e. it is a non-property firm, a non REIT property firms or a "REIT" prior to joining the UK REIT regime. For REITs the variable will have a value of zero.[56]

[56] Please see chapter three for more details.

B- Investor level taxes

Before investigating the effect of investor level taxes on interest and dividend and capital gains, T_d and T_s, the concept of the marginal investor should be defined. In theory, the marginal investor can be defined as the one who trades (most likely to be the buyer or seller on the next trade) at the margin and determines a stock's price. In other words, the marginal investor is a representative investor whose actions reflect the beliefs of those people who are currently trading a stock. No one can determine who the marginal investor is but it is reasonable to conclude that it will be an institutional investor (an insider) when the most of the stock is held by institutional investors (one or more of the large stockholders is part of the top management).

In all risk and return models in finance, it is assumed that the marginal investor is well diversified so the only risk that he or she cares about is the risk added to a diversified portfolio or market risk. The investment's risk will always be perceived to be higher for an undiversified investor than for a diversified one even if both have the same expectations about future earnings. As a result of the difficulties in identify the marginal investor, the tax status of the marginal investor has to be assumed or inferred by the researcher by using the existing data.

For example to estimate the marginal investor's tax rate on interest income (T_d), the difference between the yield on one-year taxable and tax-exempt bonds divided by the yield of taxable bond can be used as proxy for marginal tax rate. However, this proxy may include a significant error due to its sensitivity to the volatility of the tax rates during studied period (Poterba, 1989). To avoid potential error in Poterba's (1989) measure, the thesis will initially assume that the marginal investor in a firm's debt is a fully taxable individual. The rate T_d for any year of the sample period is therefore equal to the top marginal tax rate on ordinary income during that year.

In the hands of individuals, equity income can be taxed at differential rates depending on the character of the income. Prior to 6th April 1999, dividend income (T_s) was taxed at the same as savings income, after that date dividend income was subject to its own rate as follows: at 10% up to the basic rate limit and above that at 32.5%. As the tax treatment for dividend income earned by individuals differs, also the tax treatment for capital gains can have a different rate. In equation (5.8) (T_s) should represent a weighted-average tax rate on both dividend and capital gains income. However, in practice, as discussed later this is not necessary in the particular setting of this thesis.

Of course, the marginal investor may not be a taxable individual. Bell and Jenkinson (2002) investigate whether tax exempt investors, mainly pension funds, are the marginal investors in the UK equity market. By examining the abolition of the repayment of the dividend tax credit to tax exempt investors, they found that a decrease in the valuation of dividend income after 1997 for high-yielding companies was bigger than for the lower yielding companies. They concluded that although tax-exempt investors were the marginal investor in higher yielding companies they were not the marginal investors in lower yielding companies. Their results are consistent with the tax-clientele hypothesis as tax-exempt investors should have had a strict preference for dividend distributions over retained profits.

Based on Bell and Jenkinson (2002), it cannot be assumed that the marginal investor in all firms is a tax exempt investor. Therefore it will be necessary to consider investor level taxes. Gordon and MacKie-Mason (1990) estimate T_S by utilizing the following equation:

$$T_s = [D + (1 - D) * g * \alpha] * T_D \qquad (5.18)$$

Where: D is the amount per after-corporate tax dollar of earnings which will be paid to shareholders, T_D is the income tax rate on debt interest, g represents one minus the exclusion ratio for long term capital gains income[57], and α is the benefit of deferring the taxation of capital gains, and Ts represent the marginal investor's tax rate on the dividends.

Dhaliwal, Heitzman, and Li (2006) develop Gordon and MacKie-Mason' (1990) equation (5.18) to consider the equity tax rate measure based on the Jobs and Growth Tax Relief Reconciliation Act of 2003 (JGTRRA 2003). They arrive to the following equation:

$$T_s = [D * T_D + (1 - D) * \alpha * T_{cg}] \qquad (5.19)$$

Where: T_D is the marginal rate on dividend income, T_{cg} is set equal to the top statutory tax rate on capital gains income, and α is the benefit of capital gains deferral. They defined D

[57] This ratio can be defined as the portion of the return on investments which is exempt from capital gains due to it being the repayment of the investor's initial investments rather than a capital gain.

as the dividends paid for the most recent year divided by the average earnings over the prior three years.

After estimating (T_s) from the equation (5.19), Dhaliwal, Heitzman and Li (2006) define the personal tax penalty associated with debt for individual investors as the relative tax disadvantage of receiving a pound of interest income versus a pound of equity income. In this thesis, the researcher will follow Dhaliwal, Heitzman, and Li (2006) by assuming that the proxy for any disadvantage under personal tax associated with debt financing will be $(1-T_s)/ (1-T_d)$. The top statutory rate on ordinary income will be used as proxy for investor level tax rate on interest income. The top statutory tax rate on dividend and capital gains will be used as proxy for investor level tax rate on equity income.

It is also possible to measure the effect of investor taxes indirectly by examining dividend policy. In the absence of investors level taxes, Modigliani and Miller (1963) show that dividend policy does not affect firm value. However, any difference in tax rates between the dividends and capital gains can change their conclusion, as discussed in chapter 3. Brennan (1970) shows that if the dividend tax rate is higher than capital gains tax rate, the cost of equity capital should increase in dividend yield. Ayers, Cloyd and Robinson (2002), Dhaliwal, Li and Trezevant (2003), Dhaliwal, Heitzman and Li (2006) support by empirical evidence the prediction of Brennan (1970).

To investigate whether dividend taxation affects expected returns, Dhaliwal *et al.* (2004) first construct a model of the before tax expected return on equity, R_{BT}, as:

$$R_{BT} = \frac{R_F}{1-T_{cg}} + \frac{(T_d - T_{cg})}{(1-T_{cg})} y \qquad (5.20)$$

Where R_F is the return on a tax free security at the same risk level and y is the expected dividend payment divided by equity value. To highlight the effect of a firms' dividend policy on the cost of equity Dhaliwal et al. 2004 assume that equation (5.20) holds within a risk class with constant level of leverage. If leverage is set equal to zero, then it follows that:

$$R^{(D/S=0)}{}_{BT} = \frac{R^{(D/S=0)}{}_{F}}{1-T_{cg}} + \frac{(T_d - T_{cg})}{(1-T_{cg})} y$$

$$R^{(D/S=0)}{}_{BT} = r_{UZ} + \frac{(T_d - T_{cg})}{(1-T_{cg})} y = r_U \qquad (5.\ 21)$$

Where:

r_{UZ} : is the cost of capital for un-levered firm which does not pay dividends.

By substituting equation (5. 21) for r_U in equation (5.8), equation (5.22) can be obtained.

$$r_L = r_{UZ} + \frac{(T_d - T_{cg})}{(1-T_{cg})} y + (1-T_c)[(r_{UZ} + \frac{(T_d - T_{cg})}{(1-T_{cg})} y) * \frac{(1-T_s)}{(1-T_d)} - i]\frac{D}{S_L} \qquad (5.22)$$

Dhaliwal et al. (2004) conclude that a firm's dividend policy has two potential effects: first, it will increase the cost of equity when dividends are tax disadvantaged independent of leverage, and second, it will affect the equity risk premium from leverage via both T_s the weighted-average tax rate on equity income, and r_U , the cost of capital for un-levered firm. It can be noted from equation (5.22) that if y=0 or T_d=T_{cg} then the equity risk premium from leverage is not a function of dividend tax rate.

Based on the above a dividend policy or yield variable will be included as a control. The yield variable is the ratio of last quarterly dividend paid in previous year to stock price as proxy for the influence of dividend policy.

Control variables

In assessing the influence of taxation on the implied cost of equity capital, it is necessary to control for other potential relevant factors. So in the following subsections, various risk variables and firm characteristics will be described. These variables can be classified into five categories: leverage, market volatility, liquidity and information environment, earnings variability and other variables.

1- **Leverage**

Modigliani and Millar (1958) show that the risk premium relating is a function not only of the level of debt but also the corporate tax rate. Therefore in addition to testing the relationship between leverage and cost of capital, an interactive variable capturing the level of debt and corporate tax rate will be employed.

Empirically, Fama and French (1992) find a positive relation between market leverage and ex post mean stock returns. In this thesis ex ante returns are examined. Gebhardt, Lee and Swaminathan (2001) employ two measures of firm leverage, book leverage which is the ratio of total long-term debt to total book value of equity from the most recent fiscal year end, and market leverage which is the ratio of total long-term debt from the last fiscal year end to the total market value of equity at the same date. Following the argument that market leverage is more relevant than book leverage (see, for instance, Welch, 2004), this thesis uses market leverage. The long-term debt and equity market data were obtained from DataStream.

Modigliani and Millar (1958) show that the risk premium is a function of not only the level of debt but also the corporate tax rate. Therefore in addition to testing the relationship between leverage and cost of capital, an interactive variable capturing the level of debt and corporate tax rate will be employed.

2- Market volatility

The Capital Asset Pricing Model indicates that there is positive relationship between the cost of equity capital and a stock's market beta (Easton, 2007). Based on the literature, the market beta of each stock has been calculated based on a five-year rolling regression using

monthly data for firms and the FTSE all shares index as a proxy for the market return. The firms' returns are then regressed on the market returns to obtain beta estimations. These regressions are reported in table (5) in appendix (2). The required data share price and FTSE All Share Index values were been obtained from DataStream.

3- Information environment and liquidity

Gebhardt, Lee and Swaminathan (2001) show that there is positive relation between a firm's investing risk and level of company information available. They reason that information about larger firms is more readily available than for smaller firms. They use market capitalization of equity as a proxy for information availability. Another proxy for the availability of information was introduced by Brennan and Subrahmanyam (1995). They argue that stocks with greater analyst coverage react faster to market-wide common information than firms with less analyst coverage concluding that number of analysts could be used as another proxy of availability of information. Specifically, they expect that there is a negative (positive) relation between number of analysts and cost of equity capital (liquidity). However, to be consistent with the previous literature on calculating implied cost of capital, this thesis will employ the market capitalization of equity as a proxy of information availability and illiquidity. The equity market value at the end of fiscal year has been obtained from DataStream.

4- Earnings variability

In practice, the variability of reported earnings can be considered as a source of risk for firm valuation. Financial practitioners consider that the earnings variability may capture fundamental cash flow risk. However, this area of research has not been studied by a large number of academic studies (Madden, 1998). This thesis will follow Dhaliwal, Heitzman and Li (2006) methodology by using the natural logarithm of the dispersion of analyst forecasts of current earnings to capture the variability of a firm's expected earnings stream. The dispersion of analyst forecasts is defined as the coefficient of variation of the current fiscal year forecast as of the end of fiscal year. Taking the natural logarithm of this coefficient reduces the impact of potential outlier values.

5- Other market variables

A- Long term growth in earnings (Ltg)

This variable is defined as the mean of long term earnings growth rate from I/B/E/S, if available or the ratio of forecasted earnings two-year-ahead to one-year-ahead. Gebhardt, Lee and Swaminathan (2001) gives two reasons to justify the variable's inclusion as a control variable in estimating implied cost of capital. The first reason is based on La Porta (1996) which shows that high (low) *Ltg* firms earn lower (higher) subsequent returns. La Porta argues that this result is due to analyst over-optimism with the firms with high *Ltg*. If firms with high (low) *Ltg* tend to have optimistic (pessimistic) earnings forecasts and hence their stock prices that are too high (low), it is expected that these firms will have abnormally low cost of equity capital. Gebhardt, Lee and Swaminathan (2001) state that a second reason arises if the valuation model understates the expected cash flows of growth (high Ltg) firms, it is expected that these firms will appear to have (abnormally) lower cost of equity capital. Based on the above argument, it is expected that there is a negative relation between *Ltg* and cost of equity capital.

B- Book/market (B/M)

Fama and French (1992) and Lakonishok, et al. (1994) provide evidence that firms with high Book to Market ratios (B/M) earn higher ex post returns than firms with lower B/M. This result is based on the argument that if stocks with high B/M ratios are undervalued these stocks should have an abnormally high cost of equity capital until the mispricing is corrected. On the other hand, if these stocks face high systematic risk as suggested by Fama and French (1992), these stocks should have an appropriately high cost of equity capital (Berk, et al., 1999). The B/M ratio is not only considered as risk proxy, but also controls for long term mispricing as there is evidence that the aspect of mispricing has a relatively long reversion horizon (Frankel and Lee, 1998).

C- **Fama and French risk factors (SMB and HML)**

Fama and French (1993 and 1997) conclude that the variation in firms' expected returns cannot be explained fully by beta as the CAPM predicts. The notion behind including the Fama and French risk factors is based on the empirical finding that a security's return depends on the sensitivity of its return to the market movement and to the returns on two portfolios designed to capture two additional risk factors. These two portfolios are SMB (small minus big) and HML (high minus low book to market ratios).

There are a number of logical steps in estimating the SMB and HML factors but these steps differ across the studies in their application. These differences in application will be highlighted later. The construction of these factors is based upon linear aggregations of the returns of various portfolios formed on the basis of the size and the book-to-market ratio of firms. The steps in estimating the SMB and HML factors are: the portfolio's construction date; the definition of size and book-to-market; the portfolio formation; the break points; and the returns weights (Michou, Mouselli and Stark, 2007).

For the portfolio construction date, the date by which the firms are ranked into size and book-to-market portfolios, this date is chosen by the researcher either as a specific date for all firms or at the end of a financial year. This thesis will construct the SMB and HML portfolios on the financial year end for each firm because using a common date requires estimating the book value for firms whose year end does not fall on the selected common data.

For the definition of size and book-to-market, the definition of size in the literature is the firm's market value which is equal to the number of ordinary shares multiplied by the share price at the end of its financial year. The definition of the book value of equity is the firm's equity capital plus reserves as reported in the firm's balance sheet.

Within existing UK studies there are three alternative sorting methods used in the formation of the portfolios, Gregory, Harris and Michou (2001), Al-Horani, Pope and Stark (2003), Hussain, Toms and Diacon (2002), Liu Strong and Xu (1999), Dimson, Nagel and Quigley (2003) and Miles and Timmermann (1996). The three methods are: independent sort, subsequent sort and "other" sort. The independent sort is the most

popular sorting method which has also been applied by Fama and French (1993, 1995 and 1996). Due to its robustness it is used in this thesis. Its methods as follows:

After choosing the date of portfolio formation e.g. 31 December 2005, the stocks are allocated into two groups, i.e. small (S) or big (B), based on their market value. The stocks are also be allocated in an independent sort into one of three book-market (BM) groups, low (L), medium (M) or high (H). Firms with negative book-market are excluded from the sorts. Six size-BM portfolios (S/L, S/M, S/H, B/L, B/M and B/H) are then be created from the intersections of the two size and three BM groupings. Finally, monthly returns for these portfolios are calculated for the following 12 months from e.g.1 January 2006 to 31 December 2006. The size factor (SMB) return is defined as the difference every month between the average of the returns on the three small portfolios S/L, S/M and S/H and the average of the returns on the three big-stock portfolios B/L, B/M and B/H. The book-to-market factor (HML) return is defined as the difference between the average of the returns on the two high BM portfolios S/H and B/H and the average of the returns on the two low BM portfolios S/L and B/L. In other words, the risk factors (SMB and HML) are calculated as:

$$SMB = (S/H + S/M + S/L)/3 - (B/H + B/M + B/L)/3 \qquad (5.\ 23)$$
$$HML = (S/H + B/H)/2 - (S/L + B/L)/2$$

One of the sorting methods used in the formation of the portfolios is the subsequent sort in which the stocks should be allocated first into two size groups B (Big) and S (Small) for each year. Then another sort is performed within each size group into three BM groups. Finally, the risk factors are calculated as equation in equation (5. 23) above (Fletcher, 2001 and Fletcher and Forbes, 2002).

The main difference between the independent sort and the subsequent sort is the number of stock allocated to each of the six size-BM portfolios. The subsequent sort will result in exactly the same number of stocks in each of the three portfolios within each size group, whereas the independent sort may not result the same number and this difference will be mitigated by using the average in equation (5. 23). The "other" sort method, such as that used by Fletcher and Kihanda (2005) constructs SMB portfolios sorted by only size. To construct the HML factor, Fletcher and Kihanda (2005) employed the difference in

monthly returns between the Morgan Stanley Capital Investment (MSCI) UK value and growth indices.

Break points refer to the level of market values which are used to distinguish between small and big firms. The choice of market value breakpoints usually depends on the sample size. In case of large samples, the sample of stocks is split into two size groups according to the median of sample of market value. This ensure that the same number of stocks is allocated to each size group (Miles and Timmermann, 1996), Liu Strong and Xu (1999), Fletcher (2001), Hussain et al. (2002), Fletcher and Forbes (2002) and Al-Horani, Pope and Stark (2003). In case of small samples which do not represent their industries effectively, the market value of each sample firms should be compared to the median market value within its industry. In this thesis common market wide Fama and French Risk Factors are used in preference to industry specific risk factors given the relatively small sample sizes.

To choose the BM breakpoints (to distinguish between high and low BM ratios), the common method is to split stocks into three groups as in Fama and French (1993). Specifically, stocks can be ranked as low BM (L) when their BM ratios is in the lowest thirty percent of firms, medium BM (M) when their ratios in the middle forty per cent and high BM (H) when their ratios in the top thirty per cent (Fama and French, 1993). Dimson, Nagel and Quigley (2003) chose their breakpoints at the 40th and 60th percentiles. Fletcher (2001) and Fletcher and Forbes (2002) split each size portfolio into three BM groups with exactly the same number of stocks. As a result, the BM breakpoints are relative to the particular size portfolio, they then used the subsequent sort. This thesis will follow the same steps which are explained above to estimate the SMB and HML risk proxies. The thesis's stocks will be spilt into three groups with 30% and 70% as breakpoints after excluding the negative BM ratios.

For the weights used in forming the portfolio returns, the most common methods is by following a form of value-weighted approach in computing the portfolio returns which used to obtain the SMB and HML returns. Although most UK papers have employed the value-weighted approach these papers applied different strategies. Specifically, Fletcher and Kihanda (2005), Dimson, Nagel and Quigley (2003) and Gregory, Harris and Michou (2001) employed the value weights at the end of June as the weights for every month of the holding period. However, Liu Strong and Xu (1999) use value weights defined at the end of June and December. Other papers applied the value-weighted method with weights

defined by the market value at the beginning of each month. A third approach was employed by Fletcher (2001) who used an equally-weighted approach.

This thesis will employ the value-weighted approach because it reflects the size and the nature of each industry. More specifically, the returns will be weighted by the market value at the end of financial year to be consistent with the portfolio construction date. The estimation of the market beta is as described previously.

D- Industry effects

Gebhardt, Lee and Swaminathan (2001) indicate that there is a significant industry effect in their implied risk premium. They note that the market consistently ascribes a higher discount rate to certain industries. They argue that employing the realized returns as proxy for expected returns will obscure or make these industry effects statistically insignificant due to the more volatile nature of average realized returns. Also they note that the firms' implied risk premiums are consistently higher in some industries, such as: sports and leisure, tobacco, Banks, electronic technology and automotive. Conversely, the implied risk premium is consistently lower for firms in other industries, such as: real estate, precious metals and medical equipment.

They state that the difference across these industry groupings is economically significant, and the robustness of these effects over long period suggests industry membership should be an important characteristic in cost-of-capital estimations.

To control for industry risk differences independent of capital structure, industry fixed effect dummies will be included into the thesis's models.

Empirical considerations

Within a UK setting, it is necessary to adapt the above variables because of the specific features of UK tax systems. As already explained the corporate tax rate is proxied by a firms' REIT/Non-REIT status. Further because of the lack of variation in investor level tax rates is not possible to include variables utilising these measures because they are in effect a time dummy variable. It was mentioned in chapter two that the UK income tax rate and tax rate on capital gains have been only changed once (e.g. capital gains tax rate was reduced from 20% into 18%) during the whole sample period. Due to the lack of variation,

the presence of any investor level tax effects on the implied cost of equity capital will be captured by the dividend yield variables as described above.

5.4.2.3. Summary of models:

The first model which will be estimated on the sample of non-property firms will be designed to judge the appropriateness and limitations of the variables in explaining the variation in implied cost of equity before there use in examining the property and more specifically, the REIT firms. The model is as follows:

$$r_{icei,t} = \alpha_1 + \beta_1 DE_{i,t} + \beta_2 Yield_{i,t} + \beta_3 BETA_{i,t} + \beta_4 SMB_{i,t}$$
$$\beta_5 HML_{i,t} + \beta_6 Disp_{i,t} + \beta_7 LTG_{i,t} + \beta_8 MV_{i,t} + \sum_{i=9}^{14} \beta_i \text{Ind}_{i,t} + \varepsilon_{i,t} \quad \text{Model (1)}$$

The second model as described below will be estimated over the sample of property firms .i.e. both non REIT and REIT in order to provide a better control of industry related risk factors. The model follows model 1 with the addition of an intercept dummy for REIT firm year ends and the deletion of the now redundant industry fixed effect dummies.

$$r_{icei,t} = \alpha_1 + \beta_1 DE_{i,t} + \beta_2 REIT_{i,t} + \beta_3 Yield_{i,t} + \beta_4 BETA_{i,t} + \beta_5 SMB_{i,t}$$
$$\beta_6 HML_{i,t} + \beta_7 Disp_{i,t} + \beta_8 LTG_{i,t} + \beta_9 MV_{i,t} + \varepsilon_{i,t} \quad \text{Model (2)}$$

Model 3 is estimated over the same sample as model two but this time the REIT intercept dummy is replaced by a REIT slope dummy on the DE variable.

$$r_{icei,t} = \alpha_1 + \beta_1 DE_{i,t} + \beta_2 REIT_{i,t} * DE_{i,t} + \beta_3 Yield_{i,t} + \beta_4 BETA_{i,t} + \beta_5 SMB_{i,t}$$
$$\beta_6 HML_{i,t} + \beta_7 Disp_{i,t} + \beta_8 LTG_{i,t} + \beta_9 MV_{i,t} + \varepsilon_{i,t} \quad \text{Model (3)}$$

Model 2 and 3 are subsequently estimated on the REIT firms (including the REIT forms prior to their conversion). Although it is a reduced sample it is a more homogeneous group and therefore provides a better control for industry related risk factors. All the variables' abbreviations and their definitions are presented in Table (1) in Appendix (2).

5.5. Data sources

To estimate the implied cost of equity capital, the data used in the various models will be divided into variables common to the four models, these will be defined in Table (10) in Appendix (2) while variables specific to one or two models be presented in Table 11.

To estimate the Fama and French risk factors, HML, SMB and market beta, the following data is used: firm daily stock prices; the FTSE All Share Index; firms' monthly market value; and book value of equity. These were all downloaded from DataStream for the period 1 January 1995 to 31 of December 2010. The Fama and French risk factors will be presented in Table (6) in Appendix (2).

5.6. Conclusion

This chapter described the research methodology which has been conducted to investigate whether the tax status of REITs has an effect on their implied cost of equity capital. Under specific restrictions, REITs are exempt from corporation tax so they are not able to obtain a corporation tax deduction on their debt interest comparing to tax paying firms (see chapter two).

Previous studies have, by necessity, examined the effect of taxation and implied cost of equity capital on tax paying firms rather than tax exempt firms. The introduction of the REIT legislation allows estimation of implied cost of equity capital for UK REITs both pre and post conversion to examine the relationship between the cost of capital and capital structure in the context of a significant change in taxation (see chapter three). To answer this question and assessing the reliability of the ICEC estimation models, a set of research hypotheses have been constructed based on the capital structure literature. The sample of the thesis includes three different industrial categories, REITs, Property firms and non-Property Firms. All UK listed REITs, pre and post conversion to REIT status, were included in the sample and their data was collected from the period 2000 - 2009. All other listed non REIT property firms for the same period were included. A random sample of non property UK quoted firms was included to use them as a benchmark to validate the

implied cost of equity capital estimation models absent any specific characteristics of property companies.

