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Real Estate Investment Trusts: Regulation and Capital Structure

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Abstract

Real Estate Investment Trusts:
Regulation and Capital Structure

by Katharina Klara Bosl, M.Sc.

This thesis deals with REITs, their capital structure and the effects on leverage that regulatory requirements might have. The data used results from a combination of Thomson Reuters data with hand-collected data regarding the REIT status, regulatory information and law variables. Overall, leverage is analysed across 20 countries in the years 2007 to 2018. Country specific data, manually extracted from yearly EPRA reportings, is merged with company data in order to analyse the influence of different REIT restrictions on a firm's leverage.
Observing statistically significant differences in means across NON-REITs and REITs, causes motivation for further investigations. My results show that variables beyond traditional capital structure determinants impact the leverage of REITs. I find that explicit restrictions on leverage and the distribution of profits have a significant effect on leverage decisions. This supports the notion that the restrictions from EPRA reportings are mandatory. I test for various combinations of regulatory variables that show both in isolation as well as in combination significant effects on leverage.
My main result is the following: Firms that operate under regulation that specifies a maximum leverage ratio, in addition to mandatory high dividend distributions, have on average lower leverage ratios. Further the existence of sanctions has a negative effect on REITs' leverage ratios, indicating that regulation is binding. The analysis clearly shows that traditional capital structure determinants are of second order relevance. This relationship highlights the impact on leverage and financing decisions caused by regulation. These effects are supported by further analysis. Results based on an event study show that REITs have statistically lower leverage ratios compared to NON-REITs. Based on a structural break model, the following effect becomes apparent: REITs increase their leverage ratios in years prior REIT status. As a consequence, the ex ante time frame is characterised by a *bunker* and *adaption process*, followed by the transformation in the event. Using an event study and a structural break model, the analysis highlights the dominance of country-specific regulation.

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List of Abbreviations

AGM	**A**nnual **G**eneral **M**eeting
BoD	**B**oard **o**f **D**irector
CRF	**C**ovid **R**isk **F**actor
EPS	**E**arnings **p**er **S**hare
FFO	**F**unds **f**rom **O**perations
GDP	**G**ross **D**omestic **P**roduct
GNI	**G**ross **N**ational **I**ncome
ICC	**I**ntraclass-**C**orrelation **C**oefficient
IPO	**I**nitial **P**ublic **O**ffering
NPV	**N**et **P**resent **V**alue
OLS	**O**rdinary **L**east **S**quare
REIT	**R**eal **E**state **I**nvestement **T**rust
RIC	**R**euters **I**ndustry **C**lassification
SIC	**S**tandard **I**ndustry **C**lassification

Chapter 1

Introduction

Real estate investment trusts (REITs) are company-like entities that own and usually operate real estate, mostly commercial real estate. The key feature of REITs is that they are exempt from corporate taxation if they satisfy certain restrictions that differ from country-to-country. Important restrictions often include a listing requirement, a public disclosure requirement, a minimum payout ratio, a minimum share capital requirement and restrictions on the composition of the shareholder body. Typically, a violation of these restrictions may trigger the loss of the REIT status and, consequently, the accompanying tax exemption.

REITs are interesting for capital structure research as, due to the exemption from corporate tax, which eliminates any tax shield benefits of debt. As a result, the incentive to increase leverage in order to increase firm value through the present value of the tax shield is absent. This incentive is one of the main drivers, if not the single most important driver, of the capital structure of other less strictly regulated firms.[1] In the presence of bankruptcy cost, the trade-off theory predicts low level of debt for REITs. Against this background, one can analyse the capital structure choices of REITs in the absence of this key capital structure determinant in order to better understand the economic significance and the interaction of the remaining capital structure determinants. One can compare the capital structures of REITs with those of other firms investing in real estate (NON-REITs) that are subject to regular corporate taxation and, thus, are exposed to the tax shield incentive. Comparing the capital structures of REITs and NON-REITs should allow for an in-depth analysis of the intensity of the tax shield incentive. As the taxation of REITs is country specific, this analysis has to be performed on a country per country basis, or at least on a country-pooled basis.

One reason for issuing debt is to avoid the adverse selection cost of equity, as the pecking order theory suggests. Based on information asymmetry, the pecking order theory establishes a preference ordering of all funding choices, which include retained earnings, debt, and equity. However, high mandatory payout requirements reduce retained earnings of REITs, limiting their funding choices to debt and equity. This implies that equity issues may simply reflect the lack of financing via retained earnings and that capital increases are more likely.

[1] **cf. Myers (2003)**.

The paper aims to explore how the capital structure of REITs is affected by their regulation, to identify any systematic pattern in REIT financing decisions, and to contrast it with empirical evidence on REITs and NON-REITs. The control group consisting of NON-REITs is used to identify differences in capital structure determinants between REITs and NON-REITs. Further, as REITs are operating within a unique regulatory environment, the impact of a variety of restrictions can be tested.
This thesis is organized as follows: Chapter 2 contains the literature review about REITs in general and their key aspects and the regulations that exist. In addition, a market overview is given. Chapter 3 thoroughly examines the capital structure theories that pertain to REITs, and the accompanying empirical evidence from the literature. Chapter 4 presents the hypotheses. The data generating process and descriptive statistics of my three selected samples, (1) total sample, (2) REIT sample and (3) NON-REIT sample, are presented in Chapter 5. Here, the collection of the regulatory information, the coding process needed to convert non-quantitative regulatory data into data ready for statistical analysis and country and firm-specific descriptive statistics are covered. Chapter 6 includes my statistical investigations starting with the total sample. A thorough analysis of REITs is provided to analyse the impact of REIT regulation on their capital structure choices. Further model specifications are given and finally discussed in comparison to my control group. My study uses data from 2007-2018. Chapter 7 represents an event study and structural break model to identify whether a REIT status significantly affects a firm's leverage. Chapter 8 summarizes the results and addresses open questions.

Chapter 2

Real Estate Investment Trusts

Real estate investment trusts (REITs) are stock corporations that invest in real estate. Their business activities include the development or leasing and the financing or management of real estate.[1] [2] REITs have special features regarding tax privileges and regulatory aspects, which make them special in relation to other investment alternatives in the real estate industry such as funds or real estate firms without REIT status.[3] No universal trait that applies to all REITs worldwide exist. The criteria that serve to obtain and maintain REIT status vary between countries. Generally, investors who buy REIT shares invest in real estate and at the same time in a share of a stock. The listing makes it easier to determine the valuation of the company's assets.[4]
In contrast, real estate funds are characterized by the financing of one or a few properties and offer an indirect investment opportunity in real estate. The company receives cash from investors for the purchase or construction of a building. In return, the investor receives a share of the fund and participates in profit and losses. Differentiating between closed-end, mutual and special funds, the following characteristics hold. In the event of insolvency of a closed-end fund, the investor thus bears the risk of losing his investment or having to assume additional liability with other assets. A closed-end real estate fund enables only a limited number of investors to buy shares. The fund's assets are defined and are limited at a certain volume. In general, the acquisition of shares of a closed-end real estate fund is reserved for wealthier investors with a longer time-horizon, whereas sales of shares before the maturity end are unusual. The risk spreading is very small due to the restriction on one or few real estates. Closed-end real estate funds are not normally listed, thus having significant liquidity risks. In addition, the company is not obliged to redeem the fund units. This investment vehicle can take different legal forms, e.g. limited partnerships, partnerships or general partnerships and the associated legal conditions.[5] There are two types of open-ended real estate funds: special funds and mutual funds. In a mutual fund, the number of investors and thus the fund assets are not limited. Investors in a mutual fund can be both, private investors and institutional investors. In the case of

[1] **cf. Bauer (2009)**.
[2] Part of this chapter is based on my unpublished master thesis **Bosl (2019)**, submitted to Trier University.
[3] **European Public Real Estate Association (EPRA); 2007-2018**.
[4] **cf. Knoflach and Koerfgen (2007)**.
[5] **cf. Helios et al. (2008)**.

special funds, however, only the latter is permitted to invest. Open-ended real estate funds are offered by investment companies and are subject to their legislation.[6] The special fund is administered by a so-called custodian bank, a separate bank that is responsible for subscriptions and redemptions.[7] This investment vehicle is fungible, as every investor can return their units at any time after a period of notice. Money is usually invested by the investment company in commercial real estate such as office buildings or shopping centers. A certain portion of the fund's assets is retained as a liquidity reserve. This is intended to ensure that shareholders can always redeem their shares at any time. The investment fund is referred to as a special-purpose fund and is therefore, depending on the country-based taxation regulation, exempt from corporation tax. In this case, taxation exclusively affects only the investor. Open-ended real estate funds invest in properties, providing a more balanced distribution of risk compared to closed-end real estate funds.[8] The investment characteristics of REITs and open-ended real estate funds show great similarities. For example, investments with small amounts are feasible, there are limited restrictions on the number of investors and no corporate taxation under certain conditions. There is a large potential for higher risk diversification due to a wider range of investable properties. The legal form of a REIT is a company and that of an open-ended investment fund is based on a contract type. The investor in an open-ended real estate fund thus has no legal relationship with the investment company. By contrast, the REIT shareholder becomes a shareholder through the purchase of shares.

Further differences can be identified in the provided capital of both investment opportunities. In contrast to REITs, an investment in of open-ended real estate funds is not an equity investment.[9] The equity of REITs is generally constant, unless the company implements measures to increase capital which is in case of retained earnings (1) inconsistent or (2) limited due to high restrictions on profit distribution requirements. This highlights the importance of capital increases. REIT shares cannot normally be returned to the company, but are tradeable on the stock exchange. A further difference arises from registration on the stock exchange: Since an open-ended real estate fund is not listed on the stock exchange, its market value is determined solely by the real estate portfolio. REITs are characterised by the fact that the companies are active in different business areas. The investor thus has the option of choosing the company that is active in his preferred type of real estate.

An investor within the REIT market receives, similar to shareholders benefiting from the ownership of stocks in other corporations, an economic benefit through the greater diversification by investing in a portfolio of properties rather than just a single property.[10] Further, an investor has the advantage of real estate experts managing the property portfolio in a professional manner. Depending on taxation matters, a basic

[6] **cf. Klumpe and Nastold (1993); cf. Helios et al. (2008); cf. Loipfinger et al. (1994)**.
[7] **cf. Klumpe and Nastold (1993)**.
[8] **cf. Klumpe and Nastold (1993)**.
[9] **cf. Helios et al. (2008)**.
[10] **cf. EPRA (2019)**.

distinction is made between tax benefits where income stays untaxed, income that is taxed at a reduced rate, and income that is taxed at the normal rate. In the case of a reduced tax rate, the tax rate can be reduced to zero percent like it is applied to REITs in the Netherlands.
In addition to the sanction of loss of REIT status, further sanctions may be imposed. Warnings in the form of fines or imprisonment for the management or the loss of the stock exchange listing may be imposed. Furthermore, tax privileges can be denied. These sanctions apply if the rules of the REIT regime are not complied with. This can be, for example, the repeated violation of a leverage restriction, extensive trading in real estate or the illicit acquisition of certain types of property. As an example, German REITs are not allowed to hold rental properties in their portfolios. If this happens, the REIT is in breach of the requirements of the so-called asset test.[11]

2.1 Classification

REITs can be classified into three types regarding their business activities. The initial classification is based on a rough subdivision into equity, mortgage and hybrid REITs. Equity REITs are then classified according to the properties in which they prefer to invest:

- Equity REIT
- Mortgage REIT
- Hybrid REIT

Equity REITs own, invest or manage real estate and earn their income primarily from renting. This REIT type often focuses on a specific region or on individual real estate sectors such as office properties or shopping centres. They are less sensitive to changes in interest rates compared to mortgage REITs due to their investment in real estate and the resulting rental income.
The characteristic feature of mortgage REITs is the participation of the shareholders in a mortgage portfolio. Mortgage REITs grant loans such that investors are exposed for the performance of the loan portfolio. Compared to equity REITs, this REIT type is sensitive to interest rate changes, which means that an interest rate increase leads to a price decline.
Hybrid REITs represent a combination of equity REITs and mortgage REITs, i.e. they invest directly in real estate but also grant real estate loans.[12] [13]

[11] See Chapter 2.2.1.
[12] **cf. Bauer (2009); cf. Huesmann (2005)**.
[13] This business model is quite similar to that of mortgage banks.

Besides the classification of REITs in special types, a further classification according to their investment focus in certain real estate sectors exists.[14] REITs mainly focus on retail, residential and office sectors. Sectors like resorts and lodging or self storage are relatively rare. Retail REITs invest, develop and manage retail real estate that can be divided into larger shopping centers, retail markets and regional malls, while the latter ones focus on cinemas and restaurants. Residential REITs concentrate on the residential real estate sector, which can be divided into apartment REITs and a minority of manufactured-homes REITs. The sector is characterised on the one hand by a high management intensity due to a higher number of tenants and on the other hand by a higher fluctuation rate of tenants. The higher number of tenants results in strong diversification, which means that tenant turnover has often a small impact on the portfolio as one tenant can usually be quickly replaced by new applicants. These characteristics lead to a more stable value of the residential real estate sector. Office REITs are management intensive as it is particularly important that economic and employment growth is correctly assessed in order to meet the demand for office buildings. Furthermore, the office sector is mostly characterised by long-term leases and therefore has continuous rental income, without larger exposure to tenant fluctuations.
In all three sectors, an adequate property analysis and selection in combination of a well-organised management is important. In addition to these rather traditional specialised REITs, there are also REIT companies that concentrate on niches such as self-storage buildings, hospitals or timber land.[15]

2.2 Regulation

Over the course of time, the REIT structure had been implemented as a form of investment in many countries. Most countries regulations are comparable to the structures and requirements of the U.S. REIT in order to maintain and benefit from its REIT status. By law, REITs are subject to certain conditions and regulations in order to obtain or preserve REIT status. REIT status is linked to the core business of REITs, namely holding and managing a property portfolio, while not actively trading with real estate assets.[16]
The asset and income structures, distribution obligation and free float pertain to a U.S. REIT. They are required to distribute at least 90% of their annual profits as dividends to their shareholders. Income tax is not levied at a corporate level and only exists at a shareholder level, if certain payout ratio requirements by law are followed.[17] A REIT must comply with requirements, otherwise sanctions will be imposed, which will result in fines for the time being. If infringements accumulate or serious breaches of regulation occur, the REIT is ultimately sanctioned and loses

[14] **Here and in the following cf. Knoflach and Koerfgen (2007); cf. Huesmann (2005)**.
[15] **cf. Knoflach and Koerfgen (2007); cf. Huesmann (2005)**.
[16] **cf. EPRA**; **among others**.
[17] **cf. Huesmann (2005); cf. Helios et al. (2008)**.

the benefits resulting from the REIT status.[18] However, there are clear differences in the regulations governing REITs across countries.[19] Therefore, the granting of REIT status cannot be generalized. Many countries use an *Asset and Income Test*, which examines the company for compliance with the regulations on the maintenance of REIT status. Based on **Brody et al. (2009)**, REITs must satisfy two gross income tests on an annual basis to maintain qualification as a REIT. In addition, there is another test that covers restrictions on the shareholder body. This is known as the *Ownership Test*.[20] In case of successfully passing the tests, the REIT can use the tax exemption on a corporate level.

The existence of country-specific regulations on REITs is to be taken into consideration in addition to the ordinary determinants of the capital structure.[21] In terms of investor benefits, diversification, transparency and a professional management, the following applies for REITs. First, REITs with a huge portfolio are able to spread their capital over a large number of investment properties, leading to diversification. Second, REITs offer a high degree of transparency due to the listing on the stock exchange. They are obliged by law to report on the status of the company on a quarterly basis. All relevant information is frequently reviewed and evaluated by investors and analysts and the daily listing of REITs on the stock exchange enables shareholders to closely monitor the share value.[22] [23] Third, the employment of real etsate experts ensures professional management. For investors, REITs represent an alternative compared to other investment opportunities in the real estate sector. Investors who wish to own a property do not necessarily have to take out a loan to finance the property. Being a shareholder of a REIT means participating indirectly in a property or in a real estate portfolio. The advantage is that the capital invested is not tied up in the long term, but the shares can be sold daily on the stock exchange.

2.2.1 REIT-qualifying Tests

Focusing on a selection of general requirements on REITs, a REIT must meet further provisions to maintain its tax-exempt status in addition to the dividend payout restriction. In general, the main business activity of a REIT is investing in real estate and managing the property portfolio, while maintenance services play a minor role. Therefore the REIT-qualifying tests focus on the main business only. The following regulations are based on an U.S. REIT. First, five-or-fewer shareholders may not hold more than 50% of the REIT's stock. Second, at least 75% of the total assets of the REIT must consist of real estate, mortgages, cash, or government securities. A minimum of 75% of the REIT's gross annual income must be derived from the ownership of real estate properties. Last, REITs must derive their income from passive sources such

[18] **cf. Volckens (2007)**.
[19] **cf. Helios et al. (2008)**.
[20] For further information see Chapter 2.2.1.
[21] **cf. Cadmus (2009)**.
[22] **cf. Pilz (2007)**.
[23] Chapter 5.2.2 explains the country-based regulatory requirements of a REIT in more detail.

as rents and mortgage interest. Short-term trading or sale of property assets are not included. Prior to 2001, the dividend requirement was 95% of taxable earnings, while it is set to at least to 90% the years after 2001.[24] To obtain REIT status, it is not only necessary to fulfill formal criteria within the application process, but also to comply with five so-called status tests:

Distribution Test

The distribution test is one of the core elements of REIT status, as this distribution ratio obliges companies to distribute a large proportion of their income to their shareholders. If this ratio is not met, the company must expect penalties. German REIT law requires a profit distribution of 90% of the net income of the year. A penalty of 20% to 30% of the difference is due if this payout ratio is not met. The ratios vary within the countries considered from 75% to 100% payout ratio. The starting point in most countries is annual taxable income.[25] The majority of countries have followed the lead of the USA. In the US, the minimum distribution ratio was set at least 90% of taxable profits.[26] This rule was adopted in Germany[27], the United Kingdom, Australia, Japan, South Korea[28], Singapore[29] and Hong Kong[30], among others. Higher ratios are only required in Brazil[31] with a minimum of 95% and in the Netherlands[32], which stipulate a distribution of 100%. Somewhat lower requirements are found in France[33] with 85%, in Belgium[34] with 80% and South Africa[35] enforcing the lowest rate of 75%.
On the one hand, the high payout ratios guarantee high dividends for the shareholders, on the other hand, the scope for increasing equity through retained earnings is limited.[36] Conversely, a lower payout ratio means more financial flexibility for companies. It is easier to increase the equity ratio. In this case, the shareholders themselves receive proportionately less of the earnings, but could benefit from higher dividends in the future. Against this background, it is hardly surprising that **Adams (2015)** finds that REITs are more likely to raise money via capital markets, i.e. enabling investments through capital increases rather than generating them from retained earnings.

[24] **cf. Hardin et al. (2008)**.
[25] **Huesmann (2005)**.
[26] **cf. Gondring and Wagner (2010)**.
[27] **see Paragraph 13 Abs. 1 REITG**.
[28] **cf. Pilz; 2010**.
[29] **cf. EPRA Global REIT Survey (2020)**.
[30] **cf. Newell et al. (2010)**.
[31] **cf. Yokoyama et al. (2016)**.
[32] **cf. Lossau and Focke (2019)**.
[33] **cf. Huesmann (2005)**.
[34] **cf. Lossau and Focke (2019)**.
[35] **cf. Carsten and Wesson (2019)**.
[36] **cf. Schaefer and Kohl (2009)**.

Gearing Test

The gearing test checks the fulfillment of the criteria for the capital structure of REITs. There are various requirements, for example compliance with a certain debt-to-equity ratio or, conversely, the limitation of possible borrowing. Again, the requirements of the countries differ. In France[37], the USA[38], Canada[39], Brazil[40], Australia[41] and Japan[42] there is no regulatory restriction on debt financing for the companies. A limit of a maximum of twice the amount of equity is in place in South Korea.[43] The remaining countries have leverage ratios restrictions between 35% and 65% of total assets for companies with REIT status.
In detail, countries set the requirements for the asset structure as follows: Germany[44] and the Netherlands[45] require that at least 45% of the real estate assets to be financed with equity.[46] In the Netherlands, there is an additional requirement that a maximum of 60% of the real estate assets may be debt financed, or 20% in relation to other assets.[47] With a minimum equity ratio of 35%, Belgium has the lowest requirement apart from the countries without a limit. However, the borrowing costs are also limited to a maximum of 80% of income. This rule on the level of borrowing costs has been adopted in the United Kingdom.[48] In South Africa, a maximum of 60% debt ratio is allowed.[49] Singapore limits borrowing to 35% and Hong Kong to 45%.[50] However, in both countries two different benchmarks are used. Singapore refers to real estate assets, while Hong Kong refers to total assets.
Unrestricted borrowing can be advantageous to companies: They have more financial freedom and the possibility to make larger investments due to borrowing options. This seems to have an impact on the distribution and success of the countries considered here. France, the US, Brazil, Australia and Japan have a much larger number of REITs compared to other countries, as well as a high market capitalisation in some cases. In contrast, Germany, the Netherlands, South Korea and Hong Kong have a smaller number of REITs in absolute numbers.[51] Restricting leverage ratios in combination with results by **Adams (2015)** justify higher equity ratios as a way to shape REITs according to their original purpose, because REITs should act as real estate asset holders and not expose themselves to interest rate risk.

[37] **cf. Huesmann (2005)**.
[38] **cf. Stevenson (2013)**.
[39] **cf. Pilz (2010)**.
[40] **cf. EPRA Global REIT Survey (2020)**.
[41] **cf. Pilz (2010)**.
[42] **cf. Pilz (2010)**.
[43] **cf. Pham (2013)**.
[44] **cf. Paragraph 15 REITG**.
[45] **cf. Stevenson (2013)**.
[46] All the regulation relates to book values.
[47] **cf. EPRA Global REIT Survey (2020)**.
[48] **cf. Lossau and Focke (2019)**.
[49] **cf. Wesson and Carsten (2019)**.
[50] **cf. Pham (2013); cf. Newell et al. (2010)**.
[51] For further information see Chapter 5 and Chapter 2.5.

Asset Test

The asset test considers the asset situation in relation to the real estate investment. The specifications are usually based on the ratio of real estate to total assets of the REIT company. A distinction is made between a minimum real estate investment in relation to fixed assets or total assets. In addition, the weight of an individual property in the portfolio is limited in some countries.
In the United Kingdom, Belgium and Canada, the asset value of individual immovable properties and the minimum property investment is limited. These regulations are as follows: In the United Kingdom, the upper limit for an individual property is set at 40% of the total value of all real estate assets. In addition, total property values must account for at least 75% of total assets.[52] In Belgium, a property may account to a maximum of 20% of the total volume and, at the same time, 100% of the investment properties have to be real estate.[53] Canada provides similar rules to Belgium, but relies on an 80% real estate investment in relation to fixed assets.[54] South Africa requires at least R300 million[55] to be invested in real estate[56], France requires the investment of at least 80% of total assets in real estate.[57] Comparable requirements are also set in Germany, the US, Brazil and Japan. In all three countries, the asset test limit is 75%. Again, only the basis for calculation differs. Germany[58] and Japan[59] rely on the total value of the assets. The total assets are the basis in Brazil.[60] In the US, the total value of the fixed assets is applied.[61] South Korea and Singapore consider fixed assets as their calculation reference.[62] The Netherlands[63] and Hong Kong[64] have stricter requirements, as they require a real estate investment of 100%. The other extreme is Australia, where there is no asset requirement in place.[65]
Concentrating on Australia, it is noticeable that again comparatively liberal rules apply to companies with REIT status and can thus act freely in terms of financing policy. In contrast, the Netherlands and Hong Kong, with their strict regulations, are restricted in their investments, which limits their scope of business activities and also seems to be reflected in the distribution of REITs in these countries.[66] Focusing on the Netherlands, it is even the case that the largest REIT company domiciled at its origin in the Netherlands has moved to France due to the non-flexible rules regarding

[52] **cf. Pilz (2010)**.
[53] **cf. Lossau and Focke (2019)**.
[54] **cf. Pilz (2010)**.
[55] R = African Rand; approx. EUR 18 million.
[56] **cf. Carstens and Wesson (2019)**.
[57] **cf. Losse and Focke (2019)**.
[58] **Paragragh 12 Abs. 2a REITG**.
[59] **cf. Huesmann (2005)**.
[60] **cf. Yokoyama et al. (2016)**.
[61] **cf. Gondring and Wagner (2010)**.
[62] **cf. Pilz (2010)**.
[63] **cf. Stevenson (2013)**.
[64] **cf. Newell et al. (2010)**.
[65] **cf. Pilz (2010)**.
[66] For further information on the distribution of REITs across countries see Chapter 2.5.

non-real estate activities.[67] All other countries considered here are within the same range with a minimum value of 75% to 80% for the asset test, which thus establishes some kind of international norm. This ensures that companies with REIT status invest the majority of their investments in real estate that highlights their core business.

Income Test

The income test determines how much of the company's total income is generated by real estate transactions. The basis for determining this is the income from rentals and leases, the earnings from the sale of real estate and from mortgage interest. Some countries also limit income from non-real estate activities. Among others, Singapore[68] limits the income share of non-real estate activities to 10% and the US[69] to 5%. Hong Kong limits investments in uncompleted units in a building to 10% of a REITs' net asset value.[70] Some of the countries considered here set a limit of 75% of income from other sources in relation to income from real estate. The differences of the calculation across countries relies on the basis of calculation. Germany[71] and South Africa[72] refer to income from renting and leasing. The US additionally include income from mortgage interest in the calculation.[73] The United Kingdom allows all income from real estate activities.[74] France expects income exclusively from letting and leasing as well as disposals.[75] Canada presupposes the income basis of real estate transactions at 95%.[76] Significantly lower requirements are set by Australia[77] and Japan[78], both of which only require 50% of income from letting and leasing. Only for Belgium, the Netherlands, Brazil and South Korea no precise specifications for income generation are set.

The main business of the REIT companies and thus the most important source of income should be the management of their own real estate portfolio.[79] Even if this represents the core business, the flexibility of generating revenues is restricted by the limits of the income test. The example of Japan and Australia, which have liberal income test regulations, shows that both countries seem to be very successful in comparison as they have a large number of REITs and a high market capitalization. In comparison, no consistent conclusion can be drawn for the other countries, whose limits are much tighter. However, it can be assumed that the tax-exempt real estate business is in the foreground and for this reason the companies engage in non-real

[67] **cf. Lossau and Focke (2019)**.
[68] **cf. Pham (2013)**.
[69] **cf. EPRA Global REIT Survey (2020)**.
[70] **cf. Newell et al. (2010)**.
[71] **Paragraph 12 Abs. 3a REITG**.
[72] **cf. Carstens and Wessons (2019)**.
[73] **cf. EPRA Global REIT Survey (2020)**.
[74] **cf. Pilz (2010)**.
[75] **cf. Huesmann (2005)**.
[76] **cf. Pilz (2010)**.
[77] **cf. Stevenson (2013)**.
[78] **cf. Pham (2013)**.
[79] **cf. Adams (2015)**.

estate activities only as a secondary business.

Ownership Test

The shareholder structure is subject to various criteria regarding the the free float, the minimum number of shareholders and the distinction between private and institutional investors. Free float refers to the proportion of shares, generally available on the stock exchange and not held for strategic or other long-term considerations. It does not include share packages acquired by major shareholders.
REITs in Belgium[80], South Africa[81] and Hong Kong[82] operate without specific shareholder structure requirements. Some of the countries combine different ways of regulating ownership. Germany relies on a mixture of free float and maximum percentage ownership stake of individual investors.[83] 15% free float is a requirement for the REIT, apart from the listing requirements, during which the ratio must be 25%. A maximum of 10% of the share capital may be held by one investor. This rule is also found in the UK, but a free float of at least 35% is required.[84] France specifies a similar regulation.[85] Here a free float of 15% is needed for at the time of foundation, with individual ownership of no more than 2%. In principle, no more than 60% of shares are distributed to shareholders. The Netherlands limit private investors to a maximum of 25% and institutional investors to a maximum of 45% of the shares.[86] Japan limits the holdings of the three largest shareholders to a maximum cumulative block of shares of up to 50%.[87] The ten largest shareholders may hold a maximum of 75% of the share capital in total. South Korea provides for a maximum share capital of 50% for individual investors.[88] In Singapore, all REITs traded on the stock exchange must issue at least 25% of their shares to 500 public share holders.[89] Canada, the US, Brazil and Australia require a minimum number of shareholders. While Brazil[90] has the lowest number with a minimum of 50 shareholders, the USA[91] have set it at 100. Canada[92] and Australia[93] both require at least 150 shareholders, with Canada additionally requiring that each shareholder holds a share value of 500 CAD[94]. Brazil additionally provides for no more than 10% of the share capital to be in the hands

[80] **cf. EPRA Global REIT Survey (2020)**.
[81] **cf. EPRA Global REIT Survey (2020)**.
[82] **cf. Pham (2013)**.
[83] **Paragraph 11 Abs. 1 and 4 REITG**.
[84] **cf. Lossau and Focke (2019)**.
[85] **cf. EPRA Global REIT Survey (2020)**.
[86] **cf. Lossau and Focke (2019)**.
[87] **cf. Pilz (2010)**.
[88] **cf. EPRA Global REIT Survey (2020)**.
[89] **cf. Newell et al. (2014)**.
[90] **cf. Gabriel et al. (2015)**.
[91] **cf. Gondring and Wagner (2010)**.
[92] **cf. EPRA Global REIT Survey (2020)**.
[93] **cf. Westermann et al. (2018)**.
[94] approx. EUR 350. Based on the aggregate fair market value.

of one investor.[95] In the US, a maximum of 50% of the shares may be held by fewer than five investors in the second half of the tax year.[96] Belgium, Hong Kong and South Africa are exceptions with their requirements regarding the ownership test as they require no regulation on the shareholder body composition. All other countries distribute the shares of REITs by regulating them through the ownership test, as this ensures the basic idea of the REIT to enable small investors to obtain an investment opportunity in real estate. This minimum number of shareholders also guarantees that not only one shareholder or a few shareholders own all the shares, leading to an increase in free float and the REIT structure is not only exploit for tax-exemption purpose.[97] The advantage for investors lies in the opportunity to invest even with small amounts. In contrast, companies benefit from the fact that a shareholder with a large number of shares is restricted in influencing the company. The ownership test is problematic if the shareholder structure is subject to fluctuations.[98] The REIT itself is then responsible for monitoring the restrictions and, if necessary, enforcing measures to comply with the limits.[99]

2.2.2 Tax Systems

Tax systems differentiate between different tax levels, namely the corporate and personal tax level and the taxation of income and gain.[100] [101] In the following, three tax systems are introduced:

- The classical tax system is defined by a taxation of dividend payments at both the corporate and the personal level, while interest payments are tax-deductable as corporate expenses. The classical system exists in the following countries: China, Hong Kong, India, Indonesia, Ireland (post-1999), Israel, Japan, Korea (pre-2001), Netherlands, Pakistan, Peru, Philippines, South Africa, Switzerland, and the United States (pre-2003). It leads to double-taxation of corporate profits.

- Second, there is the dividend relief tax system. Within this system dividend payments are taxed at a reduced rate at the personal level. A dividend relief tax system exists, e.g., in: Austria, Belgium, Brazil, Denmark, Finland (post-2005), France (post-2004), Germany (post-2001), Greece, Italy (post-2004), Korea (post-2000), Portugal, Singapore (post-2002), Sweden, Thailand, Turkey, United Kingdom (post-2001), and the US (post-2002). In Brazil, Greece, Singapore and Turkey, dividend payments are not taxed at the personal level, since a full dividend relief system exists.

[95] **cf. Gabriel et al. (2015)**.
[96] **cf. Gondring and Wagner (2010)**.
[97] **cf. Adams (2015)**.
[98] **cf. Veenhuis (2012)**.
[99] **cf. EPRA Global REIT Survey (2020)**.
[100] Here and in the following **cf. Fan et al. (2012)**.
[101] See **Graham (2003)** for a review of the literature on the influence of taxes on capital structure choice.

- A dividend imputation tax system exists in Australia, Canada, Chile, Finland (pre-2006), France (pre-2005), Germany (pre-2002), Ireland (pre-2000), Italy (pre-2005), Malaysia, Mexico, New Zealand, Norway, Singapore (pre-2003), Spain, Taiwan, and United Kingdom (pre-2002). This system is described by corporations that can deduct interest payments. Domestic shareholders of a corporation receive a tax credit for the taxes paid by the corporation. The aim is to tax corporate profits only once.

Special regulations for REITs are introduced on a country-level and make investments in the REIT market more attractive since a REIT's income is tax-exempt in most countries at a corporate level only.

2.3 Differences between REITs and NON-REITs

Even though tax authorities and governments only collect taxes from individuals in a REIT regime, it is still unclear why REITs are attractive investment options.
REITs were originally intended to be passive entities that invested in real estate.[102] In 1960, the first REIT tax legislation[103] was enacted to ensure that small investors have access to tax-advantaged investment opportunities that are similar to those offered by regulated investment companies (RICs), also known as mutual funds, for pooled fund investments in securities. Congress aimed to provide small investors with the opportunity to enjoy the tax advantages of direct ownership, the expertise of a professional management team, and a varied real estate portfolio, all while avoiding the hazards of an involved real estate enterprise. The investors' protection from business risks and preventing active real estate operating companies from taking advantage of the special tax incentives provided to REITs is limited by stringent organizational and operational rules. They cover restrictive income generation and asset diversification rules to assure that REITs would be passive entities, primarily receiving mortgage interest and rents on properties managed by others. Recent changes in tax laws and positive private letter rulings have allowed REITs to generate *goodwill* and protect their active business income, which previously would not have been considered qualifying (passive) income under the 1960 REIT Act. As a result of this process, equity REITs are more likely to act as active real estate businesses. REITs compete directly with taxable businesses and expose their shareholders to business risk that the 1960 REIT Act did not intend them to bear in the first place. REITs were originally designed to avoid exposing investors to business risk. However, as they now trade in the stock market at prices that exceed the value of their real estate assets, and their shares are considered fixed income investments, this has changed. This new reality exposes investors to business risk, which goes against the original purpose of REITs. Currently, REITs are increasingly viewed and operating like traditional businesses: The investors' view towards REITs has changed from the view of a collection of

[102] Here and in the following cf. **Einhorn and Knopf (1998)**.
[103] Real Estate Investment Trust Act of 1960, Pub. L. No. 86-779, § 857, 74 Stat. 998, 1003.

assets to REITs acting as a business. The value of equity REITs shares in the market is not solely based on the value of its assets, but also on the perceived value of its future business prospects. When investing in shares of an equity REIT that trade at a premium to asset value, there is a higher level of business risk compared to investing in a company that trades at prices solely based on the underlying value of the company's assets. This investment risk is not in line with the original concept that REITs should be purely passive entities that protect small investors from business risks.
The basis for the market prices for equity REIT shares are earnings or funds from operations (FFO). FFO is a frequently used measure of a REIT's earnings and performance. Therefore, REITs are under pressure to report high levels of earnings and payout ratios. According to country-specific tax regulations, REITs must operate as passive entities, earning primarily passive income and not putting small investors at risk. This conflicts with the aforementioned statement.
Similarities to active businesses are also visible with respect to raising debt capital. A large number of REITs have an investment grade credit rating enabling them to issue unsecured senior debt. This financing opportunity has added risks because unsecured borrowings expose a REIT to greater risks of default than the loss of a single property, which is not with mortgages on specific properties. Characteristics of active businesses are also mergers and acquisitions. Passive investment entities are not normally takeover targets. However, tax law requires REITs to distribute up to 90% of their taxable income to shareholders so that any growth must be achieved through acquisitions or financing options such as rights issues or borrowing.
In 1986, due to the U.S. tax reform, REITs gained the ability to provide certain services directly to their tenants. This was a first-time occurrence. There is no necessity of independent contractor to provide those services, which highlights once more how the tax law has contributed to the rise of REITs.

2.4 German REIT Legislation

The REIT Act, which allows for the creation of German Real Estate Investment Trust Companies with listed shares, is a step towards expanding the potential of the German financial market while keeping up with the global financial market developments.[104][105][106] The Federal Government expected the introduction of German REITs to sustainably strengthen Germany as a business location. The introduction of German REITs should have increased the international competitiveness of German companies and created highly qualified job opportunities with Germany.
For German REITs the maximum allowable ratio of debt to total assets is restricted to 60%. Real estate investment funds typically have stricter regulations compared to

[104] **cf. EPRA Global REIT Survey (2020)**.
[105] **cf. Gesetzesentwurf der Bundesregierung Drucksache 16/4026**.
[106] **cf. Act on the Creation of German REIT Companies (2007)**.

private equity funds, as the latter can be financed through debt up to 90 or 95%. The 60% restriction in Germany corresponds roughly to the classic first lien mortgage and thus to a threshold value for "low-risk" debt financing that has been established for a long time in mortgage lending. Thus, the REIT must maintain an equity ratio of at least 40 %. It must be emphasized that concerns over the REIT being disadvantaged by high profit distributions are baseless as the required equity ratio must be upheld. Any losses or distributions causing a decrease in the equity ratio below the requirement will necessitate a capital increase or jeopardize the REIT's status. The limitation of external debt thus serves to maintain capital and thus also ensures sufficient creditor protection.[107]

2.5 Market Overview

This section provides an overview of the global REIT market, based on data from Thomson Reuters Datastream and the European Public Real Estate Association (EPRA) reportings. The data includes information on 3,422 REITs from 101 countries. Descriptive statistics are used to provide a clear picture of the market.
The first firm operating as a REIT originated back in the 1960s. The United States was the pioneer in the real estate investment trust market. Its Congress established this type of corporation to enable smaller investors to access large-scale income-generating real estate investments.[108] The REIT market has seen significant growth since its inception in 1960. Although the US was the first to introduce REITs in 1960, the Netherlands became the first European nation to allow them in 1969. In subsequent years, countries from various regions, including the Americas, Europe, Asia-Pacific, Africa, and the Middle East, have joined the market by enacting relevant legislation. As the Table 2.1 shows, since 2013 the REIT market has ceased its growth, with Portugal being the only country to enter the market in 2019.