Using accounting and share price data obtained from DataStream and analysts forecasts obtained from I/B/E/S, three models will be used to test the thesis hypotheses.
The dependent variable (ICEC) will be both the individual estimates from each of four above models and then the mean implied cost of equity based on the four models. The aim of using the mean implied cost of equity is to avoid any potential distorting effects on any one model due to its specific assumptions.

To examine the relative reliability of the above employed estimation models, the implied cost of equity capital estimated in the four models will be compared. This will involve examining the correlations among the various measures and the association between cost and firm-specific risk factors.

Chapter Six: Research results

Chapter Six: Research results

6.1. Introduction

The theoretical and empirical frameworks have been previously designed to answer the research questions and resulting regressions have been estimated. The aim of this chapter is to present and analyse the results of these empirical works based on the capital structure literature.

This chapter will be divided into three main sections excluding this introduction and the conclusion. The first section (6.2) will present the UK property market performance (REITs and non-REITs property companies). The second section (6.3) will present the descriptive statistics for the sample variables. The last section (6.4) will present and analyse the results of regressions along with correlations and sensitivity tests.

6.2. The market performance of UK-REITs and non-REITs property firms

To give further understanding of the REIT industry, this section will capture certain characteristics of REIT and non-REIT property firms.

Firstly the analysis will examine if there are any differences in pre-tax operating profitability. This will help in understanding the source of any differences in the cost of equity capital between REIT and non-REIT property firms. If significant differences were found in this profitability it is important to understand if it arises from business activities or other sources. In which case, it will be necessary to control for profitability or these other factors during calculating the implied cost of equity capital. One such factor may be the level of gearing and debt to equity ratio Therefore, these will be also examined.

6.2.1 – Basis of profitability analysis and its methods

The following profitability ratios will be calculated for REIT and non-REIT property firms to capture the companies' performance; these ratios will be calculated for 20 REITs companies and 20 non- REIT during the period from 2005 to 2008.

The first ratio, the Return on Shareholders' Equity ratio (ROE) is defined as following:

$$ROE_{i,t} = \frac{EAT_{i,t}}{TE_{i,t}} \qquad (6.1)$$

Where:

EAT = Earnings after financing costs and tax for company *i* and year *t* (2005, 06, 07 and 08), and

TE = total equity

The second ratio, Return on Capital Employed (ROCE) is defined as following:

$$ROCE_{i,t} = \frac{EBIT_{i,t}}{TA_{i,t}} \qquad (6.2)$$

Where:

EBIT = Earnings before Interest and Tax for company *i* and year *t* (2005, 06, 07 and 08), and

TA = Total assets.

The last ratio, the Debt to Equity ratio (DER) is defined as following:

$$DER_{i,t} = \frac{TD_{i,t}}{TE_{i,t}} \qquad (6.3)$$

Where:

TD = Total debt for company *i* and year *t* (2005, 06, 07 and 08), and

TE = Total equity.

6.2.2 Method of analysis

The mean profitability for each of the two categories of companies is calculated and the significance of difference in the means assessed using the parametric t-test and the Mann-Whitney non parametric test. The results of this analysis are shown in Tables (a1. 1), (a1. 2), (a1. 3) and (a1.4a) are contained in Appendix (1).

6.2.3. The Results of profitability analysis

Appendix (1) presents the ROE measure and other indicators for both REITs and non-REIT property firms. It can be seen that the ROE decreased heavily in 2007 and 2008 for most REIT though the level of reduction varies by REIT. The effects of this reduction on REITs vary according to their size and specific sector. It was found that there is negative relationship between the REITs' size and the reduction also some REITs which are working in some sectors like the storage (e.g. Big Yellow) have less reduction. This reduction in profitability is consistent with a general reduction in the wider economy. Two distinct patterns can be observed. In the first set of REIT companies, companies numbered 1, 3, 4, 6, 10, 11, 13, 16, 17 and 19 the return on shareholders' equities increased between 2005 and 2006 but after that fell in 2007 and 2008. The second set of REIT companies, companies numbered 2, 5, 7, 8, 9, 12, 14, 15, 18 and 20 show consistent falls starting from 2005 and continuing to 2008. Similar patterns exist in the comparison of non REIT converting property companies. Generally, the return on shareholders' equities have decreased heavily in 2007 and 2008 in most REIT and non-REIT property firms except one REIT (company number 20) and one non-REIT company (company number 3). This decrease is due to the global contraction of this industry which started in 2005. The ROCE measure has a similar pattern as the total return on capital for all REIT companies heavily in 2007 and 2008 for the same reasons.

The debt to equity ratio shows various patterns which should be observed. REIT companies fall into one of two sets. The first set, companies numbered 5 and 7 rely heavily on debt with a mean debt to equity measure about 151% and 1434% respectively. The high percentage for company number 7 was established on 2006 with a level of 4150%. This measure decreased to 64% and 88% in 2006-07 respectively. The second set contains the rest of companies with debt to equity percentages of less than 100%. Three patterns can be observed in non-REIT companies the first set, company numbered 10, 15, 16 and 17. In the non-REIT regime although interest expenses can be deducted from taxable profits this set

of firms does not rely on any debt at all. The second set, companies numbered 2, 6, 8, 12, 13, 14 and 18 includes companies with debt to equity percentages of more than 100%. The final set contains the rest of the companies with debt to equity percentages of less than 100%.

6.2.4 Significance tests

a- Return on shareholder equity

Two sets of tests have been employed a parametric (t-test) and non-parametric test (Mann-Whitney test). Firstly the t-test has been used to test the following hypotheses:

> H_0: there is no significant difference between the annual Return on Shareholder Equity ratio for REIT and non-REIT companies.
> H_1: there is a significant difference between the annual Return on Shareholder Equity ratio for REIT and non-REIT companies.

Table (a1. 1) in Appendix (1) presents the empirical results of the t-tests for each of the four years, 2005, 2006, 2007 and 2008. After comparing the t-statistics with the (5%) critical value, the null hypothesis cannot be rejected in 2005, 2006 or 2007. In 2008 the null can be rejected at the 5% level (t =-1.69 compared with (5%) critical value of ±1.688). This indicates that there is no a significant differences between the annual return on shareholder equity ratios for REIT and non-REIT for three of four years.

Secondly, the Mann-Whitney test was used to investigate the same hypothesis in t-test. Table (1. b) in Appendix (1) presents the empirical results of the Mann-Whitney test for each of the four years, 2005, 2006, 2007 and 2008. As shown none of the Mann-Whitney statistics are significant at normally accepted levels of significance except in 2008.

As a result, the overall picture indicates that there is no a significant differences between the annual return on shareholder equity for REIT and non-REIT for three of four years. In the fourth year, 2008 the mean return on shareholder equity in non-REIT is significantly higher than the REITs' return and this results may due to the REIT's status requirements such as the entry charge.

b- Return on capital employed ratio

As above two sets of tests have been employed a parametric and non-parametric test. Firstly the t-test has been used to test the following hypotheses:

> H_0: there is no significant difference between the annual return on capital employed ratio for REIT and non-REIT companies.
> H_1: there is a significant difference between the annual return on capital employed ratio for REIT and non-REIT companies.

Table (a1. 2) in Appendix (1) presents the empirical results of the t-tests for each of the four years, 2005, 2006, 2007 and 2008. After comparing the t-statistic values with (5%) critical value, the null hypothesis cannot be rejected in 2005 or 2007 but can be in 2006 and 2008. This indicates that there is no a significant differences between the annual return on capital employed ratios for REIT and non-REIT in 2005 and 2007 while there is such differences in 2006 and 2008.

Secondly, the Mann-Whitney test has been used to investigate the same hypothesis. Table (2. b) in Appendix (1) presents the empirical results of the Mann-Whitney test for each of the four years. As shown none of the Mann-Whitney statistics are significant at normally accepted levels of significance except in 2008.

As a result, the overall picture indicates that there is no a significant differences between the total ROCE for REIT and non-REIT for three of four years. In the fourth year, 2008 the ROCE in non-REIT is significantly higher than the REITs' ROCE and this results are consistent with the previous test and this variation may due to the REIT's status requirements (costs) such as the entry charge.

There is therefore evidence of significant variation in profitability between the two sectors after introducing the REITs' regime (especially 2008) but this variation is not consistent across all periods.

c- Debt to equity ratio

Firstly the t-test has been used to investigate the following hypotheses:

H_0: there is no significant difference between the annual Debt to Equity measure for REIT and non-REIT companies.

H_1: there is a significant difference between the annual Debt to Equity measure for REIT and non-REIT companies.

Table (a1. 3) in Appendix 1 presents the empirical results of the t-tests for each of the four years, 2005, 2006, 2007 and 2008. After comparing the t-statistic values with the (5%) critical value, the null hypothesis cannot be rejected in any of the years. This indicates that there is no a significant differences between levels of debt to equity ratio between REIT and non-REIT in any of the years.

Secondly, the Mann-Whitney test has been used to investigate the same hypothesis. Table (3. b) in appendix 1 presents the empirical results of the Mann-Whitney test for each of the four years, 2005, 2006, 2007 and 2008. As shown none of the Mann-Whitney statistics are significant at normally accepted levels of significance. As a result, the overall picture indicates that there is no a significant differences between the levels of debt and equity for REITs and non-REITs.

6.3. Sample statistics

6.3.1 The Descriptive statistics

Definitions and abbreviation of the thesis's variables are presented in Table (1) in Appendix (2)

This part will describe the data and main sample's variables. Table (2) in Appendix (2) reports the sample composition by year and industry category where during the studied period (2000-2009) this number varies between 15-18 for REITs, 10-23 for property non-REITs firms and 40-58 for non-property firms. This variation in the number of firm's sample is due to the following reasons: some firms do not have forecasted data in the early part of the sample period e.g. Big Yellow Group plc, REIT, some of them previously

operated in AIM market e.g. Hansteen Holding plc, REIT and some of them were only established later in the sample period e.g. Local Shopping plc REIT.

6.3.1.1 The Dependent variable - Implied Cost of Equity Capital (ICE)

Table (3) in Appendix (2) reports the descriptive statistics for ICE estimates and realised rate of return for non-property firms (panel a), property firms (excluding REITs) in (panel b) and REITS (panel c) during the period between 2000 through 2009. These estimations have been estimated using four estimation models (GLS, CT, OJN and Easton) and their mean, maximum, minimum and standard deviation.. Table (2 a) in Appendix (2) show that REITs' implied cost of equity may reflect their tax status because the average annual of implied cost of equity is between (5.9-9%) before 2007 and increased after 2007 to be between (7.4-14.5%). This initial result maybe reflects the tax status change. For property firms, the implied average annual was volatile ranging between (7.5-21.4%). For non property firms, the implied average annual was ranging between (15.8-24.2%). Also the figures (1-2-3) in Appendix (4) support this conclusion.

Table (2.a) in Appendix (2) also report the descriptive statistics for realized cost of equity for the sub samples for the period studied by dividing the prices at the end of year and at the beginning of the year minus one [(P1/P0)-1]. These results show that the annual REITs' realised cost of equity and implied cost of equity has nearly the same trend but the realised cost is larger than implied one which may be attributed to the optimism of analysts earning forecasts. The average annual REITs' realized cost of equity range between (10.94-18.75%) over the period studied and 17.5% over ten years. For property firms, the mean realized cost of equity's was higher ranging between (11.62-24.27%) over the same period and 19% over ten years. For non property firms, the mean implied cost of equity's was ranging between (8.8-16.9%) over the same period and 9.5% over ten year (studied period). These results are consistent with Claus and Thomas (1998) where the implied cost of equity is lower than the estimated realized cost of equity.

Tables (4) and (5) in Appendix (2) present the Pearson correlations and Spearman correlation matrices between the implied costs of equity capital estimates and realised rate of return. The Pearson correlations for implied costs of equity capital estimation models vary between 0.1 and 0.22 for non-property firms, 0.19 and 0.46 for property firms and -0.01 and 0.70 for REITs which are lower than the US papers such as Dhaliwal (2006) and

Botosan (2005) which range between 0.415, 0.03 and 0.942 and 0.86 respectively. Consistent with Elton (1994 and 1999), the correlations between the implied costs of equity capital estimates and the realised rate of return are relatively weak. These range from -0.03 to 0.11, -0.014 to 0.057 and 0.08 to 0.207 in non-property, property and REITs' sample respectively. These results support using ex ante rather than realised rate of return to estimate costs of equity capital. In a subsequent section correlations will be examined in the context of assessing the consistency between the various cost estimates.

A Spearman correlation matrix has also been employed as non-parametric version of Pearson correlations. Table (5) in Appendix (2) shows that Spearman's correlations are slightly higher than Pearson's coefficients.

It can be concluded that these correlations are lower in non-property firms compared with the other sub samples and this may due to inconsistency in the industry composition, as the sample contains 20 different industries.

Tables (6a, 6b and 6c) in Appendix (2) present the results of a comparison between the means of the variables in the sub samples i.e. non property firms, property firms and REITs. A t-test is applied to detect whether there are any statistically significant differences between these means. With respect to the various cost of capital estimates the results show that there are significant differences between all five estimates when comparing the Property and REIT samples (Table 6a.) In the other comparisons, i.e. Non property and property (Table 6b); and Non –property and REITS (Table 6c) all of the differences are again significant with the exception of the GLS cost estimates in both cases.

6.3.1.2 The independent variables

Table (6) in Appendix (2) reports the descriptive statistics, mean, maximum, minimum and standard deviation for the various independent variables for non-property firms (panel a), property firms (excluding REITs) in (panel b) and REITS (panel c) during the period between 2000 through 2009.

Tables (6a, 6b and 6c) in Appendix (2) present the results of a comparison between the means of the variables in the sub samples i.e. non property firms, property firms and

REITs. A t-test is applied to detect whether there are any statistically significant differences between these means. With respect to the various cost of capital estimates the results show that there are significant differences between all five estimates when comparing the Property and REIT samples (Table 6a.) In the other comparisons, i.e. Non property and property (Table 6b); and Non–property and REITS (Table 6c) all of the differences are again significant with the exception of the GLS cost estimates in both cases.

Differences occur with the independent variables between the sub-samples. The Property (non REIT) is on average significantly smaller than the REIT firms and has a higher BETA (Table 6a). The non-property firms and REITS are less alike where several significant differences arise. The non-property firms are on average larger than the REITS in terms of size, have a higher mean BETA and a lower level of DE. Significant differences are also present where both DISPERSION and LTG are respectively higher and lower for the non-property funds. All these differences are significant at the 1% level (Table 6b).

When comparing non-property firms and REITS the former are on average significantly larger than the REITS with a higher BETA and lower DE on average. The analysts' forecasts for the REITS have greater dispersion on average. All these differences are statistically significant at the 1% level (Table 6c).

Tables (7 and 8) in Appendix (2) present the Pearson and Spearman correlations matrices between for the independent variables. The Pearson correlations for the independent variables vary between -0.28 and 0.96 for non-property firms, -0.246 and 0.945 for property firms and -0.394 and 0.957 for REITs. The spearman correlation matrix which has been employed as non-parametric version of Pearson correlations shows a similar position. Tables (8) in Appendix (2) show that Spearman correlations are slightly higher than the Pearson coefficients.

It can be concluded, based on the value of the correlation coefficient that there is very high correlation between HML and SMB variables, in the region 0.9. In the analyses of correlation coefficients, high correlations (0.9 and higher) can indicate substantial collinearity (Hair *et al.*, 2006). This high relationship between HML and SMB may therefore indicate serious Multicollinearity. This will be examined further in the next section. The remaining linear relationships between the explanatory variables are reasonable.

6.3.1.3. Tests for Multicollinearity

When the ordinary least squares (OLS) estimation is used, it is implicitly assumed that the explanatory variables are not correlated to each other (orthogonal variables). Therefore, adding or removing a variable from a regression's model would not cause changes in the other coefficient values. However, if two or more independent variables are highly correlated with each other then multicollinearity can be a serious concern (Brooks, 2002, pp 190).

Therefore, it will be important to discover the extent of multicollinearity before conducting the multivariate analysis so that the relationship between the dependent variable and the independent variables will be better determined (Hair *et al.*, 2006). To achieve this aim, diagnostic tests including analyses of correlation coefficients, as summarised above, variance inflation factors and condition indices have been conducted to test the hypothesis of a highly linear relationship between two or more explanatory variables in the model.

The Variance Inflation Factors (VIF) are above the "high" level of 10 normally used as an indicator of potential harmful multicollinearity (Hair *et al. 2010*). In all of the five cases, see Table (9) in Appendix (2), the VIFs in excess of 10 relate to the variables SMB and HML, all of the VIFs for the remaining variables are below 10. This is consistent with the correlation coefficients reported in Tables (7 and 8). A more robust assessment of the levels of multicollinearity is performed using condition indices (Belsey *et al.* 1980). In all five cases the condition number is below 30 the level at which Belsey *et al.* (1980) interpret as indicating significant multicollinearity. An inspection of the related factor loadings confirm that the two variables SMB and HML have significant correlations with the highest condition index value, albeit one with a value less than 30. In conclusion there is no evidence of significant multicollinearity with respect to the independent variables relating directly to the hypothesis test. As SMB and HML are control variables the effect of any potential significant multicollinearity will not affect the hypotheses testing.

6.3.1.4. Heteroscedasticity

The aim of testing for heteroscedasticity is to investigate and analyse the relationship between the dependent variable and cross-section error term. Heteroscedastic errors represent an unequal variance in which the dispersion of the dependent variable's values is not constant across the independent variables' values (Hair *et al.*, 2006). When the estimation suffers from significant heteroscedasticity the dependent variable's variance will not be equally explained by each of the independent variables, as a result this will produce an incorrect estimation of the standard errors and the consequently bias the reported t-statistics.

Based on Breusch and Pagan (1979), White (1980) and Cook and Weisberg (1983), a heteroscedasticity test is reported for all the estimations to determine the extent of the heteroscedasticity. Where the test statistic is significant a Huber/White/sandwich estimator is used to adjust the standard errors to control for heteroscedasticity (Eicker 1963, Huber 1967 and White 1980).

6.4 Empirical results

In this part, the key empirical findings of this thesis will be discussed. There are three sets of results: (a) testing the validity of US derived implied cost of equity capital estimation models in a UK setting, (b) the results of testing the effect of leverage, corporate tax and investors' taxes on the implied cost of equity capital and other hypotheses and (c) the sensitivity tests.

As mentioned in the fifth chapter, three pooled regressions (Model 1, 2 and 3) will be operated to test the hypotheses. The first model which will be estimated on the sample of non-property firms has been designed to judge the appropriateness and limitations of the variables in explaining the variation in implied cost of equity before there are used in examining the property and more specifically, the REIT firms. The second model has been operated over the sample of all property firms .i.e. both non REIT and REIT in order to provide a better control of industry related risk factors. The model follows model 1 with the addition of an intercept dummy for REIT firm year ends and the deletion of the now redundant industry fixed effect dummies. Model 3 is estimated over the same sample as

model two but this time the REIT intercept dummy is replaced by a REIT slope dummy on the DE variable.

Model 2 and 3 are subsequently estimated on the REIT firms (including the REIT forms prior to their conversion). Although it is a reduced sample it is a more homogeneous group and therefore provides a better control for industry related risk factors.

In all these models the dependent variable will be the average of all four implied cost of equity capital estimation models and in turn the GLS model, CT model, OJN model and EASTON model estimate respectively after deducting the risk free rate of return i.e. the risk premium. The equity risk premium is defined as the excess of the expected return on the stock market over the risk-free rate. In other words, the equity risk premium is variable part from the cost of equity capital so the effect of the explanatory variables and/or the effect of changing in all or some of these variables will be reflected in this premium. In this thesis, the effect of changing in the REITs' tax status on the equity risk premium will be examined.

Table (1) in Appendix (3) provide a summary of all regressions' results which are contained in Tables (1 – 25) in Appendix (4)

The results of the various models are shown in Appendix (4) Tables 1 to 25 five tables are produced for each of the five costs of equity estimations to give twenty five tables in total. Each table reports two estimations. The first in panel A is an OLS estimation. By analysing the results for these models, it can be noted that the Breusch-Pagan test statistic is significant at the 5% or higher in the majority of models showing that they models suffer from heteroscedasticity. In these cases the reported standard errors are Huber/White/Sandwich robust standard errors. Panel B in each table reports the same model and sample but adopting Huber (1967) robust coefficient estimates (robust regression) as well as robust standard errors as in the panel A. This technique was employed to reduce the effect of outlier and influential observations and resulting departures from normality in the distribution of the models' error terms. Such observation can bias the prediction and distort the significance of parameter estimates (Brooks, 2002).

6.4.1 Univariate assessment of the reliability of cost of equity capital estimation models

To examine the relative reliability of the above employed estimation models, the implied cost of equity capital estimated in the four models will be compared by examining the correlations among the various measures and the associations between the cost estimates and firm-specific risk factors. The aim of these tests is to investigate whether the variations in estimates are associated with firm-specific risk factors in a consistent and predictable manner. In other words, the criteria of this assessment are the extent to which these estimates are related with firm risk in a stable and meaningful manner and the correlations among them.

The correlations among the various measures of the cost of equity estimates are presented in Tables (4 and 5) in Appendix (2). The Pearson correlations and Spearman correlation matrices between the implied costs of equity capital estimation models show that there are positive correlations among the various ICE estimates. The magnitude of these correlations varies between the sub samples where the highest correlations of 0.22, 0.46 and 0.70 in non-property firms, property firms and REITs respectively.

It can be noted that there are relatively few negative correlations between ICE estimates in property firms compared with other sub samples especially between CT model and other models. These negative correlations may due to the nature of property firms' data. The Spearman correlations in Table (5) in Appendix (2) show that correlations are slightly higher than Pearson coefficients but there are still few negative correlations.

In summary, it is concluded that there are reasonable positive correlations among the various implied cost of equity capital estimates. Consistent with the literature, Table (4) in Appendix (2) indicates that the various implied cost of equity capital estimates are related with firm risk proxies. It can be concluded that the hypothesis (V) can not be rejected and ceteris paribus, there are positive correlations between the various Implied Costs of Equity estimates. As mentioned before, relying on one implied cost of equity estimate for empirical tests may bias the results of the hypothesis testing. For example, subsequently reported results the show that using GLS (2001) and OJN (2003) cost estimates results in models with the higher explanatory power than the other methods. As a result, employing the average cost of equity estimate produces relatively consistent results and avoids relying on the specific underlying assumptions of a particular cost estimating technique.

6.4.2 Multivariate assessment of the validity of US cost of capital estimation models in UK

To validate the thesis's cost of equity estimation models for UK firms, the empirical properties of these models have previously been tested on US data only, the cost of equity estimations have been made for a sample of UK non-property firms. These estimates are then regressed on the independent variables to judge the appropriateness of the US based literature. These models are judged valid for UK firms when they produce results consistent with the literature. The results of this test have been presented in Tables 1, 6, 11, 16 and 21 in Appendix (4). Panel (A) in these Tables present the results of main control variables such as D/E, LTG, BETA, Yield and Dispersion. Based on the results in the above tables, it can be concluded that majority of the coefficient signs are consistent with the capital structure literature. More specifically, the coefficients of leverage D/E and LTG in four out of five ICE estimation models are consistent with the capital structure literature for non-property firms. The significance levels of DE coefficients vary between insignificant (Table 1), 2.5% (Table 21) and on 1% (Table 6) (The results of the D/E variables will be discussed in more detail subsequently). The results also show that coefficients of HML and SMB in all five ICE estimation models are consistent and inconsistent respectively with the capital structure. The inconsistency of the SMB sign can be attributed to the previously documented high levels of multicollinearity. The coefficients of BETA, Dispersion and MV in three out of five ICE estimation models are consistent with the capital structure literature.