[107] **cf. Act on the Creation of German REIT Companies**.
[108] **cf. EPRA (2019)**.

country	year of enactment
United States of America	1960
Netherlands	1969
Puerto Rico	1972
Spain	1984
Australia	1985
Chile	1989
Thailand	1992
Brazil	1993
Canada	1994
Belgium	1995
Turkey	1995
Costa Rica	1997
Greece	1999
Singapore	1999
Japan	2000
South Korea	2001
Malaysia	2002
France	2003
Hong Kong	2003
Taiwan	2003
Bulgaria	2004
Mexico	2004
Dubai	2006
Israel	2006
Saudi Arabia	2006
New Zealand	2007
Germany	2007
Indonesia	2007
Italy	2007
Luxembourg	2007
Pakistan	2007
United Kingdom	2007
India	2008
Lithuania	2008
Finland	2009
Philippines	2009
Hungary	2011
Ireland	2013
South Africa	2013
Portugal	2019

TABLE 2.1: REIT enactment year per country (EPRA, 2019)

According to the 2019 EPRA Report, there are now 40 countries where REITs are allowed to operate, indicating a growing acceptance of REITs over time. However, there is a discrepancy between the documentation provided by the European Public Real Estate Association and data from other providers like Thomson Reuters Datastream. In a first step, I start with the descriptives based on the EPRA reportings. The country split by region is as follows:[109]

region	number of countries
Europe	15
Asia-Pacific	13
Americas	7
Africa and Middle East	5
total	40

TABLE 2.2: Global REIT distribution based on the classification by EPRA, 2019

The EPRA Reports provide valuable insights on the market capitalization of different countries, with a focus on 2008, 2012, and 2019. Table 2.3 illustrates the growth of the REIT market over time, with all figures converted to USD for ease of analysis.[110] These reportings give special attention to the following countries: Belgium, France, Netherlands, United Kingdom, Australia, Hong Kong, Japan, Singapore, Canada, and the United States. These countries either exhibit significant growth over time or provide a wealth of observations and data compared to other countries in the report.

[109] Here I follow the classification by EPRA (2019).

[110] Exchange rates are provided by the European Central Bank and are year end values for 31.12.2008, 31.12.2012 and 31.12.2019 or the corresponding last trading day. The table with values based on €bn is provided in the Appendix A.

country	2008	2012	2019
Belgium	6.1	7.7	18.3
France	63.9	59.8	57.1
Netherlands	11.0	10.4	24.1
United Kingdom	36.6	34.7	71.6
Australia	65.0	94.6	97.1
Hong Kong	33.5	20.2	37.9
Japan	33.5	49.3	133.0
Singapore	16.6	38.2	65.9
South Africa	2.1	5.5	23.1
Canada	19.9	51.5	59.5
United States of America	250.6	599.5	1163.7

TABLE 2.3: Market Capitalisation bn USD for sub-sample EPRA REIT

In total, the market capitalisation has risen over time on a country-based level. The Netherlands and Hong Kong had lower market capitalization in 2012, with fluctuating values in the years between. Exceptions can be seen in these cases.
In the following, the data set extracted from Thomson Reuters Datastream will be presented. The data used was downloaded in August 2020 and includes all registered REITs within the Thomson Reuters environment. The data gives an overall indication of the sectoral and regional distribution. The analysis is based on the market capitalisation in USD on a firm-level basis. Focusing on differences within the REIT sector, Thomson Reuters classifies REITs according to their main type of activity. The main industries are:

- Commercial REITs
- Diversified REITs
- Specialized REITs
- Residential REITs
- Real Estate Services
- Real Estate Rental, Development and Operations

Figure 2.1 shows that the Real Estate Rental, Development and Operations sector (RDO) is the biggest sector in the REIT market with a main focus on Real Estate Operations, followed by Commercial REITs, Real Estate Services, Specialized REITs and Diversified REITs and Residential REITs.[111]

[111] In this paper, a deeper industry distribution is neglected due to the intensive granularity within the industry classification implemented by Thomson Reuters.

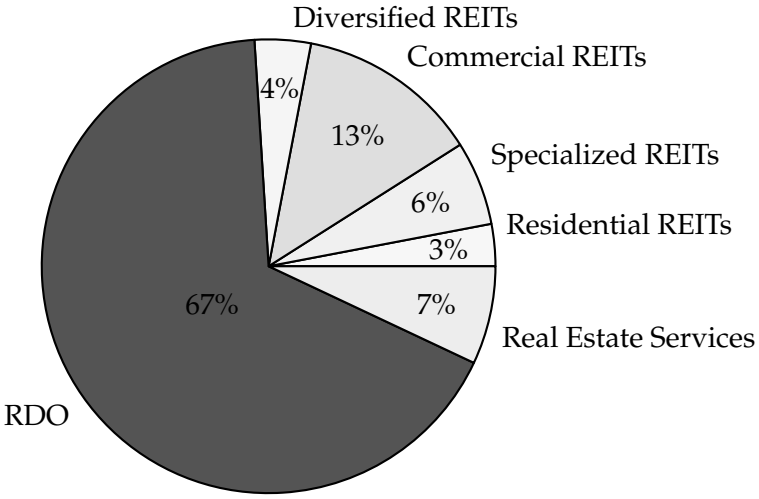

FIGURE 2.1: Global REIT industry distribution

My analysis has investigated the distribution of REITs by their country of incorporation and their total market capitalization in USD. After excluding 13 countries with insufficient data, my sample consists of 88 countries.[112] In addition to displaying country-level data in Table 2.4, I also provide a more comprehensive regional breakdown of REITs' market capitalization across the Americas, Africa, Asia, Europe, and Oceania. It is significant to note that Asia ranks first on the list with the largest share of REITs' market capitalization, largely due to China (PRC), Hong Kong, and Japan. Despite the United States having the largest REIT market capitalization of any single country, these three Asian countries are significant players in the industry.
Comparing the REIT market with the real estate investment market leads to the following: In 2019, the size of the professionally managed global real estate investment market was about 9.6 trillion USD.[113] In total the REIT market makes more than 35% of the value reported by MSCI for 2019.[114]

country	market capitalisation (million USD)
United States	1,263,190.00
China (PRC)	676,875.00
Hong Kong	350,379.00
Japan	249,233.00
Singapore	116,970.00
Germany	111,224.00
Australia	102,032.00
United Kingdom	85,739.14

[112] I excluded the Czech Republic, Ecuador, Iraq, Jamaica, Laos, Malawi, Mongolia, Montenegro, Myanmar, Saint Lucia, Slovakia, Slovenia and Trinidad and Tobago.

[113] **cf. MSCI (2020)**.

[114] Note that data for listed REITs and real estate firms are covered only, leading to a rough indication of a market overview. Within this ratio more than 80 countries are covered. Based on a survey of global REIT markets by Ernst and Young for 2019, a market capitalisation of approximately 1.7 trillion USD for REITs is reported. This number is based on 37 countries. Taking this number in comparison to the overall market capitalisation of the real estate market based on MSCI, REITs make up to 17% of market share.

country	market capitalisation (million USD)
Canada	62,484.55
Sweden	57,448.01
France	56,371.85
Philippines	48,706.36
Vietnam	37,636.82
Thailand	33,787.96
Israel	30,252.15
Spain	27,853.41
Belgium	26,963.12
Saudi Arabia	25,499.44
Switzerland	25,488.74
Luxembourg	24,727.08
India	24,584.98
Bermuda	24,511.43
Malaysia	22,869.20
United Arab Emirates	22,462.35
Taiwan	20,251.19
Brazil	16,683.07
Indonesia	16,021.43
Qatar	15,584.10
Mexico	13,666.56
South Africa	9,272.50
Norway	8,783.18
New Zealand	8,529.43
Finland	8,098.01
Chile	7,968.45
Austria	6,842.14
Kuwait	6,209.74
Turkey	5,410.70
Guernsey	5,087.81
South Korea	4,748.97
Greece	4,107.64
Netherlands	3,431.78
Egypt	3,414.53
Isle of Man	3,251.36
Poland	3,216.97
Denmark	2,503.49
Lebanon	2,392.50
Ireland	1,951.07
Russia	1,799.60
Jersey	1,634.73
Mauritius	1,304.78
Bulgaria	1,128.70
Italy	1,048.30
Argentina	1,013.84
British Virgin Islands	876.85
Cyprus	870.18
Jordan	680.89
Croatia	679.03
Iceland	673.89
U.S. Virgin Islands	611.46

country	market capitalisation (million USD)
Botswana	513.15
Hungary	498.07
Morocco	491.52
Romania	421.25
Sri Lanka	306.23
Malta	299.43
Bahrain	251.04
Pakistan	237.99
Estonia	150.31
Venezuela	117.16
Nigeria	94.79
Namibia	84.08
Palestinian Territories	80.85
Bangladesh	49.85
Lithuania	48.21
Ukraine	30.98
Portugal	30.08
Tunisia	28.72
Zimbabwe	26.04
Bosnia and Herzegovina	17.21
Oman	16.64
Kenya	10.82
Zambia	9.67
North Macedonia	8.18
Cayman Islands	2.91
Latvia	2.28
Serbia	0.86
Kazakhstan	0.83
Peru	0.14
total market capitalisation	3,700,860.00

TABLE 2.4: Country-based market capitalisation (million USD in 2019); Thomson Reuters (2019)

Impact of Covid-19 on REITs

The Covid-19 pandemic has had a significant impact on the global REIT market, leading to a decline in market capitalization. This is largely due to decreased consumer demand, the rise of hybrid work environments, and an overall sense of uncertainty. Specifically, REITs focusing on shopping centers, hotels, and offices have underperformed compared to previous years. While in comparison REITs in the sector of healthcare or data provider have gained during Covid-19. Concentrating on regional changes, total size of listed real estate markets in Developed Europe (16%), North America (9%) and Asia (11%) recorded positive market capitalisation growths in the fourth quarter of 2020. Comparison on an annual basis show that Europe almost

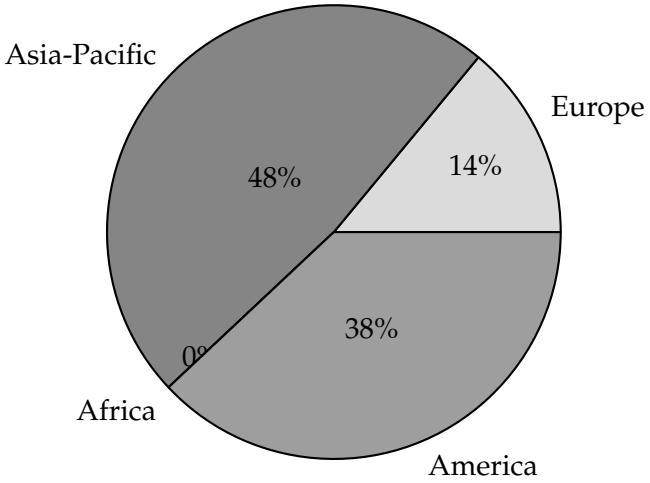

FIGURE 2.2: REIT market capitalisation per region

returned to the pre-Covid-19 level with only 1% fall (year-on-year) in terms of market capitalisation. As of now, North America and Asia are trading below their market capitalisation levels at the end of 2019. Specifically, North America has experienced a 6% decrease while Asia has decreased by 11% annually.[115]

Milcheva's (2021) recent research delves into the volatility and cross-section of real estate equity returns during the Covid-19 pandemic, along with other systematic and idiosyncratic risks. The study particularly focuses on Asia and the US, utilizing a Covid Risk Factor (CRF) to evaluate individual firms' sensitivity to Covid-19 risks. This factor measures daily fluctuations in the total number of confirmed Covid-19 cases worldwide.[116] The key results are the four main points: (1) The returns of real estate companies experience a sharp decline and a fat-tailed distribution as a result of Covid-19 with large differences across sectors in the US. (2) Returns of Asian-based companies were less negatively affected compared to those in the US, although the pandemic originated in China. (3) US real estate companies show stronger performance differences based on the real estate sector they are specialized in (significant underperformance in the retail sector), compared to Asia. (4) Incorporating the CRF into the models shows that the hotel sector has the highest sensitivity to Covid-19 risks in the US, while in Asia it is the office sector.

[115]EPRA, Global Real Estate Total Markets Table.
[116]For more information see also **Ling et al. (2020)**.

Chapter 3

Literature Review

The following chapter will give a brief synopsis of theoretical and empirical capital structure research followed by REIT-specific evidence and its application on capital structure theories.

3.1 Capital Structure: Theory and Empirical Evidence

Capital structure refers to the split between debt and equity that makes up the financing of a company. Total capital is divided into equity and debt and shown on the liability side of the balance sheet. Equity is generated from monetary reserves, share capital when a company is founded, or items that are in the long-term possession of the company and have an indefinite time horizon. Further sale of shares to shareholders increases the amount of equity. In contrast, the company's borrowed capital serves as a source of financing to make additional investments. Investors who provide debt funding to a company receive regular interest payments and are repaid the principal amount after the maturity period.
Capital structure theories are used to rationalize why the total capital of companies is composed in a certain ratio. In addition to classical static capital structure theories, there are dynamic models that provide a more comprehensive understanding of the observable dynamics of capital structures in real life. Dynamic capital structure models aim to identify the reasons why the tax advantages of debt are not fully utilized at a particular time and examine how agency conflicts influence capital structure dynamics. External shocks, transaction costs, and future expectations can cause the actual capital structure at a given time to differ from the optimal capital structure in a single period view. Adjustment processes are therefore considered.[1] In

[1] **Lev and Pekelman (1975)** developed a dynamic model of the trade-off theory. The starting point of this model is the realization that the costs of adjusting to an optimal leverage ratio must be weighted against the costs of non-adjustment. The basis of this theory is the model by **Fischer et al. (1989)**. The authors point to transaction costs as important determinants in the choice of capital structure. They develop a stochastical model of enterprise value and assume that it follows a *geometric Wiener process*, also known as the *Brownian motion process*. **Fischer et al. (1989)** show, that due to transaction costs, adjustments of the capital structure are only made with a delay. The authors find evidence for the existence of intervals for leverage within no adjustment of the capital structure is made. Empirical work examines the adjustment speed of companies to their target capital structure. It attempts to prove the existence of dynamic, partial adjustment processes. The dynamic modeling offers a wider range of interpretation of observed behavior, so that a much larger range of all changes in capital structure are in line with theory. This, however, makes it more difficult to prove the validity of the theory, but also

this paper, I focus on static capital structure theories in perfect and imperfect capital markets and analyse to which extent they can be applied to REITs.

3.1.1 Perfect Capital Markets: Modigliani and Miller

The Modigliani-Miller theory, the first and most fundamental theory of capital structure, concentrates on the market value of a company in a perfect capital market. In a perfect capital market, certain assumptions hold true, such as the absence of taxes and asymmetric information. Capital can be obtained through either risk-free borrowed funds or equity. The Modigliani-Miller theorem asserts that a company's capital structure has no bearing on its market value. In other words, a company financed by debt and one financed solely by equity have equal market values. Therefore the composition of capital is irrelevant and lead to the same total firm value.[2] When considering this theory with regard to REITs, the market value would be independent of the capital structure. The assumption of the absence of corporate taxes is consistent with the characteristic of a REIT. Although some assumptions may apply to a REIT, others do not reflect its true characteristics. Therefore, the relationship between the irrelevance theory and a REIT's capital structure choice is not applicable. The imperfection of capital markets is especially characterized by e.g. taxes and asymmetric information. The theory of irrelevance does not aim to demonstrate the irrelevance of capital structure, but rather its relevance, which would necessitate the violation of at least one assumption. Therefore, the Modigliani-Miller theory cannot effectively serve as a potential theory for determining the capital structure of REITs.

3.1.2 Imperfect Capital Markets

The following section introduces capital market imperfections and the corresponding theories, where perfect rationality is not present due to various frictions. Three theories are discussed: trade-off theory, pecking order theory, and market timing theory.

Trade-off Theory

According to the trade-off theory, companies aim for an optimal balance between debt and equity to maximize their market value. This involves considering the advantages and disadvantages of borrowing, including both the benefits and costs of debt. One of the advantages of corporate taxation is that the interest on debt can reduce a company's tax base through tax deductibility. However, agency or bankruptcy costs can lead to disadvantages. The value of a company is maximized by combining the tax advantage of debt financing with the adverse costs of debt financing.[3]
REITs have a responsibility to distribute a significant portion of their earnings to

to demonstrate more flexibility and explanatory power with regard to financing behaviour in reality. **Frank and Goyal (2008)** give an overview of this research field.

[2] **cf. Modigliani and Miller (1958); cf. Modigliani and Miller (1963)**.

[3] **cf. Kraus and Litzenberger (1973); cf. Morri and Beretta (2008); cf. Schneider (2010)**.

shareholders, resulting in exempting them from corporate taxes. Consequently, there is no motivation for REITs to amass debt capital to capitalize on their tax benefits. Following the trade-off theory and considering only the taxation aspect, REITs should maintain a low debt-to-capital ratio and ideally operate with 100% equity. **Howe and Shilling (1988)** also show that tax-exempt companies have a significant disadvantage in competing with companies that can claim tax deduction. In reality, however, REITs often have a leverage ratio of more than 50%.[4] REITs are levered because two benefits result from leverage: The reduction in agency costs and the leverage effect.[5] [6] **Ooi et al. (2010)** sum up that REITs do not consistently perform financial activities, which include both capital raising and capital reduction activities, and that managers reduce (increase) leverage by repaying (borrowing) debt or raising (buying back) equity. **Boudry et al. (2010)** confirm that the results of the trade-off theory have a low explanatory value for REITs capital structure choices. Higher bankruptcy costs, lead to lower debt ratios of REITs and consequently to higher equity ratios. **Ooi et al. (2010)** assert that REITs with higher debt ratios are more inclined to engage in financing activities with the aim of rectifying their current leverage ratio towards the optimal level. Despite acknowledging this as a secondary factor, the authors fail to disclose the precise value of the optimal leverage ratio. On the other hand, some REITs with a low debt ratio are choosing to take on more debt in order to meet their desired leverage ratio. While this aligns with the trade-off theory, the advantages of tax-exemption may not be the sole determining factor in this decision. Including the regulatory environment REITs are operating in, according to **Harrison et al. (2011)**, trade-off theory suggests that country-based regulations can hinder REITs' ability to diversify due to their focus on real estate assets. Hence, the probability of financial distress increases. Since REITs hold relatively large pools of illiquid assets the potential bankruptcy costs may well be larger.[7] [8] In conclusion, the trade-off theory cannot be properly applied to the choice of capital structure for REITs, as the critical advantage of leverage for REITs is eliminated. However, REITs target a leverage ratio in order to benefit from the leverage effect.

[4] **cf. Feng et al. (2007)**.

[5] **cf. Maris and Elayan (1990)**.

[6] The return on equity enables investors to determine how much profit their invested capital will generate. By minimizing equity and increasing debt, return on equity can be increased. This phenomenon is referred to as the leverage effect. If the company is subject to favourable market conditions, so that the interest that is generated by borrowing is lower than the return that can be generated by an investment, this leads to an increase in return on equity.

[7] **cf. Harrison et al. (2011)**.

[8] **Morri and Christanziani (2009)** show that the diversification effect allowing bigger companies to be more levered, stated by the trade-off model, does not apply to REITs' leverage. REITs' level of diversification is well below that of conglomerates, REITs are linked to only one reference market, namely real estate. Therefore, REITs are less diversified although they can assume huge dimensions and can be able to invest in different asset classes and different geographical areas that are not perfectly correlated. To be precise, REITs show a lower diversification based on the sector they are operating in, while being diversified across different assets. Firms beyond the scope of REITs show a higher diversification due to their investments in different sectors and across different asset classes. **Capozza and Seguin (1999)** focus on costs of debt and equity and find that those are higher for more diversified and therefore less focused REITs.

Pecking Order Theory

Myers and Majluf (1984) investigate the pecking order theory and argue that managers favour a certain order of preferences when raising capital. This order implies that managers, due to information asymmetry and adverse selection, prefer internal financing over external financing.[9] If external funds are needed, debt capital is raised first and equity capital is raised as a last resort. This preference is based on the implication of the theory that the issuance of equity by investors is interpreted as a negative sign or a critical financial situation of the company.[10]
In the case of REITs, the preference order cannot be followed due to lower internal financing possibilities caused by high payout ratios needed to comply with REIT regulation. As a result, a REIT uses both sources of financing, debt and equity, in order to make investments. This limitation of financing possibilities describes two important states: On the one hand, the issue of equity by managers is not seen as an incentive to profit from the overvaluation and on the other hand, debt is not raised in order to prevent adverse selection costs arising from increasing the equity. Financing arises from the two types of external financing.[11] The sale of shares should therefore be viewed less suspiciously by investors compared to NON-REITs.[12]
Boudry et al. (2010) state that REITs are one of the few companies to trade in a secondary market, which allows analysts to determine the net asset value of REITs more reliable in combination with a high level of transparency and weaker information asymmetry. **Feng et al. (2007**) also point out that REITs in their early years prefer debt financing and in the following years, a mixture of debt and equity appears. This does not mean that debt capital is placed above equity, but that it is merely the best selection of external financing in terms of market behaviour and prevailing regulations. Combining firm data with country-based requirements of REITs leads to the following results: **Dogan et al. (2019)** find that REITs have the highest debt ratio in book value terms in countries where they must pay out most of their operating income. This shows that REITs prefer debt over equity financing, in line with pecking order theory considerations. In countries with no payout requirement but leverage

[9] The *agency theory* or *principal-agent theory* deals with the asymmetry of information between principal and agent. With regard to REITs, the company assumes the position of agent and the investor who acquires shares in the REIT assumes the position of principal. The shareholder commissions the REIT management on his behalf to make investments, and the REIT company pays dividends to the shareholders. Unequal information can arise either *ex post* or *ex ante*. If the information asymmetry occurs before the contract is signed, a hidden information or hidden action problem is possible. If asymmetric information occurs after the conclusion of the contract, a hidden action problem occurs. This describes the situation that the agent, after conclusion of the contract, is less concerned with completing the task for the principal's benefit than with his own benefit. In agency theory, there exists uncertainty for the principal, whether the agent is acting to his advantage or not. This characteristic is referred to as *moral hazard*. In order to achieve a balance of interests, agency costs are required which include measures to ensure that the agent works in the interests of the principal. For further information see **Franke and Hax (2009)**.

[10] **cf. Morri and Beretta (2008)**.

[11] **cf. Feng et al. (2007)**.

[12] **cf. Boudry and Kallberg (2010)**.

restrictions, REITs have lower book leverage. This indicates that internal financing is preferred to external financing. This result is also consistent with the pecking order theory.[13]

Garmaise and Moskowitz (2004) provide a non-detailed analysis of REITs under asymmetric information. In the real estate market, there is a high degree of asymmetric information. Investors do not have enough information to properly value assets of REITs. This is due to the difficulty in calculating market values of real estate, as real estate transactions are infrequent and properties are illiquid. Additionally, real estate assets have various uses and locations, which makes valuation challenging. To properly value real estate assets, an understanding of general and local economic circumstances and financing opportunities is necessary.[14]

To overcome or at least mitigate the risks and problems brought above by asymmetric information, the management's design of a REIT can be investigated. The management of a REIT can be either external or internal.[15][16] According to **Sagalyn (1996)**, a new market for REITs developed that emphasized the importance of skilled management and resolving potential conflicts of interest between investors and managers.[17] When it comes to internally managed REITs, it's crucial to consider the trustworthiness of the management. This is especially important because the managers often act as shareholders of the REIT. To ensure fairness, it's essential to mitigate any potential conflicts of interest and align the interests of both parties. This way, shareholders and managers can be treated equally and fairly. Internally managed REITs are moreover characterized by weaker information asymmetry and agency costs in comparison to externally managed REITs.[18]

Maris and Elayan (1990) focus on three possible explanations for REIT capital structure. First, agency theory implications can explain the use of debt financing without taking advantage of taxes. **Jensen and Meckling (1976)** argue that in case a firm uses external financing, there is an optimal ratio of debt-to-external equity that minimizes agency costs. Second, an explanation of debt in the absence of tax benefits might be signaling. In this context, management may use financial leverage to provide information about future performance of the firm. Based on the tax-based motivation, one would expect investors to react negatively to an external financing strategy with debt offerings by REITs. However, based on signaling thoughts, investors interpret

[13] Overall, **Dogan et al. (2019)** show that country specific factors do not have significant impact on REIT leverage. The authors find a negative relationship between the absence of payout requirement and market leverage, which suggests an adverse impact of zero payout requirement on REIT values. In summary, their analyses reveal that differences in regulatory requirements impact REITs' leverage ratio. The magnitude and sign of firm-specific factors vary across countries and no single model adequately captures the influence of firm-specific factors across different countries. Here, no systematic pattern on how different legal structures influence the impact of firm-specific variables is visible. Further results by the authors and analysis is implemented in chapter 6 of this thesis.

[14] **cf. Geltner et al. (2014); cf. Han (2006)**.

[15] Since the new legislation, REIT companies have been allowed to manage their management internally.

[16] **cf. Knoflach and Koerfgen (2007)**.

[17] Detailed information about the regulation of the management is presented in Table 5.10.

[18] **cf. Knoflach and Koerfgen (2007); cf. Cannon and Vogt (1995)**.

the issuance of debt as signaling favourable information about the REIT, they tend to react positively to the debt offerings. Hence, announcements of debt issuance are reflected either as a positive or negative stock price reaction. It has been suggested by **Ross (1977)** that issuing more debt can improve a firm's prospects, but this explanation should be approached with caution as it applies to both taxed and untaxed firms. Additionally, REITs that show a preference for leveraged REITs may attract untaxed investors through the clientele effect. Various tax-exempt institutions, including pension funds, profit sharing plans, endowment funds, and charitable and religious organizations, can earn income through REITs' profit distribution without being subject to federal income taxation at the corporate and investor level. To appeal to different investor clienteles, firms adjust their capital structure, which can result in a bimodal distribution of capital structure. Since there is a bimodal distribution of leverage, no tendency for REITs to adopt for similar capital structures exists.[19]
When it comes to a REIT's capital structure, the pecking order theory and its assumptions are not given as much consideration.

Market Timing Theory

Another theory for justifying capital structure choices is the market timing theory. This theory suggests that the decision to use either equity or debt depends on the current market conditions. Managers will choose the type of external financing that provides the most favorable terms for their capital needs. In favorable market conditions, capital is raised, while in unfavorable market conditions, managers avoid raising capital.[20] As put forward by **Huang and Ritter (2004)**, securities are issued at low equity costs and debt is favoured in case these costs appear high. This market timing theory seems to provide a possible explanation for the choice of capital structure of REITs compared to other traditional theories. **Ooi et al. (2010)** note that REITs react to market conditions and adjust the timing and type of capital accordingly. The financing decision is determined by the changing costs of equity and debt. REITs are more inclined to issue equity in times their stocks are highly valued, whereas debt tends to be issued during periods when the risk premium for long term debt is low. **Harrison et al. (2011)** and **Boudry et al. (2010)** also report evidence that market coordination influences the choice of capital structure. They find a negative correlation between the degree of leverage and the market-to-book value as well as the interest rate. They document that REITs raise equity when they have historically recorded high equity returns and when the market-to-book value has been higher. However, the likelihood of advocating equity is dominantely influenced by the costs of debt and the leverage ratio. Contrary, **Feng et al. (2007)** argue that there is a positive correlation between the leverage ratio and the market-to-book ratio, which in turn is inconsistent with the market timing theory. The theory appears to be an appropriate

[19] **Maris and Elayan (1990)**.
[20] **cf. Frank and Goyal (2009)**.

one for the choice of capital structure of a REIT.
Nguyen and Steininger (2019) analyse REITs and NON-REITs with respect to corporate valuation. In their report, the most important factor in deciding to raise external funds for a company is whether its equity is undervalued or overvalued. The study found that when the market value of equity for REITs increases relative to its intrinsic value, they are more likely to issue equity or debt, and less likely to decrease capital. This behavior is consistent with market timing. Additionally, the comparison between REITs and NON-REITs reveals that REITs use external funds more frequently, which may be due to financial restrictions measured by factors such as interest coverage ratio or the KZ-index.

3.2 Capital Structure: Determinants and Application on REITs

In general, the capital structure of a corporation reflects the structure of the financial sources used by this corporation.[21] The main focus within the financial decision making processes is centered on the determination of the optimal capital structure of a corporation, so to speak the decision of the optimal ratio between debt and equity. The optimal capital structure of a company is the best combination of debt and equity financing that maximises the market value of a company while minimising the cost of capital. Capital structure theories consider different sets of assumptions that differentiate between perfect capital markets and imperfect capital markets in the first place. In 1958, Modigliani and Miller made a central contribution to capital structure theory. Considering perfect capital markets, **Modigliani and Miller (1958)** state in their famous proposition that under some strict assumptions the structure of capital is irrelevant for the value of a firm. In contrast, imperfect capital markets exist: Taking tax considerations into account, especially the tax-deductability while using debt, the value of levered firms is always greater than the value of unlevered equivalent firms.[22] This increase in value reflects the tax shield of debt. In fact, there are other variables that provide tax advantages similar to the tax shield of debt. For instance depreciation, net operating losses, carry-forwards or investment tax credits are variables that are comparable to the tax advantage caused by the debt tax shield. Results by **Bradley et al. (1984)**, **Titman and Wessels (1988)** and **Barclay et al. (1997)** show that the more tax shield not caused by debt issuance a firm has, the more debt these firms seem to have. A closer look at depreciation shows the following: A firm with high levels of depreciation is typically a firm with high levels of tangible assets and, thus, a firm with low contracting costs associated with debt financing. The tangible assets represent good collateral when using debt financing. Those aspects show that the existence of taxes affects capital structure decisions. Costs associated with debt, such as the issuance costs and the costs of

[21] Here and in the following cf. **Amaro de Matos (2001)**.
[22] See Chapter 3.1.1.

bankruptcy, prevent firms from fully debt financing. Explanations for the debt-equity ratio solely based on tax considerations are not entirely satisfactory. Therefore, capital structure analysis developed in the 1970s and 80s show that costs of agency and costs of information asymmetry can also play an essential role. An optimal capital structure tries to find the optimal debt-equity ratio given these costs.
The role of agency costs within capital structure decisions refers on the one hand to conflicts between managers and shareholders, and on the other hand to conflicts between shareholders and debt holders. The differences between managers and shareholders are traced back to their interests and objectives. This generates costs as shareholders monitor the activities of the management that lead to a lower value of the firm. To overcome the monitoring problem, an optimal compensation package might be paid to the management for its services. The performance of the management contributes to the debt-equity ratio. In order to avoid being sanctioned, the management needs to be efficient in setting an appropriate debt-equity ratio. Shareholders would appreciate higher levels of debt, as larger debt commitments restrict the free cash flow of a firm, so that managers are less likely to waste money in an inconvenient way.
The expenses resulting from equity are known as agency costs, which are the missed opportunities from not using debt financing and the tax benefits of debt. Additionally, issuing equity decreases the percentage of ownership held by inside shareholders. The total agency costs of obtaining external funding, whether through equity or debt, encompass both equity and debt-related expenses. To determine an optimal capital structure, these components should be combined with the tax advantages of debt.[23]

3.2.1 Capital Structure Determinants

The literature on corporate finance has identified several factors that can impact a company's capital structure. Here are the most significant factors that explain the capital structure of firms in general. Results by **Harris and Raviv (1991)** report a consensus that leverage is positively linked to fixed assets, a non-debt tax shield, investment opportunities and firm size. Contrary, a negative influence exists for advertising expenditure, probability of bankruptcy, profitability and uniqueness of the product. **Rajan and Zingales (1995)** choose tangible assets, profitability, growth opportunities and firm size as capital structure determinants since they are consistently correlated with leverage. **Frank and Goyal (2009)** support results by **Rajan and Zingales (1995)** who document that tangible assets, profitability, growth opportunities and firm size are the most reliable firm-specific determinants of capital structure decisions. The

[23] **Hull (1999)** analyses optimal capital structure with respect to firm value. Deviations from a firm's optimal capital structure, i.e., away from or closer to, is in line with decreasing or increasing firm value. In contrast, **Lambrecht and Myers (2013)** imply that managers are not concerned about a target level of leverage and only focus on optimizing investment. Consistent with this view, they expect that deviations from target leverage are positively related to the rate of investment, that is reflected in a positive sign on beta. According to **Howe and Shilling (1988)** firms have an optimal capital structure from that optimum can be deviated through security issues.

median industry leverage and the expected inflation are the most reliable market-related ones. Focusing on REITs, **Morri and Beretta (2008)** show that tangible assets, profitability, growth opportunities, operating risk and firm size are important drivers of capital structure decisions. Other factors like tax, non-debt corporate tax shield, costs of financial distress and agency costs have only little or no significant impact on a REITs' leverage ratio. **Dogan et al. (2019)** add legal restriction dummies and interest coverage ratio, as a measure of financial constraint, to their analysis. In sum, there exists an intensive discussion over a long period what the main drivers of a firm's and specific a REIT's capital structure are.
This section describes the main determinants and the corresponding research results that drive capital structure of real estate firms. The determinants are classified in the following sub-groups:

- firm-specific
- cultural
- legal
- economic

In the following, each sub-group will be summarized.

Firm-specific Variables

Firm-specific variables originate from within the company. To investigate whether leverage is influenced by firm-specific accounting data or not, a variety of ratios are computed.

Asset Tangibility

Dogan et al. (2019) argue that asset tangibility indirectly indicates the degree of financial distress. Tangible assets provide collateral for the lender and can therefore mitigate agency problems. Further they can be liquidated relatively quickly, which reduces the cost of financial distress. Hence, **Myers (1977;1984)** says that an increased use of tangible assets is associated with greater debt capacity.[24] Referring to the REIT market, REITs own a large amount of properties that reflect high tangible assets. The tangible nature of REITs' assets increase their debt capacity. Since real assets are easier to liquidate at or near their fair market value, REITs are in a good position in the event of financial distress compared to firms with lower levels of tangible assets. Asset tangibility is the ratio of net real estate investments over total assets. In case net real estate investments is a missing value, it is replaced with net property, plant and equipment or with fixed assets, where the latter one is tangible assets

[24] See also **Shyam-Sunder and Myers (1999)**; **Baker and Wurgler (2002)**; **Feng et al. (2007)**; **Chikolwa (2011)**.

minus current assets.**Dogan et al. (2019)** In line with thoughts of financial distress, **Dogan et al. (2019)** use the ratio of net fixed assets, that can be used as collateral over total assets. This ratio reflects the degree of borrowing capacity where a high ratio leads to greater borrowing capacity.[25] Consistent with this notion, **Myers (1977**; **1984)** and others[26] find a positive relationship between asset tangibility and firm leverage. Based on **Breuer et al. (2019)** leverage ratios for U.S. REITs are twice as high as those of NON-REITs. The authors observe a leverage ratio difference of 25.5 percentage points between these two groups. They show that tangibility and operating risk as variables are the most important capital structure determinants for this deviation.

Profitability

The determinant profitability covers aspects like a firm's operating risk and financial risk. **Harrison et al. (2011)** find that asset tangibility is positively related to leverage, while profitability and market-to-book ratios are negatively related.
Morri and Christanziani (2009) and **Chikolwa (2011)** analyse the relationship between operating risk[27] and leverage and demonstrate that managers of riskier firms tend to reduce the overall company's uncertainty by adopting a less aggressive capital structure. Research shows that firms with higher profitability tend to rely less on debt financing. This can be measured by the ratio of operating income or EBIT to total assets, with higher ratios indicating lower levels of debt financing. The trade-off theory suggests that profitability has a positive impact on leverage, as higher profits reduce the likelihood and cost of financial distress. This allows firms to take advantage of the interest tax shield and thus increase their leverage ratios. However, the pecking order theory predicts that profitable firms may choose to retain more earnings and therefore decrease their leverage ratios.[28] Profitability may also exert multiple influences on the firm's leverage decision. **Titman and Wessels (1988)**, **Fama and French (2002)** and **Barclay et al. (2006)** find that more profitable firms have lower debt ratios.[29] **Baker and Wurgler (2002)** find that profitability influences debt ratios through the retention of earnings. But given the relatively high payout ratios mandated by regulation for REITs the relationship between profitability and debt ratios for the firms in our sample should be weaker, considering the results by **Baker and Wurgler (2002)**. An open empirical question remains, given these opposing theories about the expected effect on the relationship between overall firm profitability and leverage.

[25] **Dogan et al. (2019)** find a significantly positive effect of asset tangibility on leverage for Hong Kong, Singapore and Turkey.

[26] **cf. Jaffe (1991)**; **cf. Shyam-Sunder and Myers (1999)**; **cf. Baker and Wurgler (2002)**; **cf. Barclay et al. (2006)**; **cf. Brown and Marble (2009b)**.

[27] Risk can be either characterised as unpredictable cash flows, thus their capacity to pay back interests and capital components of a loan can be strongly affected by the general economic cycle. It can be used as a negative indicator of probability of default and consequently acts as a proxy for risk.

[28] **cf. Demirguec-Kunt and Maksimovic (1999)**; **among others**.

[29] This is confirmed by **Leary and Roberts (2005)**. They show that high profits mechanically lower leverage. Regression results show a negative relation between profitability and leverage, although optimal-debt ratios are positively related to profitability.

The argument referring to the pecking order theory can be weakened with restricted ratios of distributing free cash flows by law for REITs being in place.[30]

Growth Opportunities

Based on investigations by **Dogan et al. (2019)** the trade-off theory predicts a negative relation between growth opportunities and leverage for REITs. Specifically, due to agency conflicts, managers are more likely to reject a positive NPV growth option if it mainly benefits debt holders. This may lead to the tendency that high growth firms are more likely to avoid debt. The pecking order theory suggests that there is a direct correlation between growth opportunities and leverage, and that high-growth companies require additional funding beyond retained earnings. In the case of REITs, mandatory payout restrictions result in limited internal capital, and equity is only used as a last resort, leading to an increased reliance on debt issuance. Consistent with this notion, **Feng et al. (2007)** report that U.S. REITs with more growth opportunities have higher leverage ratios. Based on European REITs, however, **Morri and Cristanziani (2009)** find a negative, albeit insignificant relation between growth opportunities and leverage. When looking at equity REITs that are experiencing high growth, it seems that they tend to use less debt. However, those equity REITs that have a larger firm size or are uncertain about their future cash flows tend to use more debt.[31]

Firm Size

The composition of capital depends on the firm size, usually measured by the natural logarithm of total assets. Research within this field have been done by **Dogan et al. (2019)**. Extant literature offers several controversial results on the influence of firm size on capital structure. On the one hand, bankruptcy costs are mitigated in case of a large firm size due to a higher likelihood of a diversified firm with more stable cash flows. Thus, the trade-off theory predicts a positive association between leverage and firm size.[32] On the other hand, more information is available about large firms such that managers of larger firms are at a relative advantage to issue equity. Based on the pecking order theory an increasing firm size is in line with lower leverage ratios.[33] If size proxied for decreasing information costs, since the access to a better information basis for larger firms exists for investors, the theory would support the hypothesis that larger firms should face lower disincentives to equity issuance. As a result, a negative relationship between leverage and firm size appears to be more likely. Results by **Panno (2003)** are in line with these ideas and

[30] **cf. Titman and Wessels (1988)**; **cf. Rajan and Zingales (1995)**; **cf. Fama and French (2002)**; **cf. Morri and Cristanziani (2009)**; **cf. Harrison et al. (2011)**.

[31] **Morri and Cristanziani (2009)**.

[32] Also confirmed earlier by **Brown and Riddiough (2003)** and **Rajan and Zingales (1995)**.

[33] **cf. Maris and Elayan (1990)**.

show a direct relationship between leverage and size that reflects the better access of large firms to financial markets, the relative low proportion of bankruptcy costs to the value of firms and the flexibility of banks of larger firms to borrow money when they are in financial distress.
Einhorn (1997) finds that smaller REITs will not perform as well as larger REITs. Results show that larger REITs have reduced per unit operating costs, i.e. due to taking advantage of economies of scale and economies of scope, and that these lower costs are translated into access to lower-cost capital. Larger REITs tend to have a rating process and analyst coverage, which increases investor awareness. The size of a firm and the duration of refinancing impact their leverage ratios. Small firms have longer periods of refinancing due to higher issuance costs, resulting in lower average leverage ratios compared to big firms, as shown by **Leary and Roberts (2005)**. In addition to that, a rating process and analyst coverage are more likely to exist for larger REITs which leads to larger investor awareness. The combination of firm size and the duration of refinancing leads to the following results. **Leary and Roberts (2005)** show that depending on firm size, small firms have longer periods of refinancing due to higher issuance costs, resulting in lower leverage ratios on average compared to big firms.
The impact of firm size has been investigated by many researchers. Further studies support a positive relationship between firm size and leverage and are discussed in the work by **Maris and Elayan (1990)** and others[34].

Age

Helwege and Liang (1996) posit that firm age should be inversely related to the level of asymmetric information for the firm. This is caused by the fact that the market learns more about the firm's operations over time.
Hadlock and Pierce (2010) find empirical support that firm size and age are the primary determinants of the degree to which organizations are financially constrained. Drawing on pecking order theory, firm age should be associated with a lower use of financial leverage as younger firms are typically more informationally challenging.

Interest Coverage Ratio

Firms with high interest coverage ratios have relatively low bankruptcy costs. Thus, based on the trade-off theory, there exists a positive impact of the interest coverage ratio on leverage. Especially for REITs, **Rovolis and Feidakis (2013)** find a significantly positive relation between interest coverage and leverage. However, **Harrison et al. (2011)** find an insignificant relation between (lagged) interest coverage and market leverage, so that further investigations need to be done. Based on the

[34] **cf. Jaffe (1991)**; **cf. Fama and French (2002)**; **cf. Baker and Wurgler (2002)**; **cf. Chikolwa (2011)**; **cf. Barclay et al. (2006)**.

investigation by **Dogan et al. (2019)** interest coverage ratio is a significantly negative determinant of leverage.

Rating and Banking Relationship

The influence of ratings on leverage decisions had been investigated by a variety of researchers. In the following the main research results of those are introduced. **Brown and Riddiough (2003)** find that public REIT debt prices and corporate bond prices are co-integrated. Further, the credit quality of the issuer and debt maturity are positively related. Consistent with **Diamond's (1991)** latter finding, lower credit quality borrowers are often forced to rely on short-term debt. The main relevant results are the following:[35] (1) A non-linear relation exists between bond's offer spread and issuer credit quality, meaning that a change in classification from an *investment grade* to a *non-investment grade* credit rating results in almost a 1% jump in bond yield. This leads to higher borrowing costs for REITs to issue junk bonds, (2) REITs that issue public debt have credit ratings that cluster just above the minimum *investment-grade* credit rating.[36]
Following **Faulkender and Petersen (2006)** long-term credit ratings and short-term commercial paper ratings are used as proxies for accessibility to public debt markets. The authors find higher leverage ratios for those firms that are rated compared to those that have no rating. These results are supported by **Lemmon and Zender (2004)**.
Results by **Kisgen (2009)** show that firms reduce leverage following a credit rating downgrade. Firms downgraded to speculative credit rating are about twice as likely to reduce debt as compared to other firms, while rating upgrades do not affect subsequent capital structure changes. In general, **Kisgen (2006)** motivate research in the field of credit ratings since managers' capital structure decisions are linked to discrete benefits associated with higher rating levels. The author calls this the *credit rating-capital structure* (CR-CS) hypothesis.
Results by **Sajjad and Zakaria (2018)** show that the relationship between credit rating scales and leverage ratio is a non-linear inverted U-shape. Low levels of leverage are represented by high- and low-rated companies, whereas mid-rated companies have a high level of leverage.[37] Differentiation between investment-grade and non-investment grade in the context of leverage shows that firms in an investment-grade category receive benefits by bringing down the cost of capital due to higher ratings, while firms in non-investment grade ratings have a generally low level of leverage

[35] Beyond the following results, there is more to mention: There exists a positive relation between the bonds offer spread and debt maturity. Public debt offer proceeds are most often used to buy back bank and other senior secured debt, rather than fund new investment.

[36] Based on the results by **Longstaff and Schwartz (1995)** and **Leland and Toft (1996)** credit spreads are predicted to decline with maturity for lower-rated bonds caused by a significant increase over time of the the credit quality of the representative when debt is fixed in the capital structure.

[37] Here the authors state that ratings should be in line with costs and benefits, such that each rating scale has a substantial effect on the behaviour of a company's choices for optimal capital structure.

due to high costs of debt.[38]

Hardin and Wu (2010) investigate REIT's debt structure with respect to banking relationships, asymmetric information and ratings. Their main findings are the following: (1) REITs with banking relationships are more likely to obtain long-term debt ratings and subsequently issue public debt; (2) REITs tend to use less secured debt and have lower leverage; (3) REITs have reduced their reliance on mortgage and have raised an increasing number of capital through banks and the public capital markets; (4) when it comes to information asymmetry and agency-related problems the importance within the REIT industry is evident for REITs' capital providers. Thus, banking relationships can potentially improve REITs' access to the public capital markets. REITs benefit from more flexible bank loans that are likely to be issued against the entire firm's future cash flows and not cash flows from a specific property.

Hardin and Wu (2010) support the results by **Brown and Riddiough (2003)**, who show that public debt issuers target leverage ratios in order to preserve a minimum investment-grade credit rating. Further it is likely, that a reason for REITs to use debt is to obtain financial liquidity that helps to take quick action in property acquisitions. Taking all together, the results imply that the source of capital, in this case bank debt, and banking relationships influence the capital structure of REITs. Including aspects of maturity, the results of **Hardin and Wu (2010)** support **Hackbarth et al. (2007)** in that mature REITs tend to use a mixed debt financing, including bank debt and market debt.

In general, bank debt is a unique financing instrument, which provides firms with liquidity, mitigates informational asymmetries in the capital markets and gives monitoring benefits to shareholders.[39]

In the real estate industry, it is unclear whether having a rating increases the chances of getting a bank loan or if having an existing bank loan leads to a company being evaluated and rated. Despite the difficulty in determining this relationship, it is evident that ratings and bank debt coexist.

Free Cash Flow Problem

Hardin et al. (2008) focus on REITs' cash holdings and find that these are inversely related to funds from operations, leverage, and internal advisement[40] and are directly related to the cost of external finance and growth opportunities. Cash holdings

[38] **cf. Cantor (2004); cf. Bolton et al. (2012)**.

[39] **cf. Diamond (1984); cf. James (1987); cf. Houston and James (2001)**.

[40] In combination with **Ambrose and Linneman (2001)** the authors examine differences in the financial characteristics of externally and internally advised REITs. The internal advisement structure is shown to dominate the REIT industry, as most externally advised REITs have responded to capital market pressure and now employ an internal advisement structure. This capital market pressure stems from agency problems inherent with external advisors. Financially constrained REITs are more likely to exist by being externally advised compared to REITs with internal advisors. This implies an inverse relation between excess dividends and internal advisement. The use of internal advisement helps mitigate the principal-agent conflict, reducing the necessity of excess dividends.

are also negatively associated with credit line access and use. These findings imply that REIT managers hold relatively little cash to reduce the agency problems of cash flow, thereby increasing transparency and reducing the future cost of external capital. The mandatory distribution of earnings reduces the ability of REITs to accumulate capital internally. Funding from external sources becomes more likely. However, this restriction may understate REITs' actual ability to accumulate cash. This is caused by the fact that the mandatory dividend is calculated as a portion of taxable income which is calculated after depreciation charges which do not reduce cash flow. Especially in the real estate industry, depreciation is a large non-cash expense that leads to most REITs pay out more in dividends than the minimum 90% required by law. For example, **Ghosh and Sirmans (2006)** report an average dividend payout ratio, calculated as dividends as a percentage of net income, of 150%. As **Bradley et al. (1998)** point out, the dividend-to-funds from operations ratio for REITs is between 50% and 65%. This might indicate that REIT managers have discretionary cash flow at their disposal since that a possible free cash flow problem becomes more likely. These findings imply that REIT managers choose not to accumulate cash despite their ability to do so. Further support for the inverse relation between cash holdings and leverage is given by **Kim et al. (1998)**, **Opler et al. (1999)**, and **Ozkan and Ozkan (2004)**. They argue that firms can issue debt to generate cash when internal funds are scarce. In contrast to the pecking order theory, the agency models of **Jensen and Meckling (1976)**, **Easterbrook (1984)** and **Jensen (1986)** suggest that firms with higher level of profitability have larger fractions of their earnings to debt obligations or dividend payments in order to prevent managers from wasting free cash flow. Results by **Easterbrook (1984)** and **Fama and French (2002)** show that dividends and debt policies help to control free cash flow problems. Based on **DeAngelo and DeAngelo (2006)**, firms with larger profits may pay a higher amount of their net income as dividends instead of using debt. Combining these thoughts with a maturing firm in general, a firm with greater profits relative to investment opportunities may cope with the agency problem of free cash flow with larger dividend payments instead of debt. Ultimately, in theory, the firm may become debt free.

Cultural and industry-specific Variables

Besides firm-specific, legal or economic determinants, cultural influences are a possible explanation for international differences in capital structure, as culture affects management's perception of the cost and risk related to debt finance, and agency problems in each country.

Peer Effect, Herding and Reflection Problem

In the finance literature, herding is defined as a form of imitation of others leading to an alignment of behaviour.[41] The main research regarding herding behaviour in real estate markets focuses on stock price performance and imitating investors, whereas analysis with respect to capital structure theories is less covered.[42] [43] For this reason it is worth analysing the interaction between the concept of the peer effect and capital structure decisions more in detail and to apply them to real estate firms.
The *peer effect* is the impact of the behaviour of firms on the characteristics and actions of competitors belonging to the same reference group, such as an industry. The peer effect in general encompasses both economic and sociologically behavioural reasons.[44] **Leary and Roberts (2014)** show that competition plays a central role in capital structure decisions. The authors of this study focus on imitating the capital structure and actions of similar companies, while also considering both internal and external factors related to those companies. They found that corporate financial policies are closely linked to one another. By using peer firms' unique shocks as instruments, they were able to identify peer effects in the industry. Their research showed that a change in peer firms' leverage ratios was associated with an 11% change in the leverage ratios of their own firm, based on a one standard deviation change. The study also suggests that smaller and financially constrained firms tend to imitate their peers more strongly.[45]
The diversity of the capital structure of companies in different industries leads to another example of the existence of the peer effect. These differences in capital structure can be caused by determinants such as transaction costs, bankruptcy costs or underinvestment. In order to ensure the optimal use of equity and debt capital, companies tend to take into account the minimisation of those costs when making

[41] **cf. Shefrin (2000)**; **cf. Welch (2000)**; **cf. Hirshleifer and Teoh (2003)**.
[42] **cf. Zhou and Anderson (2013)**.
[43] **Lesame et al. (2022)**; **Yang et al. (2020)**; **Philippas et al. (2011)**; **Lantushenko and Nelling (2017)** all analyse herding and investor behaviour.
[44] **Patnam (2011)**.
[45] Furthermore, studies show a negative correlation between the remuneration of CEOs and the extent of their imitative behaviour. However, this correlation shows only weak statistical relevance. The finding of a negative correlation between compensation and the degree of imitation, in which lower-paid CEOs are more inclined to imitate than better-paid CEOs, is, however, consistent with the size of the companies. This in turn is due to the positive correlation between the size of a company and the remuneration of the respective CEOs. For further information see **Leary und Roberts (2014)** and **Bizjak et al. (2008)**.

financial policy decisions. In doing so, companies face the problem of estimating probabilities about potential costs and the impact on the capital structure. This process is both costly and uncertain for companies. Consequently, there is the possibility of mimicking the competitors and thereby minimising the corresponding costs and the time delay.[46]

Companies adjust their leverage ratio taking into account the following three aspects: (1) their peers, (2) the industry leader and (3) the median leverage ratio of all companies represented in the industry.[47] Here, the importance of the industry average leverage as an economically important determinant of a company's capital structure becomes visible. This determinant is based on the assumption that the industry leader has a knowledge or information advantage compared to the rest of the industry's peers. This information advantage thus relates to financial policy decisions that have an influence on the capital structure of a company.[48] [49]

The concept of *herding* is a behavioural approach to describe the influence of competitors on capital structure decisions.[50] In doing so, companies try to design their capital structure in herds and have to weight the benefits of an optimally adapted capital structure against the costs of leaving the herd, in this case the corresponding industry. Leaving the herd is equated with deviating from the industry average leverage ratio. By following the *herd*, on the one hand, the company neglects consideration of external factors and, on the other hand, gives greater consideration to internal factors. If a company deviates from the industry average, it can be sanctioned by the market by disadvantages in the granting of loans.[51]

Another motive that reinforces herd behaviour can be the *free-riding problem in information acquisition*. Obtaining potentially better information from various sources, such as skill, luck, or effort, is called free riding in information acquisition. This information can help companies or individuals make better decisions. However, those with limited access to such information tend to imitate companies that they believe have better information.[52] [53] In the field of herding and peer effect, sociological behavioural schemata that influence and explain human behaviour and decisions can be used and in the course of this, the potential irrationality in the decision-making process of

[46] **cf. Titman and Wessels (1988)**.

[47] **cf. Leary and Roberts (2014); cf. Ertugrul and Giambona (2011)**.

[48] **cf. Filbeck et al. (1996); cf. Welch (2004)**.

[49] Research by **Frank and Goyal (2009)** shows that the median industry leverage has a positive effect on a firm's leverage, while market-to-book assets ratio and profits have a negative effect on leverage. Tangibility, log of assets and expected inflation have a positive effect on leverage. Those results are based on a sample consisting of publicly traded American firms from 1950-2003. Concentrating on book leverage, the impact of firm size, the market-to-book ratio and the effect of inflation are not reliable.

[50] In its origin, the approach deals with the behaviour of animals. The safety and chance of survival of each animal may increase with its affiliation to a herd or to a group. This approach can be transferred to the behaviour of companies.

[51] **cf. Patel et al. (1991); cf. Scharfstein und Stein (1990)**.

[52] **cf. Patel et al. (1991); cf. Scharfstein und Stein (1990)**.

[53] It should be noted that there is no consensus within the research community on the interpretation of the herding theory. There is disagreement about whether the herding theory is a response to the imitation of a leading company within an industry or describes the herding of companies itself. For further information see **Filbeck et al. (1996)** and **Patel et al. (1996)**.

individuals can be reconsidered.[54] The decision-making process involves observing and learning from others, sometimes leading to less rational decisions when time and cost become too high. This approach often focuses on competitor behavior.[55]
Further research into peer effects and the herding theory, thus appears to be useful in order to demonstrate a more far-reaching explanatory power.
Finally the *reflection problem* follows. The link between competitors' financial policy decisions and a company's capital structure has no clear interpretation in the literature. The absence of a generally accepted interpretation of this relationship is mainly due to the reflection problem, which is a specific form of endogeneity. It describes the problem of interpretation and conclusion, or the problem of separating correlation from causality. It is questionable whether the actions and characteristics of a group influence the actions of a group member, or whether all group members are stimulated by external factors to behave in the same way.[56] The reflection problem can be applied to studies of the determinants of capital structure decisions. In this context, among other things, the problem may occur with the use of competitors' balance sheet ratios as an explanatory variable for financial policy questions of an individual within an industry. In this case the median leverage ratio of an industry represents the reflection problem in a sample of NON-REITs. Considering REITs only in a sample may alleviate the reflection problem to some extent as REITs are subject to a specific regulatory framework. This regulatory framework covers aspects like e.g. the shareholder body, taxation, sanctions, listing requirements, leverage restrictions that are beyond the endogeneity problem.[57]
In examining the problem, **Manski (1993)** distinguishes between an endogenous and exogenous/correlated effect. Any correlation between the financial policies of firms and the actions or characteristics of their peers can be attributed to two possible explanations. On the one hand, a roughly similar institutional framework for the companies within an industry, which correspond to the exogenous effect, is assumed. In addition, there is a correlated effect, since companies within an industry have similar characteristics, such as production technologies or investment opportunities.[58]
On the other hand, the second explanation is based on the endogenous effect, which describes the influence of the actions or characteristics of competitors on the financial policy of companies. This effect corresponds to the peer effect. Whether the peer effect is actually caused by endogenous effects is questionable. If this applies, and the correlations are caused by exogenous or correlated effects, no significant conclusions can be drawn in this context.
In order to be able to analyse the connection between the peer effect and capital structure decisions and to avoid the reflection problem,

[54] **cf. Patel et al. (1991)**.
[55] **cf. Bikhchandani et al. (1998)**.
[56] **cf. Manski (1993)**.
[57] For further information see Chapter 2.2.
[58] Here the exogenous and correlated effects are summarized, as both effects have the same influence on all firms within an industry.

Leary and Roberts (2014) set up a two-step identification strategy. A detailed description of the identification strategy can be found in the Appendix C.

Property Type and Peers

As explained previously, REITs can operate in different fields. **Dogan et al. (2019)** classify REITs in different property type classes in order to analyse the differences in leverage across these groups. Depending on the property type, the financing choice of REITs may vary. The trade-off theory predicts that less debt is used if REITs are specialized in industrial or office properties, while REITs specialized in residential property would use more debt. This is caused by more volatile cash flows and asset values in the field of industrial and office properties compared to residential properties. Focusing on the U.S. market, confirmation is given by **Harrison et al. (2011)**. They show that U.S. REITs specializing in self-storage properties have on average low leverage ratios. In contrast, REITs concentrating on regional malls and manufactured homes use relatively high amount of debt. In a related study, **Giambona et al. (2008)** report that REITs specializing in the most liquid property type use higher leverage and longer maturity debt. Corresponding to these results, **Ertugrul and Giambona (2011)** report that about 70% of capital structure variation is attributable to a REIT's property type. Further, how a REIT relates and reacts to its peers within the same segment is an important source of observable differences in capital structure. REIT's leverage ratio depends on the median leverage ratio in its segment operating in.[59] Property segments are the following: residential, industrial, office, retail, and hotel buildings. REITs adjust their leverage in response to changes made by industry peers acting in the same property segment. They revert their leverage ratio to the property segment median leverage ratio persistently, although slowly. The authors highlight that those results are most likely for highly competitive industries.[60] Differences in segment leaders and new entrants show the following results: Segment leaders have longer maturity debt. This represents a signal to rival firms about their solvency. New entrants in the REIT market use more short-term debt, that offers lower levels of information asymmetry that new firms face in capital markets.[61][62]

[59] Further the authors find that REIT's volatility of operating performance relative to the median volatility of operating performance of its segment peers represents an important determinant of its leverage ratio.

[60] The authors find that most of the capital structure variation occurs within property segments. The regression model analysing the effect of lagged median leverage on leverage results in an adjusted-R2 of 4.9%. Leverage variation between property segments is only 4.9%. Including firm fixed-effects, the adjusted-R2 increases to 74.8%. 70% (i.e., 74.8% minus 4.9%) of leverage variation is occurring within property segments. The relative unimportance of property segment in explaining financial structure is due to the same set of regulations that apply to REITs and their real estate assets and institutional and macroeconomic variables play a similar role across different property segments.

[61] Those results can be combined with the negotiations about the peer effect or herding.

[62] **cf. Maksimovic and Zechner (1991); cf.Ertugrul and Giambona (2011)**.

Legal Variables

Common Law and Civil Law

Taking legal aspects into consideration the results of **La Porta et al. (1998)** are inevitable. The impact of country differences with regard to the legal systems, *common law* and *civil law*, is the core piece of their work. Their paper examines legal rules covering protection of corporate shareholders and creditors in 49 countries. Investor protections vary among countries with common-law countries having the strongest protections and French civil-law countries having the weakest. German and Scandinavian civil-law countries fall in the middle. The concentration of shares in the largest public companies is linked to weaker investor protections. This supports the idea that small, diversified shareholders are less influential in countries where their rights are not protected. Firm size is positively related to the size of the banking system and the efficiency of the legal system. **Beck et al. (2007)** find evidence that externally financed firms are smaller in countries that have strong creditor rights and efficient legal systems. This suggests that firms in countries with weak creditor protections are larger in order to internalize the protection of capital investments. Results by **Demirguc-Kunt and Maksimovic (1998)** show that firms in countries with less efficient legal and financial systems have less access to external financing. An application on NON-REITs is done by **Fan et al. (2012)**. The researchers examined institutional factors and discovered that a country's legal and public governance systems have a significant impact on a firm's capital structure. They also found that the country's influence on a firm's financing decisions is greater than the influence of its industry affiliation. In other words, the institutional environment plays a crucial role in financing decisions. Factors such as a country's legal and taxation systems, corruption levels, and capital supplier preferences (banks and pension funds) explain a significant portion of the variation in leverage and debt maturity ratios. The authors' strongest finding is that firms in countries that are viewed as more corrupt tend to be more levered and use more short-term debt. The rationale behind this is the following: Debt is expected to be used relatively more than equity when the public sector has a higher level of corruption, since it is easier to expropriate outside equity holders than debt holders.[63] [64] Those results are consistent with **Demirguc-Kunt and Maksimovic (1999)**.[65]

Based on the existence of the country-based existing legal system, incentive problems, i.e. conflicts of interest between corporate insiders (managers, employees, and/or

[63] **cf. Fan et al. (2012)**.

[64] See also **Djankov e al. (2003)**, **La Porta et al. (1999)**, **Fisman (2001)** and **Johnson and Mitton (2003)**.

[65] **Demirguc-Kunt and Maksimovic (1999)** find that firms offer longer debt maturities in countries where the legal system has more "integrity". Integrity, measured by a law and order index prepared by the International Country Risk Guide, reflects the extent to which individuals are willing to rely on the legal system to make and implement laws, mediate disputes, and enforce contracts.

majority shareholders) and external investors, that shape corporate policy and productivity, play an essential role. Prominently discussed by **La Porta et al. (1998)**, the extent to which contracts can be used to mitigate these problems depends on the different legal systems. Those contracts consist of both the content of the laws and the quality of their enforcement. **Fan et al. (2012)** find that countries with weak laws and enforcement, financial instruments (e.g. short-term debt) allow insiders less discretion and are contractually easier to interpret.

A comparison of legal protection of external investors across developed and developing countries was first made by **La Porta et al. (1998)**. In the paper by **La Porta et al. (2002)** they argue that legal systems based on common law offer outside investors (debt and equity) better protection than those based on civil law, resulting in higher security values. This suggests that common law countries will use more outside equity and longer-term debt, as all else being equal.

The latest research in the field of REITs and the distinction between firm-specific and country-based determinants was made by **Ghosh and Petrova (2020)**. The authors of this study analyze the market performance and risk-adjusted returns of REITs. They also develop a regulation index based on country-specific regulatory data. This index, called R-Index, takes into account various requirements such as minimum capital, management structure, minimum investment in real estate assets, percentage of income from real estate activities, leverage requirements, profit distribution rules, ownership composition, and taxation.[66] Concentrating on mandatory dividend distributions, the earnings that are subject to distribution vary by country. There exist countries that base their profit distribution on net income while others focus only on income from rental properties or real estate assets. Here, the problem lies in the non-granular data and arising difficulties in the analysis. **Ghosh and Petrova (2020)** conclude the following based on a series of studies by **La Porta et al. (1997**; **1998**; **2000a**; **2000b**; **2002**; **2006)**: The authors show that the systematic differences in the structure and enforcement of laws induce discernible differences in the development and efficiency of a country's capital market. They argue that when shareholders and creditors are assured that a country's investor protection laws are comprehensive, and strictly enforced, such that they can expect more of the firm's profits to be paid out as dividends and interest, instead of being expropriated by managers and entrepreneurs, they are willing to pay higher prices for the financial assets. The higher valuation of assets, in return, enables entrepreneurs to raise more external capital for investment, leading to an expansion of financial markets. The authors document that common (civil) law countries provide the strongest (weakest) protection to investors, while enforcement is more effective in wealthy countries.

Dogan et al. (2019) investigate leverage restriction in detail. They report that in Europe and Asia, REITs' leverage restrictions are an important determinant of capital structure. Their results are based on a small set of regulations while

[66] Information about internal and external management is provided by PricewaterhouseCoopers reportings. The majority of countries are allowed to have external and internal management either.

Ghosh and Petrova (2020) include all relevant restrictions within their R-Index.[67]

Tax Hypothesis

Higher tax rates increase the interest tax benefits of debt. Following the trade-off theory, taking advantage of the tax shield of debt goes along with issuing more debt when tax rates are higher. **DeAngelo and Masulis (1980)** see depreciation expenses and investment tax credits as tax-shield substitutes for interest expense. In general, those tax-exempt firms must compete in the debt markets with firms that can take advantage of the tax-shield of debt. These firms afford to pay higher interest on debt, leading to a stronger disadvantage for non-taxpaying firms while using debt. With the existence and upcoming real estate industry, tax incentives negotiations were made. **Howe and Shilling (1988)** focus on the tax-exempt status of REITs. The tax-exempt status due to profit distribution requirements lead the authors to argue that REITs should use little or no debt in their capital structure. Combining depreciation aspects within corporate taxation, **Gau and Wang (1990)** argue that investors, here REITs, in properties with a large existing tax shelter from building depreciation tend to use less debt. This is based on the fact, that with a large existing tax shelter, interest expenses might not be needed in the first place. Whether there exists a difference in capital structure between REITs and NON-REITs is investigated by **Barclay et al. (2013)**. The authors classify REITs and NON-REITs in non-taxable and taxable firms.[68] They test the tax hypothesis that leverage ratio of taxable firms, here NON-REITs, would be higher than that of similar non-taxable firms, here REITs. As a result they find that for most specifications, leverage of taxable real estate firms is not significantly higher than that of non-taxable real estate firms.[69] Covering tax hypothesis within the real estate industry, the hypothesis predicts a significant and negative coefficient on the non-taxable REIT dummy variable, since those firms generally receive no corporate tax benefit of debt. This implies that the coefficient on the NON-REIT dummy variable should be significantly greater than the coefficient on the REIT firm dummy variable. This is caused by the fact that NON-REITs benefit from the interest tax shield while REITs do not. To investigate this issue **Barclay et al. (2013)** take

[67] In countries that specify a maximum debt ratio, REITs have significantly lower leverage than in countries with no leverage restrictions. Higher leverage ratios are visible in countries where profit distribution is high, but no restriction on debt ratio exists. In contrast, the authors find that in countries with leverage restrictions, but the absence of minimum payout requirement, REITs tend to have lower leverage. These results suggest that internal financing is preferred to external financing. For further information see **Dogan et al. (2019)**.

[68] The authors use a sample of public companies operating as REITs using the CRSP/Ziman Real Estate Data Series, firms in the real estate industry organized as a publicly traded partnership using a search for the phrase "LP" in their name, and a set of similar taxable real estate firms based on the firm's industry membership. They exclude financial firms, including mortgage REITs. The data span the years 1984 (when segment data was first available) to 2010. It includes 2,891 firm-year observations for nontaxable real estate firms (including 156 limited partnership observations), and 1,025 firm-year observations for taxable real estate firms.

[69] In their analysis they test an one-tail p-value tax hypothesis, if leverage should be lower in non-taxable firms. But the results in their sample show no significance.

marginal corporate tax rates into account.[70] [71] The average estimated marginal tax rate for the taxable real estate firms (industrial firms), namely NON-REITs, is: (1) effective tax rate: 27.4% (27.2%); (2) trichotomous tax rate: 24.1% (24.9%); (3) simulated tax rate before financing: 30.4% (29.4%). Thus, each of the standard instruments for estimating a company's tax rate suggests that NON-REITs generally should use the tax deductibility of interest payments. This is also in line with considerations about marginal tax rates by **Mackie-Mason (1990)**. Firms with high marginal tax rates are more likely to issue debt compared to firms with low marginal tax rates.[72] [73]

Economic Variables

The difference between developed and developing countries is based on the approach and robustness test of **Demirguec-Kunt and Maksimovic (1999)** and **Chui et al. (2002)**. The classification is based on rates of growth of real GDP, 2020. Countries declared as developed countries are labeled with 1 and countries declared as developing countries are labeled with 0. Results by **Sekely and Collins (1988)** show that developing countries have on average lower debt ratios compared to developed countries. **Rajan and Zingales (1998)** find that countries with better developed financial systems show superior growth in capital-intensive sectors that rely more heavily on external financing. Further **La Porta et al. (1997)** show that countries with poor investor protection have significantly smaller debt and debt markets. In sum, aspects of law, legal protection and the extent of developed countries co-integrate.

3.2.2 REIT-specific Evidence

Focusing on REIT-specific evidence, some results from different analyses are introduced. In general, comparing debt ratios of REITs across different investigations, there exists a tendency of higher ratios compared to the industry. **Feng et al. (2007)** find debt ratios of 65% ten years after initial public offering. However, as REITs take the advantage of high depreciations and have access to free cash flow, the average payout ratio of REITs over the last few years as a percent of funds from operations is around 70%, leading to increased debt financing motivation. **Baker and Wurgler (2002)** find debt ratio above 50% in their sample period 1991-2003, whereas from 1974-1999 NON-REITs have on average debt ratio below 50%. The mean value of leverage for REITs

[70] In untabulated tests, they estimate the marginal corporate tax rate of the NON-REITs in their sample using: (1) the effective tax rate estimated as income tax expense/pretax income; (2) a trichotomous tax rate described in **Shevlin (1990)** and (3) simulated marginal tax rates before financing costs.

[71] see **Graham et al. (1998)** for simulated tax rates.

[72] **Barclay et al. (2013)** say that the most appropriate comparisons between REITs and taxable real estate firms focus on time periods when there are fewer tax-related constraints on REIT operations. In my EPRA classification I differentiate between l and h incometax, with l meaning they are tax-exempt and h meaning there exist certain constraints.

[73] Based on **Breuer et al. (2019)** tax status does not explain differences in leverage between REITs and NON-REITs while early results by **Barclay et al. (2013)** show minor differences between those two groups. Note that **Breuer et al. (2019)** concentrate on U.S. data only.

measured by **Maris and Elayan (1990)** was 31%. REITs are more levered than sixteen of the twenty-five industries considered in investigations by **Bradley et al. (1984)**. **Breuer et al. (2019)** analyse leverage ratios for U.S. REITs with historical data from 1999 to 2015 and compare them to NON-REITs. Their results show that REITs' leverage ratios are twice as high as those of NON-REITs. Further, REITs' leverage ratios are the highest across all industries. Based on the authors, the differences in leverage ratios between REITs and NON-REITs are called *REIT debt puzzle*.[74]
In the literature, there exists no clear picture regarding the amount of leverage of REITs in contrast to NON-REITs. **Feng et al. (2007)** show that during 1994-2003, REITs maintain a debt ratio of above 50%. Supporting results by **Harrison et al. (2011)** find that over the period 1990-2008, the average debt ratio of REITs is 48%. **Barclay et al. (2013)** report that over the period 1984-2010, the average leverage ratio of non-taxable real estate firms is 44%, which is much higher compared to the average leverage ratio of 18% for industrial firms. Concentrating on the U.S. market, **Brown and Riddiough (2003)** find that U.S. REITs largely fund investments with bank loans and publicly listed debt. Equity issuances seem to be a last resort only. European data is analysed by **Morri and Christanziani (2009)**, concentrating on NON-REITs' and REITs' leverage. Contrary to the U.S. evidence and the results by **Barclay et al. (2013)**, NON-REIT firms are significantly more levered than REITs. **Niskanen and Falkenback (2012)** support this result. Also **Hsieh et al. (2000)** find that REITs use less debt financing for capital needs compared to tax-paying industrial corporations. Common stock financing is more attractive among REITs than among industrial firms. Debt ratios of REITs on a book-value basis are consistently larger compared to those of industrial firms.
Morri and Beretta (2008) focus on REITs in relation to capital structure theories. They find that unlike other industries, where the trade-off model drives capital structure choices, for REITs the pecking order theory applies. The pecking order theory asserts that companies that generate higher profits typically rely on internal funding rather than external funding, which results in lower leverage ratios. Conversely, companies with growth opportunities tend to utilize more debt financing. However, higher leverage ratios cannot be fully attributed to higher interest coverage ratios. Furthermore, according to agency theory, short-term debt may be employed to mitigate the risks associated with risky projects. If operating risk is high, REITs choose financing alternatives with low-financial risks. Residential REITs are more levered, prefer long-term debt and have low volatility earnings if compared with industrial/office and retail REITs. These differences are mainly explained by the following aspects: (1) high-collateral value and specific features of residential REITs assets, (2) the wide availability of different financing sources and (3) the high-recovery rates following a borrower's default on a loan. In contrast to that, diversified REITs are less levered because they usually have low-collateral value of assets and are less attractive to investors due to their diversified investment strategy.

[74]Since there is no restriction on leverage in place for U.S. REITs, the results are not surprising.