Panel (B) in Tables 1, 6, 11, 16 and 21 in Appendix (4) present the results of the robust regressions analysis. The robust regressions provide similar results. Overall the models explain 7.27%, 11.64%, 4.6%, 5.32% and 6.12% respectively of the cross-sectional variation in implied costs of capital. Although the models all have significant F-statistics the value of the adjusted R^2 are low, this is consistent with the US literature where relatively low adjusted R^2 are reported (Dhaliwal et. al 2003).

In summary, although the non-property model does not have a high explanatory power, the results of both OLS and robust regressions indicate that the main control variables are consistent with the capital structure literature concluding that the ICE estimation models are valid in a UK setting. It can be concluded that the hypothesis (VI) can not be rejected and ceteris paribus, there are significant correlations between the various Implied Cost of Equity estimates and the risk proxies for all firms.

6.4.3 The effect of leverage, corporate tax and investors' taxes on the REIT's implied cost of equity capital

6.4.3.1 Leverage and the implied cost of equity capital

a- Non property firms

Tables 1, 6, 11, 16 and 21 in Appendix (4) present the results of model one where the dependent variable is the estimated cost of capital using in turn, the average of the four methods and then, the GLS, CT, OJN and EASTON model respectively.

Panel (A) in Tables 1, 6, 11, 16 and 21 present the results for the non-property firms which indicate that the coefficients of the leverage variable (D/E) are 0.021, 0.077***, 0.055*** -0.055 and 0.074** respectively where *** and ** indicates significance at 1 and 2.5% respectively.[58]

It is worth noting that the leverage variable (D/E) coefficients for non property firms are positive and significant when the estimations of GLS model, CT model and EASTON estimates were used while coefficient is not significant when the average estimate and OJN estimate were used. Panel (B) in Tables 1, 6, 11, 16 and 21 present the results of the robust regressions analysis which are used as an alternative method to OLS regression. The results of the robust regressions show that the coefficient of the leverage variable (D/E) are 0.034, 0.057***, 0.03***, -0.046 and 0.032. The leverage coefficients for non-property firms are positive and significant when the GLS and CT cost estimates were employed while the coefficients is positive though insignificant when the average cost and EASTON model were used and negative though insignificant with the OJN cost estimate.

In summary, the results of both OLS and robust regressions indicate that there is a reasonable support for a positive relationship between the implied cost of equity capital and firm's level of leverage in the sample of non-property firms. The exception occurs in the OJN model although the negative coefficient is not statistically significant at normal levels. It can be concluded that the hypothesis (I) can not be rejected and ceteris paribus, the cost of equity capital for non property firms is increasing in leverage.

[58] This notation to indicate statistical significance is adopted throughout this chapter.

b- All property firms' (including REITs)

To provide a better control of industry related risk factors, only property firms (including REITs) have been employed to estimate models (2 and 3). Model 2 follows model 1 with the addition of an intercept dummy for REIT firm year ends and the deletion of the now redundant industry fixed effect dummies. Model 3 follows model 2 but this time the REIT intercept dummy is replaced by a REIT slope dummy on the DE variable.

Tables 2, 7, 12, 17 and 22 in Appendix (4) present the results of model two where the dependent variable is the average implied cost of equity capital estimate and then in turn the estimates using the GLS, CT, OJN and EASTON model respectively. The corresponding results for model three are exhibited in Tables 3, 8, 13, 18 and 23 respectively.

The results of the OLS estimations of model 2 in panel (A) in Tables 2, 7, 12, 17 and 22 indicate that the coefficients of leverage variable (D/E) is 0.041**, 0.072***, -0.002, 0.009 and 0.016 respectively. Panel A in Tables 3, 8, 13, 18 and 23 present the coefficients' results of the same variables in model three which are 0.037*, 0.073***, -0.003, 0.009 and 0.008.

It is be concluded that the leverage coefficients for all property firms in model two and three are positive and significant when the average and GLS cost estimates were employed while the coefficients are positive though insignificant when the OJN and EASTON estimates were used and negative though insignificant with CT bases estimates.

Panel B the above Tables 2, 7, 12, 17 and 22 present the results of the robust regressions analysis which are used as an alternative method to OLS. The results of the robust regressions show that the coefficients of the leverage variable for all property firms are 0.042***, 0.064***, -0.033, 0.011 and 0.036*. The coefficients of the leverage variable for model three are 0.041**, 0.067***, -0.034, -0.007 and 0.026.

Similarly to the OLS regression, the leverage coefficients in models two and three are positive and significant when the GLS model and average estimated costs are employed while the coefficient is positive, though insignificant when the OJN and EASTON cost estimates are used and negative though insignificant with CT cost estimate. In summary, the results of both OLS and robust regressions in model 2 and 3 indicate evidence of a statistically significant positive relationship between the implied cost of

equity capital and leverage within the sample of property firms though the relationship is not detected under all cost estimation techniques. The detected relationships are generally robust to outliers and influential observations as they are also detected using the Huber robust regression estimates. These results provide evidence that the implied cost of equity capital is associated with increasing levels of financial risk as proxied by the level of leverage. It can be concluded that the hypothesis (I) can not be rejected and ceteris paribus, the cost of equity capital for property firms is increasing in leverage.

c- REITs

Model (2) and (3) have been estimated on the REIT firms (including the REIT firms prior to their conversion). Although it is a reduced sample it is a more homogeneous group and therefore provides a better control for industry related risk factors. Tables 4, 9, 14, 19 and 24 in Appendix (4) present the results of model (2) where the dependent variable is the average implied cost of equity capital estimate and then in turn the estimates using the GLS, CT, OJN and EASTON model respectively. Corresponding results of model (3) are exhibited in Tables 5, 10, 15, 20 and 25.

Panel (A) in Tables 4, 9, 14, 19 present the results of control variables' coefficients for REITs which indicate that the coefficients of leverage variable (D/E) are 0.002 0.046, -0.095, 0.036 and 0.009 respectively. These insignificant coefficients suggest any increase in financial risk associated with increasing levels of debt is offset by tax benefits, or other non-tax benefits of debt. Thereby an insignificant associated results. Panel (A) in Tables 5, 10, 15, 20 and 25 present the coefficients results of the same variables in model three which are -0.096***, 0.037, -0.233***, -0.013 and -0.086*.

In model (3) the inclusion of the DE*REIT_DUMMY slope variable means the DE variable captures a different relationship then that in model (2). In model (3) the variable D/E captures the relationship between D/E and cost of equity in the period prior to REIT conversion. In model (2) it captures it over the whole ten year sample period. The negative coefficients are consistent with tax or non-tax benefits of tax being greater than any costs from increase financial risk in the period prior to REIT conversion. The position post REIT conversion will be discussed in the following section, but the result are consistent with an increase in cost of equity due to the loss of tax deductibility for debt interest .

It can be concluded that the leverage's coefficients for REITs in model two are positive and insignificant in four out five ICE estimations only in use with the CT cost estimate is the coefficient negative though insignificant. Model three shows that the leverage's coefficients for REITs are negative and significant in three out five ICE estimations while this coefficient is just negative in OJN estimate. Only GLS estimate shows a positive leverage coefficient.

The inconsistency in model (3) between leverage and the ICE estimations models may be due to the insertion of the REIT slope dummy on the DE variable instead of the REIT intercept dummy. The results of model two are consistent with the capital structure literature for REITs in four out five ICE estimations. Conversely, model three produces inconsistent results between leverage and the ICE estimations models except for the GLS estimate.

Panel (B) in the above Tables 4, 9, 14, 19 and 24; and 5, 10, 15, 20 and 25 present the results of the robust regressions analysis. The results of the robust regressions show that the coefficients of leverage variable for REITs are 0.012, 0.039***, -0.065***, 0.032 and 0.016. The corresponding coefficients for leverage in model 3 are -0.054***, 0.039**, -0.037, -0.002 and -0.038.

Similarly to the OLS regression, the leverage coefficients for REITs in model two are positive (negative) and significant when the estimations of GLS (CT) model was employed while the coefficients are positive though insignificant for the rest of estimations. Model three shows that the leverage coefficients for REITs are significantly negative or positive when the average and GLS estimation were used respectively. Under the other estimations they were negative though insignificant under the other methods.

In summary, the results of both OLS and robust regressions in model two indicate that there is a statistically positive relationship between the REITs' leverage level and implied cost of equity capital estimation models (except CT model). In contrast model three indicate that there is a statistically negative relationship between the REITs' leverage level and implied cost of equity capital estimation models, except when the GLS estimate is employed. The overall results provide evidence that the firm's leverage increase firm's equity risk premium and by result its implied cost of equity capital. It can be concluded that the hypothesis (I) can not be rejected and ceteris paribus, the cost of equity capital for REITs is increasing in leverage.

6.4.3.2 The effect of corporate and investors' level taxes on the ICE

a- Corporate tax level and ICE

According to the capital structure literature, it is expected that there is a negative relationship between the implied cost of capital and firm's level tax. This conclusion implies that equity risk premium associated with leverage will decrease in the corporate tax benefit generated by the interest expense deduction.

Statistically, due to the fact that the firms' observable marginal tax rate is constant for non-property and property firms the variable generate by interacting the corporation tax rate variable and DE will be perfectly correlated with DE. The coefficient of the variable D/E captures the net effect of debt on cost of capital including any tax effect. The effect of corporation tax can be detected by observing changes in DE coefficients when a firm's tax status changes significantly, e.g. when a property form converts to REIT status.

b- Corporate tax level and REITs' ICE

REITs are not subject to corporate level taxation if they meet specific conditions. To investigate the effect of corporate tax on the cost of equity capital for REITs, the equation (5.12) will be valid up to January 2007 but after that date the corporate tax rate will be zero. Consequently, it is expected that for REITs that have debt in their capital structure after January 2007, their cost of equity capital will significantly increase compared with their cost of equity before January 2007.

Due to the absence of the corporation tax subsidy on debt interest the REIT slope dummy on the DE variable specifically test this hypothesis. Model (2 and 3) have been estimated for REITs after introducing the year end dummy variable REIT for real estate status and the REIT slope dummy on the DE variable. Tables 5, 10, 15, 20 and 25 in Appendix (4) present the results of control variables' coefficients for REITs which indicate that the coefficients of the REIT slope dummy on the DE variable are 0.187***, 0.016, 0.275***, 0.104*** and 0.211*** respectively.

Consistently with capital structure literature, the results show that the coefficients of the REIT slope dummy on the DE variable are positive and significant with all cost of capital estimates except under GLS where it is insignificant. It can be concluded that hypothesis (II) cannot be rejected and ceteris paribus, the cost of equity capital for all firms is negatively related to the firms' level of corporation tax.

Figures (1, 2 and 3) in Appendix 4 show the trend in mean implied cost of capital for each of the four estimating methods over the sample period. Each figure relates to one of the three samples i.e. REIT, property and non-property respectively. The plots are consistent with REITs tax exemption being reflected in their implied cost of equity capital estimates. Figure (1) shows that the REITs annual means of implied cost of equity capital estimates were between 11.25 and 13.25% before 2007 and increased after 2007 reflecting the tax status changing to between 14.20 and 18.75%. Figure (2) shows that the property firms' mean implied cost of equity capital estimates are more volatile ranging between 11.63 and 16.27% before 2007 and increasing after 2007 though at a lower rate than the REIT estimates. Figure (3) shows that the non-property firms' mean implied cost of equity capital estimates are more stable between ranging between 18.84 and 26.27% before 2007 and staying at about the same levels after 2007. It can be concluded that the hypothesis (IV) can not be rejected and ceteris paribus, the UK-REITs' cost of equity capital increase following their post 1 January 2007 exemption from corporation tax.

c- Investors' taxes level and ICE

The literature shows that there is a positive relationship between the investor level taxes and the cost of equity capital. The notion behind this is that increasing the tax rate on debt income relative to the tax rate on equity income will increase the pre-tax cost of debt and decrease the tax benefit from the debt interest deduction to equity holders. As a result, the equity risk premium associated with leverage will increase in the personal tax disadvantage associated with debt.

Due to the specific features of UK tax systems, it is necessary to adapt the above variables. As mentioned in chapter five, the corporate tax rate is proxied by a firms' REIT/Non-REIT status. Further because of the lack of variation in investor level tax rates is not possible to include variables utilising these measures because of this lack of variation. Instead the presence of any investor level tax effects will be captured by the dividend yield variables as described above. In the absence of differential taxation of capitals gains and dividend the Yield coefficient should always be insignificant.

Tables 1, 6, 11, 16 and 21 in Appendix (4) present the results of model one where in the panel (A) the results of yield variables' coefficients for the non property firms are 0.128, -0.003, -0.250***, 0.061 and 0.503*** respectively. Panel (B) in tables 1, 6, 11, 16 and 21 present the results of the robust regressions analysis for the non property firms. The results

of the robust regressions show that the coefficients of yield variable are 0.139, -0.039, 0.048, 0.195 and 0.194 respectively.

Regarding the property and REITs sub samples, Tables 2, 7, 12 17 and 22; and 5, 10, 15, 20 and 25 in Appendix (4) present the results of model two and three where in the panel (A) the results of yield variables' coefficients for the property firms and REITs are 0.457***, 0.234, 0.717*, 0.024 and 0.422***; and 0.562***, 1.052***, 0.136, 0.846*** and 0.526*** respectively. In panel (B) in the above Tables 2, 7, 12 17 and 22; and 5, 10, 15, 20 and 25 the results of the robust regressions for property firms and REITs are show the following coefficient values: 0.455***, 0.141*, 0.082, 0.290*** and 0.366***; and 0.489***, 0.511***, -0.097, 0.797*** and 0.388*** respectively.

In summary the coefficient on the yield variable for property firms under both regression estimators, OLS and Robust are mixed with both positive and negative significant coefficients. The yield coefficients for REITs are also mixed positive and negative where four out of five are significant under both regression estimators. The literature indicates that yield is a potential contributing factor on the cost of capital when dividend and gains are subject to differing marginal rates of investor level taxation. These results therefore suggest investor level taxation is a significant factor though the direction of the relationship is not constant across the various samples. It can be concluded that the hypothesis (III) can not be rejected and ceteris paribus, the cost of equity capital for all firms is positively related to the level of investor taxes.

6.4.3.3 The effect of other explanatory variables on the ICE

a- Beta and Fama and French risk proxies

Tables 1, 6, 11, 16 and 21 in Appendix (4) present the results of model (1). In panel (A) the results of control variables' coefficients for the non-property firms show the following coefficient estimates for the Beta, SMB and HML variable: Beta; 0.012**, -0.006, -0.003, 0.048*** and -0.007: SMB -0.039**, -0.092***, -0.019, -0.041 and -0.062: HML 0.036, 0.108***, 0.007, 0.051 and 0.036 respectively.

Tables 3, 8, 13, 18 and 23 in Appendix (4) present the results of model three where in panel (A) the results for the property firms show the following coefficients for Beta;

0.029***, -0.004, 0.018, 0.039, and -0.134***: SMB; -0.053***, -0.050*, 0.030, -0.045 and -0.108: and HML; 0.042**, 0.046, -0.046, 0.044 and 0.157** respectively.

The REITs sample results are shown in Tables 5, 10, 15, 20 and 25 in Appendix (4). The OLS regression in panel (A) report the following coefficients: Beta; -0.032, -0.036*, -0.039, 0.034*** and -0.010: SMB; -0.151***, -0.038, -0.172*, -0.132*** and -0.247***; and HML; 0.161***, 0.047, 0.168*, 0.150*** and 0.276*** respectively.

Reviewing the above results indicated a number of features. The Beta coefficients for non-property firms is positive and significant when the average and OJN cost estimators are used, in the three other cases the coefficient is negative although insignificant. For the property firms the coefficient is positive and statistically significant positive and significant when the average and EASTON cost estimators are used. Finally for the REITs firms conflicting results arise with both one case of statistically significant positive and negative coefficients. A similar summary applies with respect to the coefficients SMB and HML where there is a lack of consistency in terms of both coefficient sign and significance. One reason in this case may be the previously documented high degree correlation between the two variables. The degree of consistency is generally higher within the REIT sample which suggests greater homogeneity in industry grouping may be a contributing factor in their significance and with the use of the average cost estimator. Overall these results of this risk control factors show some consistency with the existing literature but highlight their sensitivity to the choice of both cost of capital estimator and sample industry composition

b- Dispersion, LTG and MV

Tables 1, 6, 11, 16 and 21 in Appendix (4) present the results of model one where in panel (A) the results of Dispersion, LTG and MV's control variables are as follows: Dispersion; -0.011***, -0.037***, -0.009*, 0.004 and 0.005: LTG; 0.013, 0.001, 0.013, -0.017 and 0.045; and MV; -0.001, -0.001, 0.001, -0.001* and 0.001 respectively. In panel (B) the corresponding robust regression results are as follows: Dispersion; -0.013***, -0.012***, 0.001, 0.001 and 0.034: LTG; 0.027, 0.009, 0.010, -0.016 and 0.034: and MV; 0.001, -0.001, 0.001, -0.001*** and -0.001 respectively.

The results for the property sample are shown in Tables 3, 8, 13, 18 and 23 in Appendix (4). In panel (A) the OLS results are as follows: Dispersion; -0.011, -0.004, -0.008, 0.018*** and 0.009, LTG; 0.001, -0.061, -0.004, 0.043 and 0.021: MV -0.001***, -0.001***, -0.001**, -0.001*** and -0.001*** respectively. The robust regression results in panel (B) are summarised as follows: Dispersion; -0.001, 0.002, -0.006, 0.007* and 0.004: LTG; -0.002, 0.011, -0.030, 0.012 and 0.017: and MV -0.001***, -0.001***, -0.001, -0.001*** and -0.001*** respectively.

Results for the final sample, the REIT firms are shown in Tables 5, 10, 15, 20 and 25 in Appendix (4).The OLS based results in panel (A) are as follows: Dispersion; -0.006, -0.013, 0.005, 0.004 and -0.002: LTG; 0.119, -0.054, 0.150, 0.058 and 0.038: MV; -0.001, -0.001, -0.001, -0.001 and -0.001 respectively. The robust regression results in panel B are as follows: Dispersion; -0.007*, -0.004, -0.026***, 0.001 and -0.001: LTG; 0.064, -0.010, -0.034, 0.047 and 0.022: and MV -0.001, -0.001, 0.001*** -0.001 and -0.001 respectively.

These results are summarised as follows. The Dispersion coefficient for non-property firms is negative and significant when the GLS and average cost estimates are used. In the other cases the coefficient is not significant. With the property firms sample the coefficient is statistically significant and positive only in the case of the OJN cost estimator. Finally, the Dispersion's coefficients for REITs firms are insignificant in all cost estimators when OLS is used. Under the robust regression the coefficient is negative in both the CT and average cost estimators.

Although the LTG coefficient is positive in the majority of cases in accordance with the existing literature, it is not statistically significant for any of the samples under any of the five costs of capital estimators. The coefficient for MV is statistically insignificant in the majority of cases with the non-property sample under both the OLS and robust regression estimators. A different picture emerges with the property sample where the coefficient is statistically significant and negative in all cases under both OLS and Robust regression with one exception. The exception is under the use of the CT cost estimator. Again, a more homogenous sample by industry grouping leads to more consistent results. Though for the REIT sample the MV coefficient is insignificant in all but one case.

In overall summary these results are mixed with some consistent with the capital structure literature. Again there is no overall consistency within any one cost of equity estimator. This supports the use of the composite average cost of capital estimator and the separate

reporting of the four individual, GLS, CT, OJN and EASTON based cost of capital based results.

6.4.4 Explanatory power

Further to the testing of the individual coefficient estimates discussed above, it is important to consider the overall validity or fit of each of the regression models. After considering this issue in the next section the distribution of the regression residual will be considered.

a- The models' overall fit

To test the overall validity or fit of the various model the extent to which variation in dependent variable is explained by the models as independent variables is assessed. This is done by calculating the regressions' F-statistic. The F-test tests the following hypothesis:

H_0: $\beta 1 = \beta 2 = \beta 3 = \beta 4 = \beta 5 = \beta 6 = 0$ ..... Bn =0 each year

Against the alternate that:

H_1: at least one $\beta \neq 0$.

For each of the regression models reported in Tables 1 to 25 in Appendix (4) the F statistic is reported. In total the thesis reports 50 regression estimates i.e. 5 (cost of capital estimates) * 5 (samples and/or formulation) * 2 (estimation techniques). These are reported in table 1 to 25 in appendix 4. In all cases the F-statistic is significant at the 5% level or higher. Therefore the alternate hypothesis can be accepted in all cases i.e. the models have a significant explanatory power. In general the explanatory power of the REIT based models are higher than those of the non-property firm based samples which may be due to the greater variation in firms characteristics in the later sample.

6.5 Conclusion

This thesis investigates whether the firm level taxes are reflected in cost of equity capital for UK REITs because REITs are exempt from corporation tax and not able to obtain a corporation tax deduction on their debt interest unlike other firms. While there are studies that have estimated implied cost of equity capital for tax paying firms, these suffer from having to estimate proxies for marginal corporation tax rates. Thus, estimating implied

costs of equity capital for UK REITs (pre-post the change in the tax status) overcomes this problem. Estimating these costs for a sample of traditional tax paying firms confirms their applicability for the UK. By utilising cost of capital estimation techniques which rely on Ohlson (1994) accounting based equity valuation model, the thesis avoids the disadvantages of relying on the average realised returns as used in traditional asset pricing models. In testing the hypotheses, OLS and Robust regression estimators are used to adjust for heteroscedasticity where present and to reduce the effect of outlier and influential observations.

Due to the specific features of UK tax systems, it is necessary to adapt the existing tax related variables. The corporate tax rate is proxied by a firms' REIT/Non-REIT status and the investor level tax effects are tested using a dividend yield variables. The leverage variable DE captures the corporate tax effect on debt interest for REITs up to 2007. While in the absence of the corporation tax subsidy on debt interest the DE*REIT variable captures the position post REIT conversion in 2007.

The leverage's coefficients up to 2007 show a positive relationship between leverage and the implied cost of equity capital in non-property and property firms suggest risk increasing considerations outweigh any tax interest deduction benefits. In the absence of an interest tax deduction for REITs the costs of equity would be higher. This conclusion was supported by the results of the DE*REIT slope variable which are positive and significant in all but one of the cost estimations. Hence the REIT exemption from corporation level tax is associated with an increase in their implied cost of equity capital for levered REITs.

The Yield variable is interpreted as capturing the effect of investor level taxes. The results of both OLS and Robust regressions indicate that in the majority of cases there is a significant relationship between the yield and firms' implied cost of equity capital. In the absence of taxation considerations one would expect a negative, due to signalling consideration, or an insignificant relationship. Consequently it can be concluded that relative levels of investor level taxation is associated the cost of equity. These regressions also show that the main control variables are consistent with the capital structure literature concluding that the ICE estimation models are valid for UK firms.

A secondary finding is that the degree of consistency between the costs of capital methods is lower than in the US. This may be due to differences between the countries e.g. differences in the properties of analyst forecasts, an important input into the estimates, or

changes due to the passage of time the estimates in this thesis are for a later period than those in the US literature. The results of this thesis employing the average cost of equity estimate produces relatively consistent results and avoids the relying on any one unique method in particular. The thesis also shows that GLS (2001) and OJN (2003) based models have the highest explanatory power over the whole period (2000-09).