Evidence summarized by **Feng et al. (2007)** suggests that in practice, managers tend to calculate debt ratios using book values. **Myers (1977)** show that managers focus on book leverage because debt is better supported by assets in place than it is by growth opportunities. Book leverage is also preferred due to financial markets fluctuations and less reliable market leverage numbers to base on a management's decision. Consistent with the academic perception of manager's views, in the work by **Graham and Harvey (2001)**, rebalancing of capital structure in response to equity market movements is not done by a large number of managers due to the presence of adjustment costs.[75]

Breuer et al. (2019) analyse the incentives of focusing on leverage increases in the real estate market as a financing vehicle. The authors summarize the following results from literature: (1) REITs operate in a special regulatory environment, which requires them to distribute at least 90% of their taxable income as shareholder dividend payments depending on the country they are located and operating in. This forces REITs to issue debt despite of no apparent benefits to debt.[76] (2) Financial liquidity is essential to quickly finance REITs' property acquisitions.[77] (3) Readjustments of REITs' capital structure via debt vehicles are more likely due to lower adjustment costs in the debt market compared to the equity market.[78] (4) REITs issue debt to improve real risk-adjusted performance.[79]

There is an ongoing debate in the finance literature on the choice between a book measure of leverage advocated among others by **Graham and Harvey (2001)** and **Barclay et al. (2006)** and a market measure of leverage advocated by **Welch (2004)**. The analysis so far has been based on the more frequently used market measure of leverage. The market value of debt is unavailable for a large number of REITs, since their debt is not traded. Although theory dictates that the market value of debt and equity should be used for estimations on capital structure and cost of capital, this is not practicable for REITs. As a result, in research the book value of debt is used. Based on **Baskin (1989)** and **Bowman (1980)** the correlation between book value of debt and its market value is quite high. **Titman and Wessels (1988)** argue that there is no reason to suspect that the cross-sectional difference between market value debt and book value debt are correlated with any determinants of capital structure.

[75] **cf. Titman and Wessels (1988); cf. Stonehill et al. (1973)**.
[76] **cf. Feng et al. (2007)**.
[77] **cf. Hardin and Wu (2010)**.
[78] **cf. Ooi et al. (2010)**.
[79] **cf. Alcock and Steiner (2017)**.

Chapter 4

Hypothesis

The analysis of the composition of a company's capital requires detailed analysis of various factors. The previous chapters focus on the determinants of the capital structure of REITs taking into consideration the traditional capital structure theories in perfect and imperfect capital markets: the Modigliani-Miller irrelevance proposition, trade-off theory, pecking order theory and the market timing theory. Although the financial literature has dealt with the theories at great length, these theories are difficult to apply to the capital structure of a REIT. This is due to the unique characteristics of REITs that make a comparison with NON-REITs quite difficult. The regulations are the main influencing country-specific factors of a REIT. Their explanatory power towards REITs' capital structure decisions and the corresponding analyses are part of chapter 5. The regulation of the specified payout ratio of 80% to 100% is a decisive factor in determining the choice of capital for a REIT. Normally, a new investment is financed through the selection of internal financing, equity or debt. On the one hand, a REIT is only in a position to finance an investment from equity or debt since internal financing is indirectly restricted by law. On the other hand, REITs receive a tax exemption at a corporate level due to the high payout ratio, which excludes motives for raising outside capital. In conclusion, on a theoretical basis, a REIT can neither use internal financing nor debt capital and might therefore use 100% equity. However, this assertion cannot be found in reality, as the majority of REITs are financed by more than 50% debt capital.[1]

Capital structure theories serve in part as an explanation of the choice of capital structure of REITs, whereby some theories document a greater explanatory potential than others. The irrelevance and the pecking order theory show the least or no comparability to the capital structure of a REIT. The Modigliani-Miller proposition appears interesting for REITs when considering the assumption of the absence of taxes. In the first line of thought, the capital structure could therefore be irrelevant for the market value. However, the other Modigliani-Miller assumptions exclude the connection of a REIT with this theory. The pecking order theory cannot be applied either. The given preference, which results from information asymmetry, cannot be implemented by a REIT leading to a financing with debt and equity mainly. The trade-off theory, the agency theory and the market timing theory provide possible motivations for the

[1] See chapter 3.2.2.

capital structure of a REIT. The trade-off theory focuses on the advantage of debt. Due to the tax-exemption of REITs on a corporate level, debt financing is less attractive in the first place. However, REITs incur liabilities motivated by the leverage effect and the reduction in agency costs and following a target leverage ratio. The agency theory, specifically information asymmetry, is applicable to the capital structure of a REIT. Regulation allows the company to manage its REITs internally or externally. The advantage of an internally managed REIT is the reduction of agency costs and information asymmetry. In addition, REIT managers often hold shares in the REIT themselves, thus balancing the interests of principal and agent.
Market timing theory might be the capital structure theory that has the highest explanatory power for the formation of capital. Accordingly, capital structure is most likely based on prevailing market conditions. Borrowing is preferred when the costs of equity appears high. In contrast, equity is preferred if the costs of debt exceed a certain limit. In conclusion, the choice of the capital structure of a REIT cannot be fully explained with the help of various research results about capital structure theory and factors that determine the mix between equity and debt. As a consequence, the degree of influence of country-specific regulatory requirements on capital structure decision will be analysed in the following to investigate them as possible determinants.

In total, those results are the starting point for my research question. To analyse what capital structure depends on, I will focus on the following hypotheses:

TABLE 4.1: Hypotheses

Hypothesis	
H1	In countries with less (more) restrictive requirements with regard to the distribution of operating income, REITs have lower (higher) leverage ratios.
H2	REITs located in countries where regulation specifies a maximum leverage ratio, in addition to mandatory high dividend distribution, have lower leverage ratios.
H3	The existence of sanctions[2] has a negative effect on REITs' leverage ratios.
H4	Marginal corporate tax rates have no significant effect on REITs' leverage ratios.
H5	In countries with severe sanctions and the existence of restrictions on the distribution of profits, leverage is negatively affected.

Remark: With H1 to H2, I follow the approach by **Dogan et al. (2019)**.

[2]These are country-specific sanctions, e.g., the loss of REIT status or penalties.

Chapter 5

Data

Chapter 5 describes the sample, explains the variables employed and presents the main descriptive statistics. Data is from Thomson Reuters Datastream unless stated otherwise. The data collection and data preparation process will be explained in detail. In the following my total data set and the corresponding two sub-samples, REIT and NON-REIT, all explained geographically and across time, are introduced. All terms in `typewriter` represent variables.

5.1 Samples and Variables

All financial data is obtained from Thomson Reuters Datastream and selected using SIC Codes 6512, 6513 and 6514 and the REIT-specific SIC Code 6798. For firm-specific variables, the following financial information was collected from Thomson Reuters Datastream: total assets, total debt, market capitalisation[1], total equity, EBITDA, net property, plant and equipment, operating income, rating, property type (commercial REIT, specialized REIT, diversified REIT, residential REIT), number of stocks outstanding, interest expenses and IPO date. Along with the annual accounting data, Thomson Reuters Datastream contains information about the country in which a company's headquarter is located and in which it earns the majority of its revenues. As I analyse year data, I assume that the financial year equals the calendar year.[2]
In addition to firm-specific accounting data, macroeconomic and country-specific data is taken from the following sources:
Marginal corporate income tax rates by country per year are provided by the World Bank (Development Indicators and Financial Structure Database). Classification of developed and developing countries is provided by UN DESA (based on data of the United Nations Statistics Division, UN/ECLAC and UN DESA forecasts). Country-based information regarding common law and civil law status are taken from OECD.stata (Organization for Economic Co-Operation and Development) and the Faculty of Law of the University of Ottawa, Canada.

[1] While **Morri and Cristanziani (2009)** define market capitalisation as the closing prices of the asset times the free float (absolute). My analysis replaces the free float with the number of outstanding shares based on Thomson Reuters Datastream data.

[2] For firms where the financial year does not coincide with the calendar year, I assume that the beginning of the financial year is the calendar year.

Using SIC Codes 6512, 6513 and 6514, I define a NON-REIT control group. The firms classified in this group have their core business within the real estate market but do not have REIT status.

This raw data, including REITs and NON-REITs, underwent to the following adjustment processes:

1. Duplicates and observations with `#N/A` or `#NAME?` are excluded; entities with ambiguous company names were removed.[3]

2. Firm years with missing industry classification, `#NV` or `#N/A` as industry name are excluded from the sample.

3. The observation period is truncated to 2007 to 2018.[4]

4. In order to avoid cross-listing, American Depositary Receipts (ADR) are excluded from the samples.[5]

5. Firm years with negative, missing or cash holdings which exceed the book value of total assets are removed from the sample.[6]

6. Firm years with a zero book value of total assets, with a missing value for total assets or total assets below the value of total liabilities are being removed in order to exclude companies that are kept alive by the involvement of public bodies or other measures not motivated by economic considerations.[7]

7. Only firm years with a positive market capitalisation and positive book value of equity are included.[8]

8. Global Industry Classification Standard (GICS) sub-industry names like Mortgage Real Estate Investment Trusts (REITs), Mortgage REITs, Thrifts & Mortgage Finance are deleted. Only *Equity Real Estate Investment Trusts (REITs)* are kept as GICS industry name. By focusing on Equity REITs only, I ignore Mortgage REITs and Hybrid REITs, since their capital structure is significantly different from that of Equity REITs.[9] [10]

[3] **Here I follow Almeida et al. (2004)**.

[4] Although there exists data starting in 1960 with the REIT enactment in the US, I focus on a period where the most REITs in a established legal form exist for a large number of countries.

[5] **This is in line with Opler et al. (1999)**; **among others**.

[6] **cf. Almeida et al. (2004)**; **Duchin et al. (2010)**; **Denis and Sibilkov (2010)**.

[7] **cf. Bates et al. (2009)**; **cf. Dittmar and Duchin (2012)**; **cf. Bates et al. (2018)**.

[8] **cf. Acharya et al. (2007)**; **cf. Almeida et al. (2004)**.

[9] **cf. Benefield et al. (2009); cf. Morri and Beretta (2008)**.

[10] **Morri and Beretta (2008)** justify this adjustment process by the following: Equity REITs have most of their holdings in real properties, mortgage REITs hold residential mortgages, long- and short-term construction loans and mortgages on commercial properties. Hybrid REITs fall between the equity and mortgage REITs and share the characteristics of both.

9. I restrict the sample to firms which have data for at least 3 years and countries with at least 30 firm-observations.[11] [12]

10. To correct balance sheet data for inflation, I deflate all values to the 2007 price level using consumer price inflation rates provided by the Federal Reserve Bank of St. Louis.[13]

Variables Definition and Summary Statistics:

All variables are calculated in accordance with **Feng et al. (2007)**, **Hardin and Hill (2008)** and **Morri and Beretta (2008)**. Leverage (LEV) as the dependent variable is defined as total debt scaled by total assets. The analysis is based on book leverage rather than market leverage.[14]
My independent variables are the following:
Asset tangibility (`assettang`) is defined as the ratio of property, plant and equipment over total assets. The ratio operating income over total assets measures the profitability (`profit`) of the firm. Growth opportunity (`growthopp`) is measured as the market to book ratio, which is the sum of the book value of debt and market capitalisation over total assets.[15] Firm size (`size`) is defined as the natural logarithm of total assets. The interest coverage ratio (`interestcov`) reflects the degree to which firms are able to cover their debt obligations. It is calculated as the natural logarithm of the ratio of Normalized EBITDA and Interest Expense, Supplemental.[16] For the variable `age` I take the natural logarithm of the difference of the firm year date `2018` and the IPO date. Data of firms' initial public offering (IPO) was extracted from Thomson Reuters Datastream and double-checked using hand-collected data from annual reports and official country-based register offices. `Capitalincrease` is a dummy variable that takes the value 1 if there has been a change in total equity (book value), that is indicating a capital increase, and zero otherwise. `Rating` is a dummy variable that takes the value 1 if a rating exists and 0 otherwise. Whether a firm is a REIT or a NON-REIT is measured by a dummy variable that takes the value 1 for REITs and 0 for NON-REITs. `Herding` is the industry median leverage ratio per country. `Law` is a dummy variable that takes the value 1 if the country is based on common law and zero if the country is based on civil law.[17] Differences between developed and developing countries, measured as `developedcountry`, are measured with a dummy variable that takes the value 1 for developed countries

[11] **cf. Dogan et al. (2019)**.
[12] This cleaning process results in dropping the following countries from the sample: Greece, Republic of Ireland, Israel, Italy, South Korea, Luxembourg, Pakistan.
[13] **This follows Almeida and Campello (2007)**; **cf. Duchin et al. (2010)**.
[14] For further information see Chapter 6.1.1.
[15] **cf. Dogan et al. (2019)**.
[16] Here, I follow the approach by **Dogan et al. (2019)**
[17] Scandinavian law, also known as Nordic law, is not discussed since my data set does not include the following countries that operate under this subgroup of civil law: Denmark, Finland, Iceland, Norway and Sweden.

and 0 for developing countries. I use the Thomson Reuters Key Indicator *TRBC Industry Name* to define my REITs across their property type. A dichotomous variable classifies my sample in the following property types: commercial REIT, spezialized REIT, residential REIT, diversified REIT. The corresponding variables are labelled as `CommREIT`, `SpecREIT`, `ResiREIT` and `DivREIT`.
All independent variables used in my analysis are summarized in Table 5.1.

TABLE 5.1: Variables and sources

variable	definition	data source	definition taken from
assettang	asset tangibility = (Property/Plant/Equipment, Total - net) / total assets (reported)	Thomson Reuters Datastream	Dogan et al. (2019)
profit	Profitability = operating income / total assets (reported)	Thomson Reuters Datastream	Demirgüc-Kunt, Maksimovic (1999), Psillaki and Daskalakis (2009)
growthopp	growth Opportunity = (total book value of debt + market capitalisation) / total assets (reported)	Thomson Reuters Datastream	Dogan et al. (2019)
size	firm size = ln(total assets (reported))	Thomson Reuters Datastream	Dogan et al. (2019)
interestcov	interest coverage ratio = ln(Normalized EBITDA / interest Expense, Supplemental)	Thomson Reuters Datastream	Dogan et al. (2019)
age	REIT age = ln(2018 - date become public)	Thomson Reuters Datastream	Hardin and Wu (2010)
capitalincrease	Change in total equity (book value) = 1; 0 = otherwise	Thomson Reuters Datastream	

further information see next page

TABLE 5.1: Variables and sources

variable	definition	data source	definition taken from
rating	1 = rating 0 = no rating	Thomson Reuter Datastream	Hardin and Wu (2010); Psillaki and Daskalakis (2009); Sajjad and Zakaria (2018)
CommREIT	Commercial REIT = 1; 0 = otherwise	Thomson Reuters Datastream	Dogan et al. (2019)
SpecREIT	Specialized REIT = 1; 0 = otherwise	Thomson Reuters Datastream	Dogan et al. (2019)
ResiREIT	Residential REIT = 1; 0 = otherwise	Thomson Reuters Datastream	Dogan et al. (2019)
DivREIT	Diversified REIT = 1; 0 = otherwise	Thomson Reuters Datastream	Dogan et al. (2019)
herding	industry median leverage ratio per country	Thomson Reuters Datastream	Frank and Goyal (2009)

further information see next page

TABLE 5.1: Variables and sources

variable	definition	data source	definition taken from
taxshield	marginal corporate tax rate per country per year	OECD.Stat: Corporate income tax rate - shows the basic central government statutory (flat or top marginal) corporate income tax rate	
law	equals 0 = common law, equals 1 = civil laws	Faculty of Law, University of Ottawa, Canada	La Porta et al. (1998)
developedcountry	developed versus developing countries with 1 equals developed countries and 0 equals developing countries based on rates of growth of real GDP	UN DESA, based on data of the United Nations Statistics Division, UN/ECLAC and UN DESA forecasts	Chui et al. (2002); Rajan and Zingales (1998)

end

Breuer et al. (2019) exclude the following two variables from their analysis: median industry leverage ratio and inflation. Since the average inflation is the same in the REIT sample and the control group consisting of NON-REITs, it cannot show a value-based contribution. Based on the median industry leverage, they argue that this represents merely another way to state the existence of an industry-specific fixed effect without offering any additional explanation. In general, these two variables are based on empirical data, leading to a weak explanatory capacity of traditional capital structure theories. In a previous study **Hovakimian et al. (2004)** use the median industry leverage to control for omitted factors and not as a factor itself.[18]
The REIT sample starts in the year 2007 and ends in 2018 and contains REIT entries from 20 mostly developed countries. To control for REIT specific determinants the following variables are included in the sample:
`leveragerestr`, `profitdistribrution`, `payoutlevrestr`, `payoutNOlevrestr`, `shareholderreq`, `sanction` and `incometax`. Specific information regarding those variables are provided in Chapter 5.2.2.
The NON-REIT data set is derived from the REIT data set with respect to the geographical distribution. To build a suitable control group, the sample consists of the identical country selection compared to the REIT sample. The aim is to guarantee that REITs and real estate firms are operating under the same economic and geographic conditions.

5.2 Descriptive Statistics

This section introduces the descriptive statistics for the total sample. Descriptive statistics for the REIT sample and NON-REIT sample follow in Chapter 5.2.2 and Chapter 5.2.3.

5.2.1 Total Sample

The total sample consists of REITs and NON-REITS and represents the listed real estate market in total. An identifier classifies firms as REITs or real estate firms, henceforth NON-REITs. The final sample consists of 1,200 firms and 12,200 firm-year observations. 5,493 observations correspond to REITs and 6,707 observations to NON-REITs. Those numbers are represented by 599 REITs and 601 NON-REITs. In total the sample covers 20 countries. Table 5.4 gives an overview of firm-year observation distribution by country and by sample.
The geographical distribution is shown in Figure 5.1. The bar chart shows the number of observations per country. The largest number of observations can be found in the United States, followed by Hong Kong and Japan. In absolute numbers, these countries show the largest share in the real estate market based on the market capitalisation.

[18] Here, I follow the approach by **Breuer et al. (2019)** and exclude the variable inflation. Analysis that covers the variable `herding` is discussed in the Appendix G.

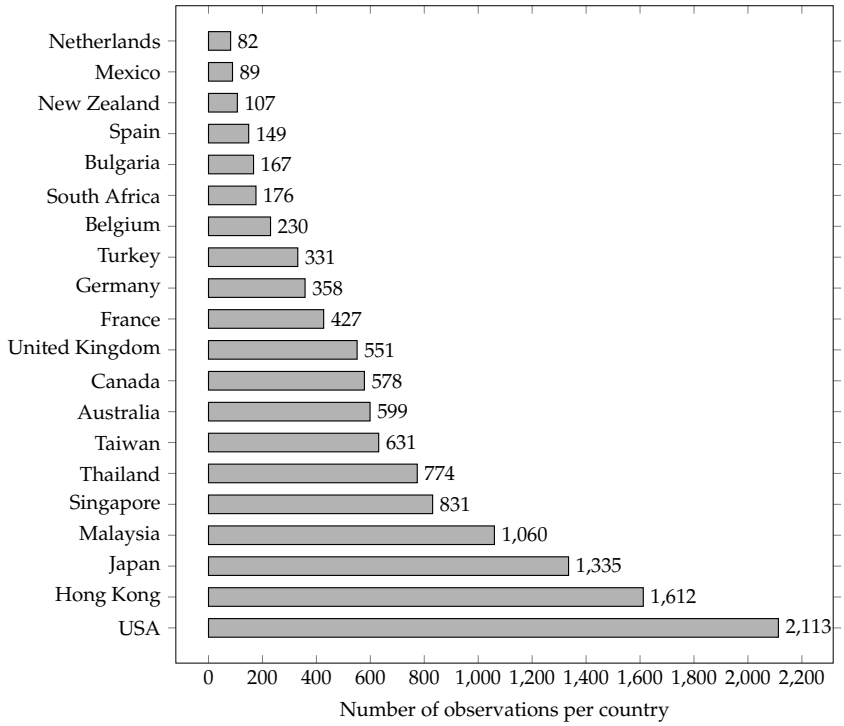

FIGURE 5.1: Geographical distribution of firm years – total sample (country)

If countries are clustered according to their location, the geographical distribution per region is shown in Figure 5.2. Although the United States represent the largest country in terms of number of observations, the region Americas makes only one third of the Asia-Pacific region. All countries located in Asia-Pacific represent 6,992 observations in the total sample. Africa is by far the smallest region, whereas the Netherlands, Mexico, New Zealand, Spain and Bulgaria have the lowest numbers of observations on a country level.[19]

[19] see Chapter 5.1.

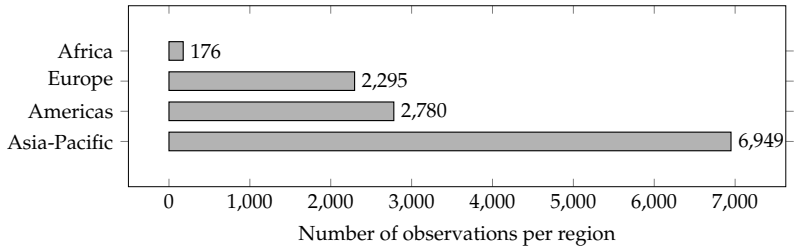

FIGURE 5.2: Geographical distribution of firm years – total sample (region)

Table 5.2 shows a steady increase in the number of firm-year observations between 2007 and 2018. The distribution of firm-year observations per year confirms the growth of the listed real estate market over time and the importance of real estate as an asset class.[20]

year	number of observations
2007	854
2008	886
2009	901
2010	919
2011	947
2012	990
2013	1,037
2014	1,085
2015	1,116
2016	1,158
2017	1,156
2018	1,151
	12,200

TABLE 5.2: Firm-year observations – total sample

[20] see Chapter 2.5.

country	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total	percent
Australia	38	42	43	43	43	45	51	57	59	61	59	58	599	4.91
Belgium	17	15	18	18	19	19	20	20	21	21	21	21	230	1.89
Bulgaria	14	14	13	13	14	15	15	14	14	14	14	13	167	1.37
Canada	38	40	38	40	44	52	55	54	53	54	55	55	578	4.74
France	33	30	34	35	36	37	38	38	39	38	35	34	427	3.50
Germany	29	29	28	28	27	29	28	28	30	34	34	34	358	2.93
Hong Kong	126	130	131	130	134	132	136	139	139	138	138	139	1612	13.21
Japan	97	102	99	100	102	105	110	115	118	129	129	129	1335	10.94
Malaysia	86	85	88	86	86	89	90	89	88	90	91	92	1060	8.69
Mexico	3	3	3	3	4	6	8	10	12	13	12	12	89	0.73
Netherlands	7	7	7	7	7	7	7	7	7	7	6	6	82	0.67
New Zealand	8	8	8	8	9	9	9	9	9	10	10	10	107	0.88
Singapore	57	60	58	63	66	70	69	75	77	77	79	80	831	6.81
South Africa	4	4	4	4	4	4	20	23	26	28	28	27	176	1.44
Spain	6	5	4	3	3	5	7	15	21	27	28	25	149	1.22
Taiwan	52	53	54	56	51	51	51	53	52	54	51	53	631	5.17
Thailand	43	48	57	58	61	64	65	70	74	78	79	77	774	6.34
Turkey	20	24	24	24	26	30	31	30	30	31	31	31	331	2.71
United Kingdom	40	41	42	43	41	43	43	48	51	53	53	53	551	4.51
USA	136	147	148	157	170	178	184	191	196	201	203	202	2113	17.32
total	**854**	**886**	**901**	**919**	**947**	**990**	**1,037**	**1,085**	**1,116**	**1,158**	**1,156**	**1,151**	**12,200**	**100.00**

TABLE 5.3: Distribution of firm-year observations by country – total sample

country	REIT		NON-REIT		total sample	
	# of firms	# of observations	# of firms	# of observations	# of firms	# of observations
Australia	36	317	25	282	61	599
Belgium	15	163	6	67	21	230
Bulgaria	8	92	7	75	15	167
Canada	40	380	18	198	58	578
France	18	209	22	218	40	427
Germany	5	42	31	316	36	358
Hong Kong	10	109	130	1,503	140	1,612
Japan	55	549	75	876	130	1,335
Malaysia	16	171	78	889	94	1,060
Mexico	11	63	3	26	14	89
Netherlands	5	60	2	22	7	82
New Zealand	7	74	3	33	10	107
Singapore	36	322	45	509	81	831
South Africa	24	128	4	48	28	176
Spain	21	93	6	56	27	146
Taiwan	6	62	53	569	59	631
Thailand	35	249	45	525	80	774
Turkey	30	307	2	24	32	331
United Kingdom	36	348	18	203	54	551
USA	185	1,845	28	268	213	2,113
	599	5,493	601	6,707	1,200	12,200

TABLE 5.4: Descriptive statistics of the samples REITs, NON-REITs and total sample

5.2.2 REIT

The final REIT sample consists of 5,493 firm-year observations from 599 firms headquartered in 20 countries. Table 5.3 shows the distribution of firm-year observations by country. The largest sample of REITs represents the U.S. (185 REITs), followed by Japan (55 REITs), Canada (40 REITs) and the UK (36 REITs).

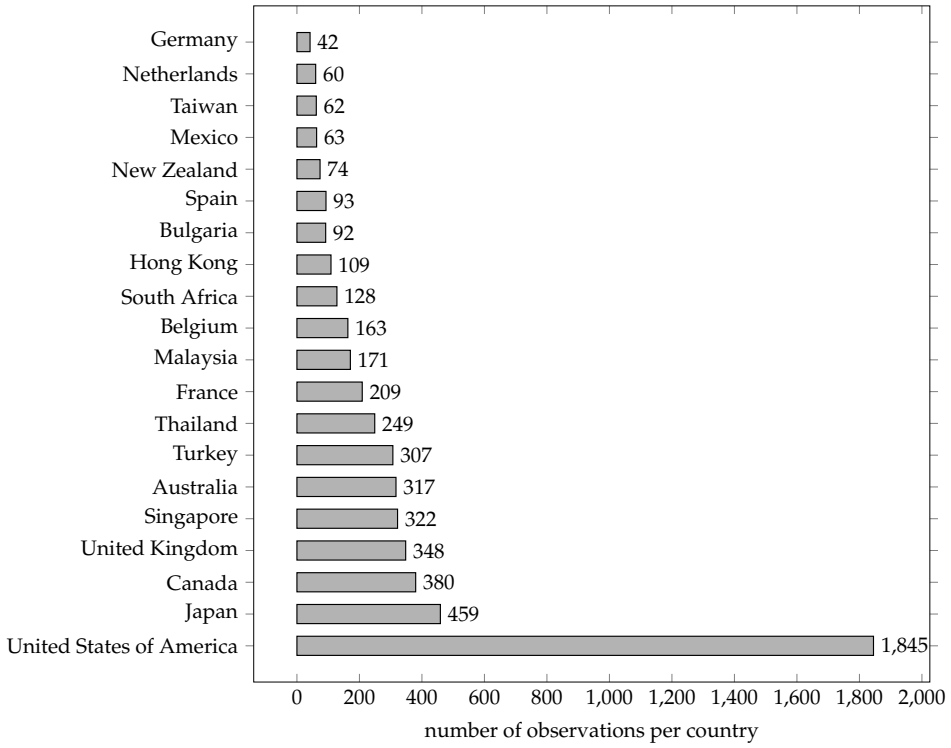

FIGURE 5.3: Geographical distribution of firm years – REIT (country)

The geographical distribution per region is shown in Figure 5.4. Compared to Figure 5.2 the region Americas dominates in the REIT sample. This is in line with the early enactment year of REITs in the US and the acceptance of such an asset class by investors compared to other countries in my sample. In general, the region Asia-Pacific represents the largest region by number of observations within the listed real estate industry.

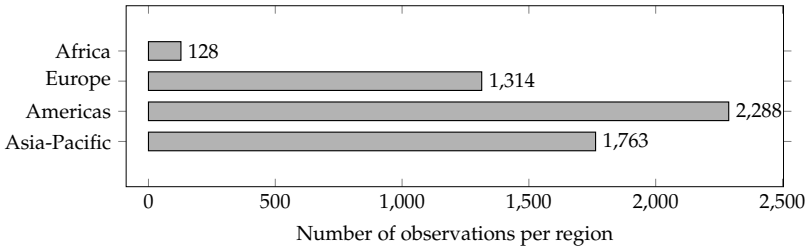

FIGURE 5.4: Geographical distribution of firm years – REIT (region)

Table 5.5 shows a steady increase in the number of firm-year observations between 2007 and 2018. This is caused by an increasing number of REITs over time and the implementation of REIT regimes in more and more countries.

year	number of observations
2007	313
2008	334
2009	350
2010	365
2011	392
2012	432
2013	478
2014	519
2015	552
2016	586
2017	590
2018	582
	5,493

TABLE 5.5: Firm-year observations – REIT

Table 5.6 gives a more detailed distribution of firm-year observations by country. Companies transform into REITs or enter the market directly as a REIT. Although the share of REITs in the overall real estate market is rather small, the attractiveness of a REIT and the motivation to found one become apparent here.[21]
Table 5.7 shows leverage ratios by country and year. As South Africa and Spain enacted in the years 2013 and 2009 respectively, the data does not cover the years prior the REIT enactment. Although Mexico allows companies to perceive REIT status since 2004, my data sets start in 2011. In total, countries show an almost stable picture of leverage ratios over time. The only exceptions are Thailand and Turkey, which have very low levels of leverage ratios across time.
The leverage ratios are in line with the prevalent restrictions and the so called gearing test.[22]

[21] Compare Chapter 2.5.
[22] Compare Chapter 2.2.1.

country	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total	percent
Australia	15	17	18	19	20	23	29	34	35	36	36	35	317	5.77
Belgium	12	11	13	13	13	13	14	14	15	15	15	15	163	2.97
Bulgaria	8	8	7	7	7	8	8	8	8	8	8	7	92	1.68
Canada	22	22	21	24	27	35	38	38	37	38	39	39	380	6.92
France	17	16	18	18	18	17	17	18	18	18	17	17	209	3.81
Germany	3	3	2	3	3	3	3	3	4	5	5	5	42	0.77
Hong Kong	7	8	8	9	10	10	10	10	10	9	9	9	109	1.98
Japan	25	28	28	28	29	33	37	41	45	55	55	55	459	8.36
Malaysia	12	12	13	12	14	15	15	15	16	16	16	15	171	3.11
Mexico					1	3	7	9	10	11	11	11	63	1.15
Netherlands	5	5	5	5	5	5	5	5	5	5	5	5	60	1.09
New Zealand	5	6	6	6	6	6	6	6	6	7	7	7	74	1.35
Singapore	16	18	18	21	23	27	26	31	35	35	36	36	322	5.86
South Africa							16	19	22	24	24	23	128	2.33
Spain				1		2	3	10	15	20	21	19	93	1.69
Taiwan	5	5	5	4	5	4	5	6	6	6	5	6	62	1.13
Thailand	5	7	13	14	16	19	20	25	29	33	35	33	249	4.54
Turkey	18	21	22	22	24	28	29	28	28	29	29	29	307	5.59
United Kingdom	24	25	25	26	25	26	26	30	33	36	36	36	348	6.34
USA	114	122	128	133	146	155	164	169	175	180	181	180	1845	33.58
total	**313**	**334**	**350**	**365**	**392**	**432**	**478**	**519**	**552**	**586**	**590**	**582**	**5,493**	**100.00**

TABLE 5.6: Distribution of firm-year observations by country – REIT

country	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	average
Australia	36.51	42.03	48.38	45.20	42.45	41.34	39.09	40.22	37.67	37.76	34.58	36.95	39.46
Belgium	36.24	41.03	43.94	44.91	45.92	48.26	46.37	47.96	46.78	47.58	46.67	47.54	45.49
Bulgaria	20.25	30.18	36.42	39.53	44.08	42.20	42.15	42.12	42.12	47.31	45.73	35.03	38.93
Canada	62.81	67.77	69.82	58.53	54.28	51.26	60.02	60.54	60.99	57.93	59.03	57.45	59.43
France	55.91	58.89	61.50	60.62	61.28	60.25	57.30	60.23	59.38	57.23	55.53	54.73	58.61
Germany	52.62	55.14	56.35	54.06	55.86	60.53	62.13	61.19	61.52	56.60	54.31	52.57	56.69
Hong Kong	47.01	46.36	45.21	37.77	34.25	39.66	38.09	38.91	41.75	38.05	36.79	36.23	39.70
Japan	46.98	49.16	49.55	50.66	50.87	52.75	51.19	50.45	49.00	48.45	49.38	49.22	49.73
Malaysia	29.16	34.73	33.92	33.05	33.01	33.07	34.56	34.61	34.82	38.14	37.14	40.40	34.90
Mexico					9.26	26.22	22.16	19.80	24.85	24.60	28.39	31.36	25.36
Netherlands	43.31	49.13	50.12	53.10	55.07	57.68	52.54	54.19	50.51	51.04	48.66	49.29	51.22
New Zealand	36.63	42.63	44.88	44.08	43.66	45.15	42.94	40.72	39.52	47.86	37.00	37.57	41.91
Singapore	34.26	36.51	34.92	37.73	35.70	36.74	36.89	37.41	38.68	40.41	39.61	39.53	37.81
South Africa							58.77	51.60	41.10	34.84	33.59	36.53	41.46
Spain				96.13		32.61	40.80	41.22	37.93	36.96	37.93	41.13	45.49
Taiwan	7.95	7.64	12.05	14.07	9.81	11.24	9.53	8.27	8.56	8.92	10.44	8.91	9.62
Thailand	1.66	1.82	2.56	5.10	2.36	2.63	4.18	6.96	10.31	12.65	11.83	13.07	8.16
Turkey	16.29	24.71	21.45	26.05	23.63	26.20	29.96	31.36	33.97	34.44	35.35	35.84	29.05
United Kingdom	41.94	48.50	50.73	46.31	47.34	49.17	45.44	40.04	37.77	35.46	34.72	33.81	41.74
USA	61.50	61.47	58.14	57.29	57.46	57.79	56.15	58.24	58.83	57.29	57.97	57.54	58.16
average	**37.12**	**41.04**	**48.56**	**47.88**	**46.85**	**47.01**	**46.95**	**46.85**	**46.23**	**45.21**	**44.99**	**45.23**	**45.32**

TABLE 5.7: Average REIT leverage per year by country

Table 5.8 summarizes the variables `leverage`, `assettang`, `profit`, `growthopp`, `size` and `interestcov` over all years by country. The variable `assettang` significantly varies from country to country. For Thailand no data exists, the majority of the countries show small ratios of asset tangibility.[23] Canada, Japan, Malaysia and the United States have the largest ratios of asset tangibility. Those countries show a larger number of observations over the whole sample period. Differences across the other countries may arise due to lower numbers of observations and lower numbers of the total amount of existing REITs in a country. As the REIT market enactment for other countries is not that old compared to the US REIT market, the firms are much younger and therefore most likely characterized by more unstable ratios. Further, the data quantity and quality for countries enacted after the US is low and needs to be interpreted with caution. The variable `profit` shows unstable ratios across countries. Differences in growth opportunities exist, leading to Belgium, Germany, Spain, the United Kingdom and the United States having a larger potential of growth opportunities. Those ratios are mainly driven by larger values of year-end market capitalisation, representing higher investor's future expectations on the company. The variable `size` shows no large differences across countries. Values for the variable `interestcov` deviate across the countries in the sample. For Canada, South Africa and the United Kingdom the interest coverage ratio is below 1 indicating a higher company's riskiness relative to its current debt or future borrowing. Japan, Spain, Taiwan and Thailand show more solid ratios with an interest coverage ratio above 2.[24]

[23] There is no Plant, Property and Equipment data available for the country Thailand, leading to no data for the variable `assettang`.