Chapter Seven: Contributions to knowledge, limitations and further researches, and Conclusions

Chapter Seven: Contributions to knowledge, limitations, further researches and conclusions

7.1. Introduction

The empirical regressions have been estimated and their results have been stated and analysed in chapter six. The aim of this chapter is to present the thesis's contributions to knowledge and recommendations, limitations, further researches and conclusions.

This chapter will be divided into the following sections; the first section (7.2) will present the contributions to knowledge. The second section (7.3) will present the limitations and further research. The last section (7.4) will present the conclusions.

7.2 Contribution to knowledge

The REITs are an interesting area to investigate tax and capital structure generally and implied cost of equity capital especially because of their unique tax status and that it is relatively young and still evolving. [59] While there are studies which have estimated implied cost of equity capital for tax paying firms, there are no studies which investigate whether the corporate tax exemption is reflected in REITs' cost of equity. Thus, estimating implied cost of equity capital for UK-REITs (pre-post the change in the tax status) and other non-REITs UK property firms and a sample of UK non-property firms can provide a useful method of evaluating the merits of the cost of equity estimators.

The findings of the thesis contribute towards a better understanding of the impact of corporate taxation on firms' cost of equity capital. The unique REIT setting allows the testing of tax related hypothesis because firms' tax rate can be observed without significant error which is not the case for non REIT firms. There is clear evidence of an increase in the cost of equity following an effective abolition of the tax deduction for debt interest.

[59] See chapter two

Regarding the degree of consistency between the costs of capital methods, the results were lower than in the USA. This result may be due to differences between both countries e.g. differences in the properties of analyst forecasts, an important input into the estimation models, or changes due to the passage of time, the estimates in this thesis are for a later period than those in the USA literature.

1- Summary of results

The thesis's empirical results can be summarised as following:

a- Overall explanatory power – R^2

The results indicate that the adjusted R^2 for the non-property, property and REIT samples are 11.64%, 23.20% and 54.13% respectively. These values are reasonable when compared with existing USA literature and indicate that the USA based costs of capital estimations can be used in another, although similar, jurisdiction.

b- Corporate tax level and ICE

The coefficient of the leverage variable (D/E) can be interpreted as capturing any corporate tax effects along with financial risk costs etc. for non-property firms, property firms and REITs up to 2007. The positive relationship between leverage and the implied cost of equity capital and leverage level in non-property and property firms suggest risk increasing considerations outweigh any tax interest deduction benefits. In the absence of an interest tax deduction the cost of equity would be higher. By estimating the coefficient on the DE*REIT slope variable this hypothesis is tested. Consistent with the effect of the deduction in reducing the cost of equity, the coefficients of the REIT slope dummy on the DE variable are positive and significant in all but one of the cost estimations. Hence the REIT exemption from corporation level tax is associated with an increase in their implied cost of equity capital for levered REITs.

c- Investors' taxes level and ICE

The coefficients of the YIELD variable can be interpreted as capturing the effect of differential investor level taxes. The results of both OLS and Robust regressions indicate that in the majority of cases there is a significant relationship between the yield and firms' implied cost of equity capital. In the absence of taxation considerations one would expect a negative, due to signalling consideration, or an insignificant relationship. Consequently it can be concluded that relative levels of investor level taxation is associated the cost of equity.

d- The implied cost of capital estimation models and UK setting

In general the results of both OLS and robust regressions indicate that the main control variables are consistent with the capital structure literature concluding that the ICE estimation models are valid for UK firms. Consistent with the literature the various implied cost of equity capital estimates are associated with firm risk proxies although not in all cases.

As mentioned before, relying on one implied cost of equity estimate for empirical tests may be unwise. The thesis shows that GLS (2001) and OJN (2003) based models have the highest explanatory power over the whole period (2000-09). As a result, employing the average cost of equity estimate produces relatively consistent results and avoids the relying on any one unique method in particular.

In summary, this thesis contributes to the knowledge in two main aspects; the first aspect is in taxation where it can be considered one of early studies which investigate the effect of taxation on the implied cost of equity capital for tax exempt firms (REITs); the second aspect is in implied cost of capital estimation techniques where this thesis avoids the disadvantages of relying on the average realised returns as used in traditional asset pricing models and provide evidence that these models are valid for UK firms.

7.3. Limitations of the study and further research

It is important to highlight the research's limitations to pave the way to further investigations which might lead into improvements in implied cost of equity capital estimation models. Most the thesis's limitations arise from the implied cost of equity capital estimation models. For example, models such as GLS apply a finite horizon of the discounted cash flow model and this implementation will involve simplifying assumptions. Other research's limitations can be listed as following:

1. The period which has been covered by the research (2000-2009) may not be long enough to conclude with confidence that the relationship reported in the thesis will continue to hold in the future especially for UK REITs which have been introduced in January 2007;

2. Although the sample includes all REIT and all other property firms which are listed in London Stock Exchange (Main Market) the number of observation is still relatively small sample (41 firms) therefore the sample size may affect the results;

3. The UK tax system does not restrict the carry forward of tax losses by time, unlike under the US tax system which apply a 20 year maximum period. Therefore US based methods of proxy corporate marginal tax rates are inappropriate for UK firms. While the method used in this thesis to overcome this problem i.e. the use of REIT provided a strong setting the results are potentially limited to this particular industry sector.

7.4 Conclusion

In the finance literature, capital structure is considered as a puzzle because there is not one specific theory which explains why firms use debt financing and what determines the optimal size of debt in firms' capital structure.

Modigliani and Miller introduced a set of influential papers (1958, 1963 and Miller 1977) which paved the way for the capital structure theories to be created. In 1958, Modigliani and Miller indicate that in a perfect capital market with absence of taxes, a firm's value is independent of its capital structure (and implicitly its dividend policy) while their second paper (1963) has introduced the impact of the corporate tax. This paper (1963) shows that

if interest is deductible and dividends are not, then the firm's optimal capital structure will be 100% debt. Miller (1977) considered the effect of personal taxes to the leverage controversy. Keeping the original M&M (1958 and 1963) assumptions, Miller predicted that when interest is taxed at the investor level more highly than share income, either dividend or capital gains, this will cause debt holders to demand a higher pre tax rate of return in compensation. In equilibrium this required premium will offset the firm level tax deduction on interest and therefore the value of the firm will not be affected from a tax perspective by the level of debt. Since M&M (1958) a large volume of papers have examined the concept of an optimal capital structure. These studies include Baxter (1967), Ross (1977), Myers and Majluf (1984) and Myers (1984) which have relaxed some of the assumptions of the M&M's theory.

Many researches have focused directly on determinants of firms' cost of equity capital. These researches address two main approaches to estimating the cost of equity capital, the Benchmark Approach and the Present Value Approach. The benchmark approaches recognize that the cost of equity should be related to a benchmark return in the capital markets. It was concluded that the CAPM cannot be used because the cost of capital is affected by more than one risk factor. The results of using multifactor APT models support this conclusion. Although the macroeconomic factors examined vary widely depending on the sample and the time period studied, the models are still more effective at predicting the cost of capital than the single-factor CAPM. The Fama and French (1993) model can be considered as a multi-factor CAPM and like the CAPM and APT it relies on historical realised returns which generally have a weak relationship with the future earnings. These models do not supply guidance about the magnitude or degree of the difference between a firm's cost of equity and the benchmark rate. The present value approach estimates the cost of equity capital as the rate that equates the current price with the present value of future cash flows. The present value models differ in their recognition of value. The DDM and DCFM models forecast future earnings and find the value of stock by discounting them back to the present using the required return on equity. The RI model starts with a value based on the balance sheet, the book value of equity and adjusts this value by adding the present values of expected future residual income. Due to the significant variation in the magnitude of the associations between the various implied cost of equity's estimates and individual risk proxies, relying on one estimation model may produce misleading results if the specific model's attributes are correlated with the variable studied. Due to the

absence of a consensus on the superiority of any particular model in estimating the cost of equity, this thesis employed four models.

Previous studies have, by necessity, examined the effect of taxation and implied cost of equity capital on tax paying firms rather than tax exempt firms. The introduction of the REIT legislation allows estimation of implied cost of equity capital for UK REITs both pre and post conversion to examine the relationship between the cost of capital and capital structure in the context of a significant change in taxation. To answer this question and assessing the reliability of the ICEC estimation models, a set of research hypotheses have been constructed and tested based on the capital structure literature. The sample of the thesis includes three different industrial categories, REITs, Property firms and non-Property Firms for the period 2000 - 2009. Estimating these costs for a sample of traditional tax paying firms confirms their applicability for the UK. By utilising cost of capital estimation techniques which rely on Ohlson (1994) accounting based equity valuation model, the thesis avoids the disadvantages of relying on the average realised returns as used in traditional asset pricing models. In testing the hypotheses, OLS and Robust regression estimators are used to adjust for heteroscedasticity where present and to reduce the effect of outlier and influential observations.

Due to the specific features of UK tax systems, it is necessary to adapt the existing tax related variables. The corporate tax rate is proxied by a firms' REIT/Non-REIT status and the investor level tax effects are tested using a dividend yield variables. The leverage variable DE captures the corporate tax effect on debt interest for REITs up to 2007. While in the absence of the corporation tax subsidy on debt interest the DE*REIT variable captures the position post REIT conversion in 2007.

The leverage coefficients up to 2007 refer to positive relationship between leverage and the implied cost of equity capital and leverage level in non-property and property firms suggest risk increasing considerations outweigh any tax interest deduction benefits. In the absence of an interest tax deduction for REITs the costs of equity would be higher. This conclusion was supported by the results of the DE*REIT slope variable which are positive and significant in all but one of the cost estimations. Hence the REIT exemption from corporation level tax is associated with an increase in their implied cost of equity capital for levered REITs.

The Yield variable is interpreted as capturing the effect of investor level taxes. The results of both OLS and Robust regressions indicate that in the majority of cases there is a

significant relationship between the yield and firms' implied cost of equity capital. In the absence of taxation considerations one would expect a negative, due to signalling consideration, or an insignificant relationship. Consequently it can be concluded that relative levels of investor level taxation is associated the cost of equity. These regressions also show that the main control variables are consistent with the capital structure literature concluding that the ICE estimation models are valid for UK firms.

A secondary finding is that the degree of consistency between the costs of capital methods is lower than in the US. This may be due to differences between the countries e.g. differences in the properties of analyst forecasts, an important input into the estimates, or changes due to the passage of time, the estimates in this thesis are for a later period than those in the US literature. The results of this thesis employing the average cost of equity estimate produces relatively consistent results and avoids the relying on any one unique method in particular. The thesis also shows that GLS (2001) and OJN (2003) based models have the highest explanatory power over the whole period (2000-09).

In overall, this thesis documents clear evidence of a relationship between firm level taxation and implied cost of equity capital. The effect of the corporate tax deduction for debt interest is associated with lower costs of equity capital. In the absence of the deduction a higher cost is observed.

Appendix 1 REIT and non-REIT data

Table (a1.1)
Total return on capital employed

REIT	2005	2006	2007	2008	No
Big Yellow Group plc	31.4%	52.3%	33.7%	21.1%	1
Brixton plc	30.08%	18.3%	6.32%	- 15.9%	2
Workspace Group plc	40.77 %	49.3%	22.87%	-1.14 %	3
Great Portland Estates plc	20.6%	35.6%	33.3%	2.6 %	4
Primary Health Properties plc	42.1%	33.4%	6.0%	1.8 %	5
Derwent London plc	28.3%	34.99%	-2.5%	-7.6%	6
Local Shopping REIT plc	-	28.22 %	3%	-7%	7
McKay Securities plc	18%	30.4%	24.6%	-16.2 %	8
Liberty International plc	29%	19.6%	1.1%	-0.25%	9
The British Land Company plc	26 %	34.6%	23.5%	-19.4%	10
Mucklow (A & J) Group plc	14.2 %	17.6%	15.1 %	-11.8%	11
Hammerson plc	25.2%	22.8%	0.56%	-9.1%	12
Land Securities Group plc	23.2%	32.6%	18.7%	-5.1%	13
SEGRO plc	33.2%	23.3%	-5.5%	-10.3%	14
Town Centre Securities plc	8.3%	7.5%	20.8%	-25.7%	15
Warner Estate Holdings plc	18.5%	21.4%	12.2%	-15.4%	16
Shaftesbury plc	36.3%	38.1 %	17.1%	-8.7%	17
Rugby Estates plc	-	-	-4.3%	-9.8%	18
Highcroft investment plc	11.3%	13.8%	-2.4%	-10.5%	19
Pineapple corporation PLC	8.4%	-	16.6%	38.4%	20
Mean	24.7%	28.5%	12%	-5.5%	
Variance	106%	137.3%	152.7%	203.1%	
Standard deviation	10.3%	11.7%	12.4%	14.3%	
N	18	18	20	20	
t-statistic	.890	.140	-.565	-1.69	
Degree of freedom	36	36	38	36	
Critical value 5% two tailed	±1.688	±1.688	±1.686	±1.688	

Properties	**2005**	**2006**	**2007**	**2008**	
DTZ holdings PLC	38.1%	37.1%	30.2%	1.2%	1
Cardiff plc	21.3%	13%	22.9%	8.4%	2
Safeland plc	22.5%	-8%	-0.5%	5.9%	3
Terrace Hill Group plc	6.9%	14.5%	13.6%	7.7%	4
Development Securities plc	15.3%	11.7%	3%	-4.3%	5
Helical Bar plc	38.5%	27%	21.4%	-9.1%	6
Quintain Estates and Development plc	7.4%	6.2%	6.6%	-5.9%	7
Unite plc	18.1%	20%	3.5%	-4.6%	8
Capital & Regional plc	30.6%	30%	-18.6%	-38%	9
CLS Holdings plc	34.4%	47.8%	11.5%	- 0.13%	10

Daejan holdings plc	16%	22.9%	4.3%	2%	11
Grainer plc	42.9%	50.2%	30.6%	15.6%	12
MWB Group Holdings plc	5.7%	21.5%	5.6%	4%	13
OEM PLC	-1580%	78%	-5.5%	-	14
Fletcher King PLC	22.1%	18.4%	28.9%	22.5%	15
J Smart CO PLC	-1.4%	14%	6.1%	4.6%	16
Stewart Wight plc	7.9%	18.3%	14.1%	-1.3%	17
SafeStore plc	139%	65.9%	49.5%	14.5%	18
Savill plc	32.5%	37.7%	37.2%	13.6%	19
St. Modwen	59%	29.3%	28.1%	-	20
Mean	-51.2%	27.8%	14.6%	2%	
Variance	130382.7%	420.3%	265.7%	169.4%	
Standard deviation	361.1%	20.5%	16.3%	13%	
n	20	20	20	18	

Table (a1. 2)
Operating profit/total assets ratio

REIT	2005	2006	2007	2008	No
Big Yellow Group plc	14%	24.3%	22%	13.4%	1
Brixton plc5	15.3%	11.8 %	4%	-7.8%	2
Workspace Group plc	13.9 %	17.7 %	12.9%	-0.6%	3
Great Portland Estates plc	11.9%	20.9%	23.3%	1.8%	4
Primary Health Properties plc	14.1%	11.3%	3%	0.7%	5
Derwent London plc	16.2%	20.5 %	-1.7 %	-4.9%	6
Local Shopping REIT plc	-	0.6 %	1.8%	-3.5%	7
McKay Securities plc	10 %	16%	15.8 %	-9.1 %	8
Liberty International plc	11.7%	10.6%	0.6%	-10.5%	9
The British Land Company plc	10.1%	15.4%	12.6%	-10.4%	10
Mucklow (A & J) Group plc	11.3%	13.8%	13.3 %	-9.6%	11
Hammerson plc	13%	13.5%	3.4%	-4.8%	12
Land Securities Group plc	13.3%	17.4%	10.7%	-3%	13
SEGRO plc	14.6%	12.3%	-3%	-5%	14
Town Centre Securities plc	5%	3.8%	9.5%	-12.4%	15
Warner Estate Holdings plc	8.7%	10.5%	6.4%	-6.2%	16
Shaftesbury plc	16.9%	18%	10.4%	-5%	17
Rugby Estates plc	-	-	-2.6%	-6%	18
Highcroft investment plc	6.7%	10.9%	-2.1%	-9.5%	19
Pineapple corporation PLC	6.2%	-	7.8%	12%	20
Mean	11.8%	13.9%	7.4%	-4%	
Variance	11.96%	33.83%	61%	47.1%	
Standard deviation	3.5%	5.8%	7.8%	6.9%	
N	18	18	20	20	
t-statistic	1.167	1.715	.658	-2.384	
Degree of freedom	36	36	38	36	
Critical value 5% two tailed	±1.689	±1.689	±1.687	±1.689	

Properties	2005	2006	2007	2008	No
DTZ holdings PLC	17%	16.5%	7.3%	6%	1
Cardiff plc	20%	12.3%	2.2%	0.8 %	2
Safeland plc	7%	-1.7%	-0.12%	2%	3
Terrace Hill Group plc	3.5%	6%	6.8%	3.7%	4
Development Securities plc	9%	7.5%	1.5%	-2.3%	5
Helical Bar plc	16%	14.6%	11.9%	-4.3%	6
Quintain Estates and Development plc	4.8%	3.8%	3.8%	-3.2%	7
Unite plc	5.4%	9%	1.4%	-1.7%	8
Capital & Regional plc	18.2%	18.1%	-8.8%	-16.2 %	9
CLS Holdings plc	9.6%	15.8%	3.4%	-0.05%	10

Daejan holdings plc	9.8%	14.6%	2.9%	1.4%	11
Grainer plc	7%	8.3%	5%	2.3%	12
MWB Group Holdings plc	1.4%	6.7%	2.3%	1.4%	13
OEM PLC	-5.8%	1.4%	-0.7%	-	14
Fletcher King PLC	12.3%	12.1%	17.6%	14.2%	15
J Smart CO PLC	-1.3%	11.1%	5.1%	4.1%	16
Stewart Wight plc	6.2%	13%	10.3%	-1%	17
SafeStore plc	26%	15.9%	16.9%	5.1%	18
Savill plc	13.9%	17.3%	18.1%	6%	19
St. Modwen	10.9%	11.8%	10.8%	-	20
Mean	9.5%	10.7%	5.9%	1%	
Variance	57.9%	30.1%	45.9%	36.97%	
Standard deviation	7.6%	5.5%	6.8%	6.1%	
n	20	20	20	18	

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Table (a1. 3) Debt to equity ratio

REIT	2005	2006	2007	2008	No
Big Yellow Group plc	68.1%	63.7%	38.8%	48.8%	1
Brixton plc5	38.6%	29%	37.7%	36.3%	2
Workspace Group plc	130.2%	123.1%	64.9%	81.5%	3
Great Portland Estates plc	57.7%	51.3%	36.6%	40.9%	4
Primary Health Properties plc	155.6%	158.2%	128.3%	161.6%	5
Derwent London plc	48.9%	43.5%	41.2%	38.7%	6
Local Shopping REIT plc	-	4150%	64.7%	88%	7
McKay Securities plc	59.5%	66%	47.1 %	68.4 %	8
Liberty International plc	94.7%	70.1%	79.8%	117%	9
The British Land Company plc	95%	77.4%	57.9%	65.9%	10
Mucklow (A & J) Group plc	8.6%	8.3%	7.3%	14.1%	11
Hammerson plc	67%	54.8%	54.3%	78.6%	12
Land Securities Group plc	40.8%	49.6%	47.7%	56.7%	13
SEGRO plc	92.8%	70.7%	68.6%	91.1%	14
Town Centre Securities plc	58.5%	71.7%	84.1%	95.2%	15
Warner Estate Holdings plc	93.2%	31.2%	72.2%	132.6%	16
Shaftesbury plc	81.2%	77.2%	57.1%	65.7%	17
Rugby Estates plc	-	-	50.2%	56.8%	18
Highcroft investment plc	6.3%	13.3%	4.6%	3.4%	19
Pineapple corporation PLC	90.9%	-	110.2%	193.7%	20
Mean	77.8%	290.2%	55.8%	77.5%	
Variance	3250%	929363%	659%	2358%	
Standard deviation	57%	964%	25.7%	48.6%	
n	18	18	20	20	
t-statistic	-1.105	.910	-1.285	-.899	
Degree of freedom	36	36	38	36	
Critical value 5% two tailed	1.6885	1.6885	1.6862	1.6885	
Properties	2005	2006	2007	2008	
DTZ holdings PLC	60%	53.7%	91%	107.3%	1
Cardiff plc	202%	151.9%	197%	144.6%	2
Safeland plc	55.7%	42.1%	63.8%	61.8%	3
Terrace Hill Group plc	83.9%	53.4%	48.7%	82.9%	4
Development Securities plc	30.6%	37.1%	39.8%	72.6%	5
Helical Bar plc	192.8%	96%	131.4%	146.5%	6
Quintain Estates and Development plc	0	0	0	0	7
Unite plc	386.9%	382.3%	437.9%	512.9%	8
Capital & Regional plc	6.9%	2.4%	23.1%	68%	9
CLS Holdings plc	0	0	0	0	10
Daejan holdings plc	30.7%	20%	12.8%	18.5%	11
Grainer plc	431.3%	434.2%	437%	510%	12
MWB Group Holdings plc	261.4%	170.6%	111.5%	143.9%	13
OEM PLC	3750%	154%	76.6%	-	14
Fletcher King PLC	0	0	0	0	15
J Smart CO PLC	0	0	0	0	16
Stewart Wight plc	0	0	0	0	17
SafeStore plc	250%	176.2%	98.3%	95.4%	18
Savill plc	2%	9.1%	12.8%	21.9%	19
St. Modwen	123.2%	67.4%	91.2%	-	20
Mean	2.9%	92.5%	93.6%	110.4%	
Variance	679818%	15450%	166776%	24063%	
Standard deviation	824.5%	124.3%	129.1%	155.1%	
n	20	20	20	18	

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Table (1.a)

Mann-Whitney Test Return on Shareholders' equity (ROE)
REIT and Non REIT property firms

Ranks

Variable	Sample	N	Mean Rank	Sum of Ranks
ROE2005	REITs	18	20.50	369.00
	Non_REITs	20	18.60	372.00
	Total	38		
ROE2006	REITs	18	20.81	374.50
	Non_REITs	20	18.32	366.50
	Total	38		
ROE2006	REITs	20	19.45	389.00
	Non_REITs	20	21.55	431.00
	Total	40		
ROE2006	REITs	20	14.68	293.50
	Non_REITs	18	24.86	447.50
	Total	38		

Table (1.b)

Test statistics
Mann Whitney Test Return on Shareholders' equity (ROE) REIT and non REIT property firms

	ROE2005	ROE2006	ROE2007	ROE2008
Mann-Whitney U	162.000	156.500	179.000	83.500
Wilcoxon W	372.000	366.500	389.000	293.500
Z	-.526	-.687	-.568	-2.821
Significance (2-tailed)	.599	.492	.570	.005

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Table (2.a)

Mann-Whitney Test Return on Capital Employed (ROCE) REIT and Non REIT property firms

		Ranks		
Variable	Sample	N	Mean Rank	Sum of Ranks
ROCE2005	REITs	18	22.00	396.00
	Non_REITs	20	17.25	345.00
	Total	38		
ROCE2006	REITs	18	22.42	403.50
	Non_REITs	20	16.88	337.50
	Total	38		
ROCE2006	REITs	20	21.32	426.50
	Non_REITs	20	19.68	393.50
	Total	40		
ROCE2006	REITs	20	14.25	285.00
	Non_REITs	18	25.33	456.00
	Total	38		

Table (2.b)

Test statistics

Mann Whitney Test Return on Capital Employed (ROCE) REIT and non REIT property firms

	ROE2005	ROE2006	ROE2007	ROE2008
Mann-Whitney U	135.000	127.500	183.500	75.000
Wilcoxon W	345.000	337.500	393.500	285.000
Z	-1.316	-1.535	-.446	-3.070
Significance (2-tailed)	.188	.125	.655	.002

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Table (3.a)

Mann-Whitney Test Debt –Equity REIT and Non REIT property firms

		Ranks		
Variable	Sample	N	Mean Rank	Sum of Ranks
DER2005	REITs	18	20.22	364.00
	Non_REITs	20	18.85	377.00
	Total	38		
DER 2006	REITs	18	21.22	382.00
	Non_REITs	20	17.95	359.00
	Total	38		
DER 2006	REITs	20	20.32	406.50
	Non_REITs	20	20.68	413.50
	Total	40		
DER 2006	REITs	20	19.90	398.00
	Non_REITs	18	19.06	343.00
	Total	38		

Table (3.b)

Test statistics

Mann Whitney Test: Return on Debt Equity (DER) REIT and non REIT property firms

	DER2005	DER2006	DER2007	DER2008
Mann-Whitney U	167.000	149.000	196.500	172.000
Wilcoxon W	377.000	359.000	406.500	343.000
Z	-.380	-.907	-.095	-.234
Significance (2-tailed)	.704	.364	.924	.815

Appendix 2 Descriptive Statistics and data sources

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Table 1
Variables abbreviation and definitions

Variable	Variable's definition	Source
P_t	Price per share at the end of each financial year	DataStream
B_t	Book value per share at the end of each financial year	DataStream
r_{gls}	Implied cost of equity estimate for four used models	Estimated by researcher
$r_{ct}, r_{ojn}, r_{easton}$		
$FEPS_t$	Actual earnings per share reported	Financial statements
LTG	Consensus long-term growth forecast	As reported at the end of each financial year by IBES
DPS_t	Dividends per share paid during year $t-1$	DataStream
$FEPS_{t+i}$	Forecasted earnings per share for year $t+i$. *FEPS1* and *FEPS2* are the one and two year-ahead *FEPS3* is the third year-ahead consensus EPS forecasts if available and $FEPS3=FEPS2\cdot(1+LTG)$ if not	Consensus earnings per analyst' forecasts I/B/E/S
r_f	Three-month (one year)UK Treasury Bills risk-free rate.	DataStream
Por	Expected dividend payout ratio, calculated as *DPS0/EPS0*. If $EPS0 \leq 0$, then *Por is* equal to previous year payout ratio.	DataStream
(Tc)	Corporate tax rate, dummy variable equal to one if the firm year end is REIT and zero if not.	Financial statements.
(Td)	Income Tax rate on interest income (debt).	40% (HMRC)
(Ts)	Income Tax rate on equity income.	32.5% (HMRC)
(Tcg)	Capital gains tax rate on share gains.	18% (HMRC)
Dispersion	Dispersion of Analyst Forecasts	Calculated by researcher using I/B/E/S
D/E	The long-term debt to the market value of equity.	DataStream.
Beta, SMB and HML	The market beta and Fama &French "small"- minus-"big" and "High" – minus –"low" risk factors	Calculated by researcher using data obtained from DataStream.
MV	The equity market value at the end of fiscal year	DataStream
Y	Firm's dividend yield. Dividend/price	DataStream.
B/M	Book value of equity to market value of equity ratio.	DataStream.

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Table 2

Sample composition by year and industry category

Number of firms	REITs	Non Property firms	Property firms
2000	15	40	10
2001	16	55	16
2002	16	55	16
2003	16	55	17
2004	16	56	18
2005	16	56	18
2006	17	56	21
2007	18	56	22
2008	18	58	23
2009	18	58	23
Total	164	540	184

Table (2.a)

the average annual ICE and realized cost of equity for the sub samples

Year	ICE Non property	ICE property	ICE REITs	Realized CE REITs	Realized CE property	Realized CE non property
2000	0.1641335	0.075693	0.0892791	0.13257	0.120485	0.188414
2001	0.1586179	0.1114785	0.074895	0.112498	0.149923	0.189843
2002	0.2423719	0.1124708	0.0904523	0.131	0.162745	0.268893
2003	0.1788208	0.1099755	0.0778571	0.119638	0.156794	0.198741
2004	0.183124	0.0961766	0.0676556	0.109388	0.131478	0.20943
2005	0.1767694	0.0724342	0.0647081	0.12657	0.116295	0.204636
2006	0.1783184	0.0718165	0.0596434	0.125328	0.121429	0.214402
2007	0.2119349	0.0897954	0.0744459	0.141978	0.158484	0.241222
2008	0.2357426	0.1932183	0.1066177	0.163285	0.235313	0.260492
2009	0.200621	0.2147713	0.1452283	0.187538	0.242735	0.222496

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Table 3

Descriptive statistics for Implied Costs of Capital estimate and realised rate of return for: non-property firms (panel a), property firms (excluding REITs) (panel b) ad REITS (panel c)

Panel a	N	Minimum	Maximum	Mean	Std. Deviation
Ex_ante_gls	329	-0.120	0.728	0.064	0.134
Ex_ante_ct	329	0.000	0.498	0.061	0.079
Ex_ante_ojn	329	-0.864	0.881	0.184	0.138
Ex_ante_easton	329	-0.185	0.764	0.195	0.136
Ex_ante_average	329	-0.196	0.351	0.126	0.070
Realised_return	329	-0.888	4.750	0.095	0.512
Panel b					
Ex_ante_gls	95	-0.042	0.600	0.088	0.105
Ex_ante_ct	95	0.009	0.617	0.124	0.123
Ex_ante_ojn	95	0.008	0.890	0.131	0.127
Ex_ante_easton	95	0.003	0.998	0.142	0.107
Ex_ante_average	95	0.039	0.490	0.121	0.059
Realised_return	95	-0.930	5.000	0.190	0.694
Panel c					
Ex_ante_gls	98	0.002	0.556	0.054	0.064
Ex_ante_ct	98	0.022	0.666	0.090	0.111
Ex_ante_ojn	98	0.022	0.199	0.102	0.046
Ex_ante_easton	98	0.038	0.894	0.104	0.092
Ex_ante_average	98	0.033	0.275	0.088	0.050
Realised_return	98	-0.733	1.350	0.175	0.367

Table 4

Pearson correlation matrix for Implied Costs of Capital estimate and realised rate of return
*, **, *** indicates significance at 5, 2.5 and 1% respectively (single tailed)

Panel a	Ex_ante_gls	Ex_ante_ct	Ex_ante_ojn	Ex_ante_easton	Ex_ante_average	Realised_return
Ex_ante_gls	1	.055	.060	.073	.555***	-.028
Ex_ante_ct		1	.025	.132***	.384***	.072
Ex_ante_ojn			1	.219***	.631***	.010
Ex_ante_easton				1	.662***	.011
Ex_ante_average					1	.017
Realised_return						
Panel b						
Ex_ante_gls	1	.127	-.186*	.82	.239***	.057
Ex_ante_ct		1	-.112	-.087	.364***	.012
Ex_ante_ojn			1	.684***	.702***	-.014
Ex_ante_easton				1	.734***	.030
Ex_ante_average					1	.037
Realised_return						1
Panel c						
Ex_ante_gls	1	.090	.303***	.150	.512***	.155
Ex_ante_ct		1	.260***	.097	.693***	.008
Ex_ante_ojn			1	.359***	.640***	.207*
Ex_ante_easton				1	.648***	.131
Ex_ante_average					1	.163
Realised_return						1

Table 5

Spearman's correlation matrix for Implied Costs of Capital estimate and realised rate of return

*, **, *** indicates significance at 5, 2.5 and 1% respectively (single tailed)

Panel a	Ex_ante_gls	Ex_ante_ct	Ex_ante_ojn	Ex_ante_easton	Ex_ante_average	Realised_return
Ex_ante_gls	1	.094*	.115*	.054	.495***	.014
Ex_ante_ct		1	.006	.178***	.329***	.011
Ex_ante_ojn			1	.358***	.631***	-.005
Ex_ante_easton				1	.699***	.011
Ex_ante_average					1	.009
Realised_return						
Panel b						
Ex_ante_gls	1	-.073	-.199*	-.055	.239***	-.045
Ex_ante_ct		1	-.015	-.039	.429***	.123
Ex_ante_ojn			1	.456***	.509***	.0734
Ex_ante_easton				1	.505***	.193*
Ex_ante_average					1	.128
Realised_return						1
Panel c						
Ex_ante_gls	1	-.011	.333***	.297***	.465***	.226*
Ex_ante_ct		1	.088	.070	.511***	-.047
Ex_ante_ojn			1	.696***	.730***	.219*
Ex_ante_easton				1	.706***	.215*
Ex_ante_average					1	.058
Realised_return						1

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Table 6

Descriptive statistics for independent variables for: non-property firms (panel a), property firms (excluding REITs) (panel b) ad REITS (panel c)

Panel a		Minimum	Maximum	Mena	Std. Deviation
DE	329	0.000	0.921	0.239	0.200
YIELD	329	0.000	0.391	0.035	0.039
BETA	329	-2.376	3.450	0.934	0.666
SMB	329	-0.838	1.175	0.075	0.612
HML	329	-0.750	1.048	0.041	0.573
DISPERSIO	329	-5.107	0.819	-1.749	1.003
LTG	329	-0.860	0.650	0.020	0.209
MV	329	520.000	34,579,230.000	2,253,786.535	4,969,806.599
Panel b					
DE	95	0.000	0.971	0.460	0.247
YIELD	95	0.000	1.415	0.045	0.152
BETA	95	-0.402	2.236	0.747	0.500
SMB	95	-0.838	1.175	-0.025	0.588
HML	95	-0.750	1.048	-0.069	0.546
DISPERSIO	95	-5.136	0.300	-2.326	1.196
LTG	95	-0.687	0.321	0.019	0.209
MV	95	8,610.000	1,175,090.000	271,380.316	246,059.542
Panel *c*					
DE	98	0.000	0.964	0.449	0.187
YIELD	98	0.000	0.563	0.039	0.064
BETA	98	0.013	1.462	0.558	0.320
SMB	98	-0.838	1.175	0.000	0.593
HML	98	-0.750	1.048	-0.011	0.552
DISPERSIO	98	-4.917	0.330	-2.128	0.972
LTG	98	-0.127	0.081	-0.017	0.056
MV	98	11,040.000	8,121,760.000	1,086,297.143	1,570,859.288

Table 6a

Difference of means in dependent and independent variables between Property (non REIT) firms and REITs

*, ** and *** indicates significance at 5, 2.5 and 1% level respectively

Variable	Sub - sample	n	Mean	t	df
Ex_ante_gls	Property -non REIT	95	0.088	2.642***	154.477
	REIT	98	0.054		
Ex_ante_ct	Property -non REIT	95	0.124	2.049*	187.327
	REIT	98	0.090		
Ex_ante_ojn	Property -non REIT	95	0.131	2.059*	117.479
	REIT	98	0.102		
Ex_ante_easton	Property -non REIT	95	0.142	2.686***	184.536
	REIT	98	0.104		
Ex_ante_average	Property -non REIT	95	0.121	4.273***	182.864
	REIT	98	0.088		
DE	Property -non REIT	95	0.460	.332	174.974
	REIT	98	0.449		
Yield	Property -non REIT	95	0.045	.348	125.254
	REIT	98	0.039		
BETA	Property -non REIT	95	0.747	3.118***	159.086
	REIT	98	0.558		
SMB	Property -non REIT	95	-0.025	-.287	190.892
	REIT	98	0.000		
HML	Property -non REIT	95	-0.069	-.725	190.914
	REIT	98	-0.011		
Dispersion	Property -non REIT	95	-2.326	-1.260	180.967
	REIT	98	-2.128		
LTG	Property -non REIT	95	0.019	1.627	107.071
	REIT	98	-0.017		
MV	Property -non REIT	95	271,380.316	-5.072***	101.905
	REIT	98	1,086,297.143		

Table 6 b
Difference of means in dependent and independent variables between Non property firms and REIT firms

*, ** and *** indicates significance at 5, 2.5 and 1% level respectively

Variable	Sub - sample	n	Mean	t	Df
Ex_ante_gls	Non Property	329	0.064	1.030	343.445
	REIT	98	0.054		
Ex_ante_ct	Non Property	329	0.061	-2.355**	128.173
	REIT	98	0.090		
Ex_ante_ojn	Non Property	329	0.184	9.106***	420.936
	REIT	98	0.102		
Ex_ante_easton	Non Property	329	0.195	7.689***	236.026
	REIT	98	0.104		
Ex_ante_average	Non Property	329	0.126	6.096***	225.233
	REIT	98	0.088		
de	Non Property	329	0.239	-9.618***	168.832
	REIT	98	0.449		
yield	Non Property	329	0.035	-.572	119.252
	REIT	98	0.039		
BETA	Non Property	329	0.934	7.690***	341.033
	REIT	98	0.558		
SMB	Non Property	329	0.075		
	REIT	98	0.000	1.095	163.407
HML	Non Property	329	0.041		
	REIT	98	-0.011	.819	164.313
Dispersion	Non Property	329	-1.749		
	REIT	98	-2.128	3.362***	163.507
LTG	Non Property	329	0.020		
	REIT	98	-0.017	2.898***	422.263
MV	Non Property	329	2,253,786.535		
	REIT	98	1,086,297.143	3.687***	423.736

Table 6 c
Difference of means in dependent and independent variables between Non property firms and REIT firms

*, ** and *** indicates significance at 5, 2.5 and 1% level respectively

Variable	Sub - sample	n	Mean	t	df
Ex_ante_gls	Non Property	329	0.064	-1.765	191.460
	Property -non REIT	95	0.088		
Ex_ante_ct	Non Property	329	0.061	-4.692***	117.341
	Property -non REIT	95	0.124		
Ex_ante_ojn	Non Property	329	0.184	3.499***	164.044
	Property -non REIT	95	0.131		
Ex_ante_easton	Non Property	329	0.195	3.977***	189.798
	Property -non REIT	95	0.142		
Ex_ante_average	Non Property	329	0.126	.681	177.572
	Property -non REIT	95	0.121		
de	Non Property	329	0.239	-7.985***	131.638
	Property -non REIT	95	0.460		
yield	Non Property	329	0.035	-.620	97.574
	Property -non REIT	95	0.045		
BETA	Non Property	329	0.934	2.964***	199.862
	Property -non REIT	95	0.747		
SMB	Non Property	329	0.075	1.441	157.418
	Property -non REIT	95	-0.025		
HML	Non Property	329	0.041	1.707	158.624
	Property -non REIT	95	-0.069		
Dispersion	Non Property	329	-1.749	4.285***	134.478
	Property -non REIT	95	-2.326		
LTG	Non Property	329	0.020	.046	152.547
	Property -non REIT	95	0.019		
MV	Non Property	329	2,253,786.535	7.205***	333.509
	Property -non REIT	95	271,380.316		

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Table 7

Pearson correlation matrix for independent variables for: non-property firms (panel a), property firms (excluding REITs) (panel b) ad REITS (panel c)

*, **, *** indicates significance at 5, 2.5 and 1% respectively (two tailed)

Panel a	DE	Yield	Beta	SMB	HML	Dispersion	LTG	MV
DE	1	.277***	.084	.099	.054	.044	.053	.056
Yield		1	-.007	.082	.064	.002	.082	-.075
Beta			1	-.259***	-.279***	-.090	-.068	-.022
SMB				1	.959***	.133***	-.029	-.013
HML					1	.155***	.003	-.012
Dispersion						1	.115***	.030
LTG							1	.044
MV								1
Panel b								
DE	1	.127	-.065	.100	.044	-.246*	.052	-.290**
Yield		1	.169	-.106	-.127	-.048	.023	-.078
Beta			1	-.095	-.090	.072	.012	.057
SMB				1	.945***	.073	-.032	-.352***
HML					1	.042	-.027	-.296***
Dispersion						1	-.184	-.162
LTG							1	-.063
MV								1
Panel c								
DE	1	.298***	.201*	.110	.047	-.394**	.063	.067
Yield		1	.052	-.233*	-.250*	-.122	-.012	-.135
Beta			1	-.238*	-.360***	-.072	-.011	.117
SMB				1	.957***	.098	.239*	-.172
HML					1	.086	.233*	-.133
Dispersion						1	-.061	.223*
LTG							1	-.064
MV								1

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Table 8

Spearman's correlation matrix for independent variables for: non-property firms (panel a), property firms (excluding REITs) (panel b) ad REITS (panel c)

*, **, *** indicates significance at 5, 2.5 and 1% respectively (two tailed)

Panel a	DE	Yield	Beta	SMB	HML	Dispersion	LTG	MV
DE	1	.281***	.081	.097	.091	.089	-.005	.083
Yield		1	-.007	.092	.088	-.033	.098	.047
Beta			1	-.260***	-.286***	-.058	-.062	-.008
SMB				1	.962***	.124*	-.035	-.024
HML					1	.134*	.006	-.018
Dispersion						1	.044	.079
LTG							1	.043
MV								1
Panel b								
DE	1	-.157	-.053	.128	.093	-.300*	.032	-.239*
Yield		1	.-081	.130	.079	.295***	.006	-.434***
Beta			1	-.171	-.167	.084	-.052	.164
SMB				1	.956***	.131	-.029	-.332***
HML					1	.194	-.025	-.294***
Dispersion						1	-.224*	-.292***
LTG							1	-.092
MV								1
Panel c								
DE	1	.146	.127	.155	.121	-.104	.074	.041
Yield		1	-.039	-.114	-.134	-.152	.140	-.308***
Beta			1	-.304**	-.377***	-.201	.028	.246*
SMB				1	.959***	.227*	.240*	-.137
HML					1	.251*	.221*	-.098
Dispersion						1	-.028	.124
LTG							1	-.101
MV								1

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Table 9

Summary of VIFs and Condition number by model and sample

Model	Sample	VIF (max)	VIF (mean)	Condition number	Variables (pair) with highest factor loading
Model 1	Non property firms	13.33	4.57	7.49	SMB & HML
Model 1	Property - Non REITs and REITs	13.5	3.86	11.19	SMB & HML
Model 2	Property - Non REITs and REITs	13.28	3.85	7.55	SMB & HML
Model 1	REITs	30.3	7.72	12.63	SMB & HML
Model 2	REITs	29.29	7.78	12.51	SMB & HML

Table 10: Dependent variable - specific variable definitions

Gebhardt Lee Swaminathan	**Claus and Thomas 2001**	**Ohlson and Jüettner-Narouth 2005**	**Easton (2004)**
$FROE_{t+1}$, $FROE_{t+2}$ Forecasted Return on Equity for two years ahead calculated by using two years ahead Forecasted earning per share as follows: $FROE_{t+i} = FEPS_{t+1} / B_{t+i-1}$ T = Forecast horizon or terminal value in the thesis is T = 10 Clean surplus relation has been used to forecast the future book values Model assumes that after third year, $FROE_{t+i}$ is a linear interpolation to the industry median ROE. In other words, GLS Model imposes the assumption that a firm's return-on-equity reverts to the industry-level ROE beyond the forecast horizon. The moving median industry ROE has been downloaded from DataStream.	*aei* Abnormal earnings calculated as $FEPSt+i - rct \cdot Bt$. r_f Three-month UK Treasury Bills risk-free rate at the end of financial year *gae* = Growth in abnormal earnings, calculated as Risk-free rate (r_f) – expected inflation rate. *Rf* and UK expected inflation rate have been downloaded from the DataStream. Clean surplus relationship has been used to forecast the future book values.	g_2 Short term earnings growth rate; *lteg* UK expected Long term economic growth. r_f Three-month UK Treasury Bills risk-free rate at the end of financial year r_f And *lteg* have been downloaded from the DataStream. $DPS_{t+1} = DPS_0$ Dividends per share paid during year $t-1$ or using payout ratio The model requires that $FEPS_{t+1} > 0$ and $FEPS_{t+2} > 0$	DPS_{t+1} : Forecasted Dividends per share or using payout ratio The model requires $FEPS_{t+2} > FEPS_{t+1} > 0$

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Table 1
Summary of regression results contained in following tables 2 – 25.
± indicates significance at 5% level or higher and direction, blank cell indicates not significant

	Model 1- non-property firms					Model 2- all property firms					Model 3- all property firms				
Reference to table	*2*	*7*	*12*	*17*	*22*	*3*	*8*	*13*	*18*	*23*	*4*	*9*	*14*	*19*	*24*
Cost estimation method:	*Average*	*GLS*	*CT*	*OJN*	*EASTON*	*Average*	*GLS*	*CT*	*OJN*	*EASTON*	*Average*	*GLS*	*CT*	*OJN*	*EASTON*
Panel A (OLS)															
DE +		+	+		+	+	+				+	+			
REIT_DUMMY	n/a	n/a	n/a	n/a	n/a				+	+	n/a	n/a	n/a	n/a	n/a
DE* REIT_DUMMY						n/a	n/a	n/a	n/a	n/a				+	+
YIELD ±			-		+	+		+		+	+		+		+
BETA +	+			+		+				+	+				+
SMB +	+	-				-	-			-	-	-			-
HML +		+				+	+			+	+				+
DISPERSION +	-	-	-				-		+					+	
LTG +															
MV -				-				-	-	-		-	-	-	-
Constant				+	+				+	+					+
Panel B (ROBUST)														+	
DE +			+			+	+			+	+	+			
REIT_DUMMY	n/a	n/a	n/a	n/a	n/a			+	+	+	n/a	n/a	n/a	n/a	n/a
DE* REIT_DUMMY						n/a	n/a	n/a	n/a	n/a				+	+
YIELD ±		+				+			+	+	+	+		+	+
BETA +	+			+		+			+	+	+			+	+
SMB +	+		-			-			-	-	-	-		-	-
HML +		+	+				+	-	+	+		+	-	+	+
DISPERSION +	-	-					-							+	
LTG +															
MV -				-		-				-	-	-		-	-
Constant				+				+	+	+		-	+	+	+

Table 1 (continued)
Summary of regression results contained in following tables 2 – 25.
± indicates significance at 5% level or higher and direction, blank cell indicates not significant

	Model 2-REITs					Model 2- REITs				
Reference to table	*5*	*10*	*15*	*20*	*24*	*6*	*11*	*16*	*21*	*26*
Cost estimation method:	*Average*	*GLS*	*CT*	*OJN*	*EASTON*	*Average*	*GLS*	*CT*	*OJN*	*EASTON*
Panel A (OLS)										
DE +						-		-		-
REIT_DUMMY	+		+	+	+	n/a	n/a	n/a	n/a	n/a
DE* REIT_DUMMY	n/a	n/a	n/a	n/a	n/a	+		+	+	+
YIELD ±	+	+		+	+	+	+		+	+
BETA +		-		+			-		+	
SMB +	-		-	-	-	-		-	-	-
HML +	+	+	+	+	+	+		+	+	+
DISPERSION +		-								
LTG +										
MV -										
Constant		-	+			+	-	+		+
Panel B (ROBUST)										
DE +		+	-			-	+			
REIT_DUMMY	+	+	+	+	+	n/a	n/a	n/a	n/a	n/a
DE* REIT_DUMMY	n/a	n/a	n/a	n/a	n/a	+		+	+	+
YIELD ±	+	+	-	+		+	+		+	+
BETA +		-	-	+		-			+	
SMB +	-	-		-	-	-	-	-	-	-
HML +	+	+		+	+	+	+	+	+	+
DISPERSION +			-			-		-		
LTG +										
MV -								+		
Constant	+					+	-	-		

Appendix 4: Regression Results

Table 1

Sample: Non property firms

$$RPavgi,t = \alpha + \beta_1 DEi,t + \beta_2 Yieldi,t + \beta_3 Betai,t + \beta_4 SMBi,t + \beta_5 HML_{i,t} + + \beta_6 Dispi,t + \beta_7 LTG_{i,t} + \beta_8 MVi,t + \sum_{i=9}^{14} \beta_i Ind_i + \varepsilon i,t$$

Panel A: contains Huber/White/sandwich robust standard errors.
Panel B: contains Huber robust regression estimates.
*, **, *** represents significance at 5, 2.5 and 1% respectively.