[24] Information regarding Table 5.8: There exists no data for the variable `assettang` for Taiwan.

country	leverage	assettang	profit	growthopp	size	interestcov
Australia	0.395	0.031	0.055	0.875	20.698	1.347
Belgium	0.455	0.044	0.057	1.195	20.050	1.752
Bulgaria	0.389	0.088	0.022	0.606	17.737	1.947
Canada	0.594	0.365	0.034	0.887	20.639	0.884
France	0.586	0.081	0.038	0.927	20.483	1.081
Germany	0.567	0.001	0.045	1.058	19.933	1.005
Hong Kong	0.397	0.122	0.071	0.340	23.196	1.781
Japan	0.497	0.408	0.031	0.469	25.764	2.018
Malaysia	0.349	0.132	0.061	0.470	20.766	1.603
Mexico	0.254	0.320	0.036	0.274	23.566	1.540
Netherlands	0.512	0.002	0.042	0.974	21.933	1.267
New Zealand	0.419	0.024	0.051	0.810	20.628	1.038
Singapore	0.378	0.037	0.045	0.755	21.514	1.473
South Africa	0.415	0.009	0.068	0.413	22.844	0.931
Spain	0.395	0.010	0.049	1.395	18.775	2.542
Taiwan	0.096	0.001	0.026	0.107	23.159	2.208
Thailand	0.081		0.056	0.071	21.428	2.000
Turkey	0.291	0.028	0.055	0.516	19.498	1.744
United Kingdom	0.417	0.038	0.046	1.198	20.562	0.801
USA	0.582	0.795	0.019	1.281	21.273	1.206
all countries	0.466	0.418	0.037	0.904	21.375	1.360

TABLE 5.8: REIT Descriptive statistics of firm-specific variables averaged by country and across time (2007-2018)

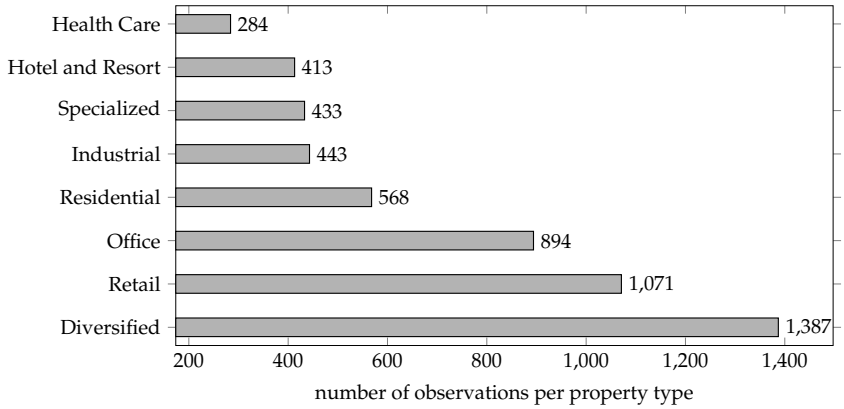

FIGURE 5.5: Number of observations based on property type

Descriptive statistics based on the property type are shown in Figure 5.5 and Figure 5.9. By classifying the sample by property type, diversified REITs (1,386) have the largest share in terms of numbers of observations, followed by Retail REITS (1,071) and Office REITs (892). Health Care REITs represent the smallest property type with only 284 numbers of observations in the sample.
Table 5.9 shows that leverage ratios for Residential REITs are the highest leverage ratio, while Industrial REITs show the lowest leverage ratios. In sum all property types range between 43% and 51% for the leverage ratio. More variation exists between property type's asset tangibility. Health Care REITs, Hotel and Resort REITs, Residential REITs and Specialized REITs offer the highest asset tangibility ratios. Diversified REITs show the lowest asset tangibility ratio that indicates a lower level of asset liquidation possibilities and collateral. Profitability shows low levels across all property types. This is caused by low levels of operating income and high levels of total assets. Growth opportunities range between 0.739 and 1.377. High growth opportunities exist in the Health Care REIT sector and in the Specialized REIT sector. The variables size and interest coverage ratio are almost similar across property types.

The variables `developedcountry`, `capitalincrease`, `law` and `rating` show the following descriptive results:
Only one third of the total number of firms have a rating. Standard and Poor's is the most frequently used rating agency. The latest rating is used.[25] A more granular rating classifications is not made to avoid a loss of observations in the data set. The dichotom variable `capitalincrease` shows that more than 3,000 firm-years exist with an increase in total equity (book value). Here, the importance of equity based financing becomes apparent. Differentiating between common law and civil law, 3,566 observations are labeled as 0, representing common law countries. More than

[25]In case the year end rating for 2018 is provided, this rating is used in my analysis, otherwise the latest updated rating is used. This is caused by the lack of rating data provided by Thomson Reuters Datastream. Since Thomson Reuters Datastream also list ratings from rating agencies beyond Standard and Poor's, Moody's and Fitch, I only concentrate on ratings from Standard and Poor's to overcome problems of comparability.

three quarters of observations are based on a legal environment that is determined by higher investor protection.
Classification between developed and developing countries lead to the following distribution. 4,082 observations are from developed countries, while only 1,411 observations are from developing countries. In combination with the variable `law` my sample mainly concentrates on developed common law countries that offer characteristically higher investor protection than other countries.[26]

[26] **cf. La Porta et al. (1998)**.

property type	leverage	assettang	profit	growthopp	size	interestcov
Diversified REITs	0.448	0.224	0.028	0.757	20.999	1.362
Health Care REITs	0.488	0.699	0.025	1.221	20.916	1.372
Hotel & Resort REITs	0.451	0.638	0.035	0.739	21.565	1.218
Industrial REITs	0.432	0.385	0.038	0.851	21.526	1.443
Office REITs	0.454	0.410	0.040	0.784	22.093	1.426
Residential REITs	0.511	0.508	0.026	0.962	21.144	1.195
Retail REITs	0.478	0.384	0.048	0.977	21.555	1.408
Specialized REITs	0.499	0.601	0.060	1.378	20.939	1.423
all	0.467	0.417	0.037	0.904	21.377	1.364

TABLE 5.9: REIT Descriptive statistics by property type from 2007-2018

EPRA Regulatory Information

The main difference between the REIT and NON-REIT data sample arises through the inclusion of EPRA regulatory variables, since NON-REITs are not obliged to follow them. This section presents details of the REIT-specific regulations on leverage, profit distribution, income taxation, shareholder requirements and sanctions.[27]
Data on REIT regulation is obtained from various publications of the European Public Real Estate Association (EPRA)[28], a European interest group based in Brussels. These publications include the annual reports as well as annual surveys on European and global REIT markets.
I use EPRA's Global REIT Survey which is structured by region, by country and by content. As an example, consider the information on REITs in Belgium which EPRA provides in five sections in the following way:[29]

- General introduction, containing general information on the sector in Belgium, on the enactment year of the relevant law and, if necessary, changes in the law after enactment;
- requirements on the legal form of a REIT, its minimum share capital, its listing requirements, its leverage restrictions, requirements on minimum payout ratios and sanctions for the violation of these requirements;
- tax treatment at BE-REIT level[30], containing information on the treatment of operating income and capital gains;
- tax treatment at the level of Belgian individual or corporate shareholders of the REIT;
- tax treatment of non-Belgian REITs with property in Belgium and their Belgian shareholders.

Due to the country-specific and not always quantitative nature of REIT regulation, it was necessary to manually collect and codify the information provided in these sections for use in this thesis.[31] [32] Each of the five EPRA sections contains several summary boxes. From these boxes, information on share capital, shareholder and listing requirements, leverage, mandatory profit distribution, sanctions and tax treatment were being retrieved. Three items directly relate to a REIT's equity: minimum share capital, shareholder requirements and mandatory listing. One item directly

[27] The criterion *mandatorylisting* is neglected, as the data set consists of listed REITs only.
[28] These reports were accessed via `www.epra.com` or directly provided by EPRA.
[29] Part of this analysis uses an updated regulatory data set from **Bosl (2019)**.
[30] Since 2014, Belgian REITs are called BE-REITs or *société d'investissement en immobilier à capital fixe* (SICAFI).
[31] This codification closely follows Chapter 4 in **Metze (2018)**.
[32] Mexico (2012) had been overwritten due to lack of data. However, as the EPRA information for this country is the same for 2011 and for 2013, I use the information from these years to deal with this missing value problem. Taiwan's marginal corporate tax rate represents data from the PRC, as my source does not differentiate between tax rates of China and Taiwan. Based on EPRA reports, the leverage restriction for Bulgarian firms is set to 0, meaning that there is no leverage restriction in place.

relates to debt: maximum permitted leverage, later called leverage restriction. Income tax regulation is an item that is related to debt only in an indirect fashion. Minimum requirements on the payout ratio, as a percentage of operating income paid out to shareholders, relate to a REIT's possibility to built up capital reserves by retaining profits. Table 5.10 shows a detailed country-based overview of the REIT regulations in place.[33]

[33] All data from EPRA sources.

TABLE 5.10: Comparison of REIT regulatory regimes

	Australia	Belgium	Bulgaria	Canada	France	Germany	Hong Kong	Japan
Enacted year	1985	1995	2004	1993	2003	2007	2003	2000
Minimum share capital	none	a fully paid-up share capital of at least EUR 1.2 million	BGN 500,000	none	EUR 15 million	EUR 15 million	none, but depends on the listing market	JPY 100 million
Management internal or external	both permitted	both permitted	no information	both permitted	both permitted	both permitted	both permitted	external

table continued on next pages

TABLE 5.10: Comparison of REIT regulatory regimes

Minimum real estate investment	50% of the revenue of from rent	100%	no more than 10% of the SPIC's assets may be invested in mortgage bonds and service companies; no investments allowed in real estate subject to legal dispute; real estate investments must be located in Bulgaria	Qualified properties should be at least 90% of the FMV of the REIT's nonportfolio assets.	flexible; the main activity should be to acquire or build RE properties to lease.	At least 75% of the assets and earnings must relate to real estate assets	When a REIT indicates a particular type of real estate in its name, it must invest at least 70% of its non-cash assets in such type of real estate.	At least 80% of the assets must be real estate properties and rights referred to exempt business.
Leverage restriction	75% of the adjusted Australian asset base	no more than 65% of the assets at the time of the loan agreement close	Short-term loans cannot exceed 20% of income generating assets.	none	none	no more than 60% of REIT's assets	45% of gross asset value	none

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TABLE 5.10: Comparison of REIT regulatory regimes

Dividend payout requirement	none	at least 80% of net profit	90% of the net income of the year	no requirement	95% of the tax-exempt profit; 60% of capital gains from primary tax-exempt sector	at least 90% of the distribution net profit	at least 90% of the audited annual net income after tax	90% of accounting income
Undistributed real estate income taxed on a corporate level	yes	no	no	yes	no	no	no	yes
sanction	possible loss of tax status, income rule	various penalties (not necessarily resulting in the loss of BE-REIT status)	monetary penalties and a possible loss of SPIC status	loss of mutual fund trust status	Profit and gain exemption is denied for the financial year in which the distribution shortfall appears or when the exit occurs.	several penalties, loss of REIT status	de-listing, loss of authorisation by the SFC	regulatory actions, prohibition on deduction of dividend distributions

table continued on next pages

TABLE 5.10: Comparison of REIT regulatory regimes

Concentration of ownership	none	none	At least 30% of the capital shall be owned by institutional investor(s); no more than 50 founders	none	No investor can own more than 60%.	No investor can hold more than 10% in the G-REIT directly.	none	No investor can own more than 50%.
	Malaysia	**Mexico**	**Netherlands**	**New Zealand**	**Singapore**	**South Africa**	**Spain**	**Taiwan**
Enacted year	2002	2005	1969	2007	2002	2013	2009	2003
Minimum share capital	MYR 100 million (approx. USD 25 million in May 2018)	none, but depends on the listing market	EUR 45,000	none	SGD 300 million	A Company REIT is required to own at least ZAR 300 millions of property.	EUR 5 million	depending on the scope of business engaged by the trustee (ranging from NT$ 300 million to NT$ 2 billion)
Management internal or external	external	both permitted	both permitted	both permitted	external	both permitted	both permitted	no information

table continued on next pages

TABLE 5.10: Comparison of REIT regulatory regimes

Minimum real estate investment	At least 50% of the REIT's total asset value must be invested in real estate and/or single-purpose companies investing into real estate at all times.	At least 70% of the equity should be invested in RE projects.	100% or real estate and associated rights (passive portfolio investments)	90% of land, financial arrangements, excepted financial arrangements, rights or options over the above types of assets	70% of income-producing real estate	75% of revenue from rental or dividends from unconsolidated REITs	At least 80% of the assets must be qualifying RE assets and shares.	The total investment amount of the real estate to be developed and the related rights of real estate shall not be greater than 15% of the net worth of the publicly-offered REIT or 40% of the net worth of the privately-placed REIT. Except for the investment of a privately-placed REIT in a public construction, said ratio could be up to 100%.

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TABLE 5.10: Comparison of REIT regulatory regimes

Leverage restriction	max 50% of the total asset value	none	max 60% (20%) of fiscal book value of real property (all other investments)	none	60% (35%) of total gross asset value for REITs with (without) credit rating; 45% since 2016	maximum debt to total assets ratio of 60%	none	50% of the net worth of the REIT
Dividend payout requirement	90% of total income	95% of the prior year's taxable income	100% of taxable profit within 8 months from end of year	no requirement but taxation of income not allocated	90% of income from properties in Singapore	75% of earnings before tax; 100% prior to 2013	at least 80% of profits derived from income other than dividends and capital gains	pursuant to the REIT contract
Undistributed real estate income taxed on a corporate level	yes	no	no	yes	no	no	no	no

table continued on next pages

TABLE 5.10: Comparison of REIT regulatory regimes

sanction	various sanctions possible, including revocation of approval	loss of PIE (portfolio investment entity) status and loss of PIE tax treatment	cancellation of FBI status (fiscale beleggingstelling)	Tax incentives do not apply, may lose status as FIBRA	loss of tax concession if S-REIT is de-listed	renunciation of the REIT status and therefore loss of the tax benefit	loss of SOCIMI status (i.e. loss of the SOCIMI special tax regime), penalties of between EUR 1,500 and EUR 30,000 in the event of failure to comply with information obligations	transfer REIT/REAT to other trustee

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TABLE 5.10: Comparison of REIT regulatory regimes

Concentration of ownership	no	no	max 45% (25%) ownership for single taxable entity (individual)	no	no	no	no	With regard to a public offering, certificates shall be held by at least 50 persons for at least 335 days during a fiscal year; and any five certificate holders shall not own more than 50% of the total value of the certificates issued.

	Thailand	**Turkey**	**UK**	**USA**
Enacted year	1992	1995	2007	1960
Minimum share capital	Baht 500 million	TRY 30 million	GBP 700,000 (if listed in UK).	no

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TABLE 5.10: Comparison of REIT regulatory regimes

Management internal or external	external	both permitted	both permitted	both permitted
Minimum real estate investment	75% of the net asset value invested in property	75% of its portfolio must consist of assets mentioned in its title and/or articles of association.	At least 75% of a REIT's net profits must be derived from the property rental business (measured using financial statements).	At least 75% of its assets must be real estate, government securities or cash.
Leverage restriction	Borrowing up to a maximum of 35% of its total assets and extended to 60% of its total assets if rated as investment grade.	none	interest cover test	none

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TABLE 5.10: Comparison of REIT regulatory regimes

Dividend payout requirement	90% of net profit	REICs determine their own profit distribution politics.	90% of tax-property rental profits	at least 90% of its taxable ordinary income
Undistributed real estate income taxed on a corporate level	no	no	no	yes
sanction	Units may be delisted as securities if they fail to satisfy the unit holder requirements.	modification of the articles of association to exclude real estate investment company operations	tax penalties and the potential loss of the REIT status	tax penalties and the potential loss of the REIT status

table continued on next pages

TABLE 5.10: Comparison of REIT regulatory regimes

Concentration on ownership	no	no	There are potential penalties if a single corporate shareholder owns 10% or more of the shares/voting rights.	Five or fewer individuals or foundations may not hold more than 50% of the shares.

end

Remark: This overview covers all countries that are part of the analysis.

Each regulatory item provided by EPRA is classified by the severity of the restriction. The result of this classification is provided in Table 5.11. These classifications are being summarized in a country year variable that indicates whether the regulation in that year and country is considered *low*, *middle* or *high*, or *low* or *high* for binary restrictions, respectively.

variable	definitions and thresholds
`minSCA`	*l*: USD 0 to USD 1 *m*: $<$ USD 1 to USD 6,572,037 *h*: $<$ USD 6,572,037 to USD 238,095,238
`shareholderreq`	*l*: no restrictions *h*: at least some restriction imposed
`lisMAN`	*l*: no *h*: yes
`leveragerestr`	*l*: 100 % to 70 % *m*: $>$ 70 % to 40 % *h*: $>$ 40 % to 0 %
`profitdistribution`	*l*: 0 % to 80 % *m*: $<$ 80 % to 90 % *h*: $<$ 90 % to 100 %
`incometax`	*l*: (almost) full tax exemption or rental income is not taxed *h*: REITs taxed as ordinary corporates
`sanction`	*l*: no sanctions, no mentioning of any sanctions, or sanctions with no negative effect on the going concern assumption *h*: loss of the REIT status including full tax treatment, de-listing, negative material effects on the going concern assumption

TABLE 5.11: Regulation: definition of variables

Remark: The limits and definitions are based on a sample consisting of 38 EPRA countries between 2007-2018. In order to represent the severity of regulation in the EPRA universe as accurately as possible, a larger sample of countries is used. Thus, the selected countries in this study more accurately represent the severity of regulation across countries beyond the sample selection.

The variable `minSCA` captures the minimum share capital requirement. It is classified into three groups, *l*, *m* and *h*. The limits between these groups are determined by the distribution of the minimum share capital requirements in the countries included in my study. The boundary between *l* and *m* is set at the 30th percentile of the distribution, the boundary between *m* and *h* is set at the 70th percentile. The upper bound of *h* is at the 100th percentile. The monetary values are all deflated and, if necessary,

converted to USD. Minimum share capital is deflated to the 2007 domestic currencies and converted into USD using year-end exchange rates.
`shareholderreq` captures shareholder requirements, such as restrictions on blockholdings. Whenever there is a restriction, the variable takes the value *h*; otherwise, the value is *l*. The variable `lisMAN` captures listing requirements and is coded in the same way.
`leveragerestr` captures restrictions on leverage. If a REIT can choose a leverage ratio from 70% up to 100%, the leverage restriction is low.[34] For leverage ratios between 40% up to 70%, the restriction is classified as `m`. Otherwise, it is set to h. In case a country's regulation allows for different thresholds under additional condition, I always use the tighter of the two. For example, the highest permitted leverage for REITs in Singapore is 35%, but leverage can be increased up to 60% if certain additional conditions are met by the REIT. In this case, I usually include the tighter restriction only. This classification implies that about half of the firms operated under mild or no restrictions at all, that about 35% operate under moderate restrictions and that the remaining about 18% operate under relatively tight restrictions.
Restrictions on the payout ratio are captured by `profitdistribution`. The boundaries between the three groups are determined by the distribution of the observations. The 30th percentile defines the boundary between *l* and *m* which is at a payout ratio of 84% for ordinary income. The 70th percentile of the distribution sets the boundary between *m* and *h* at a payout ratio of 90%. The upper bound of *h* is at the 100th percentile.
The variable `incometax` captures corporate income taxation of REITs in the respective country. Taxation is classified as low (`l`) in case (i) corporate income remains fully tax-exempt or (ii) taxation applies to certain types of income only that are not the main source of income for a typical REIT or (iii) rental or all income is taxed at a very low rate only.[35] Otherwise, taxation is classified as high (`h`).
The severity of the consequences of violating the rules for REITs is measured by the variable on sanctions (`sanction`).

Descriptive Statistics: Regulatory Data

This section presents the descriptive statistics properties of the regulatory data set. Table 5.12 summarizes the regulation per country for each of the regulatory variables described in Section 5.2.2 and is exclusively based on EPRA information. The table provides the mode over the full observation period for each country. The figures in brackets display the number of observations with the highest frequency (mode) and the total number of country years. The following countries had been excluded from the sample due to lack of sufficiently many observations: Greece, Ireland, Israel, Italy, South Korea, Luxembourg, Pakistan. Companies with less than three firm year

[34] In most countries, the relevant leverage ratio is defined as total liabilities or long-term liabilities over total assets or total assets of the REIT scheme.

[35] For example, REIT income in Spain was taxed at a rate of just 1% in 2007 and 2008.

observations had been excluded too.[36]

It is apparent from Table 5.12 that there are hardly any systematic patterns across countries at the current level of analysis. The bracketed numbers indicate that most regulation was stable during the observation period.[37] Table 5.13 provides aggregate information per region, showing that there is variation across regions as well as within a region.[38]

In the data set, I define leverage as total liabilities over total assets.[39] I have to merge firm year data with country year regulatory data as described in Chapter 5.2.2. Based on the merged data, I can determine the severity of the regulation with respect to each regulatory dimension for any REIT in a particular country in a given year. I use the merged data set to test for differences in means between firms that are subject to regulation with different severity. To be specific, I use **Welch's (1947)** two-sided test for unequal variances (Welch's t-test).[40] Differences in means of leverage have been tested for various regulatory dimensions. The results are given in Table 5.14.

With respect to the severity of the minimum share capital requirements (as proxied for by `minSCA`), Table 5.14 shows that the mean leverage ratio declines the stronger the share capital requirement is. This relation appears to be monotonous. All differences are highly significant (1% level). It seems almost natural and self-evident that tougher equity requirements should go hand in hand with lower leverage; my results are in line with this conjecture.

Regarding restrictions on the composition of the shareholder body (`shareholderreq`), the mean leverage of REITs with such restrictions in place is higher than for REITs without such restrictions. Again, the difference in means is highly statistically significant. As most of the restrictions limit blockholdings, require a minimum number of shareholders or require other measures aiming at a more dispersed ownership, one could argue that REITs with more dispersed shareholders have, on average, higher leverage. However, such interpretation would be incorrect as I do not know whether these restrictions are binding or not. Data on the actual composition of the shareholder body is not available but would be needed to substantiate such interpretation.[41]

The variable `lisMAN` is coded as high (*h*) if there is a listing requirement and low (*l*) otherwise. Again, the difference in means between REITs in these two classes is highly significant with the leverage of REITs subject to a listing requirement being about 10 percentage points lower. However, one cannot draw any conclusions from this observation as all REITs in the sample are listed, despite that fact that this was

[36] Due to the fact that REIT regulation in Ireland and in South Africa was not enacted before 2013, there are only six country years for these countries.

[37] In addition, there are hardly any missing values on regulatory items.

[38] Africa and the Americas as regions have only one and four countries in our sample, leading to low variability within these regions.

[39] Compare Chapter 5.1.

[40] A two-sample t-test with unequal variance is used since the samples are normally distributed, each standard deviation is unknown and assumed to be unequal, and the sample is sufficiently large.

[41] To control for the composition of the shareholder body more data beyond information about the free float of stocks would be needed. This data has not been collected.

not compulsory in 3,051 firm years.

With respect to restrictions on payout ratios as proxied for by `profitdistribution`, Table 5.14 shows that the mean leverage ratio for REITs that are in the 30th percentile with the weakest such restriction have lower mean leverage rates. The difference of the means in this class to the means of the other two classes is highly significant (again at 1% level) whereas the means on the other two classes are not statistically distinguishable from one another. The results indicate that REITs with low payout ratio requirements have, on average, lower leverage ratios. The differences in means to the other groups are quite large with 14.6 (*l* to *h*) and 14.2 (*l* to *m*) percentage points. This finding is in line with the notion that REITs that have to pay out a high percentage of their earning have only very limited opportunities to retain profits, hence, can only grow by raising debt, leading to a higher leverage. However, additional checks are needed to investigate whether these payout restrictions are in fact binding or not.

The results with regard to the taxation of REITs are as follows: When taxation is very light such that the variable `incometax` is coded as low (*l*), the mean leverage of firms in such an environment is higher than in an environment in which REIT taxation is more in line with that of NON-REIT, ordinary companies. This difference is highly significant. These results need to be interpreted with caution, due to a huge difference in the total number of observations for the two codings low (*l*) and high (*h*). Intuitively, one would expect higher leverage ratios if operating income is taxed. As REITs are non-taxable companies, it is not clear why leverage ratios strongly differ within this classification.

Finally, the stronger the sanction following a violation of REIT regulation in a given country (proxied for by `sanction`), the higher the mean leverage ratio. This difference is statistically significant at the 1% level, albeit relatively small with 6.2 percentage points. As almost half of the observations with the variable `sanction` coded as low are from REITs based in the United States, the results need to be interpreted with caution.

I have merged my sample from Thomson Reuters Datastream with the manually collected EPRA data. Here, the different encodings on region, countries and on a content level that EPRA makes, were taken into account, as well as the reclassification process[42] regarding the REIT status.

Chapter 6 will be based on all available regulatory data. In a second step I will focus on the variables `payoutdistribution`, `leveragerestr` and `sanction` more in depth. In a third step, analysis based on the variable `shareholderreq` is implemented.

[42] For further information see Chapter 6.1.2.

country	minSCA	shareholderreq	lisMAN	leveragrestr	profitdistribution	incometax	sanction
Australia	*l* (8/12)	*l* (12/12)	*l* (12/12)	*l* (12/12)	*h* (12/12)	*l* (12/12)	*h* (6/12)
Belgium	*m* (12/12)	*l* (12/12)	*h* (12/12)	*m* (12/12)	*l* (12/12)	*l* (12/12)	*h* (12/12)
Bulgaria	*m* (12/12)	*h* (12/12)	*h* (12/12)	*h* (12/12)	*m* (12/12)	*l* (12/12)	*h* (12/12)
Canada	*l* (12/12)	*h* (12/12)	*h* (12/12)	*l* (12/12)	*h* (12/12)	*l* (12/12)	*h* (12/12)
France	*h* (12/12)	*h* (12/12)	*h* (12/12)	*l* (12/12)	*h* (7/12)	*l* (12/12)	*h* (12/12)
Germany	*h* (12/12)	*h* (12/12)	*h* (12/12)	*m* (12/12)	*m* (12/12)	*l* (12/12)	*h* (12/12)
Hong Kong	*l* (12/12)	*l* (12/12)	*h* (12/12)	*m* (12/12)	*m* (12/12)	*l* (10/12)	*h* (12/12)
Japan	*m* (12/12)	*l* (12/12)	*l* (12/12)	*l* (12/12)	*m* (12/12)	*h* (12/12)	*l* (12/12)
Malaysia	*h* (12/12)	*l* (12/12)	*l* (12/12)	*m* (10/12)	*m* (12/12)	*l* (12/12)	*h* (12/12)
Mexico	*l* (11/11)	*h* (11/11)	*l* (11/11)	*l* (11/11)	*h* (11/11)	*h* (11/11)	*h* (11/11)
Netherlands	*l* (6/12)	*h* (12/12)	*l* (12/12)	*m* (12/12)	*h* (12/12)	*l* (12/12)	*h* (12/12)
New Zealand	*l* (12/12)	*l* (12/12)	*l* (12/12)	*l* (12/12)	*h* (12/12)	*h* (12/12)	*h* (12/12)
Singapore	*h* (12/12)	*h* (12/12)	*h* (12/12)	*m* (12/12)	*m* (12/12)	*l* (12/12)	*h* (12/12)
South Africa	*h* (6/6)	*l* (6/6)	*h* (6/6)	*m* (6/6)	*l* (6/6)	*h* (6/6)	*l* (6/6)
Spain	*h* (7/12)	*h* (12/12)	*h* (10/12)	*l* (10/12)	*l* (8/12)	*l* (8/12)	*h* (12/12)
Taiwan	*h* (12/12)	*h* (12/12)	*l* (12/12)	*m*(6/12)	*l* (12/12)	*l* (12/12)	*h* (12/12)
Thailand	*h* (12/12)	*h* (12/12)	*h* (12/12)	*h* (12/12)	*m* (12/12)	*h* (12/12)	*h* (6/12)
Turkey	*h* (9/12)	*l* (12/12)	*h* (12/12)	*l* (12/12)	*l* (12/12)	*l* (12/12)	*h* (12/12)
UK	*m* (12/12)	*h* (12/12)	*h* (12/12)	*l* (12/12)	*m* (12/12)	*l* (12/12)	*h* (12/12)
USA	*l* (12/12)	*h* (12/12)	*l* (12/12)	*l* (12/12)	*m* (12/12)	*l* (12/12)	*h* (12/12)

TABLE 5.12: Severity of regulation per country between 2007-2018

country	minSCA	shareholderreq	lisMAN	leveragerestr	profitdistribution	incometax	sanction
Africa	*h* (6/6)	*l* (6/6)	*h* (6/6)	*m* (6/6)	*l* (6/6)	*h* (6/6)	*l* (6/6)
Americas	*l* (35/35)	*h* (35/35)	*l* (23/35)	*l* (35/35)	*h* (23/35)	*l* (24/35)	*h* (35/35)
Asia-Pacific	*h* (48/96)	*l* (60/96)	*l* (60/96)	*m* (48/96)	*m* (72/96)	*l* (58/96)	*h* (72/96)
Europe	*h* (40/96)	*h* (72/96)	*h* (84/96)	*l* (46/96)	*m* (36/96)	*l* (92/96)	*h* (96/96)

TABLE 5.13: Severity of regulation per region between 2007-2018

criterion	group	*l*	*m*	*h*
minSCA	mean	0.556	0.436	0.337
	diff(*l*-*h*)	0.22*** (30.471)		
	diff(*l*-*m*)	0.121*** (20.585)		
	diff(*m*-*h*)	0.098*** (13.117)		
	N	2,583	1,453	1,457
shareholderreq	mean	0.407		0.493
	diff(*l*-*h*)	-0.086*** (-15.227)		
	N	1,728		3,765
lisMAN	mean	0.515		0.406
	diff(*l*-*h*)	0.109*** (18.480)		
	N	3,053		2,440
profitdistribution	mean	0.344	0.485	0.490
	diff(*l*-*h*)	-0.145*** (-14.093)		
	diff(*l*-*m*)	-0.140*** (-15.466)		
	diff(*m*-*h*)	-0.005 (-0.674)		
	N	750	3,744	999
incometax	mean	0.490		0.361
	diff(*l*-*h*)	0.130*** (17.516)		
	N	4,502		991
sanction	mean	0.419		0.482
	diff(*l*-*h*)	-0.062*** (-10.308)		
	N	1,327		4,166
leveragerestr	mean	0.507	0.401	0.103
	diff(*l*-*h*)	0.404*** (45.483)		
	diff(*l*-*m*)	0.107*** (18.873)		
	diff(*m*-*h*)	0.297*** (31.425)		
	N	4,195	1,007	291

Remark: Groups are assigned by the criteria given in Table 5.11. For every criterion diff(*l*-*h*) $=$ Mean$_l$ $-$ Mean$_h$ $\neq 0$ is tested using a two-sample t-test with unequal variances **(Welch (1947))**. *t*-values in parenthesis. Where applicable, we also test whether diff(*l*-*m*) $=$ Mean$_l$ $-$ Mean$_m$ $\neq 0$ and diff(*m*-*h*) $=$ Mean$_m$ $-$ Mean$_h$ $\neq 0$ using the same method. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

TABLE 5.14: Leverage: Differences in means for REIT Data

5.2.3 NON-REIT

The NON-REIT data set serves as the control group. It consists of 6,707 observations from 601 firms headquartered in 20 countries. The country selection process is based on the REIT data universe provided by Thomson Reuters Datastream.[43]
The geographical distribution is shown in Figure 5.6. In the NON-REIT data set, Hong Kong represents the largest country in terms of the total number of observations (1,503). Malaysia and Japan follow with 889 and 876 observations, respectively. Countries like Netherlands, Turkey, Mexico, New Zealand, South Africa, Spain, Belgium and Bulgaria provide less than 100 observations within the sample period. In total, the NON-REIT sample is dominated by the Asian-Pacific region, which is confirmed by Figure 5.7. It is noteworthy that the region Americas is not offering the largest number of NON-REIT firm-year data, although representing the largest share in the REIT industry. As the US was a pioneer within the REIT market starting in 1960, it is plausible that over time the US constitutes the largest share in terms of the number of observations. The US benefit from investors acceptance and market development during this period compared to regimes that entered into the market at a later point in time. In comparison to that, NON-REITs are not based on any enactment years or specific regulations in place. This makes it much easier to identify a real estate company compared to a REIT structure. The real estate market grow at a different pace compared to the REIT market.

year	number of observations
2007	542
2008	553
2009	551
2010	555
2011	555
2012	558
2013	559
2014	566
2015	563
2016	571
2017	565
2018	569
	6,707

TABLE 5.15: Firm year observations – NON-REIT

[43] As this sample covers the control group that should reflect the NON-REIT side, lower numbers of observations in the countries Mexico, Turkey and Netherlands are being tolerated.

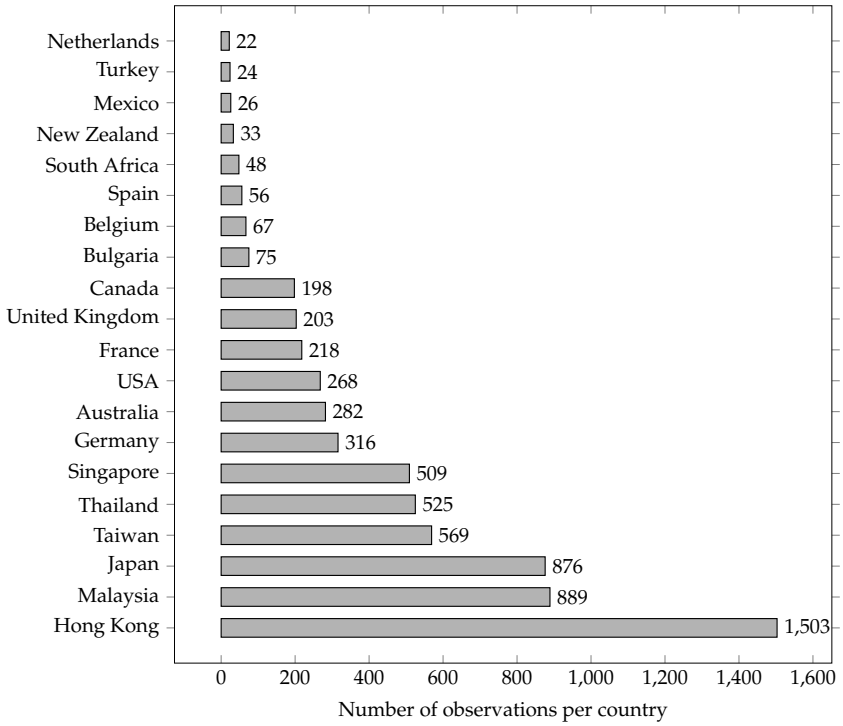

FIGURE 5.6: Geographical distribution of firm years – NON-REIT (country)

The geographical distribution per region is shown in Figure 5.7.

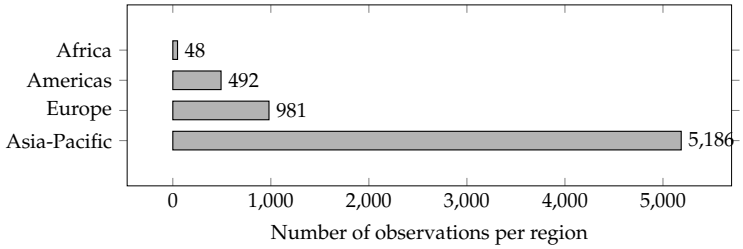

FIGURE 5.7: Geographical distribution of firm years – NON-REIT (region)

Table 5.15 shows the number of firm years in each year. Compared to the REIT industry, the number of observations for NON-REITs is relatively stable and shows no significant increase over time. Here, the growth of REIT regimes becomes more apparent.[44]

Table 5.16 shows the number of observations by country and year. Hong Kong, Japan and Malaysia make up together more than 48% in the NON-REIT sample, while the other countries show only smaller shares.

[44]See Chapter 5.5.

country	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	total	percent
Australia	23	25	25	24	23	22	22	23	24	25	23	23	282	4.20
Belgium	5	4	5	5	6	6	6	6	6	6	6	6	67	1.00
Bulgaria	6	6	6	6	7	7	7	6	6	6	6	6	75	1.12
Canada	16	18	17	16	17	17	17	16	16	16	16	16	198	2.95
France	16	14	16	17	18	20	21	20	21	20	18	17	218	3.25
Germany	26	26	26	25	24	26	25	25	26	29	29	29	316	4.71
Hong Kong	119	122	123	121	124	122	126	129	129	129	129	130	1503	22.41
Japan	72	74	71	72	73	72	73	74	73	74	74	74	876	13.06
Malaysia	74	73	75	74	72	74	75	74	72	74	75	77	889	13.25
Mexico	3	3	3	3	3	3	1	1	2	2	1	1	26	0.39
Netherlands	2	2	2	2	2	2	2	2	2	2	1	1	22	0.33
New Zealand	3	2	2	2	3	3	3	3	3	3	3	3	33	0.49
Singapore	41	42	40	42	43	43	43	44	42	42	43	44	509	7.59
South Africa	4	4	4	4	4	4	4	4	4	4	4	4	48	0.72
Spain	6	5	4	3	3	3	4	5	5	6	6	6	56	0.83
Taiwan	47	48	49	52	46	47	46	47	46	48	46	47	569	8.48
Thailand	38	41	44	44	45	45	45	45	45	45	44	44	525	7.83
Turkey	2	2	2	2	2	2	2	2	2	2	2	2	24	0.36
United Kingdom	16	16	17	17	16	17	17	18	18	17	17	17	203	3.03
USA	23	26	20	24	24	23	20	22	21	21	22	22	268	4.00
total	**542**	**553**	**551**	**555**	**555**	**558**	**559**	**566**	**563**	**571**	**565**	**569**	**6707**	**100.00**

TABLE 5.16: Distribution of firm-year observations by country – NON-REITs

Table 5.17 provides the average leverage ratio per country per year. In contrast to the REIT sample (see Table 5.7) the leverage ratio per country is more varied. Thailand and Turkey show only small and unstable leverage ratios in the REIT sample, the NON-REIT industry offers stable leverage ratios. Leverage ratios by country tend to be influenced by restrictions in place in the REIT-market, thus highlighting a regulatory dominance. Compared to that, NON-REIT leverage ratios follow normal market circumstances only without any country-specific restrictions and are thus not confronted by real estate-specific regulations.
Table 5.18 summarizes the variables `leverage`, `assettang`, `profit`, `growthopp`, `size` and `interestcov` by country. The variable `assettang` shows larger values in the NON-REIT sample compared to the REIT sample. While in the REIT sample firms from Canada, Japan, Malaysia and the United States dominate in terms of asset tangibility, the NON-REIT sample shows high asset tangibility in Bulgaria and France as well. The variable `profit` shows unstable ratios across countries. As the data quality for measuring profitability is low, a reliable interpretation of the values is not possible.[45] Differences in growth opportunities exist with firms from Australia, Germany, Japan, South Africa, Spain, Thailand, Turkey and the United States of America having larger potentials of growth opportunities. Here, more countries show higher growth opportunities compared to the REIT sample. Those ratios are mainly driven by larger values of year-end market capitalisation. The variable `size` shows no large differences across countries. Values for the variable `interestcov` vary across the countries in the sample but show an almost comparable picture to the REIT sample. For the Netherlands, South Africa and Turkey the interest coverage ratios are below 1 indicating higher company riskiness, given its current debt. Australia, Bulgaria, Hong Kong, Japan, Malaysia, New Zealand and Thailand show much more solid ratios with an interest coverage ratio above 2. Taiwan is the only country with an interest coverage ratio larger than 3. In total the sample interest coverage ratio for REITs is significantly smaller than for NON-REITs. This is mainly driven by larger values for the normalized EBITDAs for NON-REITs compared to REITs.