Panel A	*Coefficient*	*Standard error*	*t-statistic*
DE +	0.028	0.021	1.35
YIELD ±	0.128	0.137	0.93
BETA +	0.012	0.007	1.83**
SMB +	-0.039	0.021	-1.85**
HML +	0.036	0.023	1.58
DISPERSION +	-0.011	0.004	-2.86***
LTG +	0.013	0.019	0.66
MV -	-0.001	0.001	-0.04
Constant	0.006	0.025	0.25
F	2.84*** (14, 314)		
R^2adjusted	7.27%		
Breusch-Pagan	0.17		
N	329		

Panel B	*Coefficient*	*Standard error*	*t-statistic*
DE +	0.034	0.022	1.59
YIELD ±	0.139	0.141	0.99
BETA +	0.014	0.007	2.0**
SMB +	-0.038	0.022	-1.74*
HML +	0.032	0.024	1.34
DISPERSION +	-0.013	0.004	-3.15***
LTG +	0.027	0.020	1.33
MV -	0.001	0.000	0.0
Constant	-0.002	0.026	-0.08
F	3.94*** (14,314)		
N	329		

Table 2

Sample: All property firms

$$RFavgi,t = \alpha + \beta_1 DEi,t + \beta_2 Reit_{dummyi,t} + \beta_3 Yieldi,t + \beta_4 Betai,t + \beta_5 SMBi,t + \beta_6 HML_{i,t} + + \beta_7 Dispi,t + \beta_8 LTG_{i,t} + \beta_9 MVi,t + \sum_{i=10}^{15} \beta_i Ind_i + \varepsilon i,t$$

Panel A: contains Huber/White/sandwich robust standard errors.
Panel B: contains Huber robust regression estimates.
*,**,*** represents significance at 5, 2.5 and 1% respectively.

Panel A	*Coefficient*	*Standard error*	*t-statistic*
DE +	0.041	0.020	2.07**
REIT_DUMMY +	0.018	0.013	1.41
YIELD ±	0.457	0.139	3.29***
BETA +	0.029	0.012	2.49**
SMB +	-0.059	0.021	-2.82***
HML +	0.050	0.022	2.21***
DISPERSION +	-0.001	0.004	-0.15
LTG +	0.001	0.029	0.04
MV -	-0.001	0.000	-5.56
Constant	0.017	0.011	1.47
F	7.44***		
	(9,183)		
R^2adjusted	23.20%		
Breusch-Pagan	11.90***		
n	193		

Panel B	*Coefficient*	*Standard error*	*t-statistic*
DE +	0.042	0.018	2.36***
REIT_DUMMY +	0.013	0.011	1.14
YIELD ±	0.455	0.124	3.68***
BETA +	0.022	0.008	2.65***
SMB +	-0.044	0.021	-2.16**
HML +	0.032	0.023	1.4
DISPERSION +	-0.001	0.003	-0.37
LTG +	0.000	0.022	0
MV -	-0.001	0.000	-3.26***
Constant	0.013	0.012	1.11
F	6.99***		
	(9,183)		
n	193		

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Table 3

Sample: All property firms

$$RPavgi,t = a + \beta_1 DEi,t + \beta_2 DE * Reit_{dummyi,t} + \beta_3 Yieldi,t + \beta_4 Betai,t + \beta_5 SMBi,t + \beta_6 HML_{i,t} + + \beta_7 Dispi,t + \beta_8 LTG_{i,t} + \beta_9 MVi,t + \sum_{i=10}^{15} \beta_i Ind_i + \varepsilon i,t$$

Panel A: contains Huber/White/sandwich robust standard errors.
Panel B: contains Huber robust regression estimates.
*,**,*** represents significance at 5, 2.5 and 1% respectively

Panel A	*Coefficient*	*Standard error*	*t-statistic*
DE +	0.037	0.021	1.77*
DE*REIT_DUMMY +	0.015	0.023	0.65
YIELD ±	0.490	0.136	3.6***
BETA +	0.029	0.012	2.49***
SMB +	-0.053	0.021	-2.52***
HML +	0.042	0.023	1.84**
DISPERSION +	-0.001	0.004	-0.18
LTG +	-0.001	0.029	-0.02
MV -	-0.001	0.000	-5.55***
Constant	0.018	0.012	1.53
F	8.26*** (9,183)		
R^2adjusted	22.34%		
Breusch-Pagan	11.53***		
N	193		

Panel B	*Coefficient*	*Standard error*	*t-statistic*
DE +	0.041	0.018	2.29**
DE*REIT_DUMMY +	0.007	0.021	0.36
YIELD ±	0.471	0.124	3.8***
BETA +	0.023	0.008	2.73***
SMB +	-0.039	0.021	-1.89*
HML +	0.025	0.022	1.12
DISPERSION +	-0.001	0.003	-0.37
LTG +	-0.002	0.022	-0.11
MV -	-0.001	0.000	-3.16***
Constant	0.013	0.012	1.07
F	6.73*** (9,183)		
N	193		

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Table 4

Sample: REITSs

$$RPavgi,t = a + \beta_1 DEi,t + \beta_2 Reit_{dummyi,t} + \beta_3 Yieldi,t + \beta_4 Betai,t + \beta_5 SMBi,t + \beta_6 HML_{it} + + \beta_7 Dispi,t + \beta_8 LTG_{it} + \beta_9 MVi,t + \sum_{i=10}^{15} \beta_i Ind_i + \varepsilon i,t$$

Panel A: contains Huber/White/sandwich robust standard errors.

Panel B: contains Huber robust regression estimates.
*,**,*** represents significance at 5, 2.5 and 1% respectively

Panel A	*Coefficient*	*Standard error*	*t-statistic*
DE +	0.002	0.027	0.09
REIT_DUMMY +	0.101	0.020	5.14***
YIELD ±	0.536	0.206	2.60***
BETA +	-0.028	0.019	-1.47
SMB +	-0.167	0.032	-5.24***
HML +	0.184	0.035	5.32***
DISPERSION +	-0.004	0.005	-0.79
LTG +	0.108	0.076	1.42
MV -	-0.001	0.000	-1.00
Constant	0.011	0.017	0.63
F	13.72***		
	(9, 88)		
R^2adjusted	54.13%		
Breusch-Pagan	18.30***		
N	98		

Panel B	*Coefficient*	*Standard error*	*t-statistic*
DE +	0.012	0.021	0.56
REIT_DUMMY +	0.094	0.013	7.38***
YIELD ±	0.241	0.135	1.78*
BETA +	-0.020	0.012	-1.61
SMB +	-0.132	0.026	-5.08***
HML +	0.147	0.030	4.92***
DISPERSION +	0.002	0.004	0.44
LTG +	0.087	0.056	1.55
MV -	-0.001	0.000	-0.96
Constant	0.021	0.011	1.87*
F	14.28***		
	(9, 88)		
N	98		

Table 5
Sample: REITS

$$RPavgi,t = \alpha + \beta_1 DEi,t + \beta_2 DE * Reit_{dummyi} t + \beta_3 Yieldi,t + \beta_4 Betai,t + \beta_5 SMBi,t + \beta_6 HML_{it} + + \beta_7 Dispi,t + \beta_8 LTG_{i,t} + \beta_9 MVi,t + \sum_{i=10}^{15} \beta_i Indi_i + \varepsilon i,t$$

Panel A: contains Huber/White/sandwich robust standard errors.
Panel B: contains Huber robust regression estimates.
*,**,*** represents significance at 5, 2.5 and 1% respectively

Panel A	*Coefficient*	*Standard error*	*t-statistic*
DE +	-0.096	0.034	-2.8***
DE*REIT_DUMMY +	0.187	0.042	4.49***
YIELD ±	0.562	0.178	3.15***
BETA +	-0.032	0.022	-1.5
SMB +	-0.151	0.040	-3.78***
HML +	0.161	0.044	3.67***
DISPERSION +	-0.006	0.005	-1.08
LTG +	0.119	0.080	1.5
MV -	-0.001	0.000	-0.63
Constant	0.055	0.023	2.44**
F	11.75*** (9, 88)		
R^2adjusted	49.94%		
Breusch-Pagan	14.85***		
N	98		

Panel B	*Coefficient*	*Standard error*	*t-statistic*
DE +	-0.054	0.022	-2.44***
DE*REIT_DUMMY +	0.211	0.025	8.34***
YIELD ±	0.489	0.131	3.75***
BETA +	-0.036	0.012	-2.96***
SMB +	-0.165	0.025	-6.73***
HML +	0.184	0.028	6.57***
DISPERSION +	-0.007	0.004	-1.93*
LTG +	0.064	0.054	1.18
MV -	-0.001	0.000	-0.03
Constant	0.029	0.012	2.4**
F	25.42*** (9, 88)		
N	98		

Appendixes

Table 6

Sample: Non property firms

$$RPgIsi,t = \alpha + \beta_1 DEi,t + \beta_2 Yieldi,t + \beta_3 Betai,t + \beta_4 SMBi,t + \beta_5 HML_{i,t} + + \beta_6 Dispi,t + \beta_7 LTG_{i,t} + \beta_8 MVi,t + \sum_{i=9}^{14} \beta_i Ind_i + \varepsilon i,t$$

Panel A: contains Huber/White/sandwich robust standard errors.
Panel B: contains Huber robust regression estimates.
*,**,*** represents significance at 5, 2.5 and 1% respectively

Panel A	*Coefficient*	*Standard error*	*t-statistic*
DE +	0.077	0.030	2.58***
YIELD ±	-0.003	0.221	-0.01
BETA +	-0.006	0.009	-0.71
SMB +	-0.092	0.024	-3.86***
HML +	0.108	0.026	4.13***
DISPERSION +	-0.037	0.007	-4.98***
LTG +	0.001	0.021	0.04
MV -	-0.001	0.000	-0.61
Constant	-0.047	0.036	-1.3
	5.96***		
F	(14, 513)		
R^2adjusted	11.64%		
Breusch-Pagan	112.560***		
n	528		

Panel B	*Coefficient*	*Standard error*	*t-statistic*
DE +	0.057	0.021	2.71***
YIELD ±	-0.039	0.129	-0.3
BETA +	0.008	0.006	1.22
SMB +	-0.058	0.021	-2.8
HML +	0.057	0.022	2.57***
DISPERSION +	-0.012	0.004	-3.19***
LTG +	0.009	0.017	0.54
MV -	-0.001	0.000	-0.21
Constant	-0.016	0.022	-0.73
	2.75***		
F	(14,513)		
n	528		

Appendixes

Table 7

Sample: All property firms

$$RFgksi,t = \alpha + \beta_1 DEi,t + \beta_2 Reit_{dummyi,t} + \beta_3 Yieldi,t + \beta_4 Betai,t + \beta_5 SMBi,t + \beta_6 HML_{i,t} + + \beta_7 Dispi,t + \beta_8 LTG_{i,t} + \beta_9 MVi,t + \sum_{i=t0}^{15} \beta_i Ind_i + \varepsilon i,t$$

Panel A: contains Huber/White/sandwich robust standard errors.
Panel B: contains Huber robust regression estimates.
*,**,*** represents significance at 5, 2.5 and 1% respectively

Panel A	*Coefficient*	*Standard error*	*t-statistic*
DE +	0.072	0.021	3.34***
REIT_DUMMY +	-0.003	0.014	-0.17
YIELD ±	0.234	0.213	1.1
BETA +	-0.004	0.011	-0.38
SMB +	-0.052	0.030	-1.71*
HML +	0.048	0.033	1.46
DISPERSION +	-0.004	0.006	-0.67
LTG +	-0.060	0.048	-1.24
MV -	0.001	0.000	-5.03***
Constant	-0.006	0.017	-0.34
F	3.15*** (9,262)		
R^2adjusted	6.66%		
Breusch-Pagan	33.23***		
n	272		

Panel B	*Coefficient*	*Standard error*	*t-statistic*
DE +	0.064	0.013	4.87***
REIT_DUMMY +	-0.003	0.008	-0.34
YIELD ±	0.141	0.085	1.65*
BETA +	0.003	0.006	0.53
SMB +	-0.048	0.015	-3.28***
HML +	0.043	0.016	2.7***
DISPERSION +	0.003	0.003	0.99
LTG +	0.013	0.017	0.76
MV -	-0.001	0.000	-3.35***
Constant	-0.012	0.016	-0.97
F	5.28*** (9,261		
n	272		

Table 8
Sample: All property firms

$$RPgisi,t = a + \beta_1 DEi,t + \beta_2 DE * Reit_{dummyi},t + \beta_3 Yieldi,t + \beta_4 Betai,t - \beta_5 SMBi,t + \beta_6 HML_{i,t} + + \beta_7 Dispi,t + \beta_8 LTG_{i,t} + \beta_9 MVi,t + \sum_{i=1}^{1i} \beta_i Ind_i + \varepsilon i,t$$

Panel A: contains Huber/White/sandwich robust standard errors.
Panel B: contains Huber robust regression estimates.
*,**,*** represents significance at 5, 2.5 and 1% respectively.

Panel A	*Coefficient*	*Standard error*	*t-statistic*
DE +	0.073	0.023	3.19***
DE*REIT_DUMMY +	-0.011	0.031	-0.35
YIELD ±	0.241	0.213	1.13
BETA +	-0.004	0.012	-0.33
SMB +	-0.050	0.031	-1.65*
HML +	0.046	0.033	1.41
DISPERSION +	-0.004	0.006	-0.67
LTG +	-0.061	0.049	-1.25
MV -	-0.001	0.000	-5.00***
Constant	-0.007	0.017	-0.41
F	3.16*** (9,262)		
R^2adjusted	6.7%		
Breusch-Pagan	34.22***		
N	272		

Panel B	*Coefficient*	*Standard error*	*t-statistic*
DE +	0.067	0.013	5.07***
DE*REIT_DUMMY +	-0.017	0.014	-1.16
YIELD ±	0.161	0.084	1.91**
BETA +	0.005	0.006	0.76
SMB +	-0.044	0.014	-3.05***
HML +	0.039	0.016	2.47***
DISPERSION +	0.002	0.003	0.94
LTG +	0.011	0.017	0.68
MV -	-0.001	0.000	-3.24***
Constant	-0.015	0.008	-1.74*
F	5.54*** (9,261		
n	271		

Appendixes

Table 9
Sample: REITSs

$$RPglsi,t = \alpha + \beta_1 DEi,t + \beta_2 Reit_{dummy}i,t + \beta_3 Yieldi,t + \beta_4 Betai,t + \beta_5 SMBi,t + \beta_6 HML_{i,t} + + \beta_7 Dispi,t + \beta_8 LTG_{i,t} + \beta_9 MVi,t + \sum_{i=1}^{15} \beta_i Ind_i + \varepsilon i,t$$

Panel A: contains Huber/White/sandwich robust standard errors.

Panel B: contains Huber robust regression estimates.
*,**,*** represents significance at 5, 2.5 and 1% respectively

Panel A	*Coefficient*	*Standard error*	*t-statistic*
DE +	0.046	0.033	1.42
REIT_DUMMY +	0.027	0.020	1.34
YIELD ±	0.945	0.223	4.24***
BETA +	-0.043	0.020	-2.16**
SMB +	-0.062	0.040	-1.54
HML +	0.076	0.046	1.64*
DISPERSION +	-0.012	0.006	-2.17**
LTG +	-0.047	0.084	-0.56
MV -	-0.001	0.000	-0.48
Constant	-0.048	0.018	-2.73***
F	7.24***		
	(9, 126)		
R^2adjusted	29.39%		
Breusch-Pagan	52.63***		
n	136		

Panel B	*Coefficient*	*Standard error*	*t-statistic*
DE +	0.039	0.014	2.67***
REIT_DUMMY +	0.026	0.009	2.9***
YIELD ±	0.408	0.099	4.12***
BETA +	-0.021	0.009	-2.35***
SMB +	-0.076	0.018	-4.27***
HML +	0.091	0.021	4.44***
DISPERSION +	-0.004	0.003	-1.58
LTG +	0.000	0.037	-0.01
MV -	-0.001	0.000	-0.65
Constant	-0.031		
F	10.78***		
	(9, 125		
n	135		

Table 10
Sample: REITS

$$RPgIsi,t = \alpha + \beta_1 DEi,t + \beta_2 DE * Reit_{dummyi,} t + \beta_3 Yieldi,t + \beta_4 Betai,t + \beta_5 SMBi,t + \beta_6 HML_{i,t} + + \beta_7 Dispi,t + \beta_8 LTG_{i,t} + \beta_9 MVi,t + \sum_{t=10}^{15} \beta_t Ind_t + \varepsilon i,t$$

Panel A: contains Huber/White/sandwich robust standard errors.
Panel B: contains Huber robust regression estimates.
*,**,*** represents significance at 5, 2.5 and 1% respectively

Panel A	*Coefficient*	*Standard error*	*t-statistic*
DE +	0.037	0.048	0.77
DE*REIT_DUMMY +	0.016	0.048	0.33
YIELD ±	1.052	0.387	2.72***
BETA +	-0.036	0.018	-1.95*
SMB +	-0.038	0.048	-0.79
HML +	0.047	0.050	0.94
DISPERSION +	-0.013	0.008	-1.55
LTG +	-0.054	0.136	-0.4
MV -	-0.001	0.000	-0.64
Constant	-0.047	0.020	-2.32**
F	6.97*** (9, 126)		
n	136		

Panel B	*Coefficient*	*Standard error*	*t-statistic*
DE +	0.039	0.017	2.28**
DE*REIT_DUMMY +	0.012	0.019	0.65
YIELD ±	0.511	0.102	5.01***
BETA +	-0.014	0.009	-1.47
SMB +	-0.049	0.018	-2.66***
HML +	0.059	0.021	2.79***
DISPERSION +	-0.004	0.003	-1.34
LTG +	-0.010	0.039	-0.26
MV -	-0.001	0.000	-0.78
Constant	-0.032	0.009	-3.34***
F	9.62*** (9, 125)		
n	135		

Appendixes

Table 11
Sample: Non property firms

$$RPctt = \alpha + \beta_1 DEi,t + \beta_2 Yieldi,t + \beta_3 Betai,t + \beta_4 SMBi,t + \beta_5 HML_{i,t} + + \beta_6 Dispi,t + \beta_7 LTG_{i,t} + \beta_8 MVi,t + \sum_{i=9}^{14} \beta_i Ind_i + \varepsilon i,t$$

Panel A: contains Huber/White/sandwich robust standard errors.
Panel B: contains Huber robust regression estimates.
*,**,*** represents significance at 5, 2.5 and 1% respectively

Panel A	*Coefficient*	*Standard error*	*t-statistic*
DE +	0.055	0.022	2.57***
YIELD ±	-0.250	0.112	-2.22***
BETA +	-0.003	0.007	-0.47
SMB +	-0.019	0.022	-0.86
HML +	0.007	0.023	0.28
DISPERSION +	-0.009	0.006	-1.64*
LTG +	0.013	0.016	0.83
MV -	0.001	0.000	0.82
Constant	-0.019	0.016	-1.19
	2.79***		
F	(14, 513)		
R^2adjusted	4.54%		
Breusch-Pagan	63.89***		
n	528		

Panel B	*Coefficient*	*Standard error*	*t-statistic*
DE +	0.030	0.010	3.2***
YIELD ±	0.048	0.060	0.79
BETA +	-0.001	0.003	-0.24
SMB +	-0.033	0.009	-3.49***
HML +	0.018	0.010	1.78*
DISPERSION +	0.000	0.002	-0.02
LTG +	0.010	0.008	1.36
MV -	0.001	0.000	1.06
Constant	-0.010	0.011	-0.92
	7.48***		
F	(14,513)		
n	528		

Table 12
Sample: All property firms

$$RPcti,t = \alpha + \beta_1 DEi,t + \beta_2 Reit_{dummyi},t + \beta_3 Yieldi,t + \beta_4 Betai,t + \beta_5 SMBi,t + \beta_6 HML_{i,t} + + \beta_7 Dispi,t + \beta_8 LTG_{i,t} + \beta_9 MVi,t + \sum_{i=10}^{15} \beta_i Ind_i + \varepsilon i,t$$

Panel A: contains Huber/White/sandwich robust standard errors.
Panel B: contains Huber robust regression estimates.
*,**,*** represents significance at 5, 2.5 and 1% respectively

Panel A	*Coefficient*	*Standard error*	*t-statistic*
DE +	-0.002	0.040	-0.05
REIT_DUMMY +	0.020	0.026	0.75
YIELD ±	0.717	0.372	1.92*
BETA +	0.017	0.023	0.74
SMB +	-0.010	0.045	-0.22
HML +	-0.030	0.045	-0.66
DISPERSION +	-0.008	0.008	-0.97
LTG +	0.002	0.030	0.07
MV -	-0.001	0.000	-2.4**
Constant	0.012	0.035	0.34
F	5.21***		
	(9,272)		
R^2adjusted	11.89%		
Breusch-Pagan	118.2***		
n	282		

Panel B	*Coefficient*	*Standard error*	*t-statistic*
DE +	-0.033	0.022	-1.51
REIT_DUMMY +	0.021	0.012	1.77*
YIELD ±	0.082	0.139	0.59
BETA +	0.005	0.010	0.5
SMB +	0.024	0.024	1.02
HML +	-0.047	0.026	-1.78*
DISPERSION +	-0.005	0.004	-1.25
LTG +	-0.025	0.028	-0.91
MV -	-0.001	0.000	-1.63
Constant	0.033	0.014	2.39**
F	3.3***		
	(9,272)		
n	282		

Table 13
Sample: All property firms

$$RPcti,t = \alpha + \beta_1 DEi,t + \beta_2 DE * Reit_{dummy},t + \beta_3 Yieldi,t + \beta_4 Betai,t + \beta_5 SMBi,t + \beta_6 HML_{i,t} + + \beta_7 Dispi,t + \beta_8 LTG_{i,t} + \beta_9 MVi,t + \sum_{i=1.0}^{15} \beta_i Ind_i + \varepsilon i,t$$

Panel A: contains Huber/White/sandwich robust standard errors.
Panel B: contains Huber robust regression estimates.
*,**,*** represents significance at 5, 2.5 and 1% respectively

Panel A	*Coefficient*	*Standard error*	*t-statistic*
DE +	-0.003	0.041	-0.08
DE*REIT_DUMMY +	0.003	0.053	0.06
YIELD ±	0.757	0.364	2.08***
BETA +	0.018	0.023	0.77
SMB +	0.003	0.047	0.06
HML +	-0.046	0.047	-0.97
DISPERSION +	-0.008	0.008	-1
LTG +	-0.004	0.029	-0.13
MV -	-0.001	0.000	-2.2*
Constant	0.012	0.037	0.32
F	5.07***		
	(9,272)		
R^2adjusted	11.53%		
Breusch-Pagan	111.69***		
n	282		

Panel B	*Coefficient*	*Standard error*	*t-statistic*
DE +	-0.034	0.022	-1.52
DE*REIT_DUMMY +	0.022	0.023	0.97
YIELD ±	0.107	0.139	0.77
BETA +	0.007	0.010	0.66
SMB +	0.030	0.023	1.29
HML +	-0.053	0.026	-2.06***
DISPERSION +	-0.006	0.004	-1.5
LTG +	-0.030	0.028	-1.07
MV -	-0.001	0.000	-1.32
Constant	0.029	0.014	2.07***
F	2.94***		
	(9,272)		
n	282		

Table 14
Sample: REITSs

$$RFct1,t = \alpha + \beta_1 DEt,t + \beta_2 Reit_{dummyt},t + \beta_3 Ytelds_t,t + \beta_4 Betat,t + \beta_5 SMBt,t + \beta_6 HML_{t,t} + + \beta_7 Dispt,t + \beta_8 LTG_{t,t} + \beta_9 MVt,t + \sum_{i=10}^{15} \beta_i Ind_i + \varepsilon t,t$$

Panel A: contains Huber/White/sandwich robust standard errors.
Panel B: contains Huber robust regression estimates.
*,**,*** represents significance at 5, 2.5 and 1% respectively

Panel A	*Coefficient*	*Standard error*	*t-statistic*
DE +	-0.095	0.073	-1.3
REIT_DUMMY +	0.128	0.041	3.11***
YIELD ±	0.140	0.603	0.23
BETA +	-0.031	0.033	-0.97
SMB +	-0.171	0.079	-2.16**
HML +	0.164	0.083	1.97*
DISPERSION +	0.009	0.015	0.58
LTG +	0.169	0.156	1.09
MV -	-0.001	0.000	-1.71
Constant	0.097	0.042	2.31**
F	3.23***		
	(9, 136)		
R^2adjusted	20.19%		
Breusch-Pagan	98.55***		
n	146		

Panel B	*Coefficient*	*Standard error*	*t-statistic*
DE +	-0.065	0.028	-2.34**
REIT_DUMMY +	0.101	0.016	6.48***
YIELD ±	-0.412	0.182	-2.27**
BETA +	-0.040	0.016	-2.54**
SMB +	-0.052	0.033	-1.55
HML +	0.061	0.039	1.57
DISPERSION +	-0.018	0.005	-3.29***
LTG +	0.031	0.072	0.43
MV -	0.001	0.000	0.65
Constant	0.014	0.015	0.91
F	8.76***		
	(9, 136)		
n	146		

Table 15
Sample: REITS

$$RPct,t = \alpha + \beta_1 DEt,t + \beta_2 DE * Reit_{dummy\,it},t + \beta_3 Yield,t + \beta_4 Betat,t + \beta_5 SMBt,t + \beta_6 HML_{t,t} + + \beta_7 Dispi,t + \beta_8 LTG_{it} + \beta_9 MVi,t + \sum_{i=1}^{15} \beta_i Ind_i + \varepsilon t,t$$

Panel A: contains Huber/White/sandwich robust standard errors.
Panel B: contains Huber robust regression estimates.
*,**,*** represents significance at 5, 2.5 and 1% respectively

Panel A	*Coefficient*	*Standard error*	*t-statistic*
DE +	-0.233	0.078	-3.0***
DE*REIT_DUMMY +	0.275	0.084	3.26***
YIELD ±	0.136	0.505	0.27
BETA +	-0.039	0.035	-1.12
SMB +	-0.172	0.092	-1.87*
HML +	0.168	0.099	1.7*
DISPERSION +	0.005	0.016	0.29
LTG +	0.150	0.151	0.99
MV -	-0.001	0.000	-1.27
Constant	0.148	0.045	3.32***
F	5.14*** (9, 136)		
R^2adjusted	20.42%		
Breusch-Pagan	111.46***		
n	146		

Panel B	*Coefficient*	*Standard error*	*t-statistic*
DE +	-0.037	0.023	-1.6
DE*REIT_DUMMY +	0.105	0.024	4.37***
YIELD ±	-0.097	0.132	-0.74
BETA +	-0.019	0.012	-1.6
SMB +	-0.063	0.024	-2.6***
HML +	0.074	0.028	2.62***
DISPERSION +	-0.026	0.004	-6.58***
LTG +	-0.034	0.052	-0.66
MV -	0.001	0.000	3.17***
Constant	-0.041	0.012	-3.41***
F	9.56*** (9, 136)		
n	146		

Table 16
Sample: Non property firms

$$RPojni,t = \alpha + \beta_1 DEi,t + \beta_2 Yieldi,t + \beta_3 Betai,t + \beta_4 SMBi,t + \beta_5 HML_{i,t} + + \beta_6 Dispi,t + \beta_7 LTG_{i,t} + \beta_8 MVi,t + \sum_{i=9}^{18} \beta_i Ind_i + \varepsilon i,t$$

Panel A: contains Huber/White/sandwich robust standard errors.
Panel B: contains Huber robust regression estimates.
*,**,*** represents significance at 5, 2.5 and 1% respectively

Panel A	*Coefficient*	*Standard error*	*t-statistic*
DE +	-0.055	0.036	-1.52
YIELD ±	0.061	0.223	0.27
BETA +	0.048	0.011	4.29***
SMB +	-0.041	0.036	-1.14
HML +	0.051	0.039	1.33
DISPERSION +	0.004	0.006	0.65
LTG +	-0.007	0.029	-0.23
MV -	-0.001	0.000	-1.67*
Constant	0.113	0.038	2.95***
	2.90***		
F	(14, 460)		
R^2adjusted	5.32%		
Breusch-Pagan	3.12		
n	475		

Panel B	*Coefficient*	*Standard error*	*t-statistic*
DE +	-0.046	0.032	-1.42
YIELD ±	0.195	0.197	0.99
BETA +	0.030	0.010	3.01***
SMB +	-0.044	0.032	-1.39
HML +	0.049	0.034	1.45
DISPERSION +	0.001	0.006	0.2
LTG +	-0.016	0.026	-0.6
MV -	-0.001	0.000	-2.57***
Constant	0.106	0.034	3.14***
	2.66***		
F	(14,460)		
n	475		

Table 17
Sample: All property firms

$$RPropri,t = \alpha + \beta_1 DEi,t + \beta_2 Reil_{dummyi} t + \beta_3 Yieldi,t + \beta_4 Betai,t + \beta_5 SMBi,t + \beta_6 HML_{i,t} + + \beta_7 Dispi,t + \beta_8 LTG_{i,t} + \beta_9 MVi,t + \sum_{i=10}^{ti} \beta_i Indi_i + \varepsilon i,t$$

Panel A: contains Huber/White/sandwich robust standard errors.
Panel B: contains Huber robust regression estimates.
*,**,*** represents significance at 5, 2.5 and 1% respectively

Panel A	*Coefficient*	*Standard error*	*t-statistic*
DE +	0.019	0.039	0.49
REIT_DUMMY +	0.028	0.015	1.82*
YIELD ±	0.024	0.202	0.12
BETA +	0.040	0.030	1.35
SMB +	-0.045	0.058	-0.78
HML +	0.045	0.066	0.68
DISPERSION +	0.018	0.006	3.04***
LTG +	0.043	0.035	1.21
MV -	-0.001	0.000	-3.91***
Constant	0.083	0.025	3.34***
F	2.52*** (9,272)		
R^2adjusted	4.59%		
Breusch-Pagan	31.48***		
n	286		

Panel B	*Coefficient*	*Standard error*	*t-statistic*
DE +	0.011	0.018	0.65
REIT_DUMMY +	0.059	0.010	5.99***
YIELD ±	0.290	0.113	2.57***
BETA +	0.026	0.008	3.09***
SMB +	-0.109	0.019	-5.7***
HML +	0.113	0.021	5.38***
DISPERSION +	0.007	0.003	2.06
LTG +	0.013	0.023	0.58
MV -	-0.001	0.000	-2.37
Constant	0.043	0.011	3.83***
F	9.4*** (9,276)		
n	286		

Table 18
Sample: All property firms

$$RPo_{jm}t,t = \alpha + \beta_1 DEt,t + \beta_2 DE * Reit_{dummyji},t + \beta_3 Yieldi,t + \beta_4 Betat,t + \beta_5 SMBt,t + \beta_6 HMLi,t + + \beta_7 Dispt,t + \beta_8 LTG_{i,t} + \beta_9 MVt,t + \sum_{i=10}^{15} \beta_i Ind_i + \varepsilon t,t$$

Panel A: contains Huber/White/sandwich robust standard errors.
Panel B: contains Huber robust regression estimates.
*,**,*** represents significance at 5, 2.5 and 1% respectively

Panel A	*Coefficient*	*Standard error*	*t-statistic*
DE +	0.009	0.039	0.24
DE*REIT_DUMMY +	0.057	0.025	2.28**
YIELD ±	0.021	0.201	0.11
BETA +	0.039	0.030	1.32
SMB +	-0.045	0.056	-0.8
HML +	0.044	0.064	0.7
DISPERSION +	0.018	0.006	3.04***
LTG +	0.043	0.036	1.2
MV -	-0.001	0.000	-3.79***
Constant	0.088	0.024	3.65***
F	2.56*** (9,276)		
R^2adjusted	4.71%		
Breusch-Pagan	31.28***		
n	286		

Panel B	*Coefficient*	*Standard error*	*t-statistic*
DE +	-0.007	0.018	-0.41
DE*REIT_DUMMY +	0.104	0.019	5.55***
YIELD ±	0.314	0.114	2.76***
BETA +	0.025	0.008	2.96***
SMB +	-0.105	0.019	-5.52***
HML +	0.108	0.021	5.19***
DISPERSION +	0.007	0.003	1.93*
LTG +	0.012	0.023	0.51
MV -	-0.001	0.000	-2.1**
Constant	0.050	0.011	4.41***
F	8.87*** (9,276)		
n	286		

Table 19
Sample: REITSs

$$RPojni,t = \alpha + \beta_1 DEi,t + \beta_2 Reit_{dummypi},t + \beta_3 Yieldi,t + \beta_4 Betai,t + \beta_5 SMBi,t + \beta_6 HML_{i,t} + + \beta_7 Dispi,t + \beta_8 LTG_{i,t} + \beta_9 MVi,t + \sum_{i=1}^{15} \beta_i Ind_i + \varepsilon i,t$$

Panel A: contains Huber/White/sandwich robust standard errors.
Panel B: contains Huber robust regression estimates.
*,**,*** represents significance at 5, 2.5 and 1% respectively

Panel A	*Coefficient*	*Standard error*	*t-statistic*
DE +	0.036	0.023	1.59
REIT_DUMMY +	0.065	0.013	4.96***
YIELD ±	0.763	0.153	4.98***
BETA +	0.033	0.013	2.48***
SMB +	-0.156	0.028	-5.5***
HML +	0.178	0.033	5.44***
DISPERSION +	0.005	0.004	1.13
LTG +	0.071	0.059	1.21
MV -	-0.001	0.000	-1.14
Constant	0.036	0.023	1.59
F	14.91***		
	(9, 139)		
R^2adjusted	45.82%		
Breusch-Pagan	3.59		
n	149		

Panel B	*Coefficient*	*Standard error*	*t-statistic*
DE +	0.032	0.024	1.32
REIT_DUMMY +	0.068	0.014	4.82***
YIELD ±	0.730	0.165	4.42***
BETA +	0.031	0.014	2.18**
SMB +	-0.152	0.031	-4.98***
HML +	0.174	0.035	4.93***
DISPERSION +	0.004	0.005	0.89
LTG +	0.078	0.063	1.23
MV -	-0.001	0.000	-1.07
Constant	0.000	0.014	-0.03
F	12.79**		
	(9, 139)		
n	149		

Table 20
Sample: REITS

$$RPojni,t = \alpha + \beta_1 DEi,t + \beta_2 DE * Reit_{dummyi},t + \beta_3 Yieldi,t + \beta_4 Betai,t + \beta_5 SMBi,t + \beta_6 HML_{i,t} + + \beta_7 Dispi,t + \beta_8 LTG_{i,t} + \beta_9 MVi,t + \sum_{i=10}^{15} \beta_i Ind_i + \varepsilon i,t$$

Panel A: contains Huber/White/sandwich robust standard errors.
Panel B: contains Huber robust regression estimates.
*,**,*** represents significance at 5, 2.5 and 1% respectively

Panel A	*Coefficient*	*Standard error*	*t-statistic*
DE +	-0.013	0.027	-0.49
DE*REIT_DUMMY +	0.104	0.029	3.62***
YIELD ±	0.846	0.159	5.33***
BETA +	0.034	0.014	2.44***
SMB +	-0.132	0.029	-4.52***
HML +	0.150	0.034	4.43***
DISPERSION +	0.004	0.004	0.82
LTG +	0.058	0.061	0.96
MV -	-0.001	0.000	-0.79
Constant	0.017	0.015	1.13
F	12.77*** (9, 139)		
R^2adjusted	41.72%		
Breusch-Pagan	2.02		
n	149		

Panel B	*Coefficient*	*Standard error*	*t-statistic*
DE +	-0.002	0.028	-0.06
DE*REIT_DUMMY +	0.108	0.030	3.64***
YIELD ±	0.797	0.164	4.86***
BETA +	0.031	0.015	2.14**
SMB +	-0.132	0.030	-4.36***
HML +	0.154	0.035	4.39***
DISPERSION +	0.001	0.005	0.32
LTG +	0.047	0.063	0.75
MV -	-0.001	0.000	-0.44
Constant	0.006	0.015	0.39
F	11.55*** (9, 139)		
n	149		

Appendixes

Table 21
Sample: Non property firms

$$RPeastoni,t = \alpha + \beta_1 DEi,t + \beta_2 Yieldi,t + \beta_3 Betai,t + \beta_4 SMBi,t + \beta_5 HML_{i,t} + + \beta_6 Dispi,t + \beta_7 LTG_{i,t} + \beta_8 MVi,t + \sum_{i=9}^{14} \beta_i Ind_i + \varepsilon i,t$$

Panel A: contains Huber/White/sandwich robust standard errors.
Panel B: contains Huber robust regression estimates.
*,**,*** represents significance at 5, 2.5 and 1% respectively.

Panel A	*Coefficient*	*Standard error*	*t-statistic*
DE +	0.074	0.038	1.97**
YIELD ±	0.503	0.251	2.00**
BETA +	-0.007	0.012	-0.57
SMB +	-0.062	0.041	-1.52
HML +	0.036	0.042	0.85
DISPERSION +	0.005	0.007	0.71
LTG +	0.045	0.032	1.41
MV -	0.001	0.000	1.12
Constant	0.092	0.033	2.83**
	2.53***		
F	(14, 314)		
R^2adjusted	6.12%		
Breusch-Pagan	10.73***		
n	329		

Panel B	*Coefficient*	*Standard error*	*t-statistic*
DE +	0.032	0.039	0.83
YIELD ±	0.194	0.253	0.77
BETA +	0.010	0.013	0.79
SMB +	-0.012	0.039	-0.3
HML +	-0.010	0.042	-0.24
DISPERSION +	0.005	0.007	0.72
LTG +	0.034	0.036	0.95
MV -	-0.001	0.000	-1.16
Constant	0.108	0.046	2.35
	2.93***		
F	(14,314)		
n	329		

Table 22
Sample: All property firms

$$R^{Peaston}i,t = \alpha + \beta_1 DE_{i,t} + \beta_2 Reit_{dummy\,i,t} + \beta_3 Yield_{i,t} + \beta_4 Beta_{i,t} + \beta_5 SMB_{i,t} + \beta_6 HML_{i,t} + + \beta_7 Disp_{i,t} + \beta_8 LTG_{i,t} + \beta_9 MV_{i,t} + \sum_{i=10}^{15} \beta_i Ind_i + \varepsilon_{i,t}$$

Panel A: contains Huber/White/sandwich robust standard errors.
Panel B: contains Huber robust regression estimates.
*,**,*** represents significance at 5, 2.5 and 1% respectively.

Panel A	*Coefficient*	*Standard error*	*t-statistic*
DE +	0.016	0.032	0.52
REIT_DUMMY +	0.025	0.014	1.81*
YIELD ±	0.422	0.180	2.34**
BETA +	0.061	0.036	1.72*
SMB +	-0.136	0.027	-4.95***
HML +	0.159	0.036	4.48***
DISPERSION +	0.009	0.006	1.48
LTG +	0.022	0.031	0.7
MV -	-0.001	0.000	-4.73***
Constant	0.049	0.016	3.09***
F	3.58*** (9,198)		
R^2adjusted	13.99%		
Breusch-Pagan	90.01***		
n	208		

Panel B	*Coefficient*	*Standard error*	*t-statistic*
DE +	0.036	0.019	1.88*
REIT_DUMMY +	0.036	0.011	3.17***
YIELD ±	0.366	0.134	2.74***
BETA +	0.033	0.009	3.7***
SMB +	-0.113	0.022	-5.12***
HML +	0.114	0.024	4.71***
DISPERSION +	0.004	0.004	1.08
LTG +	0.017	0.025	0.68
MV -	-0.001	0.000	-3.05***
Constant	0.030	0.012	2.44***
F	7.46*** (9,198)		
n	208		

Table 23
Sample: All property firms

$$RPeastoni,t = \alpha + \beta_1 DEi,t + \beta_2 DE * Reit_{dummy},t + \beta_3 Yieldi,t + \beta_4 Betai,t + \beta_5 SMBi,t + \beta_6 HML_{i,t} + + \beta_7 Dispi,t + \beta_8 LTG_{it} + \beta_9 MVi,t + \sum_{i=t0}^{t5} \beta_i Ind_i + \varepsilon i,t$$

Panel A: contains Huber/White/sandwich robust standard errors.
Panel B: contains Huber robust regression estimates.
*,**,*** represents significance at 5, 2.5 and 1% respectively.

Panel A	*Coefficient*	*Standard error*	*t-statistic*
DE +	0.008	0.032	0.26
DE*REIT_DUMMY +	0.046	0.023	1.96*
YIELD ±	0.418	0.176	2.38***
BETA +	0.060	0.036	1.7*
SMB +	-0.134	0.028	-4.83***
HML +	0.157	0.036	4.3***
DISPERSION +	0.009	0.006	1.49
LTG +	0.021	0.031	0.69
MV -	-0.001	0.000	-4.71***
Constant	0.054	0.016	3.32***
F	3.56***		
	(9,198)		
R^2adjusted	10.02%		
Breusch-Pagan	92.21***		
n	208		

Panel B	*Coefficient*	*Standard error*	*t-statistic*
DE +	0.026	0.019	1.36
DE*REIT_DUMMY +	0.057	0.022	2.58***
YIELD ±	0.376	0.135	2.78***
BETA +	0.032	0.009	3.51***
SMB +	-0.108	0.022	-4.87***
HML +	0.108	0.024	4.45***
DISPERSION +	0.004	0.004	1.08
LTG +	0.017	0.025	0.68
MV -	-0.001	0.000	-2.99***
Constant	0.036	0.013	2.8***
F	6.91***		
	(9,198)		
n	208		

Table 24
Sample: REITSs

$$RPeustoni,t = \alpha + \beta_1 DEi,t + \beta_2 Reit_{dummyi},t + \beta_3 Yieldi,t + \beta_4 Betai,t + \beta_5 SMBi,t + \beta_6 HML_{i,t} + + \beta_7 Dispi,t + \beta_8 LTG_{i,t} + \beta_9 MVi,t + \sum_{i=10}^{15} \beta_i Ind_i + \varepsilon i,t$$

Panel A: contains Huber/White/sandwich robust standard errors.
Panel B: contains Huber robust regression estimates.
*,**,*** represents significance at 5, 2.5 and 1% respectively.

Panel A	*Coefficient*	*Standard error*	*t-statistic*
DE +	0.009	0.034	0.25
REIT_DUMMY +	0.098	0.018	5.49***
YIELD ±	0.584	0.243	2.40***
BETA +	-0.001	0.027	-0.03
SMB +	-0.243	0.037	-6.62***
HML +	0.275	0.044	6.32***
DISPERSION +	-0.001	0.005	-0.15
LTG +	0.049	0.070	0.7
MV -	-0.001	0.000	-0.84
Constant	0.014	0.021	0.69
F	2.971***		
	(9, 103)		
R^2adjusted	13.66%		
Breusch-Pagan	5.64***		
n	113		

Panel B	*Coefficient*	*Standard error*	*t-statistic*
DE +	0.016	0.023	0.72
REIT_DUMMY +	0.118	0.014	8.4***
YIELD ±	0.280	0.153	1.83***
BETA +	0.017	0.014	1.22
SMB +	-0.227	0.029	-7.91***
HML +	0.256	0.033	7.67***
DISPERSION +	0.001	0.004	0.23
LTG +	0.054	0.062	0.87
MV -	-0.001	0.000	-0.96
Constant	0.005	0.013	0.42
F	1.95***		
n	113		

Table 25
Sample: REITS

$$RPeastani,t = \alpha + \beta_1 DEi,t + \beta_2 DE * Reit_{dummyi,} t + \beta_3 Yieldi,t + \beta_4 Betai,t + \beta_5 SMBi,t + \beta_6 HML_{i,t} + + \beta_7 Dispi,t + \beta_8 LTG_{i,t} + \beta_9 MVi,t + \sum_{i=1.0}^{1.5} \beta_i Ind_i + \varepsilon i,t$$

Panel A: contains Huber/White/sandwich robust standard errors.
Panel B: contains Huber robust regression estimates.
*,**,*** represents significance at 5, 2.5 and 1% respectively.