[45] To avoid a large reduction of the sample size due to implausible data for profitability, the results need to be interpreted with caution. This is mainly caused by the provided data by Thomson Reuters Datastream. Due to a time restriction, data cannot be hand-collected and double-checked and compared to my data set.

country	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	average
Australia	48.53	59.99	58.09	53.15	50.24	50.49	44.76	44.41	43.36	43.68	46.38	41.43	48.83
Belgium	52.06	47.41	55.80	55.00	50.68	49.41	49.51	53.01	52.55	51.70	50.75	51.81	51.65
Bulgaria	42.46	52.41	53.56	53.67	47.98	41.96	40.35	31.09	30.10	29.52	29.89	30.17	40.39
Canada	58.07	56.73	53.33	53.43	52.03	52.44	46.10	49.49	49.40	49.74	49.80	48.72	51.65
France	53.86	55.83	55.41	58.30	53.75	56.49	50.52	53.41	50.33	45.97	49.63	52.52	52.80
Germany	50.77	57.89	60.23	56.75	57.44	57.97	59.79	58.45	56.19	52.82	56.44	56.64	56.72
Hong Kong	39.92	41.17	38.36	39.19	40.94	42.18	41.26	42.46	44.03	43.99	45.44	46.93	42.22
Japan	63.91	66.39	67.22	66.01	65.26	62.96	60.17	59.14	57.96	58.80	58.84	58.07	62.03
Malaysia	41.47	41.12	40.63	38.61	39.68	38.23	37.65	37.23	40.39	40.32	40.28	39.94	39.63
Mexico	59.43	65.40	69.80	67.73	69.83	74.70	95.20	63.20	75.40	80.90	67.30	72.70	70.45
Netherlands	65.95	69.00	69.75	66.40	64.25	65.25	64.50	64.60	64.55	67.15	39.50	36.70	63.59
New Zealand	26.09	20.18	13.80	14.63	26.03	26.85	22.70	22.70	18.31	18.48	22.08	23.71	21.76
Singapore	42.44	42.02	41.14	38.52	37.93	43.55	47.29	45.51	48.36	47.92	46.31	48.40	44.15
South Africa	44.85	50.77	56.31	53.89	46.87	33.33	40.71	44.89	33.10	41.22	47.47	46.65	45.00
Spain	48.71	45.33	56.80	48.10	51.73	51.16	37.66	40.11	34.30	34.68	35.78	36.15	42.17
Taiwan	53.07	55.82	48.74	49.87	56.06	53.44	54.22	53.45	53.09	53.40	53.57	53.83	53.17
Thailand	45.91	48.35	47.48	49.98	50.69	48.94	48.09	46.39	47.09	47.91	47.96	50.84	48.33
Turkey	57.10	65.35	52.25	55.25	51.13	32.37	32.96	29.25	29.96	31.78	46.35	62.80	45.54
United Kingdom	44.65	44.69	50.05	48.05	47.14	46.17	47.06	39.85	36.83	38.92	36.07	34.05	42.71
USA	42.90	43.94	35.64	39.51	41.82	44.66	40.08	44.48	41.35	41.15	36.36	38.01	40.93
average	**47.63**	**49.67**	**48.22**	**47.75**	**48.35**	**48.25**	**47.02**	**46.74**	**47.04**	**47.08**	**47.37**	**47.9**	**47.75**

TABLE 5.17: Average NON-REIT leverage per year by country

country	leverage	assettang	profit[46]	growthopp	size	interestcov
Australia	0.488	0.126	-0.015	1.115	18.455	2.156
Belgium	0.516	0.065	0.021	0.716	18.601	1.022
Bulgaria	0.403	0.440	-0.006	0.841	14.997	2.383
Canada	0.516	0.169	0.032	0.840	18.981	1.539
France	0.528	0.231	0.024	0.967	18.634	1.730
Germany	0.567	0.153	0.066	1.161	18.914	1.184
Hong Kong	0.422	0.082	0.034	0.831	20.664	2.060
Japan	0.620	0.351	0.030	1.051	19.652	2.458
Malaysia	0.396	0.166	0.045	0.599	18.723	2.354
Mexico	0.704	0.029	0.043	0.676	20.438	1.749
Netherlands	0.635	0.017	0.005	0.561	20.178	0.307
New Zealand	0.217	0.002	0.071	0.938	19.241	2.825
Singapore	0.441	0.125	0.008	0.920	19.365	1.800
South Africa	0.450	0.025	0.067	1.025	17.981	0.147
Spain	0.421	0.054	-0.002	1.49	18.694	1.205
Taiwan	0.531	0.096	0.027	0.959	19.201	3.161
Thailand	0.483	0.126	0.057	1.089	18.909	2.098
Turkey	0.455	0.216	0.013	1.693	17.916	0.732
United Kingdom	0.427	0.145	0.035	0.839	19.038	1.073
USA	0.409	0.445	-0.194	1.904	17.907	1.457
all Countries	0.477	0.168	0.023	0.95	19.325	2.104

TABLE 5.18: NON-REIT Descriptive statistics of firm-specific variables by country for 2007-2018

[46]Negative values for the variable profit are caused in negative operating income positions.

Chapter 6

Panel Data Analysis

Based on my data generating process, data sets are extracted for (1) the total sample (REIT and NON-REIT), (2) REITs and (3) NON-REITs. Chapter 6.1 presents the economic analysis, Chapter 6.2 the discussion.

6.1 Statistical Investigation

6.1.1 Total Sample

My analysis starts with an ordinary least square regression model. I pool all countries and all real estate firms to analyse the determinants of capital structure, i.e. leverage. For the calculation of the dependent variable, I follow previous literature by **Feng et al. (2007)**, **Hardin and Hill (2008)** or **Morri and Beretta (2008)**. Leverage as the dependent variable is defined as total debt over total assets. In the following, four main reasons are presented to justify the use of book value leverage as the dependent variable in this analysis, although market values may reflect faster changes in market participants' attitudes and expectations: (1) Market data on all assets are difficult to obtain. (2) Capital structure decisions of managers and analyses of rating agencies are usually conducted based on book value data. Market value data are highly volatile over a short time and are also impacted by factors beyond the direct control of a company. (3) **Fama and French (2002)** document that most predictions of capital structure theories, specifically the trade-off and the pecking order theory, apply directly to book leverage. (4) Country-specific regulations from EPRA are based on book values.[1]
I estimate the following ordinary least square model:[2]

$$\begin{aligned} LEV_i = \beta_0 + \beta_1 assettang_i + \beta_2 profit_i + \beta_3 growthopp_i \\ + \beta_4 size_i + \beta_5 interestcov_i + \beta_6 age_i \\ + \sum \beta_7 Law - Dummy + \sum \beta_8 REIT - Dummy + \epsilon_i \end{aligned} \tag{6.1}$$

[1] All analyses are based on the book value of leverage as the dependent variable.

[2] The sample regression line with epsilon being the whitenoise error term and i denoting the individual firm.

Table 6.1 shows the ordinary least square regression results with leverage being the dependent variable. Although the independent variables are not normal distributed, tested by the Shapiro–Francia test for normality in Table D.2, the residuals of the model, displayed in the QQ plot (D.3) show an almost normal distribution.[3] I follow the approach by **Davidson and Mackinnon (1993)** and use robust standard errors to deal with heteroskedasticity.[4] To test for multicollinearity, I implement a variance inflation factor (VIF) test (Appendix D.1). A large VIF on an independent variable indicates a highly collinear relationship to other variables. VIFs are no larger than 1.92 with an average VIF of 1.33, there is only fairly moderate multicollinearity such that I continue with the analysis.

Table 6.1 shows the results for the total sample. Widely used capital structure variables such as `assettang`, `profit`, `growthopp`, `size`, `interestcov` and `age` had been investigated. Additionally, my model had been extended with respect to the variables `reitnonreit`, `law` and `age`.

The variable `assettang` shows a significant positive effect on leverage which can be explained by the collateral argument.[5] Measuring the effect of `profit` on leverage shows no statistical significance. This is likely to be mainly driven by the data set provided by Thomson Reuters Datastream for NON-REITs and the existing inconsistencies within the data.[6] A firm's growth opportunities show a significant positive influence on leverage. This is in line with results by **Dogan et al. (2019)** that concentrate on the pecking order theory. The variable `size` is in line with elements of the trade-off theory: Larger firms tend to have lower bankruptcy costs resulting in a positive influence on leverage.[7] Although the trade-off theory is consistent with a statistically positive effect of the interest coverage ratio on leverage, my analysis shows contrary results. Mixed results had also been tested by **Harrison et al. (2011)** and **Dogan et al. (2019)**.

As I am dealing with the total sample, results need to be interpreted with caution as I combine highly regulated with unregulated real estate firms. Differences in law show that countries based on civil law have on average lower leverage ratios. This shows significance on a 1% confidence interval. Civil law is characterized by e.g. comparatively weak investor protection. This would be in line with the negative effect on leverage. **Titman and Wessels (1988)** and **Demirguec-Kunt and Maksimovic (1999)** show, in combination with the severity of corruption, a negative effect on leverage.

[3] The one-sample Kolmogorov-Smirnov test against theoretical distribution on the residuals of my model rejects the null hypothesis of a statistical normal distribution.

[4] Ordinary least square regression model with vce(hc3). This method tends to produce better results when the model exhibits heteroskedastic. Vce(hc3) produces confidence intervals that tend to be even more conservative. The Breusch-Pagan/Cook-Weisberg test for heteroskedasticity had been executed and shows the existence of heteroskedasticity. As I use panel data, OLS t-statistics might be biased upward. Therefore, reported t-statistics are based on White heteroscedasticity consistent errors adjusted for the residuals correlation across observations of a given firm. For further information see **White (1980)**.

[5] See Chapter 3.2.

[6] See Chapter 5.2.3.

[7] **cf. Dogan et al. (2009)**; **cf. Rajan and Zingales (1995)**.

The variable `age` shows a statistically negative effect on leverage. As older firms are characterized by on average lower levels of asymmetric information during financing and more firm years to build up retained earnings, the subsequent analysis will show that this effect is likely to be due to NON-REITs only.

	LEV
`assettang`	0.0862***
	(0.0066)
`profit`	0.0256
	(0.0608)
`growthopp`	0.0291***
	(0.0076)
`size`	0.0189***
	(0.011)
`interestcov`	-0.0493***
	(0.0018)
`reitnonreit`	-0.1386***
	(0.0056)
`law`	-0.0841***
	(0.0047)
`age`	-0.0228***
	(0.0031)
`constant`	0.3280***
	(0.0248)
observations	7,629
R-squared	0.2578

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

TABLE 6.1: Total sample OLS pooled regression model

Remark: OLS pooled regression estimates of capital structure determinants and REIT status on leverage for total sample during 2007-2018.

REITs provide an interesting framework for the study of capital structure because they have many structural features and, in particular regulatory issues that preclude certain motivations for capital structure choices and rule out certain actions to alter capital structure. Caused by those structural features, it is not obvious how empirical results relating to NON-REIT companies can be applied to REITs. The aim of this paper is to investigate whether REITs differ in their financing decisions from NON-REITs and if they do so, to what causes can this be attributed to. As the leverage ratio of REITs is substantially different from that of NON-REITs, I expect that at least some estimated coefficients of these determinants will be significantly different across the two samples. In a first step, this is tested by a two-sided test for unequal variances

(Welch's Test).[8] To test this, I use an interaction model of all capital structure determinants and `reitnonreit` as a dummy variable taking the value 1 for REITs and 0 for NON-REITs. The dummy variable `reitnonreit` shows a statistically negative influence on leverage. This means, that REITs have on average lower leverage ratios compared to NON-REITs. In a second step, I test whether regulation drives capital structure. This is why the main focus is on the variable that measures the effect of REIT status on leverage. Since REITs are subject to a set of regulations, any analysis of the financing decisions has to take these regulations into consideration. Regulatory differences across countries are the starting point of my analysis. Implementing a mixed level regression model for REITs and NON-REITs shows that the country of incorporation explains much more variety within the model for REITs as it does in the control group of NON-REITs. As both firms are affected by the same economic situation per country, the main differences arise through the regulatory set REITs are subject to. In the hierarchical model, `leverage` as the dependent variable is tested in combination with the group variable `country` for both data sets. The intraclass-correlation coefficient (ICC) for REITs is more than twice as big as the one for NON-REITs. To be precise, the ICC for REITs is 0.3931 and for NON-REITs 0.1461. This means that for REITs 39.31% of the variance in the model can be explained by differences across countries. Whereby only 14.61% of the variance in the NON-REIT model are explained by country diversification.[9]

Here, I want to point out again, that the two sub-samples REIT and NON-REIT rely on the same country selection to base my analysis and interpretation on the same prerequisites. This includes identical countries in both data sets and a similar application of the data cleaning process. This highlights the importance of country-specific differences and effects on capital structure decisions for REITs and NON-REITs separately.

[8] **cf. Welch (1947)**.

[9] As regulation differs at country level, an analysis per region (Americas, Asia-Pacific, Europe, Africa) is redundant.

6.1.2 REIT

As the analysis of the total sample shows that REITs significantly differ in their leverage ratios compared to NON-REITs, this chapter concentrates on the REIT sample more in detail. The aim is to explain leverage ratio variation beyond traditional capital structure determinants. To do so, I combine firm-year data with regulatory data. Starting with analysis covering traditional capital structure determinants, in the following the interplay of regulatory determinants with capital structure decisions is analysed and discussed.
My model specifies leverage as the dependent variable that is controlled by asset tangibility, profitability, growth opportunities, firm size, interest coverage, capital increases, age, law, marginal corporate income tax, rating and developed countries. The index i denotes the individual REIT and epsilon represents the error term. Indicator variables such as `leveragerestr`, `profitdistribution`, `incometax`, `shareholderrequirement` or `sanction` represent the regulatory environment based on the EPRA classifications and are summarized by the variable sum of `Regulation-Dummies`. In my sample, REIT regimes were not everywhere in place by 2007, i.e. at the start of my observation period. To be specific, in South Africa, a REIT regime was only enacted in 2013, creating a missing value problem for the years from 2007 until 2012. As already known from Compustat, it makes backward adjustments if a firm is re-classified in its industry classification.[10] In other words, if a South African real estate firm decides to become a REIT in, say 2014, Compustat will re-classify this firm in such a way that it will record this firm as a REIT for all previous firm years covered by Compustat, leading to an incorrect classification for the firm years prior to the re-classification. For this reason, I have eliminated all firm year observations for South African firms prior to 2013. This problem did not occur with any other country in my sample. To overcome this problem known from Compustat the same approach is applied to my final data set based on Thomson Reuters Datastream.[11]

$$\begin{aligned} \hat{LEV}_i = \hat{\beta}_0 + \hat{\beta}_1 assettang_i + \hat{\beta}_2 profit_i + \hat{\beta}_3 growthopp_i + \hat{\beta}_4 size_i \\ + \hat{\beta}_5 interestcov_i + \hat{\beta}_6 age_i + \hat{\beta}_7 taxshield_i + \sum \hat{\beta}_8 Law - Dummy \\ + \sum \hat{\beta}_9 Capitalincrease - Dummy + \sum \hat{\beta}_{10} Rating - Dummy \\ + \sum \hat{\beta}_j Regulation - Dummies_j + \hat{\epsilon}_i \end{aligned} \tag{6.2}$$

As a starting point, Table 6.2 shows the ordinary least square regression results for Model 1, Model 2 and Model 3 with leverage being the dependent variable in each

[10] **cf. Guenther and Rosman (1994); cf. Phillips and Ormsby (2016)**.

[11] The hat operator on the components of the regression line does not present estimates. They refer to the analysis on the sub-samples.

model specification. Market values of total debt and total equity are not considered since EPRA base their restrictions mainly on book values. Although the independent variables are not normal distributed, tested by the Shapiro–Francia test for normality in Table E.2, the residuals of the model, displayed in the QQ plot (Appendix E.1) show an almost normal distribution. Based on **Lumley et al. (2002)** the non-existence of the normal distribution can be justified by the central limit theorem.[12] I follow the approach of **Davidson and Mackinnon (1993)** and use robust standard errors to deal with heteroskedasticity. To test for multicollinearity, I implement a variance inflation factor (VIF) test (Appendix E.1). VIFs are no larger than 5.34 with an average VIF of 2.48, there is only fairly moderate multicollinearity such that I continue with the analysis.

In my analysis (see Table 6.2 Model 3) I pool all countries and all REITs in the sample to analyse what determinants drive capital structure, in detail leverage. In a second step, I enlarge Model 3 and include variables such as `capitalincrease`, `age`, `law`, `taxshield`, `rating` and `developedcountry`. The results are shown in Model 2. Finally, Model 1 includes a large set of determinants, concentrating on regulatory data in particular. Model 1 is the starting point to analyse the impact of country-based regulatory restrictions in more depth.

Starting with Model 3 in Table 6.2, the coefficients of traditional capital structure determinants such as `assettang`, `profit`, `growthopp`, `size` and `interestcov` are in line with results from literature. Model 3 shows a statistically positive relation between asset tangibility and leverage. Here, the collateral argument is a possible reason for this effect.[13] The variable measuring profitability shows a statistically negative effect on leverage. The more profitable a firm is, the less debt-financing is done. This relationship has long been established for unregulated firms.[14] A firm's growth opportunities show a positive effect on leverage. In literature there exists no clear consensus on the direction of the effect: Based on the trade-off theory a negative effect is expected due to agency conflicts, while the pecking order theory predicts a positive effect due to restrictions on retained earnings.[15] The variable `size` shows a statistically positive effect on leverage which is broadly in line with literature. As larger firms face average lower bankruptcy costs the positive relationship is plausible.[16] Arguments against this relationship are based on decreasing information costs as firms grow, making equity issuance more likely.[17] Finally, Model 3 includes the variable `interestcov` that shows a statistically negative effect on leverage. Based on the trade-off theory a positive effect is expected due to lower bankruptcy costs, while arguments beyond traditional capital structure theories rely on a negative

[12] The one-sample Kolmogorov-Smirnov test against theoretical distribution on the residuals of my model rejects the null hypothesis of statistical normal distribution.

[13] **cf. Dogan et al. (2019)**.

[14] **cf. Harris and Raviv (1991)**.

[15] **cf. Dogan et al. (2019); cf. Morri and Christanziani (2009); cf. Feng et al. (2007)**.

[16] **cf. Dogan et al. (2019); cf. Rajan and Zingales (1995)**.

[17] **cf. Einhorn (1998); cf. Maris and Elayan (1990)**.

effect.[18] All values are significant on a 1% confidence interval.

[18] **cf. Harrison et al. (2011) ; cf. Dogan et al. (2019)**.

	Model 1 LEV	Model 2 LEV	Model 3 LEV
assettang	0.0382***	0.0857***	0.0907***
	(0.0094)	(0.0082)	(0.0069)
profit	-0.1293*	-0.1733**	-0.3751***
	(0.0775)	(0.0823)	(0.0777)
growthopp	0.0585***	0.0688***	0.0743***
	(0.0096)	(0.0089)	(0.0071)
size	0.0165***	0.0104***	0.0112***
	(0.0020)	(0.0015)	(0.0014)
interestcov	-0.0878***	-0.0865***	-0.0820***
	(0.0056)	(0.0055)	(0.0048)
capitalincrease	-0.0323***	-0.0323***	
	(0.0048)	(0.0049)	
age	-0.0063	-0.0105**	
	(0.0044)	(0.0046)	
leveragerestr	-0.0225**		
	(0.0106)		
profitdistribution	-0.0294***		
	(0.0078)		
incometax	0.0501**		
	(0.0151)		
shareholderreq	0.0030		
	(0.0010)		
sanction	0.1270***		
	(0.0108)		
law	0.0441***	0.0379***	
	(0.0103)	(0.0080)	
taxshield	0.0000	0.0003	
	(0.0005)	(0.0004)	
rating	-0.0345***	-0.0293***	
	(0.0050)	(0.0051)	
developedcountry	0.1633***	0.0850***	
	(0.0153)	(0.0094)	
constant	0.0301	0.2778***	0.2857***
	(0.0484)	(0.0370)	(0.0332)
observations	3,353	3,353	3,458
R-squared	0.4299	0.3946	0.3379

TABLE 6.2: OLS pooled regression REITs

Remark: OLS pooled regression estimates of the impact of capital structure determinants and regulation on leverage for REITs during 2007-2018. The dependent variable is leverage (LEV) defined as REIT's book debt divided by the sum of total assets. Robust standard errors, clustered by firm ID, are given in parentheses under the coefficients. *, ** and *** indicate significance at the 10%, 5% and 1% levels, respectively.

Taking Model 3 as a basis, I enlarge my model with respect to the following variables: `capitalincrease`, `age`, `law`, `taxshield`, `rating` and `developedcountry`. The variables already included in Model 3 show the same sign of the effects and statistical significance compared to Model 2. The only exception is the significance level of the variable `profit` which is in Model 2 on a 5% confidence level.

Including the variable `capitalincrease` reveals a negative effect on leverage. This result is intuitively plausible, since financing through equity makes financing through debt less likely and leads to a decrease in leverage.[19] Overall, REIT financing decisions clearly point out in the direction of trade-off between lack of incentive for debt, and adverse selection cost of equity. The variable `age` shows a negative effect on leverage on a 5% confidence interval. Based on the pecking order theory this is caused by a lower level of asymmetric information for older firms leading to favoring equity financing compared to debt financing.[20] REITs acting in a civil law country show on average higher leverage ratios. This is not in line with results by **Titman and Wessels (1988)** or **Demirguec-Kunt and Maksimovic (1999)** and is also in contrast to results of the total sample.[21] Analysing the effect of an increase in marginal corporate tax rates on leverage shows, that REIT financing is not affected by taking the advantage of a tax shield of debt. Since REITs are tax-exempt, debt financing becomes less financially attractive due to the absence of a tax shield. As there exists no such incentive for debt financing, the insignificant results in Model 2 and also Model 1 are not surprising. The variable `rating` indicates that having a rating leads to lower leverage ratios for REITs. Since the literature on unregulated firms shows exactly the opposite it seems likely that the regulation of REITs may dominate at this point and neglects this relationship.[22] Finally, I consider the variable `developedcountry`. REITs in developed countries are more levered compared to REITs in developing countries. Countries with e.g. a higher gross domestic product (GDP) or gross national income (GNI) per capita, level of industrialization, the general standard of living, and the amount of technological infrastructure, among several other potential factors provide a better access to debt financing.[23] [24]

Capital structure and some variation in industry capital structure are mainly explained through partial equilibrium models, such as the pecking order and trade-off theory. Their limitation lies in the fact that the implications of a firm's choice on its capital structure arise in isolation from the choices of other industry players. These theories are less appealing in this case due to the strongly regulated environment in which REITs operate. To improve the explanatory power of the model, the industry

[19] According to **Brown and Riddiough (2003)** capital increases appear to be the least attractive type of financing.

[20] **cf. Helwege and Liang (1996)**.

[21] See Chapter 6.1.1.

[22] **Faulkender and Peterson (2006)** and **Lemmon and Zender (2004)** show a positive relationship between the existence of a rating and a firm's leverage ratio.

[23] See Chapter 3.2.1.

[24] See Heritage Foundation (2009).

median leverage ratio, represented by the variable `herding` is considered. Based on my analysis the adjusted-R-squared for the leverage model including the herding variable increases by 5%. Please consult the Appendix G for a detailed analysis.[25] The relevance of median industry leverage represents merely another way to state the prevalence of an industry-specific fixed effect without offering any additional explanation. In other words, `herding` is empirical based, so that traditional capital structure theories only have a weak explanatory power for them; e.g. previous studies use median industry leverage to control for omitted factors and not as a factor itself.[26] This point becomes more clear when the explanatory content of this variable is considered. Every company in this industry is subject to the same regulatory, economic and social conditions. Testing each of them separately is hardly feasible, so a variable that covers the socio-economic and legal framework in its entirely seems to make sense. Since the variable `herding` is controversially discussed in literature, the Appendix G contains the regression model extended by the variable, while it is not focused in the main analysis.

Model 1 in Table 6.2 shows the combination of firm-specific variables and control variables from a regulatory and country perspective. To be precise, I enlarge Model 2 using hand-collected regulatory data. I analyse whether regulatory restrictions such as regulation on profit distribution, taxation and leverage restrictions are critical factors in determining REITs' leverage. I pool all the available data and use single and categorical variables to control for different legal restrictions.[27] [28] Independent variables beyond the set of regulatory variables show almost identical results compared to further investigations. The only differences are within the confidence levels, with `profit` being significant on a 10% confidence level and `age` showing no statistical significance any more. Taking so many variables into consideration and combining them with regulatory aspects, the results need to be interpreted with caution: In this model, the variable `leveragerestr` shows a statistically significance on a 5% confidence interval, implying that tighter regulation on leverage goes hand in hand with lower leverage ratios. The variable `profitdistribution` shows a statistically negative effect on leverage on a 1% confidence interval. The higher the percentage of distributed income to be paid out, the lower retained earnings. Intuitively, one would argue, that debt financing becomes more important but this is not supported by this large model. The variable `incometax` has a positive effect on leverage on a

[25] The results by **Chui et al. (2002)** show that national culture affects corporate capital structure. In detail, high scores on the cultural Hofstede dimensions of 'conservatism' and cultural Schwartz dimension 'mastery' tend to have lower corporate debt ratios. Definition and cultural dimensions by Hofstede and Schwartz can be found in the Appendix B. Moreover the Worldwide Governance Indicators (WGI) and the country-based Heritage Index had been tested in untabulated regression models to analyse the dimensions of economic freedom and political and regulatory drivers. The implementation of the Hofstede dimensions or the WGI index limits drastically the number of observations. To overcome this issue the effects are indirectly represented by the variable `herding`.

[26] **cf. Hovakimian et al. (2004); cf. Breuer et al. (2019)**.

[27] By implementing categorical regulatory restriction variables I follow the approach by **Dogan et al. (2019)**.

[28] I assume that all REIT-qualifying tests covered in Chapter 2.2.1 are in line with the country-based regulation. I do not check whether a REIT actually complies with the regulation in place in a given year.

5% confidence interval. REITs acting in countries with high income taxation have on average higher leverage ratios in combination with no incentives based on the tax shield of debt. The coefficient of the variable `shareholderreq` shows no statistical significance. The variable `sanction` shows a statistically positive significance. Again, one would have expected that tougher penalties and sanctions applied when in breach of any regulation would lead to lower leverage ratios.[29]

To further investigate how robust the findings of Model 1 are, I concentrate on the main variables explaining capital structure dispersion from literature and combine those variables with my hand-collected regulatory data. The effect of regulation on capital structure is represented by the restrictions on leverage, distribution of operating income and possible sanctions. Doing this leads to the following model shown in Table 6.3:

[29]The results of Model 1 need to be interpreted with caution as this model employs a relatively large number of variables. Further, interaction effects between the dependent variables are not considered.

	LEV
assettang	0.0629***
	(0.0091)
profit	-0.2699***
	(0.0824)
growthopp	0.0723***
	(0.0076)
size	0.0127***
	(0.0015)
interestcov	-0.0841***
	(0.0051)
capitalincrease	-0.0349***
	(0.0050)
age	-0.0135***
	(0.0044)
leveragerestrc	-0.0505***
	(0.0081)
profitdistribution	-0.0078
	(0.0074)
sanction	0.0286***
	(0.0076)
constant	0.3180***
	(0.0340)
observations	3,359
R-squared	0.3670

TABLE 6.3: OLS pooled regression REITs – regulatory focus

Remark: OLS pooled regression estimates of the impact of capital structure determinants and regulation on leverage for REITs during 2007-2018. The dependent variable is leverage (LEV) defined as REIT's book debt divided by the sum of total assets. Robust standard errors, clustered by firm ID, are given in parentheses under the coefficients. *, ** and *** indicate significance at the 10%, 5% and 1% levels, respectively.

While the variables assettang, profit, growthopp, size, interestcov, capitalincrease and age show the same statistical significance and effects on leverage, the regulatory variables differ. Analysing the regulatory variables in isolation, the variable profitdistribution shows no statistically significance. The variable sanction shows a statistically positive effect on leverage. Intuitively one should suggest the opposite effect. Acting as a REIT in a country with a stringent set of sanctions leads to a negative effect on leverage. It is questionable whether the punishment is more directed to shareholder interest in respect to profit distribution or with respect to leverage ratios and the level of bankruptcy. Therefore, analysis

including interaction effects testing this effect will follow.[30] The result of the variable `leverageregstr` is in line with Model 1 in Table 6.2. The severity in leverage restrictions leads to a statistically negative effect on a REIT's leverage ratio. The more restrictive a REIT regime is with respect to the permitted use of debt financing, the less debt financing is done. In combination with the impact of the variables `profitdistribution` and `sanction` it gives a first indication on the question whether REIT-specific regulations are binding or not.[31] [32] [33] [34]

I follow the approach by **Dogan et al. (2019)** and cluster countries with respect to regulatory systems. I conduct a more in-depth analysis to determine whether restrictions on leverage and profit distribution are binding and influence the financing decisions of REITs:
First, I group the countries with respect to their payout requirements. Second, those two groups are splitted into sub-groups depending on whether there are leverage restrictions in place or not and, if they exist, how tight they are. Note that `profitdistribution` and `leverageregstrc` are classified into three groups. The existence of a leverage restriction is represented by the indicator 1 and 2, while 0 defines no existence of any leverage restrictions. A 2 indicates the tightes leverage restriction in place for a specific country. The same applies for the variable `profitdistribution`. The purpose is to analyse whether this approach increases the explanatory power in relation to a separate analysis on a country level, where the respective sample size does not reach sufficiently enough observations which then would result in the exclusion of some countries.
Classification leads to the following clusters displayed in Table 6.4:

[30] Considering possible relationships among those variables, leads to some model specification and the implementation of interaction terms.

[31] In untabulated regression models I control for economic variables. The following variables are included in my sample: per capita GDP, GDP annual growth rate in %, Inflation (Consumer Prices (annual%)), developed country versus developing country (tabulated). Since the market circumstances apply to firms in a country to the same extent a deeper analysis is neglected.

[32] Per capita GDP, GDP annual growth rate in % and Inflation (Consumer Prices (annual%)) data is downloaded via Worldbank. Developed and developing country data was prepared by the Development Policy and Analysis Division (DPAD) of the Department of Economic and Social Affairs of the United Nations Secretariat (UN/DESA). It is based on information obtained from the Statistics Division and the Population Division of UN/DESA, as well as from the five United Nations regional commissions, the United Nations Conference on Trade and Development (UNCTAD), the United Nations World Tourism Organization (UNWTO), the International Monetary Fund (IMF), the World Bank, the Organization for Economic Cooperation and Development (OECD), and national and private sources.

[33] Reliable information regarding fixed income market conditions are not available across all countries.

[34] Per capita GDP is a broad indicator of wealth. The average annual growth rate in GDP represents an indicator of the financing needs of firms on an individual firm level. The growth rate is a proxy for the investment opportunity set faced by firms **Smith and Watts (1992)** and its effect on the optimal financing of projects. See also **Myers (1977)**. Inflation (Consumer Prices (annual%)) is an indicator of the government's management of the economy. Further it represents evidence on whether the local currency provides a stable measure of value to be used in long-term contracting.

PAYOUT LEVRESTRC	PAYOUT NOLEVRESTRC	NOPAYOUT LEVRESTRC	NOPAYOUT NOLEVRESTRC
Germany (1)	Australia (0)	Belgium (1)	Spain (0)
Hong Kong (1)	Bulgaria (0)	South Africa (1)	Turkey (0)
Malaysia (1,2)	Canada (0)	Taiwan (0,1,2)	
Netherlands (1)	France (0)		
Singapore (1)	Japan (0)		
Thailand (2)	Mexico (0)		
	New Zealand (0)		
	United Kingdom (0)		
	USA (0)		

TABLE 6.4: Country classification by regulation

Remark: The numbers in parentheses corresponds to the strength of regulation with 0 equal to no regulation in place and 1 or 2 referring to the existence of restrictions.

In the next step of my analysis, the variables `payoutlevrestr` and `payoutNOlevrestr` are now added as explanatory variables to the ordinary least square regression model and are based on the cluster process presented in Table 6.4. I control for asset tangibility, profitability, growth opportunities, firm size, interest coverage, marginal corporate income tax and a regulatory dummy variable which is either restricted by distributing income and leverage or by distributing income only, presented by the variables `payoutlevrestr` and `payoutNOlevrestr`. The dependent variable is leverage defined as total debt over total assets.
I estimate the following OLS model that includes REITs with the following restrictions on profit distribution and leverage. This regression line refers to the results of Model 4 presented in Table 6.5.:

$$\begin{aligned} \hat{LEV}_i = \hat{\beta}_0 + \hat{\beta}_1 assettang_i + \hat{\beta}_2 profit_i + \hat{\beta}_3 growthopp_i \\ + \hat{\beta}_4 size_i + \hat{\beta}_5 interestcov_i + \hat{\beta}_6 taxhsield_i \\ + \sum \hat{\beta}_7 Payoutlevrestr - Dummy + \hat{\epsilon}_i \end{aligned} \tag{6.3}$$

The second model focuses on the effect of restriction on profit distribution without any restrictions on leverage. The corresponding regression line looks as follows. The results are presented in Model 5 in Table 6.5.:

$$\begin{aligned} \hat{LEV}_i = \hat{\beta}_0 + \hat{\beta}_1 assettang_i + \hat{\beta}_2 profit_i + \hat{\beta}_3 growthopp_i \\ + \hat{\beta}_4 size_i + \hat{\beta}_5 interestcov_i + \hat{\beta}_6 taxshield_i \\ + \sum \hat{\beta}_7 PayoutNOlevrestr - Dummy + \hat{\epsilon}_i \end{aligned} \tag{6.4}$$

Model 4 (Table 6.5) shows that REITs that have to distribute their profits and are restricted in their financing possibilities have on average lower leverage positions. To go one step further, the independent variable `payoutlevrestr` is replaced by `payoutNOlevrestr`. Here, REITs are tested that have high profit distribution requirements but no restrictions on leverage. Intuitively, having no restriction on leverage, but low internal financing possibilities due to high profit distributions, the effect on leverage should be positive. Empirical evidence is given in Table 6.5.
Including the variable `taxshield`, defined as marginal corporate tax rate, into those analyses, the concept of tax shield of debt becomes apparent. In principal, interest on debt is a tax-deductible expense and being financed with debt creates a tax shield. The higher the marginal corporate tax rate the larger the value of the tax shield. As a result, including the marginal corporate tax rate as a proxy for tax shield effects, a positive effect on leverage is expected. Concentrating on real estate firms only, there exists a positive effect on leverage. Since REITs are tax-exempt corporate entities, tax shield considerations only play a minor role, expecting no statistical impact on leverage. Surprisingly, Model 4 and Model 5 point to a positive influence on leverage. Although there exists a positive effect on leverage, the coefficients are very small. REITs also show a lower coefficient compared to NON-REITs, indicating a lower relevance of tax shield negotiations. This holds for countries with high regulation on profit distribution and no leverage restriction. Statistically, it seems as if REITs, although their income is tax-exempt, behave like NON-REITs that benefit from tax shield. To see why, it is important to note that tax regulation often classifies income generated from real estate related transactions as being tax-exempt. When REITs also generate income from other sources beyond real estate, tax shield considerations exist, although playing only a minor role. Here, the interaction of regulatory restrictions and managements' general financing considerations becomes apparent. Although the amount of income generated beyond the real estate purpose is quite low for REITs there exists some scope of tax shield application. However, this is automatically limited by the regulatory sanctions REITs are confronted with when not adhering to the REIT specific tests mentioned in Chapter 2.2.1.
The positive coefficient of marginal corporate tax rate on leverage disappears when controlling for the variable `herding`.[35] Further, I control for the following variables: `assettang`, `profit`, `growthopp`, `size` and `interestcov`. The results are in line with the ordinary least square regression model displayed in Table 6.2 (Model 3). Comparing the models in Table 6.5 with respect to the control variables mentioned, there exists no real difference. The statistical power and the effects equal each other. The main difference lies in the dummy variables representing the regulatory severity with respect of profit distribution and leverage restriction. This could also be interpreted in the way that REITs' regulatory requirements direct the capital structure, and that control variables such as the `assettang`, `profit`, `growthopp`, `size` and

[35] See Appendix G for further information.