Panel A	*Coefficient*	*Standard error*	*t-statistic*
DE +	-0.086	0.044	-1.94*
DE*REIT_DUMMY +	0.211	0.049	4.32***
YIELD ±	0.526	0.206	2.55***
BETA +	-0.010	0.033	-0.31
SMB +	-0.247	0.052	-4.75***
HML +	0.276	0.062	4.43***
DISPERSION +	-0.002	0.005	-0.41
LTG +	0.038	0.069	0.55
MV -	-0.001	0.000	-0.43
Constant	0.059	0.029	2.0*
F	2.96*** (9, 103)		
R^2adjusted	20.55%		
Breusch-Pagan	13.54***		
n	113		

Panel B	*Coefficient*	*Standard error*	*t-statistic*
DE +	-0.038	0.028	-1.36
DE*REIT_DUMMY +	0.194	0.033	5.9***
YIELD ±	0.388	0.170	2.28***
BETA +	0.011	0.016	0.67
SMB +	-0.214	0.032	-6.78***
HML +	0.241	0.036	6.63***
DISPERSION +	-0.001	0.004	-0.32
LTG +	0.022	0.067	0.33
MV -	-0.001	0.000	-0.18
Constant	0.023	0.016	1.49
F	12.77*** (9, 103)		
n	113		

Appendixes

Figure 1

REIT sample mean implied cost of equity capital estimates

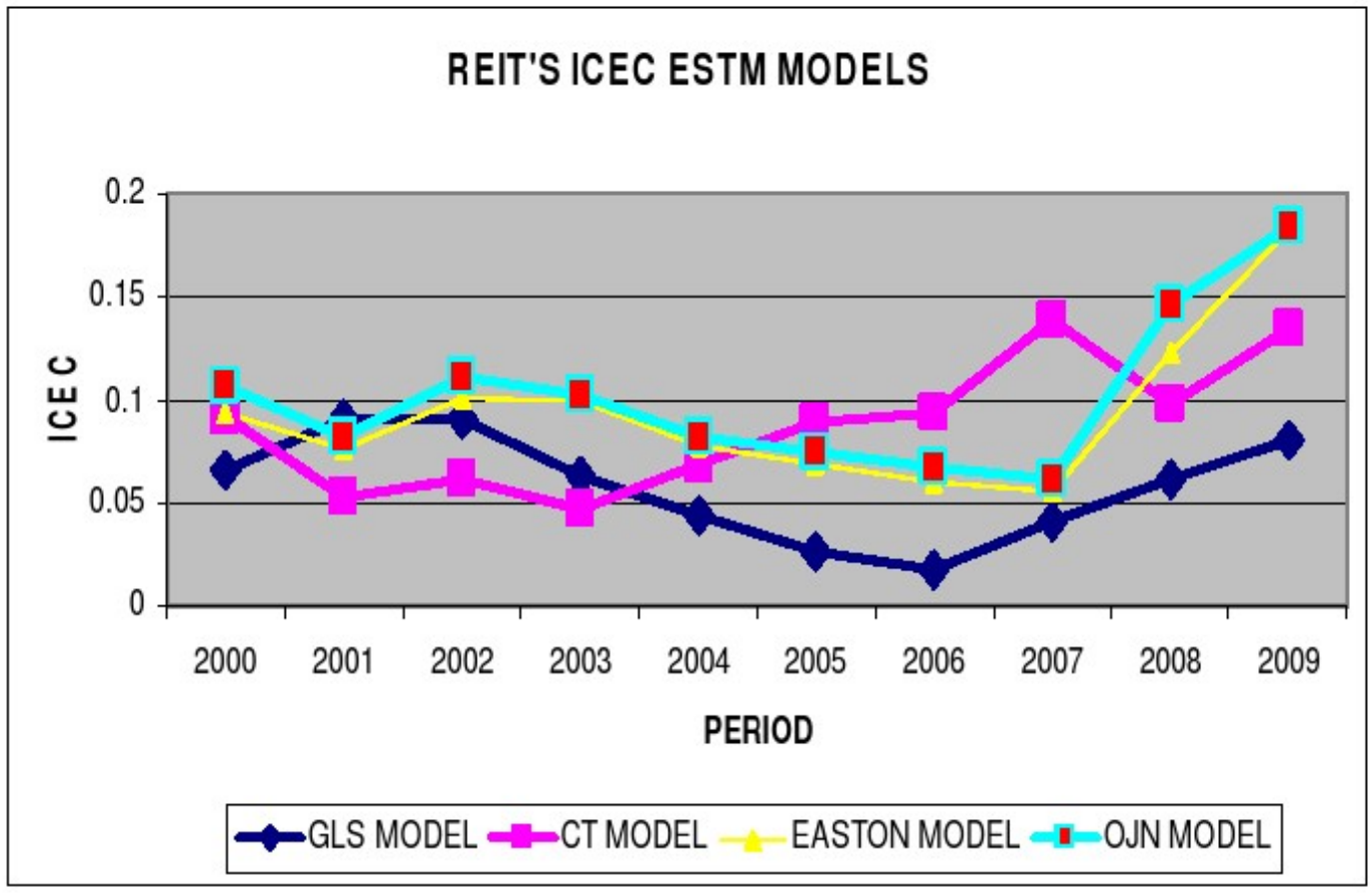
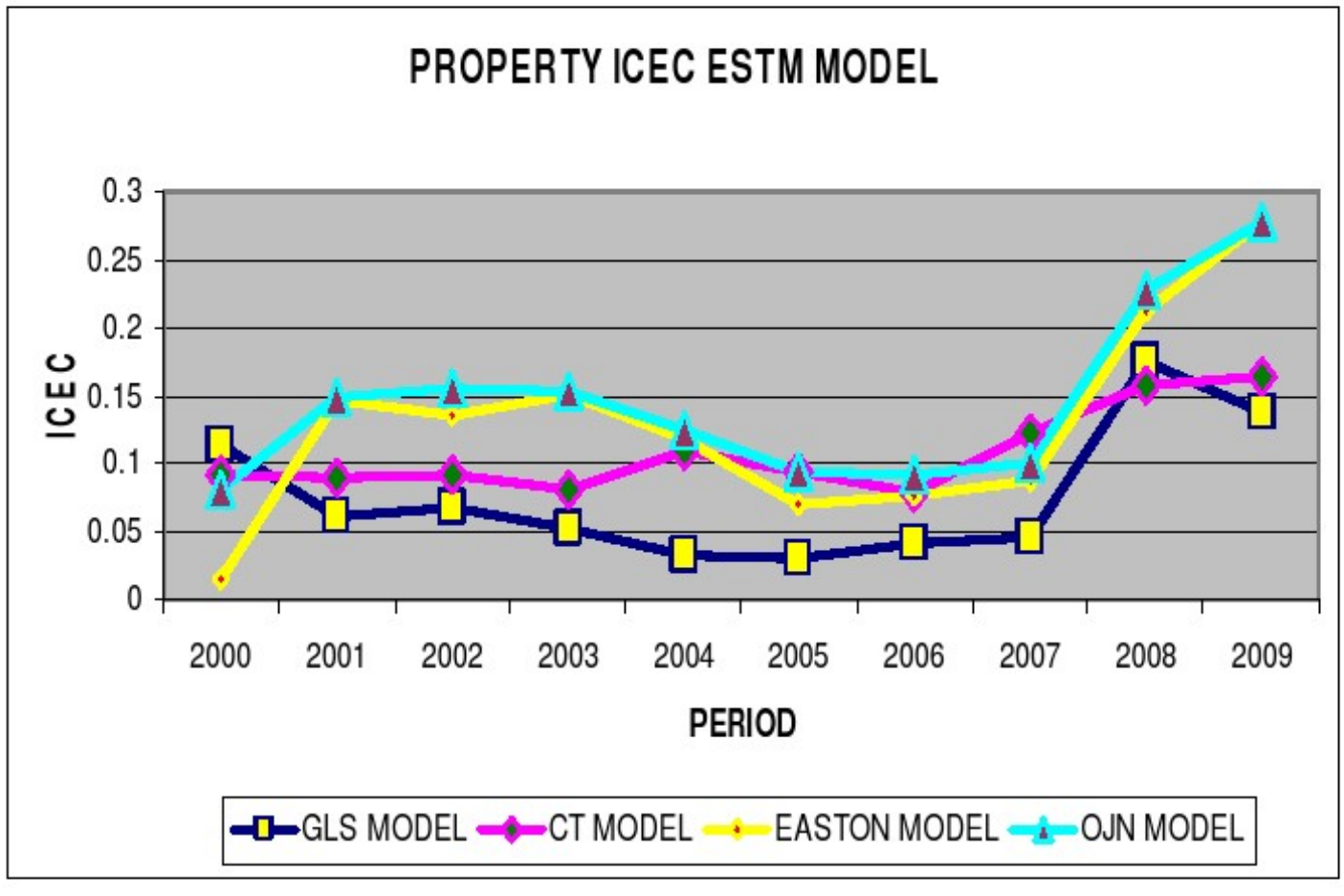


Figure 2

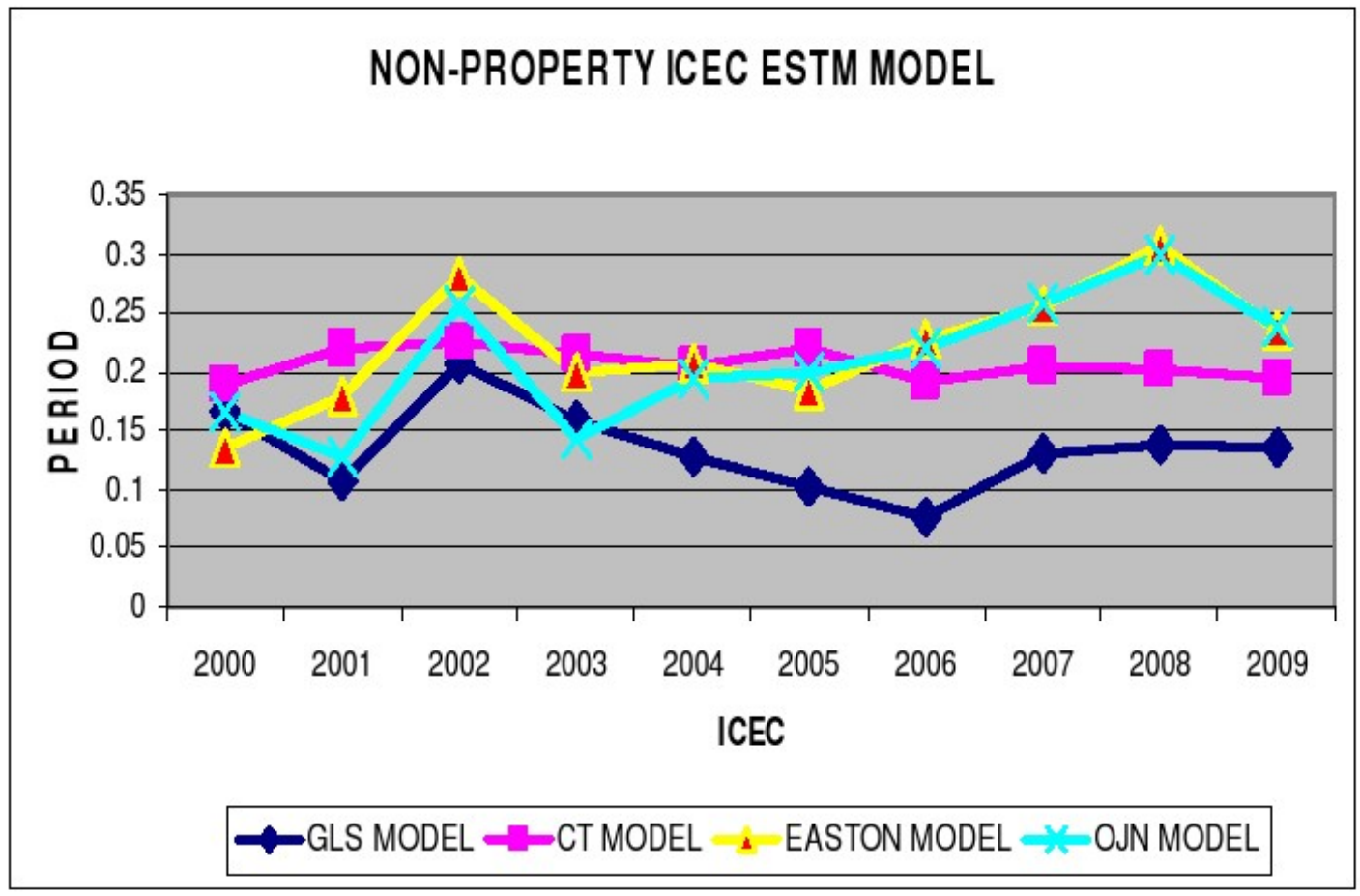
Property sample mean implied cost of equity capital estimates



Appendixes

Figure 3

Non-property sample mean implied cost of equity capital estimates




```
STATA DO FILE
clear

insheet using "C:\Documents\Ymchwil\Hosam\Final data no missing.csv",comma

log using "C:\Documents\Ymchwil\Hosam\Hope_output smcl", replace

**drop if ct==-999
**drop if exantegls ==-999
**drop if exantect ==-999
**drop if exanteojn ==-999
**drop if exanteeaston ==-999

drop if de==-999
drop if yield==-999
drop if cgtaxes ==-999
drop if beta ==-999
drop if smb ==-999
drop if hml ==-999
drop if dispersion==-999
drop if ltg ==-999
drop if b2m ==-999
drop if mv ==-999
generate a=de*ct
generate b=de*invtax
```

```
generate c=yield*cgtaxes

drop if a==-999
drop if b==-999
drop if c==-999

generate missdum= missexantegls+ missexantect+ missexanteojn+ missexanteeaston

generate pexantegls =exantegls-arf
generate pexantect =exantect- arf
generate pexanteojn =exanteojn- arf
generate pexanteeaston =exanteeaston-arf
generate pexanteaverage = exanteaverage-arf

/*sum pexantegls if missexanteojn==0
sum pexantect if missexantect==0
sum pexanteojn if  missexanteojn==0
sum pexanteeaston if missexanteeaston==0
sum pexanteaverage if missexanteojn==0

bysort time  :sum pexantegls if missexanteojn==0
bysort time  :sum pexantect if missexanteojn==0
bysort time  :sum pexanteojn if  missexanteojn==0
bysort time  :sum pexanteeaston if missexanteeaston==0
bysort time  :sum pexanteaverage if missexanteojn==0

winsor pexantegls, gen(pexanteglsw)p(0.02) ,if missexanteojn==0
winsor pexantect, gen(pexantectw)p(0.02) ,if missexanteojn==0
winsor pexanteojn, gen(pexanteojnw)p(0.02) ,if missexanteojn==0
winsor pexanteeaston, gen(pexanteeastonw)p(0.02) ,if missexanteeaston==0
winsor pexanteaverage , gen(pexanteaveragew) p(0.02) ,if missexanteojn==0

/*sum pexanteglsw if missexanteojn==0
sum pexantectw if missexanteojn==0
sum pexanteojnw if  missexanteojn==0
sum pexanteeastonw if missexanteeaston==0
sum pexanteaveragew if missexanteojn==0

bysort time  :sum pexanteglsw if missexanteojn==0 & colour==1
bysort time  :sum pexantectw if missexanteojn==0& colour==1
bysort time  :sum pexanteojnw if  missexanteojn==0& colour==1
bysort time  :sum pexanteeastonw if missexanteeaston==0& colour==1
bysort time  :sum pexanteaveragew if missexanteojn==0& colour==1

bysort time  :sum pexanteglsw if missexanteojn==0 & colour==2
bysort time  :sum pexantectw if missexanteojn==0& colour==2
bysort time  :sum pexanteojnw if  missexanteojn==0& colour==2
bysort time  :sum pexanteeastonw if missexanteeaston==0& colour==2
bysort time  :sum pexanteaveragew if missexanteojn==0& colour==2

bysort time  :sum pexanteglsw if missexanteojn==0 & colour==3
bysort time  :sum pexantectw if missexanteojn==0& colour==3
```

```
bysort time  :sum pexanteojnw if  missexanteojn==0& colour==3
bysort time  :sum pexanteeastonw if missexanteeaston==0& colour==3
bysort time  :sum pexanteaveragew if missexanteojn==0& colour==3

bysort time  :sum pexanteglsw if missexanteojn==0
bysort time  :sum pexantectw if missexanteojn==0
bysort time  :sum pexanteojnw if  missexanteojn==0
bysort time  :sum pexanteeastonw if missexanteeaston==0
bysort time  :sum pexanteaveragew if missexanteojn==0*/

winsor exantegls, gen(exanteglsw)p(0.02), if missexanteojn==0
winsor exantect, gen(exantectw)p(0.02), if missexanteojn==0
winsor exanteojn, gen(exanteojnw)p(0.02), if missexanteojn==0
winsor exanteeaston, gen(exanteeastonw)p(0.02), if missexanteeaston==0
winsor exanteaverage , gen(exanteaveragew) p(0.02), if missexanteojn==0
winsor realisedcec , gen(realisedcecw) p(0.02), if missexanteojn==0

/*sum exantegls realisedcec if missexanteojn==0
sum exantect realisedcec if missexanteojn==0
sum exanteojn realisedcec if  missexanteojn==0
sum exanteeaston realisedcec if missexanteeaston==0
sum exanteaverage realisedcec if missexanteojn==0


bysort time  :sum exantegls if missexanteojn==0
bysort time  :sum exantect if missexanteojn==0
bysort time  :sum exanteojn if  missexanteojn==0
bysort time  :sum exanteeaston if missexanteeaston==0
bysort time  :sum exanteaverage if missexanteojn==0

sum exanteglsw realisedcecw if missexanteojn==0
sum exantectw realisedcecw if missexanteojn==0
sum exanteojnw realisedcecw if  missexanteojn==0
sum exanteeastonw realisedcecw if missexanteeaston==0
sum exanteaveragew realisedcecw if missexanteojn==0

bysort time  :sum exanteglsw if missexanteojn==0
bysort time  :sum exantectw if missexanteojn==0
bysort time  :sum exanteojnw if  missexanteojn==0
bysort time  :sum exanteeastonw if missexanteeaston==0
bysort time  :sum exanteaveragew if missexanteojn==0

bysort time  :pwcorr exantegls  exantect  exanteojn  exanteeaston  exanteaverage
realisedcec if missexanteojn==0 , sig star(.05) obs

bysort time  :pwcorr exanteglsw  exantectw  exanteojnw  exanteeastonw  exanteaveragew
realisedcecw if missexanteojn==0, sig star(.05) obs

bysort time  :pwcorr pexantegls  pexantect  pexanteojn  pexanteeaston  pexanteaverage if
missexanteojn==0, sig star(.05) obs
```

```
bysort time  :pwcorr pexanteglsw  pexantectw  pexanteojnw  pexanteeastonw
pexanteaveragew if missexanteojn==0, sig star(.05) obs

pwcorr exantegls  exantect  exanteojn  exanteeaston  exanteaverage realisedcec if
missexanteojn==0 , sig star(.05) obs

pwcorr exanteglsw  exantectw  exanteojnw  exanteeastonw  exanteaveragew realisedcecw
if missexanteojn==0, sig star(.05) obs

pwcorr pexantegls  pexantect  pexanteojn  pexanteeaston  pexanteaverage if
missexanteojn==0, sig star(.05) obs

pwcorr pexanteglsw  pexantectw  pexanteojnw  pexanteeastonw  pexanteaveragew if
missexanteojn==0, sig star(.05) obs

bysort time :ttest  exanteaveragew, by (colour) unequal, if colour<3

bysort time :ttest  exanteaveragew, by (colour) unequal, if colour>1

bysort time :ttest  exanteaveragew, by (colour) unequal, if colour!=2

bysort time :ttest  pexanteaveragew, by (colour) unequal, if colour<3

bysort time :ttest  pexanteaveragew, by (colour) unequal, if colour>1

bysort time :ttest  pexanteaveragew, by (colour) unequal, if colour!=2*/

winsor de , gen(dew) p(0.02)
winsor ct , gen(ctw) p(0.02)
winsor a , gen(aw) p(0.02)
winsor invtax, gen(invtaxw) p(0.02)
winsor b , gen(bw) p(0.02)
winsor yield , gen(yieldw) p(0.02)
winsor cgtaxes , gen(cgtaxesw) p(0.02)
winsor c , gen(cw) p(0.02)
winsor beta , gen(betaw) p(0.02)
winsor smb, gen(smbw) p(0.02)
winsor hml , gen(hmlw) p(0.02)
winsor dispersion , gen(dispersionw) p(0.02)
winsor ltg , gen(ltgw) p(0.02)
winsor b2m , gen(b2mw) p(0.02)
winsor mv, gen(mvw) p(0.02)

generate dew_reit=reit*dew

/*bysort time  :sum dew yieldw betaw smbw hmlw dispersionw ltgw mvw if
missexanteojn==0 & colour==1

bysort time  :sum dew yieldw betaw smbw hmlw dispersionw ltgw mvw if
missexanteojn==0 & colour==2
```

bysort time :sum dew yieldw betaw smbw hmlw dispersionw ltgw mvw if missexanteojn==0 & colour==3*/

/*xi:rreg pexanteeaston dew yieldw betaw smbw hmlw dispersionw ltgw mvw i.ind if colour==1 & missexanteeaston ==0

xi:rreg pexanteeaston dew reit yieldw betaw smbw hmlw dispersionw ltgw mvw if colour>1 & missexanteeaston ==0

xi:rreg pexanteeaston dew dew_reit yieldw betaw smbw hmlw dispersionw ltgw mvw if colour>1 & missexanteeaston==0

xi:rreg pexanteeaston dew reit yieldw betaw smbw hmlw dispersionw ltgw mvw if colour==3 & missexanteeaston==0

xi:rreg pexanteeaston dew dew_reit yieldw betaw smbw hmlw dispersionw ltgw mvw if colour==3 & missexanteeaston==0

xi:rreg pexanteglsw dew yieldw betaw smbw hmlw dispersionw ltgw mvw i.ind if colour==1 & missexantegls ==0
xi:rreg pexanteglsw dew reit yieldw betaw smbw hmlw dispersionw ltgw mvw if colour>1 & missexantegls ==0

xi:rreg pexanteglsw dew dew_reit yieldw betaw smbw hmlw dispersionw ltgw mvw if colour>1 & missexantegls ==0

xi:rreg pexanteglsw dew reit yieldw betaw smbw hmlw dispersionw ltgw mvw if colour==3 & missexantegls ==0

xi:rreg pexanteglsw dew dew_reit yieldw betaw smbw hmlw dispersionw ltgw mvw if colour==3 & missexantegls ==0

xi:rreg pexanteojn dew yieldw betaw smbw hmlw dispersionw ltgw mvw i.ind if colour==1 & missexanteojn ==0

xi:rreg pexanteojn dew reit yieldw betaw smbw hmlw dispersionw ltgw mvw if colour>1 & missexanteojn ==0

xi:rreg pexanteojn dew dew_reit yieldw betaw smbw hmlw dispersionw ltgw mvw if colour>1 & missexanteojn ==0

xi:rreg pexanteojn dew reit yieldw betaw smbw hmlw dispersionw ltgw mvw if colour==3 & missexanteojn ==0

xi:rreg pexanteojn dew dew_reit yieldw betaw smbw hmlw dispersionw ltgw mvw if colour==3 & missexanteojn ==0

xi:rreg pexantect dew yieldw betaw smbw hmlw dispersionw ltgw mvw i.ind if colour==1 & missexantect ==0

```
xi:rreg pexantect dew  reit yieldw  betaw  smbw  hmlw dispersionw ltgw mvw  if
colour>1 & missexantect ==0

xi:rreg pexantect dew  dew_reit yieldw  betaw  smbw  hmlw dispersionw ltgw mvw  if
colour>1 & missexantect ==0

xi:rreg pexantect dew  reit yieldw  betaw  smbw  hmlw dispersionw ltgw mvw  if
colour==3 & missexantect ==0

xi:rreg pexantect dew  dew_reit yieldw  betaw  smbw  hmlw dispersionw ltgw mvw  if
colour==3 & missexantect ==0*/

xi:rreg pexanteaverage dew  yieldw  betaw  smbw  hmlw dispersionw ltgw mvw  i.ind  if
colour==1 & missdum ==0
estat vif

xi:rreg pexanteaverage dew  reit yieldw  betaw  smbw  hmlw dispersionw ltgw mvw  if
colour>1 & missdum ==0

estat vif
xi:rreg pexanteaverage dew  dew_reit yieldw  betaw  smbw  hmlw dispersionw ltgw
mvw  if colour>1 & missdum ==0

estat vif

xi:rreg pexanteaverage dew  reit yieldw  betaw  smbw  hmlw dispersionw ltgw mvw  if
colour==3 & missdum ==0

estat vif

xi:rreg pexanteaverage dew  dew_reit yieldw  betaw  smbw  hmlw dispersionw ltgw
mvw  if colour==3 & missdum ==0

estat vif
xi: coldiag2 dew  yieldw  betaw  smbw  hmlw dispersionw ltgw mvw  if colour==1 &
missdum ==0,f corr

xi: coldiag2  dew  reit yieldw  betaw  smbw  hmlw dispersionw ltgw mvw  if colour>1 &
missdum ==0

xi: coldiag2  dew  dew_reit yieldw  betaw  smbw  hmlw dispersionw ltgw mvw  if
colour>1 & missdum ==0,f corr

xi: coldiag2  dew  reit yieldw  betaw  smbw  hmlw dispersionw ltgw mvw  if colour==3
& missdum ==0,f corr

xi: coldiag2  dew  dew_reit yieldw  betaw  smbw  hmlw dispersionw ltgw mvw  if
colour==3 & missdum ==0,f corr
stop
**sort coid time
**tsset coid time
```

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