`interestcov` are subordinately considered. The implementation of the variables `payoutlevrestr` and `payoutNOlevrestr` increases the explanatory power of leverage variation of REITs by approximately 3%. Table 6.6 controls for the variable `capitalincrease`. Including this variable, the results are in line with those from Table 6.5.

	Model 4 LEV	Model 5 LEV
`assettang`	0.0709***	0.0590***
	(0.0075)	(0.008)
`profit`	-0.3597***	-0.3205***
	(0.0771)	(0.0776)
`growthopp`	0.0658***	0.0612***
	(0.0073)	(0.0072)
`size`	0.0105***	0.0086***
	(0.0014)	(0.0015)
`interestcov`	-0.0808***	-0.0792***
	(0.0048)	(0.0048)
`taxshield`	0.0009*	0.0014***
	(0.0005)	(0.0004)
`payoutlevrestr`	-0.0527***	
	(0.0071)	
`payoutNOlevrestr`		0.0457***
		(0.0073)
`constant`	0.2979***	0.2883***
	(0.0363)	(0.0347)
observations	3,452	3,452
R-squared	0.3477	0.3481

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

TABLE 6.5: Regulation drives capital structure: Dogan et al. (2019) approach

	Model 6 LEV	Model 7 LEV
assettang	0.0674***	0.0557***
	(0.0074)	(0.0079)
profit	-0.2992***	-0.2617***
	(0.078)	(0.0785)
growthopp	0.0654***	0.0608***
	(0.0073)	(0.0071)
size	0.0105***	0.0086***
	(0.0014)	(0.0015)
interestcov	-0.0806***	-0.0789***
	(0.0048)	(0.0049)
taxshield	0.0009*	0.0014***
	(0.0005)	(0.0004)
payoutlevrestr	-0.0546***	
	(0.0071)	
payoutNOlevrestr		0.0460***
		(0.0073)
capitalincrease	-0.0329***	-0.0320***
	(0.0049)	(0.0049)
constant	0.3168***	0.3054***
	(0.0365)	(0.0347)
observations	3,452	3,452
R-squared	0.3565	0.3564

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

TABLE 6.6: Regulation drives capital structure: Dogan et al. (2019) approach

Remark: OLS pooled regression estimates of the impact of regulation on capital structure for REITs during 2007-2018. Supported by capital increase argumentation.

In contrast to **Dogan et al. (2019)** my analysis differentiates between different property types represented in Table 6.7 and show a more granular analysis. Here, the main focus is on the explanatory variables that represent the regulatory characteristics. Consistent with **Brown and Riddiough (2003)**, property types significantly impact REITs' leverage ratio. Commercial REITs have the largest share in my sample. The results show a statistically positive effect on leverage for the variable `payoutNOlevrestr` and a statistically negative effect for the variable `sanction` on leverage which is in line with further results. For diversified, residential and specialized REITs the results show either an effect based on `profitdistribution` and `leverage` or `sanction`. Those inconsistencies can be justified by the smaller numbers of observations for diversified, residential and specialized REITs.[36] As a

[36]See Table 6.7.

consequence, I will not interpret those results due to a lack of reliability of the data.

	Commercial LEV	Diversified LEV	Residential LEV	Specialized LEV
assettang	0.0748***	0.1808***	0.1233***	-0.0368
	(0.0098)	(0.0300)	(0.0165)	(0.0235)
profit	-0.4614***	-0.2033	0.1364	0.0515
	(0.1011)	(0.2611)	(0.2469)	(0.2158)
growthopp	0.0921***	0.0316	0.0016	0.0716***
	(0.0129)	(0.0376)	(0.0188)	(0165)
size	0.0072**	0.0221***	-0.0016	0.0054
	(0.0024)	(0.0058)	(0.0052)	(0.0040)
interestcov	-0.0754***	-0.0519**	-0.0683***	-0.1268***
	(0.0047)	(0.0148)	(0.0141)	(0.0162)
payoutNOlevrestr	0.0370***	0.0242	0.0437**	0.1598***
	(0.0094)	(0.0368)	(0.0181)	(0.0252)
sanction	-0.0347**	0.0955**	0.0065	-0.0256
	(0.0131)	(0.0290)	(0.023)	(0.0326)
Constant	0.3577***	-0.0776	0.5778***	0.4015***
	(0.0604)	(0.1444)	(0.1217)	(0.1064)
observations	2,023	304	440	691
R-squared	0.3887	0.3296	0.3839	0.3765

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

TABLE 6.7: OLS regression clustered by property types

Dogan et al. (2019) concentrate on twelve countries, while I have 15 countries in my sample.[37] In line with these authors, I analyse the combination of payout requirement and leverage restriction as well as payout requirement and the absence of leverage restriction. Additionally, **Dogan et al. (2019)** test combinations that cover the absence of payout requirements and leverage restrictions. Those combinations are not covered in my analysis since the number of observations is not sufficiently large enough. I adapt the approach by **Dogan et al. (2019)** and cover the severity of sanction. My analyses reveal that leverage restriction is an important determinant of a REIT's debt ratio. Specifically, I find that in countries where REITs must pay out most of their operating income, but are not subject to any restriction on leverage, REITs have higher book leverage. This result implies that REITs prefer debt financing compared to equity financing, which is consistent with the pecking order theory. This result is valid for the countries tested by **Dogan et al. (2019)** and extended in my analysis with respect to the following six countries: Bulgaria, Germany, Malaysia, Mexico, New Zealand and Thailand.[38]

[37] As I only control for two sets of variables, I neglect five countries in my sample. These countries are the following: Belgium, South Africa, Taiwan, Spain and Turkey.

[38] **Dogan et al. (2019)** find the following results: In countries without any payout requirements, but with leverage restrictions, REITs have lower book leverage, which indicates preference for internal financing. This result is also consistent with the pecking order theory. Finally, they find a negative relationship between the absence of payout requirement and market leverage, which suggests an adverse impact of zero payout requirement on REIT values.

Overall, my analyses reveal that differences in regulatory requirements impact REITs' leverage ratios. The magnitude and sign of firm-specific factors vary across countries.[39] Since no single model adequately captures the influence of firm-specific factors across different countries, I pool countries based on their restriction (leverage, profit distribution and sanction) while neglecting control variables such as `law` or `developedcountry`. I control for the standard capital structure determinants in my model. In a first step, I analyse the impact of the variables `leveragerestr`, `profitdistribution` and `sanction` on leverage. Model 3s[40] (Table 6.8) shows that the existence of high payout ratios of operating income leads to an increase in leverage. This is reflected in the statistically positive coefficient of the variable `profitdistribution`. The variable `sanction` shows a statistically negative effect on leverage. This means that the existence of severe sanctions leads to an increase in leverage. REITs operate carefully and are more conservative in their financing, so as not to be sanctioned in case a restriction was not complied with. Model 2s again shows the effect of more severe restrictions on leverage having a statistically negative effect on leverage. The coefficient of `sanction` shows no statistical significance. Model 1s combines all three regulatory variables in focus. While the variable `leveragerestr` shows a statistically negative effect on leverage, the other two coefficients have no effect on leverage. Table 6.8 is my starting point to analyse combinations of those restrictions more in detail. I test for my combined restriction dummy variables followed by models with interaction effects. The aim is to test to what extent sanctions influence the restrictions on leverage and the distribution of operating income.

[39] Analyses is only done in case there is a sufficiently large number of observations available on a country level (unreported).

[40] The letter *s* behind the number of the Model highlights the model extension with respect to the variable that covers all sorts of sanctions REITs are subject to while not comply with regulation.

	Model 1s LEV	Model 2s LEV	Model 3s LEV
assettang	0.0744***	0.0740***	0.0919***
	(0.0082)	(0.0079)	(0.0069)
profit	-0.3461***	-0.3477***	-0.3565***
	(0.0782)	(0.0778)	(0.0780)
growthopp	0.0734***	0.0733***	0.0782***
	(0.0081)	(0.0081)	(0.0079)
size	0.0084***	0.0085***	0.0080***
	(0.0019)	(0.0019)	(0.0019)
interestcov	-0.0818***	-0.0819***	-0.0822***
	(0.0049)	(0.0049)	(0.0050)
leveragerestrc	-0.0434***	-0.0443***	
	(0.0076)	(0.0067)	
profitdistribution	0.0019		0.0115**
	(0.061)		(0.0055)
sanction	-0.0161	-0.0155	-0.0265**
	(0.0110)	(0.0106)	(0.0107)
constant	0.3726***	0.3723***	0.3611***
	(0.0483)	(0.0483)	(0.0483)
observations	3,458	3,458	3,458
R-squared	0.3469	0.3469	0.3401

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

TABLE 6.8: OLS pooled regression – REIT

The models in Table 6.9 analyse the impact of combinations of restrictions on profit distribution and leverage restriction. Here, I test whether higher ratios of profit distribution in combination with severe restrictions on leverage and sanctions explain leverage variation. The second model in Table 6.9 tests the existence of high ratios of profit distribution in combination with no restriction on leverage together with the existence of sanctions. This model is the extension of the model with respect to the variable `sanction` tested in Table 6.5.[41] Here, I base my analysis on the approach by **Dogan et al. (2019)** but enlarge it with respect to more regulatory variables.
As a result, Table 6.9 shows that country-specific regulation on REITs tend to dominate common capital structure determinants in literature. Industries that are affected by the influence of regulation through laws and restrictions cannot directly resort to known corporate finance strategies in the first place. This implies that management primarily operates and decides in accordance with the industry-specific law, here the EPRA regulation. Thus, the theories starting with **Modigliani and Miller (1958)** are relevant in a second step. Company-specific influencing factors and their interaction are only taken into account, in case that the country-specific laws are complied with.

[41] The variable `taxshield` is not included here as the model focus on regulation.

It seems as if the regulator intervenes externally in the dynamics of the general formation of a capital structure. The influence of the regulator enormously restricts the financial flexibility of companies, in this case specifically the financing flexibility of REITs.[42] This raises the question of why such constructions of a REIT are marketable and competitive. Despite their tight decision-making corset, REITs convince with relatively high, steady and untaxed dividend payouts.[43] They enable even small investors to participate in the real estate market. The history of REIT development in particular suggests that global competitiveness with the USA, as the place of origin, has promoted the global acceptance of REITs. The successive acceptance of several countries over the years shows that countries introduce and permit the REIT construct in order to maintain their competitiveness on the real estate market and on the stock market, while concentrating on listed REITs. This argumentation based on shareholder incentives, accessibility for smaller investors and the attractiveness in the market leads to the following analysis in Table 6.10.

[42] In the light of this results supports the exclusion of highly regulated firms in research data sets and to analyse them separately.

[43] Very high payout ratios may also attract a special group of investors. **Forest (1994)** says that high dividend yields of REITs are the main reason why investors move into the REIT market. This comes into play especially when the market faces high interest rates or when regulatory problems and competition put pressure on the dividend levels of utility.

	Model 4s LEV	Model 5s LEV
assettang	0.0772***	0.0692***
	(0.0073)	(0.0077)
profit	-0.3589***	0.3185***
	(0.0775)	(0.0781)
growthopp	0.0694***	0.0688***
	(0.0081)	(0.0079)
size	0.0106***	0.0074***
	(0.0019)	(0.0019)
interestcov	-0.0815***	0.0805***
	(0.0049)	(0.0050)
payoutlevrestr	-0.0571***	
	(0.0076)	
payoutNOlevrestr		0.0487***
		(0.0076)
sanction	-0.0001	-0.0128
	(0.0116)	(0.0106)
constant	0.3156***	0.3525***
	(0.0488)	(0.0478)
observations	3,458	3,458
R-squared	0.3479	0.3481

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

TABLE 6.9: Regulation drives capital structure: Dogan et al. (2019) approach including the variable sanction

The results in Table 6.10 are based on, besides traditional capital structure determinants, a set of regulatory variables. The following variables are included separately: leveragerestr, profitdistribution, shareholderrequ and sanction. The variables shareholderreq*sanction and profitdistribution*sanction represent interaction terms.[44]
Starting with the traditional capital structure determinants, the results lead to by and large the same picture compared to further results in my analyses. A remarkable exception is the insignificance of the variable assettang in this model. The main focus is on the regulatory variables. The variable leveragrestr shows a statistically negative effect on leverage, which is intuitive and comparable to further investigation. Again, more severe regulation on debt financing leads to lower leverage ratios on average. The coefficients on the variables profitdistribution, shareholderreq and sanction can be neglected in this model, since the interpretation is based on the interaction effects mainly. The interaction effect of shareholder requirements and sanctions is tested by the variable shareholderreq*sanction. The results show that leverage decreases in case of existing shareholder requirements (low) and

[44]Further information about interaction terms can be found in **Brambor et al. (2006)**.

sanctions. The interaction effect between the distribution of operating income and sanction on leverage is tested by the variable `profitdistribution*sanction`. In case there are severe sanctions in place together with restrictions on profit distribution (low and medium) leverage will be negatively effected more strongly. The interaction of medium severity restrictions on profit distribution and the non-existence of sanctions shows a significantly positive effect on leverage. The integration of the interaction effects shows an increase in the R-squared of the model compared to the results of the model shown in Table 6.8. This supports my assertion that regulation and the interaction of different restrictions lead to further explanation of a REIT's capital structure compared to traditional capital structure determinants only.[45]
Besides showing what affects the capital structure of REITs, I also want to clarify why REITs exist in the first place. Why should a company decide to become a REIT and thus be subjected to strong regulation. A number of restrictions have to be met in order to keep a REIT status and the tax incentives that come with it. Nevertheless, a REIT is an instrument that is gaining more and more importance as already shown in Chapter 2.5 covering the market overview. An increasing acceptance in different countries is visible; increasing absolute numbers of REITs are recorded worldwide. Therefore, to test the argument of marketability and competitiveness, the variable `shareholderreq` is analysed. Further the results support my hypothesis, that in countries with severe sanctions in place and the existence of restrictions on the distribution of profits, leverage is negatively affected (H5). The results in Table 6.10 show that shareholder restrictions have an impact on the capital structure. The presence of these restrictions and stronger sanctions leads to a stronger decrease in leverage which is supported by the interaction term that shows that the joint effect has a stronger negative influence on leverage.

[45]The following combinations of restrictions are neglected due to collinearity: For the interaction effect of shareholder requirements and sanction combination (1 0) and (1 1) is not covered. For the interaction effect of profit distribution and sanction the combination (2 0) and (2 1) is not covered. Further for *high* restrictions on profit distribution only a small number of observations is in the data set, which cannot be reliably tested. In general, the labels 0, 1 and 2 refer to the severity of regulation of low, medium and high respectively.

	LEV
assettang	0.0003
	(0.0091)
profit	-0.2027***
	(0.0730)
growthopp	0.0713***
	(0.0087)
size	0.0038**
	(0.0018)
interestcov	-0.0886***
	(0.0056)
leveragerestr	-0.0957***
	(0.0092)
profitdistribution	-0.0889***
	(0.0112)
shareholderreq	-0.2038***
	(0.0161)
sanction	0.3513***
	(0.0253)
shareholdereq*sanction	
(0 1)	-0.2729***
	(0.0168)
profitdistribution*sanction	
(0 1)	-0.2052***
	(0.0310)
(1 0)	0.0945***
	(0.0153)
(1 1)	-0.0747***
	(0.0129)
constant	0.5466***
	(0.0425)
observations	3,458
R-squared	0.4124

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

TABLE 6.10: Regulation drives capital structure

Beyond ordinary least square regression models, I analyse my data with the help of a fixed-effect model. **Lemmon et al. (2008)** argue that static pooled ordinary least square regressions of leverage ratios appear inadequate for dealing with unobserved heterogeneity present in corporate capital structures. Concentrating on the impact of variables that vary over time, leads to the application of a fixed-effect (FE) model. The existence of a significant unobserved transitory component suggests that dynamic specifications are necessarily leading to the implementation of fixed effect

estimates.[46] The Durbin-Wu-Hausman test[47] determines that a fixed effect model represents the most appropriate specification for my panel data compared to a random effects model. This is caused as the correlation between the error term and the explanatory variables is statistically significant. I also use standard errors that are clustered at the firm level to control for heteroscedasticity and serial correlation.[48] Fixed-effect models remove the effect of those time-invariant characteristics. As a consequence, I can assess the net effect of the predictors on the outcome variable. Following **Lemmon et al. (2008)** firm-fixed effects in capital structure analysis are shown to be major drivers of capital structure choices, so that it is worth mentioning that firm fixed effects are automatically controlled for by the fixed effect model. As a consequence my hand-collected EPRA regulatory data and dummy variables such as `law`, `capitalincrease`, `rating` or `developedcountry` cannot be considered. Having this in mind, the main motivation for this analysis is based on the explanatory power of variables beyond firm-fixed variables. Taking into account that this form of method cannot cover regulatory effects comparable to those by **Dogan et al. (2019)** or those of my classification variables, which is basically my main focus, nevertheless I apply the fixed effect model in order to do justice to the statistical significance and application in this field of research.

Fixed-effect models differentiate between three R-square values: (1) the within, (2) the between and (3) overall R-squared. The within R-squared measures how much of the variation in the dependent variable within firm units is captured by the model. In my analysis, represented in Table 6.11, the R-square (within) for REITs is 0.1895. The variation of leverage within firms is influenced by prominent capital structure determinants and country-based regulatory requirements, respectively.[49] The results for traditional capital structure determinants are comparable to those represented by the ordinary least square model. Regulatory variables differ in their significance. While the variables `profitdistribution` and `incometax` show no significance, the variables `leveragerestr` and `sanction` are statistically significant on a 1% confidence level. The results do not yield any further insights. However, the model was presented for completeness and is no longer used in the further course of my thesis.

[46] **cf. Bertrand and Schoar (2003); cf. Frank and Goyal (2006)**.

[47] **cf. Hausman (1978)**.

[48] Here I follow the approach by **Breuer et al. (2019)**.

[49] Focusing on the fixed effect models for the total sample, the Hausman test leads to contradictory results while differentiating between the instrument level or country level. On the instrument level a fixed effect model is preferred. In contrast, a random effect model is preferred on a country level. Since the number of observations per country are too small, no further analysis is implemented with respect to a random or fixed effect model controlled by country. Further, an analysis based on the total sample does not represent an appropriate model to analyse my research questions since the variable `reitnonreit` is excluded.

	LEV
assettang	0.0585***
	(0.0086)
profit	-0.1635***
	(0.0377)
growthopp	0.0116*
	(0.0063)
size	0.0265***
	(0.0035)
interestcov	-0.0499***
	(0.0025)
capitalincrease	-0.0230***
	(0.0029)
leveragerestr	-0.0712*
	(0.0403)
profitdistribution	-0.0179
	(0.0145)
incometax	0.0547
	(0.0354)
sanction	-0.0248*
	(0.0144)
constant	0.0276
	(0.0808)
observations	3,458
number of id	451
R-squared (within)	0.1895
R-squared (between)	0.1390
R-squared (Overall)	0.1314
Robust standard errors in parentheses	
*** p<0.01, ** p<0.05, * p<0.1	

TABLE 6.11: Fixed Effect Model – REIT

Remark: Fixed Effect Model REIT sample. Hausman test leads to fixed effect model.

Discussing possible models for my research leads to the following aspects:
According to **Peng and Knaap (2021)** an one-level OLS will underestimate the standard error, and thus overestimate test statistics and the statistical significance of the parameters. As a consequence, the results show spuriously significant effects.[50] Although I can correct standard errors of one-level OLS through clustering method in some extents, **Cheah (2009)** argues that modeling hierarchical data using multi-level methods is better than fixing the standard errors of the OLS estimate.[51] Benefit by

[50] **cf. Krull and MacKinnon (2001)**.
[51] **cf. Peng and Knaap (2021)**.

using a multi-level method approach can account for both spatial correlation and heterogeneity of residuals.[52] Further, multi-level specification can help examining the variability of the coefficient across groups and can be useful in examining cross-level interaction. As my analysis is limited due to small numbers of observations on a country level, a multi-level regression model is not taken into consideration. At least it is implemented to indicate country-based differences in leverage for REITs and NON-REITs as a starting point for my analysis.

Some authors argue that transformed variables (often in lagged form) remove the potential for an endogenous relationship.[53] In many cases, authors take advantage of an exogenous shock that is unlikely to be correlated with most (or any) of the potentially endogenously determined variables in the system.[54] To overcome the endogeneity problem in the field of capital structure decision of REITs, exogenous influence and regulatory factors are investigated on their impact on REITs' leverage. This thesis is characterised by the absence of analysis of traditional influences on a firm's capital structure. Main focus lies on the analysis of the two data sets and the hand-collected data from EPRA reportings to test whether capital structure determinants are being dominated by regulation.

Interestingly, if I lag my independent variables the results will show the same picture compared to my ordinary least square models without having a lagged structure tested. Detailed results are presented in the Appendix (Tables E.9 and F.6 for REIT and NON-REIT respectively). In theory, lagged structures are often discussed and the empirical results are not consistent. In some contexts, there are clear theoretical reasons to expect that the effect of an explanatory variable only operates with a one-period lag. But to solve potential endogeneity problems with lagged explanatory variables is not approved in general.[55]

[52] **cf. Djurdjevic et al.(2008)**.

[53] **cf. Roberts and Whited (2013)**; **cf. Berg and Gider (2017)**; **cf. Frank and Goyal (2009)**; **cf. Rajan and Zingales (1995)**.

[54] **cf. Morrellec et al. (2012)**; **cf. Roberts and Whited (2013)**.

[55] **cf. Bellemare et al. (2017)**.

6.1.3 NON-REIT

In order to support the results based on the REIT sample, the NON-REITs as a control group are examined more closely. The aim is to work out differences in the design of capital structures and to test the significance of the regulatory requirements. For this purpose, I test regressions comparable to those I implemented for REITs. The main difference between the regressions are the variables that represent the regulatory requirements. These are not applied into my analysis of my control group as NON-REITs must not comply with those restrictions.

In a first step, my model specifies leverage as the dependent variable that is controlled by asset tangibility, profitability, growth opportunities, firm size, interest coverage, capital increases, age, law, marginal corporate income tax, rating and developed countries. The index i denotes the individual NON-REIT and epsilon represents the error term. The sample regression covers the full set of variables tested.

$$\begin{aligned} \hat{LEV}_i = \hat{\beta}_0 + \hat{\beta}_1 assettang_i + \hat{\beta}_2 profit_i + \hat{\beta}_3 growthopp_i \\ + \hat{\beta}_4 size_i + \hat{\beta}_5 interestcov_i + \hat{\beta}_6 taxshield_i + \hat{\beta}_7 age_i \\ + \sum \hat{\beta}_8 Law - Dummy + \sum \hat{\beta}_9 Capitalincrease - Dummy + \\ + \sum \hat{\beta}_{10} Rating - Dummy + \sum \hat{\beta}_{11} developedcountry - Dummy + \hat{\epsilon}_i \end{aligned} \tag{6.5}$$

My data had been tested for muliticollineartiy with a Variance Inflation Test (VIF), for heteroscedasticity and normal distribution.[56] Again, although our independent variables are not normal distributed, the residuals of our model, displayed in the QQ plot, show an almost normal distribution.[57] Starting with Model 3 in Table 6.12 leads to the following results: The dependent variable `leverage` is controlled by `assettang`, `profit`, `growthopp`, `size` and `interestcov`. The variables `assettang` as a proxy for collateral argumentation is statistically positive significant and in line with prior results.[58] The variable `profit` shows unstable ratios across countries. As the data quality for measuring profitability is low, a reliable interpretation of the values is not possible.[59] Consequently, any further interpretation of the data is disregarded as its reliability cannot be ensured. A positive relation exists between leverage and a firm's growth opportunities. Those growth opportunities in expectation lead to further investments and financing. Therefore, it is not surprising that high growth opportunities are accompanied by a potential increase in leverage to finance new projects. The variable `size` shows a statistically significant positive

[56] For detailed information see Appendix F.

[57] Comparable approach towards total sample and REIT sample. Approach based on **Davidson and Mackinnon (1993)**.

[58] see Chapter 3.2.

[59] Further information can be found in Chapter 5.2.3

effect which can be explained by lower bankruptcy costs, rating opportunities and diversified firm models explained in the trade-off theory. Finally, Model 3 controls for the variable `interestcov` which shows a statistically negative effect on leverage. Although the trade-off theory assumes an inverse statistically relationship, the results are consistent with results beyond classical capital structure theories.[60] Model 2 controls for two more variables such as `capitalincrease` and `taxshield`. The variable `capitalincrease` shows no statistically significance, while the variable `taxshield` shows a statistically positive influence on leverage, which is in line with the tax shield of debt incentive. In contrast to REITs, the tax shield hypothesis is supported by NON-REITs leading to an increase in leverage based on an increase of marginal corporate tax rates.[61] NON-REITs benefit from raising additional debt capital, as they can deduct interest expenses and thus reduce corporate tax. Finally, Model 1 controls for `age`, `law`, `rating` and `developedcountry`. Still, previous statistical relationships hold, except the variable `growthopp` which shows no statistical significance. This is the only inconsistency within the three models tested. The variable `age` shows a statistically negative effect on leverage, which is in line with the pecking order theory. As older firms show on average lower levels of asymmetric information the direction of the effect is plausible.[62] NON-REITs have on average lower levels of leverage in civil law based countries. This is in line with the characteristics of a civil law based country as weak investor protection intuitively leads to lower leverage. The positive effect of `rating` on leverage is supported by **Faulkender and Peterson (2006)** and **Lemmon and Zender (2004)**. Differentiating between developed and developing countries leads to the following results: NON-REITs headquartered in developed countries have on average more leverage compared to NON-REITs in developing countries. This is in line with results by **Demirguenc-Kunt and Maksimovic (1999)**, **Chui et al. (2002)** and **Rajan and Zingales (1998)**.[63] Appendix F.5 contains the NON-REIT sample applied to a fixed effect model.

[60] **Harrison et al. (2011)**.

[61] In some models REITs show a statistically positive effect of the variable `taxshield` on leverage, while this does not hold for all analyses implemented. For NON-REITs the variable is robust over all model specifications.

[62] See Chapter 3.2.

[63] See Chapter 3.2.1.

	Model 1 LEV	Model 2 LEV	Model 3 LEV
assettang	0.0669***	0.0811***	0.1062***
	(0.0118)	(0.0123)	(0.0119)
profit	0.0007	0.0261	0.0298
	(0.0064)	(0.0368)	(0.0474)
growthopp	-0.0056	0.0212**	0.0244***
	(0.0057)	(0.0083)	(0.0093)
size	0.0289***	0.0287***	0.0241***
	(0.0019)	(0.0017)	(0.0017)
interestcov	-0.0411***	-0.0421***	-0.0418***
	(0.0018)	(0.0019)	(0.0019)
capitalincrease	0.0012	0.0009	
	(0.0056)	(0.0061)	
age	-0.0472***		
	(0.0056)		
law	-0.0939***		
	(0.0065)		
taxshield	0.0022***	0.0059***	
	(0.0005)	(0.0005)	
rating	0.0406***		
	(0.0076)		
developedcountry	0.0431***		
	(0.0061)		
constant	0.1481***	-0.1313***	0.0871*
	(0.0423)	(0.0407)	(0.0360)
observations	4,224	3,888	4,225
R-squared	0.3243	0.2239	0.2005

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

TABLE 6.12: OLS pooled regression model – NON-REIT

6.2 Discussion

The aim of my analysis is to compare REITs and NON-REITs with respect to their leverage ratios. While Chapter 6.1.2 focuses on the results for REITs and Chapter 6.1.3 for NON-REITs, I will discuss the results and highlight the main differences in the following.

Table 6.13 presents the first empirical results. Starting with the variable `assettang` the coefficients between REIT and NON-REIT are both statistically positive significant on a 1% confidence level. For both types of firms higher ratios of asset tangibility lead to higher leverage ratios that are justified by the collateral argument already discussed in Chapter 6.1.2.[64] Comparing the results between REITs and NON-REITs, the coefficient for the variable `growthopp` shows that REITs rely more heavily on debt financing than NON-REITs do. This is caused by the existence of restrictions on profit distribution and the limited possibilities to retain earnings. The effect

[64]The analysis of the variable `profit` is neglected since the data for NON-REITs are not reliable to base interpretation on them.

of the variables `interestcov` and `size` is broadly the same for REITs and for NON-REITs.

	REIT LEV	NON-REIT LEV
`assettang`	0.0907***	0.1062***
	(0.0069)	(0.012)
`profit`	-0.375***	0.0298
	(0.0777)	(0.0474)
`growthopp`	0.0743***	0.0244***
	(0.0071)	(0.0093)
`size`	0.0112***	0.0241***
	(0.0014)	(0.0017)
`interestcov`	-0.082***	-0.0418***
	(0.0048)	(0.0019)
`constant`	0.2857***	0.0871**
	(0.0332)	(0.0360)
observations	3,458	4,225
R-squared	0.3379	0.2005

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

TABLE 6.13: Comparison of OLS pooled regression model for REIT and NON-REIT

To control for more variables beyond the traditional capital structure determinants, I enlarge my model with respect to six further variables.[65] In Table 6.14, the main differences between REITs and NON-REITs become apparent. For REITs capital increases are a vital approach to finance their business. Capital increases have a statistically negative effect on a REIT's leverage, whereas capital increases for NON-REITs show no significant influence. In general, capital increases are an important instrument for raising new capital. Preferential financing by means of capital increases is more important for REITs than for NON-REITs, due to existing restrictions REITS are confronted with and the lack of freedom in financing.

The variable `law` is statistically significant for both groups, but with opposite signs. REITs headquartered in a country that relies on civil law show higher leverage ratios, while NON-REITs show lower leverage ratios. The existence of the regulatory framework for REITs tends to dominate the influence of the variable. It seems that the effect of various determinants is being dominated by strict regulation in the real estate sector.

As already discussed, the tax shield hypothesis is an essential motivator for debt financing. I expect that tax shield aspects have less or a minor impact on REITs since they are exempt from corporate taxes while qualifying for REIT status. The results in my OLS regressions show that NON-REITs increase their leverage ratios in case

[65] The results including the variable `herding` are covered in Appendix G. See Table G.3 in particular.

	REIT LEV	NON-REIT LEV
assettang	0.0857***	0.0669***
	(0.0082)	(0.0118)
profit	-0.1733**	0.0008
	(0.0823)	(0.0064)
growthopp	0.0688***	-0.0056
	(0.0089)	(0.0057)
size	0.0104***	0.0289***
	(0.0015)	(0.0019)
interestcov	-0.0865***	-0.0411***
	(0.0055)	(0.0018)
capitalincrease	-0.0323***	0.0012
	(0.0049)	(0.0056)
age	-0.0105**	-0.0472***
	(0.0046)	(0.0056)
law	0.0379***	-0.0939***
	(0.0080)	(0.0065)
taxshield	-0.0003	0.0021***
	(0.0005)	(0.0005)
rating	-0.0293***	0.0406***
	(0.0051)	(0.0076)
developedcountry	0.0850***	0.0431***
	(0.0094)	(0.0061)
constant	0.2778***	-0.1480***
	(0.0370)	(0.0423)
observations	3,353	4,224
R-squared	0.3946	0.3243

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

TABLE 6.14: Comparison of OLS pooled regression model for REIT and NON-REIT – extended

Remark: OLS pooled regression estimates of the impact of capital structure determinants for REITs and NON-REITs during 2007-2018.

marginal corporate taxes are also increasing. This supports the tax shield hypothesis. For REITs, no statistical significance exists. Some model specification shows a small statistically positive effect of marginal corporate tax rates on leverage for REITs, but the effect vanishes in case I control for more variables. In contrast, NON-REITs show over all analyses a statistically positive effect. As REITs only benefit from a tax shield of debt for small amounts of non-distributed income, whereas NON-REITs benefit in total, the results are plausible. **Graham (2003)** investigates capital structure and tax incentives of firms. With respect to capital structure, there is evidence that high tax rate firms use debt more intensively than do low tax rate firms. He argues, although REITs' income is tax-exempt, they show on average higher debt ratios compared to real estate firms: These results motivate more intensively to determine other capital structure drivers in the field of REITs. With respect to my sample, I cannot confirm

that REITs have on average higher leverage ratios compared to NON-REITs.[66] But, results based on the tax hypothesis are applicable for NON-REITs while only being applicable in part for REITs.
The existence of a rating has a statistically negative effect on the leverage ratio of REITs, while the opposite applies for NON-REITs. The result for REITs is not in line with investigations by **Faulkender and Petersen (2006)**. Whether the results by **Kisgen (2006)** considering the credit-rating-capital structure hypothesis apply to REITs remains an unsolved question since my analysis focuses on the existence of a rating only but does not specify the exact rating.[67] As a consequence it is possible that the statistically negative effect of rating on leverage might be caused by this non-linear inverted U-shape.[68]

In conclusion Table 6.15 summarizes the main statistical differences between REITs and NON-REITs.

Variables	REIT	NON-REIT
`capitalincrease`	-	no sig.
`taxshield`	no sig.	+
`rating`	-	+
`law`	+	-

TABLE 6.15: Comparison between REIT and NON-REIT for selected variables

Remark: The comparison is based on the results of Table 6.14.

[66] This is in line with **Breuer et al. (2019)**.
[67] Further investigations cannot be implemented due to lack of sufficiently granular data.
[68] See Chapter 3.2.1.

Alternative Model Specification

In a next step, I compare REITs to NON-REITs with respect to different types of models. The results are shown in Table 6.16. The table reports panel regression results of a fixed-effect model in Panel A, pooled OLS without firm fixed effects (FFE) in Panel B and pooled OLS with firm fixed effects and time fixed effects in Panel C. Results include coefficients and robust standard errors in parentheses of determinants affecting a firm's leverage. For Panel A and Panel B the t-statistics use standard errors which are clustered at a firm level.
Although this thesis focuses on regulatory differences across REIT regimes, an analysis clustered by firm fixed-effects is implemented. Literature is most likely based on those model specifications for capital structure decisions of unregulated firms. In order to do justice to empirical evidence from literature, I include analysis of capital structure determinants that apply to REITs in general, while disregarding any country-based regulatory variations. The results show the following picture:
In Panel A, I apply a firm-fixed effect model. Again, I neglect the variable `profit` for NON-REITs. The only difference exists for REITs' and NON-REITs' growth opportunities. While REITs show a positive effect, the effect for NON-REITs reveals a statistically negative effect on leverage. Here, the importance of capital structure theories such as the trade-off theory and the pecking order theory is visible. As REITs are tax-exempt entities, the benefits and application of the trade-off theory is less reasonable. As a consequence aspects of the pecking order theory are more applicable towards REITs. REITs are restricted in retaining earnings leading to an increased demand on debt. The presence of additional regulations that REITs are obliged to adhere to, curtails any potential growth in leverage. In conclusion, REITs need to finance their business with capital increases while being confronted with severe costs of asymmetric information. In contrast, NON-REITs seem to behave in a way that is more in line with traditional capital structure theories. The sign of the coefficient of the variable `capitalincrease` indicates that NON-REITs operate based on the trade-off theory which is supported by results by **Morri and Christanziani (2009)**.
Panel B includes an OLS regression model without firm fixed effects. Again, country-specific regulations are not considered within this model. The only difference between REIT and NON-REIT shows the sign of the coefficient of the variable `capitalincrease`. While REITs more heavily rely on capital increases as a financing opportunity compared to NON-REITs, the results are plausible. This is also in line with the results from Panel A indicating that REITs follow more intensively pecking order theory argumentation.[69]
The OLS regression model in Panel C includes calendar year fixed effects. I include year fixed effects in my analysis. Comparable to my main OLS for REITs, the independent variables show the same picture. This leads to the suggestion that temporal

[69] In Panel B the variable `growthopp` shows the same significance and effect on leverage for REITs and NON-REITs respectively.

influences have no effect on the capital structure determinants of REITs. This is in line with the constant existence of regulation over time. Operating under these (binding) restrictions does not show any deviations in significance over time. One could argue that based on these results, market timing aspects are less applicable to REITs.[70] To be more precise, the importance of regulatory power over capital structure decisions for REITs become more apparent. To analyse the REIT data set based on property segments, the results are similar to those of the main pooled OLS approach. Comparable to the year fixed effects controlling for property segments leads to no differences in significance or direction of influence. Regulatory frameworks apply to REITs in general and are not specified towards a single property segment REITs are operating in.
As those results explain capital structure decisions following theory only in part, the importance of regulatory variables is strengthened which leads to my next paragraph.

[70] **cf. Breuer et al. (2019)**.

	Panel A: Fixed Effect		Panel B: Pooled OLS without FFE		Panel C: Pooled OLS with FFE		
	REIT	NON-REIT	REIT	NON-REIT	REIT	NON-REIT	REIT
assettang	0.0594***	0.0833***	0.0878***	0.1061***	0.0878***	0.1061***	0.0878***
	(0.0086)	(0.0127)	(0.0069)	(0.0119)	(0.0093)	(0.0142)	(0.0182)
profit	-0.166***	0.0035	-0.3178***	0.0299	-0.3178**	0.0299	-0.3178***
	(0.0377)	(0.0075)	(0.0786)	(0.0476)	(0.1270)	(0.0189)	(0.0554)
growthopp	0.0126**	-0.017**	0.0741***	0.0244***	0.0741***	0.0244***	0.0741***
	(0.0126)	(0.0042)	(0.0071)	(0.0093)	(0.0048)	(0.0068)	(0.0134)
size	0.0260***	0.0675***	0.0112***	0.0241***	0.0112***	0.0241***	0.0112**
	(0.0035)	(0.0034)	(0.0014)	(0.0017)	(0.0013)	(0.0009)	(0.0042)
interestcov	-0.0505***	-0.0204***	-0.0818***	-0.0418***	-0.0818***	-0.0418***	-0.0818***
	(0.0025)	(0.0013)	(0.0049)	(0.0019)	(0.0056)	(0.0019)	(0.0090)
capitalincrease	-0.0232***	-0.0149***	-0.0314***	-0.0010	-0.0314***	-0.001	-0.0314***
	(0.0029)	(0.0033)	(0.0049)	(0.0062)	(0.0050)	(0.0104)	(0.0086)
constant	-0.0019	-0.7739***	0.3029***	0.0870**	0.3029***	0.0870***	0.3029**
	(0.0782)	(0.0687)	(0.0334)	(0.036)	(0.0309)	(0.0231)	(0.0876)
firm fixed effects	Yes	Yes	No	No			
property fixed effects							Yes
calendar year fixed effects					Yes	Yes	
observations	3,458	4,225	3,458	4,225	3,458	4,225	3,458
R-squared (within)	0.1868	0.1858					
R-squared (between)	0.2293	0.1133					
R-squared (Overall)	0.2003	0.1061	0.3459	0.2005	0.3459	0.2005	0.3459

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

TABLE 6.16: Comparison of model specification – REIT and NON-REIT

Hypothesis revisited

In the following, I resort to my hypotheses presented in Chapter 4. As a reminder, the table shows the hypotheses and notes in the right column whether the hypothesis cannot be rejected by the empirical analysis. The hypotheses relating to the event study are not considered in this paragraph and will be analysed in Chapter 7.

TABLE 6.17: Hypothesis

Hypothesis		analysis	supported
H1	In countries with less (more) restrictive requirements with regard to the distribution of operating income, REITs have lower (higher) leverage ratios.	Table 6.3	No
H2	REITs located in countries where regulation specifies a maximum leverage ratio, in addition to mandatory high dividend distribution, have lower leverage ratios.	Table 6.6	✓
H3	The existence of sanctions has a negative effect on REITs' leverage ratios.	Table 6.10	✓
H4	Marginal corporate tax rates have no significant effect on REITs' leverage ratios.	Table 6.2[71]	✓
H5	In countries with severe sanctions and the existence of restrictions on the distribution of profits, leverage is negatively affected.	Table 6.10	✓

[71] See also Table 6.5 and the corresponding interpretation.

The first hypothesis focuses on how regulations on the distribution of operating income impact leverage. Intuitively, one would expect the following relation: The more severe the profit distribution is regulated, the more debt financing is favored. But, this does not hold in all of my analyses. Looking at the variable `profitdistribution` in isolation and not combining it with other regulatory variables or interaction variables, lead in part to opposite results. This indicates that the regulation in place cannot be analysed in isolation, moreover the variables interact and should be combined to be interpreted correctly. Those interim results lead to my second hypothesis. This combines two regulatory variables, namely profit distribution and leverage restriction. Following the approach by **Dogan et al. (2019)** I cannot reject the hypothesis that REITs located in countries where regulation specifies a maximum leverage ratio, in addition to mandatory high dividend distribution, have on average lower leverage ratios. Going one step further, I include a dummy variable that measures the effect on leverage based on the existence of sanctions. I test whether the existence of sanctions has a negative effect on REITs' leverage ratios. This hypothesis cannot be rejected. Based on my results in Table 6.10, the existence of sanctions, e.g. the loss of REIT status or penalties, in combination with shareholder requirements and profit distribution requirements, shows a statistically negative effect on leverage.[72] Further, I indirectly test the application of the trade-off theory for REITs which is based on the variable `taxshield`, proxied by marginal corporate tax rates. As a major driver of debt financing, tax shield considerations play an important role in a firm's capital structure. To support that regulation mainly drives capital structure for regulated firms, here REITs, I tested the effect of marginal corporate tax rates on leverage for REITs and NON-REITs. As already mentioned in Chapter 6.2, tax shield consideration influences the capital structure for NON-REITs while being in part neglected by REITs.
Concentrating on the shareholder body and the corresponding restrictions for REITs, empirical evidence shows a statistically negative effect on leverage, in case severe sanctions are set by the government while not being complied with the REIT law.[73] As the regulator intervenes in the real estate industry with restrictions that directly or indirectly affect a shareholder of a REIT, the superior relevance of regulation compared to traditional capital structure theories is supported. The combination of high payout ratios of operating income and low levels of debt financing turns out to be in favor of the shareholder. This leads to a possible motivation of the regulator to set those restrictions to light.

[72] Detailed results and interpretation can be looked up in Chapter 6.1.2.
[73] See Hypothesis 5.

Chapter 7

Event Study Analysis

The aim of the following analysis is to measure the differences in leverage for specific NON-REITs that transform at some point in time into a REIT structure as illustrated in Figure 7.1. There is hardly any empirical evidence on corporate behavior around REIT IPO which serves as the starting point for the analysis. Using an event study and structural break model, the analysis will focus on the extent to which regulation affects the financing decisions of a REIT. The aim is to broaden my initial analysis and provide additional insight into REIT capital structure. Using three firms as a starting point, I show the time and content-based transformation process into REIT status to learn something about the regulatory influence on capital structure decisions in regulated industries.

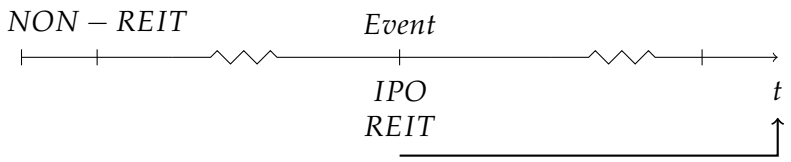

FIGURE 7.1: Event Study REIT

7.1 Literature Review

Some research in the field of REITs and the effect of REIT status on corporate finance issues has been already done. **Morri and Cristanziani (2009)** work with REIT dummy variables and find that there exists a significant negative value effect showing that companies adopting the REIT status are characterized by lower leverage, mainly caused by the loss of tax shield. This result stands in contrast to a list of other investigations specified in the REIT market. Based on early investigations by **Damodaran et al. (1997)**, REITs in financial distress tend to an unregulated legal form. The change from a REIT to a corporation leads to substantially smaller dividend payments and will allow for a non radical restructuring of the assets. Specifically, such firms often sell a significant portion of their existing assets and replace them with new assets. These results indicate that the REIT structure does impose costs

on a firm. For financially distressed firms, which need more flexibility in financial policies and asset acquisitions, the costs are higher. In contrast NON-REITs have, due to lower regulatory requirements, more flexibility in managing assets, making investment decisions and engaging activities that are not permitted for REITs.
In the REIT event study by **Feng et al. (2007)** the authors observe an increasing trend in book leverage ratio in the early years after IPO. Their sample average leverage ratio stabilizes around 65% as REITs mature. The average debt ratio is 52% one year after IPO and steadily grows up to 65% ten years later. This continuously growing debt ratio over time does not support the notion of a stable target capital structure.
Lemmon et al. (2008) run an event study. The authors examine the event-time evolution of leverage among the sub-sample of their non-financial firms. They mention that the last observable leverage ratio is a reasonable proxy for future leverage ratios. Applying this concept to REITs, it is unlikely that the last observable leverage ratio is an important driver of capital structure choices. More likely, the dominance of regulation needs to be tested as a capital structure driver for REITs.

7.2 Three examples for a REIT transformation

During the data cleaning process two Spanish companies and one South African company had been detected to be appropriate firms to be analysed more in depth.[1] To understand the process of becoming a REIT by content and time, a descriptive analysis of three companies will follow:

- Inmobiliaria Colonial SOCIMI S.A., Spain
- MERLIN Properties SOCIMI S.A., Spain
- Delta Property Fund, South African

Inmobiliaria Colonial SOCIMI SA

Inmobiliaria Colonial SOCIMI SA, formerly Inmobiliaria Colonial SA, is a Spanish company engaged in owning and operating real estate. The company's activities are divided into two business segments: property rental and land and development. The property rental division focuses on the acquisition, development, leasing and sale of office buildings across Europe. The land and development division includes shopping centers managed by the Riofisa subgroup. The company's real estate portfolio comprises office buildings located in Barcelona, Madrid and Paris. Inmobiliaria Colonial SOCIMI SA controls a number of subsidiaries, such as Torre Marenostrum SL, Societe Fonciere Lyonnaise SA, Danieltown Spain SLU and Colonial Invest SLU.[2]

[1] The two Spanish companies had been eliminated from the final sample due to outliers in data well after the IPO. Still, the South African company is included in the final sample.

[2] **cf. Thomson Reuters Datastream**.

IPO Inmobiliaria Colonial S.A. enacted in 1999. On May 22, 2017 there had been the approval from the Board of Directors to submit the application to SOCIMI status, the Spanish form of a REIT. The process of becoming the REIT status took only three months. Detailed information of the process are displayed in the time line 7.2 and the summary below:

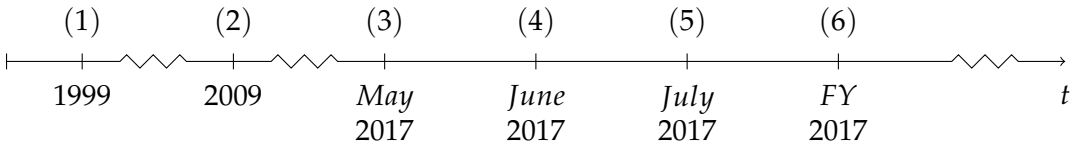

FIGURE 7.2: Inmobiliaria Colonial SOCIMI S.A.

(1) IPO Inmobiliaria Colonial S.A.

(2) REIT enactment Spain

(3) Approval from BoD to submit application to SOCIMI status

(4) AGM approval of application to SOCIMI status. Following AGM approval communication of the SOCIMI status election to tax authorities

(5) Amendments by law in accordance with SOCIMI status rules and comparable European REITs

(6) SOCIMI status will apply for entire 2017 fiscal year

As the transformation from an unregulated to a regulated firm may affect the shareholder body and other firm-specific requirements, the board of director argued along the following aspects of why to apply for SOCIMI status:

- Reduction of tax rate from 25% to 0% in Spain.
- Improvement of company cash flow and fundamental value including increase of FFO per share and EPS.
- Positive impact on consolidated group equity and future income statements.[3]
- Current benefits from use of tax credits remain fully in place subject to legal limitations.
- Enhanced visibility in capital markets (firms current institutional shareholders could deploy additional money coming from REITs; access to REIT only-funds that currently would not be able to invest in the firm).

[3]For further details see Annual report 2017.

- Access to a broader institutional investor universe.

- Increased liquidity with potential positive impacts on cost of capital.

Figure 7.3 illustrates, that over time, the firm showed unstable but in the long run decreasing leverage ratios. By REIT law, the leverage restriction were relaxed over time. Since 2017 Spanish REITs are free in their financing decisions which is reflected in the non-existence of leverage restrictions. Although leverage is not limited to a certain amount, the firm did converge to the Spanish REIT industry median leverage ratio. Again it is questionable what capital structure drives. Here, it makes sense to split the observation period in different time periods. First, in the time of the application process. The regulator requires the leverage ratio to be below the country-specific threshold. Second, following these restrictions leads in the long run to be geared to the industry leader without breaching the leverage restriction. Mimicking the industry leader leads to indirectly following the overall restrictions by law.

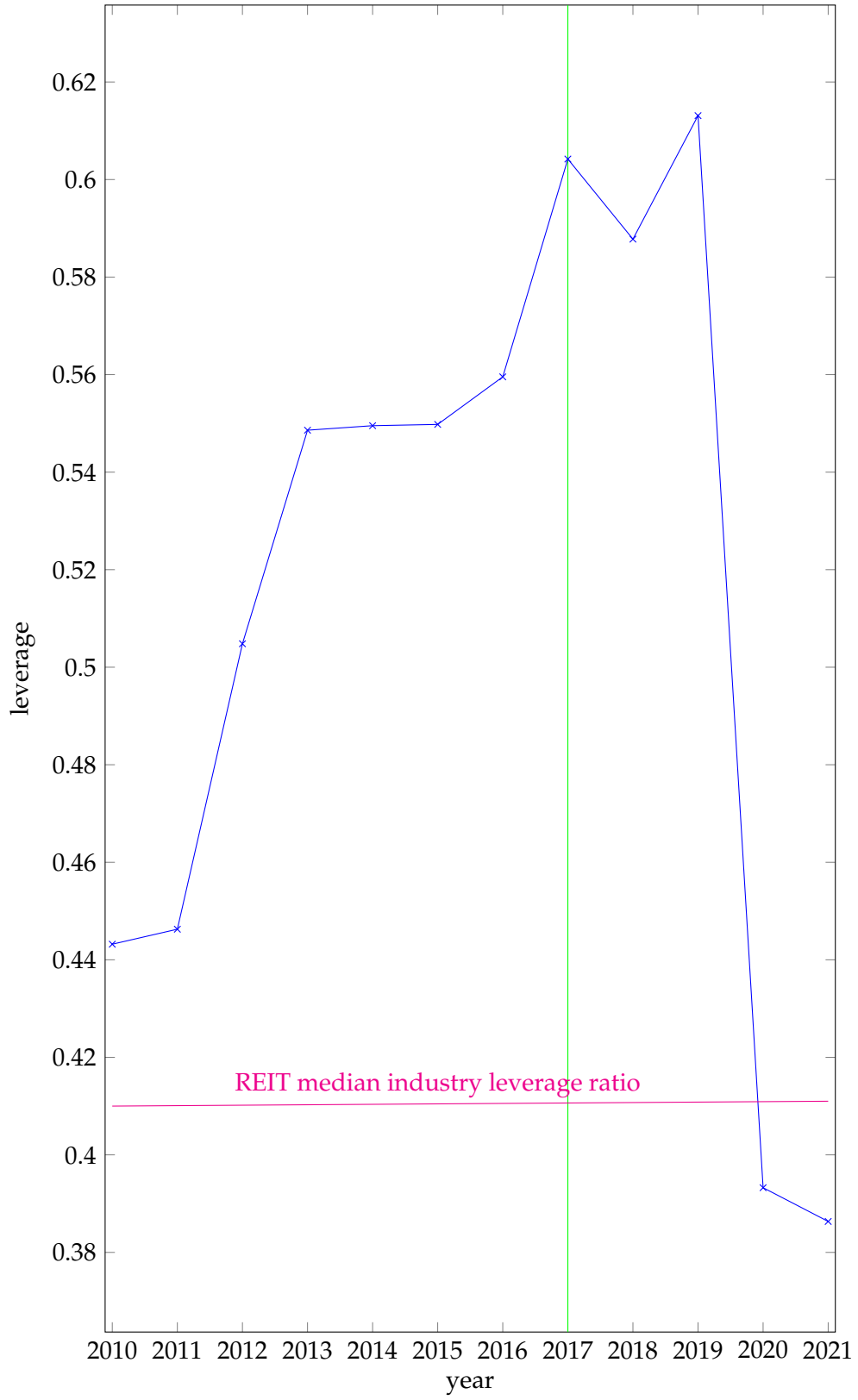

FIGURE 7.3: Inmobiliaria Colonial SOCIMI S.A. – leverage ratio (2010-2021)

MERLIN Properties SOCIMI S.A.

MERLIN Properties SOCIMI S.A. is a Spanish real estate investment trust. The company focuses on the acquisition, management and lease of commercial properties located in the Iberian Peninsula, primarily in Spain. The company's activities are divided into the following segments: office buildings, operating a portfolio of office space, high-street retail, engaged in leasing retail stores, shopping centers, engaged in managing department stores, logistics, operating logistics warehouses and distribution centers, and others. The company's other activities include property management services offered to third parties.[4] MERLIN Properties SOCIMI S.A. decided to become a REIT in 2014 which is five years after a REIT structure had been enacted in Spain. The company had been the industry leader with respect to market capitalisation until 2020, but had lost the position to Inmobiliaria Colonial SOCIMI S.A. that grew rapidly after the transformation to REIT structure. Figure 7.4 shows the development of book leverage from 2010-2021.[5] The vertical green line indicates the first financial year with REIT status, which is 2014. The horizontal line in red shows the leverage restriction in place. From 2010-2013 the leverage threshold was set to 70%, after 2013 there exist no more leverage restriction. The blue line shows the corresponding leverage ratios per year. Applying for REIT status reveals a drastically decrease in leverage. This descriptive result is taken as the motivation to analyse the effect of REIT status more in detail. One the one hand, the beginning of acting as a REIT leads to decreasing leverage ratios. On the other hand, switching from an unregulated industry to a regulated industry follows different median industry leverage ratios and a difference in the peer effect. The horizontal pink line act for the median industry leverage ratios and represents indirectly the herding effect.

[4] **cf. Thomson Reuters Datastream**.

[5] Referring to data from Thomson Reuters Datastream the book leverage ratio in 2013 shows an implausible value of 1.0274, which is above 1.

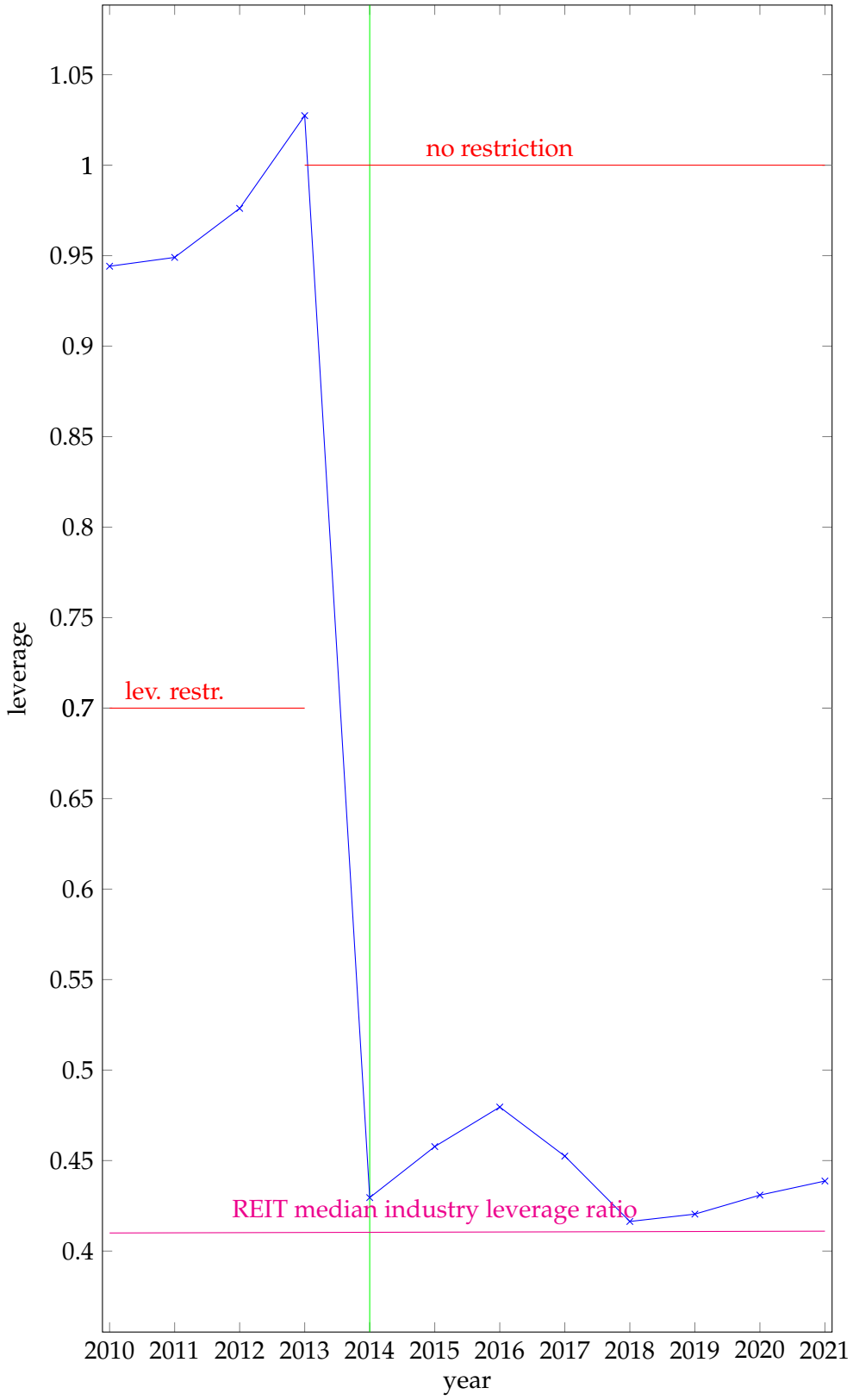

FIGURE 7.4: MERLIN Properties SOCIMI S.A. – leverage ratio (2010-2021)

Delta Property Fund

Delta Property Fund Limited is a real estate investment trust based in South Africa. The company offers among others access to a portfolio of government and parastatal tenanted buildings, providing secure income streams and large, single tenant occupancy. It has approximately 100 properties with gross lettable area of 909,984 square meters. The company operates in the following business segments: retail, office government, office other, industrial and administration. The company's properties are located in several of South Africa provinces. Its properties include well-known buildings such as Beacon Hill, Broadcast House, Campus Building and Anchor House. The company's subsidiary, Delta Property Asset Management Proprietary Limited provides asset management services. Its subsidiaries Delta Property Services, Broll Management Services Proprietary Limited and Excellerate Real Estate Services provide property management.[6] The IPO had been in 2010. One year after the REIT structure had been enacted in South Africa (2013), the firm transformed into a REIT. Figure 7.5 illustrates the development of leverage from 2013-2022. Since 2014 the company operates as a REIT. The corresponding leverage restriction in South Africa is set to 60%. Prior to the transformation to a REIT structure, the company shows higher leverage than the REIT law permits. With the beginning of the REIT, the book leverage ratio declines to a level below the 40% threshold. Again, regulation shows an impact on the capital structure of a firm. Whether this holds in general will be tested in my further analysis.

[6] **cf. Thomson Reuters Datastream**.

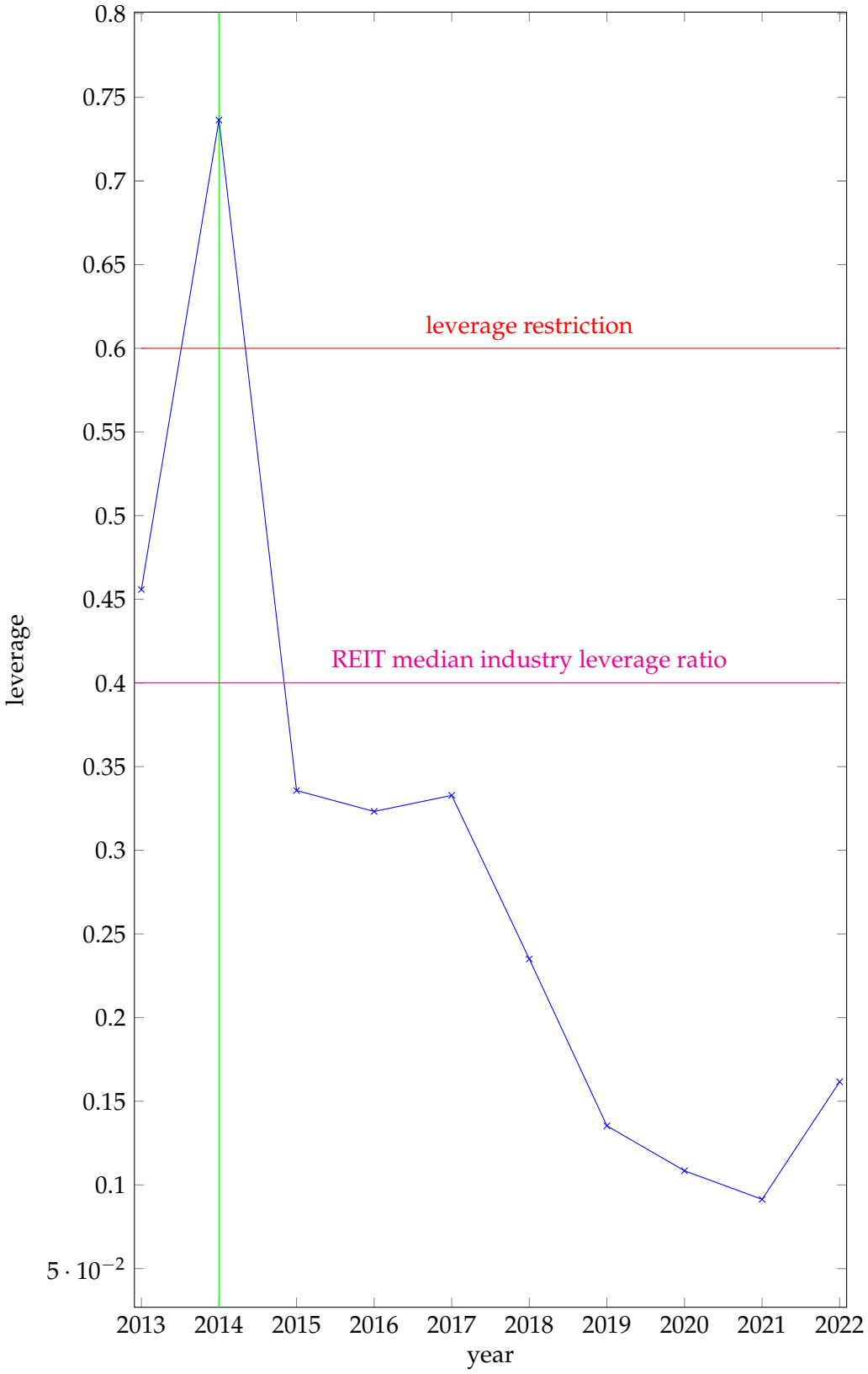

FIGURE 7.5: Delta Property Fund – leverage ratio (2013-2022)

7.3 Hypothesis

My main interest is to test whether the transformation into a REIT shows significant lower leverage ratios compared to NON-REITs. As shown in Chapter 6, NON-REITs have on average higher leverage ratios compared to REITs. In this chapter, my main focus is on the event of the transformation into a REIT structure and on whether this event shows significant differences in the ex ante and ex post window in terms of leverage ratios (H6). The aim is to find evidence on whether REIT-specific regulations are binding and to further support my results from Chapter 6.2. In addition to the REIT status event hypothesis, I want to analyse the capital structure of a firm before and after the transformation more in detail. As management decides to operate as a REIT some time before the event takes place, it is reasonable, that a so called *adaption* or *bunker process* will start. On the one hand, management knows in advance to apply for REIT status and to adapt key performance indicators to comply with certain restrictions (H7). On the other hand, companies increasingly take on debt before the REIT transformation, knowing that they will follow the REIT regulations after time t and will be restricted in their financing options accordingly. Through the adjustment period granted by law, debt can be reduced in the following years to comply with the regulations.[7] My next hypothesis (H8) is based on this, while focusing more closely on the period after the transformation. Here, I analyse whether REITs undergo an adaptation process to comply with the restrictions or whether a gradual reduction of debt already prior the REIT transformation takes place.

TABLE 7.1: Hypotheses REIT status

Hypothesis	
H6	The REIT Classification (IPO) has a negative impact on leverage.
H7	Leverage is reduced before REIT classification.[8]
H8	Leverage is reduced after the REIT classification. [9]

[7] For most of the countries in my sample an adjustment period of two years is granted by law.

[8] Knowing the REIT transformation in advance leads to a stepwise reduction of leverage prior the REIT status date to comply with the REIT regulation.

[9] As REITs follow a transformation and adaption process of approximately two years, a stepwise reduction of leverage is expected.

7.4 Data

Chapter 7.4 describes the sample, explains the variables employed and presents the main descriptive findings of the samples and variables. My sample consists of data from Thomson Reuters Datastream and hand-collected data focusing on REITs' date of becoming public. The data collection and data preparation process for the corporate data are explained in detail. All terms in `typewriter` represent variables.

7.4.1 Sample and Variables

Within my analysis firms that are not directly founded as a REIT are considered only. Therefore, I analyse firm data before and after the date of becoming public, also named as the initial public offering (IPO) date. This date represents the transformation date of applying for REIT status and is consequently representing the event. This means, the event is defined as the change of a NON-REIT corporation to a REIT corporation. A firm acting as a REIT needs to be officially classified as such by the country-based regulator under the condition that the REIT-specific restrictions are complied to. Whether a firm is acting as a REIT or not is double-checked with the help of IPO data and stock price data provided by Thomson Reuters Datastream. Due to the fact that Thomson Reuters Datastream does not strictly differentiate between NON-REITs and REITs by looking at firm data of the past, the hand-collected IPO date is compared to the beginning of the stock price time series of each and every firm. Again, I concentrate on REITs with listing requirements in place only. REIT status information is hand-collected via country-based official registers, firms' annual reports and homepages and compared to the data from Thomson Reuters Datastream. I exclude firms with unreasonable high values of leverage.[10]
Since EPRA reportings prior 2007 are not available for all countries, I overwrite restrictions to countries that lack in data. The following countries and corresponding years are affected by this:

- Belgium 2004-2006
- Canada 2003-2006
- France 2004-2006
- Hong Kong 2005-2006
- Singapore 2004-2006
- Turkey 2002-2006
- United States of America 1984-2006

[10] Inmobiliaria Colonial SOCIMI SA and Merlin Properties SOCIMI SA had been excluded. The main use of those firms had been to visualize the REIT transformation process.

7.4.2 Descriptive Statistics

My data set consists of 1,317 firm year observations from 105 firms. In total, the NON-REIT sample consists of 419 observations and the REIT sample of 898 observations. The sample distribution by country and type of firm is presented in Table 7.2. Comparable to my analysis in chapter 5, the US make up the largest share in the sample followed by France and Belgium. In sum, 13 countries are included.

Country	NON-REIT	REIT	Total
Australia	16	38	54
Belgium	49	58	107
Canada	12	18	30
France	88	185	273
Hong Kong	10	34	44
Japan	4	9	13
Malaysia	3	9	12
New Zealand	7	4	11
Singapore	10	65	75
South Africa	9	17	26
Turkey	28	67	95
United Kingdom	32	41	73
USA	151	353	504
	419	**898**	**1,317**

TABLE 7.2: Firm year observations per country

To start with a time frame of 17 years, the data set contains firm year observations seven years before and ten years after the event takes places.[11] Prior the event there exists an increasing number of observations followed by a decrease after REIT status for the following years. Figure 7.6 shows the distribution of observations per year in absolute numbers. The red vertical line represents time 0, the first year of operating as REIT and being transformed as such. The persistence of REIT structure over time is weak reflected by decreasing observations. With the help of a histogram I analyse the frequency distribution of data points close to the date of becoming a REIT. In the histogram H.1 (Appendix H) the abscissa *time frame* shows the distribution for each and every point in time (here: year) deviating positively or negatively from time 0, that represents the event. The data sample follows an almost normal distribution which is still sufficient to proceed with the analysis.
Table 7.3 clusters leverage ratios by country and by time. In total, leverage variation averaged across all countries is between 0.373 and 0.445 and shows a systematic pattern without any outliers. In contrast to that, within country leverage variation is

[11] I delete eleven observations for NON-REITs in the data set prior the start of the time frame of my analysis. This includes three firms from the United States.

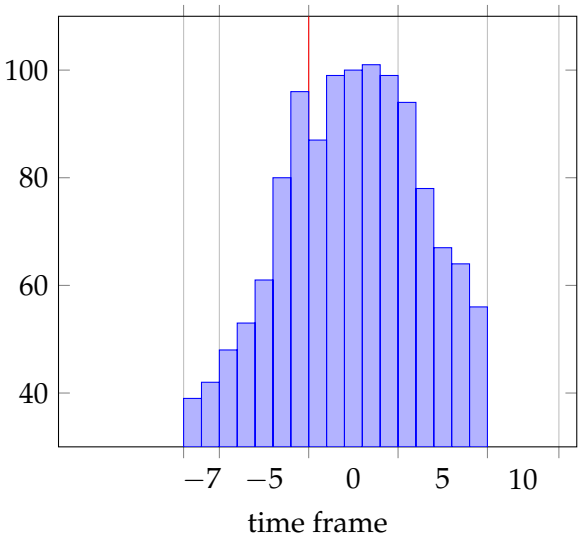

FIGURE 7.6: Firm year observations (in absolute numbers) before and after REIT status is obtained (date 0)

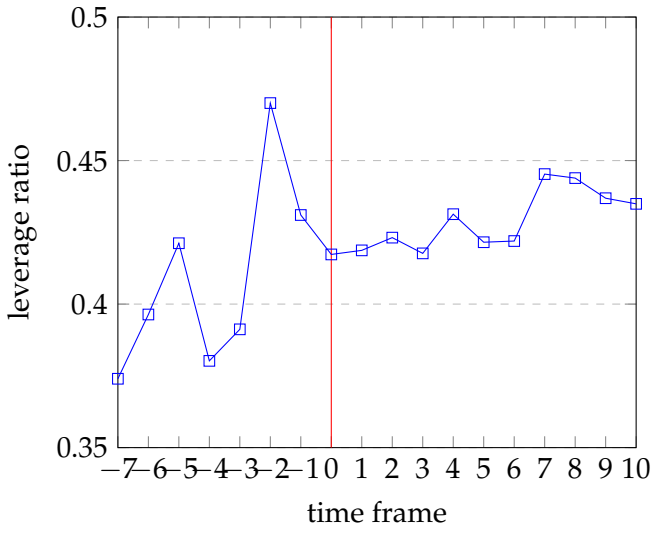

FIGURE 7.7: Average leverage ratio before and after REIT status

large in case of averaging over time. Figure 7.7 shows that two years prior the event a book large leverage ratio exists that decreases in the following years.

Country	-7	-6	-5	-4	-3	-2	-1	**0**	1	2	3	4	5	6	7	8	9	10	average
Australia	0.287	0.674	0.739	0.413	0.471	0.477	0.434	0.378	0.362	0.365	0.312	0.347	0.335	0.292	0.313	0.244	0.230	0.238	0.375
Belgium	0.301	0.334	0.341	0.384	0.407	0.425	0.402	0.419	0.420	0.407	0.397	0.440	0.400	0.362	0.313	0.325	0.323	0.260	0.386
Canada	0.225	0.218	0.281	0.258	0.320	0.355	0.321	0.403	0.375	0.359	0.373	0.409	0.429	0.436	0.467	0.477	0.437	0.441	0.363
France	0.428	0.383	0.426	0.343	0.237	0.371	0.339	0.426	0.453	0.472	0.456	0.493	0.469	0.469	0.494	0.481	0.474	0.441	0.432
Hong Kong				0.560	0.383	0.420	0.359	0.263	0.228	0.276	0.278	0.290	0.296	0.282	0.254	0.284	0.368	0.369	0.315
Japan				0.106			0.371	0.369	0.501	0.488	0.452	0.440	0.460	0.475	0.476	0.480			0.420
Malaysia					0.169	0.173	0.153		0.350	0.333	0.309	0.310	0.333	0.332	0.342	0.385	0.378		0.297
New Zealand	0.455	0.450	0.386	0.396	0.360	0.334	0.345	0.410	0.348	0.303	0.308								0.372
Singapore						0.240	0.332	0.299	0.352	0.338	0.304	0.310	0.339	0.357	0.356	0.337	0.357	0.337	0.330
South Africa	0.067	0.163	0.177	0.178	0.185	0.130	0.538	0.519	0.343	0.370	0.248	0.363	0.426						0.333
Turkey	0.153	0.095	0.333	0.128	0.327	0.254	0.134	0.169	0.200	0.269	0.275	0.237	0.231	0.226	0.295	0.278	0.362	0.324	0.237
United Kingdom	0.344	0.388	0.376	0.286	0.401	0.403	0.352	0.325	0.378	0.381	0.396	0.362	0.287	0.260	0.237	0.278	0.272	0.230	0.344
USA	0.436	0.453	0.491	0.489	0.549	0.624	0.590	0.491	0.483	0.486	0.505	0.505	0.498	0.496	0.501	0.499	0.463	0.479	0.506
All Countries	0.373	0.396	0.421	0.380	0.391	0.470	0.431	0.417	0.418	0.423	0.417	0.431	0.421	0.421	0.445	0.443	0.436	0.434	0.423

TABLE 7.3: Leverage ratio by country and time

7.5 Analysis

Analysis of the effect of the REIT classification on capital structure is based on a step-wise approach. First, I run an event study to identify significant points in time that affect a firm's leverage ratio. In a second step, I concentrate on the REIT transformation process more in depth and implement a structural break model to highlight structural changes of leverage at in different point in time. As my data has no collective starting point, variables are not deflated to a joint reference point. I use the merged data set to test for differences in means for leverage between firms that are subject to regulation and NON-REITs. To be specific, I use the **Welch (1947)** two-sided test for unequal variances (Welch's t-test). Differences in means of leverage have not been detected between the two groups (untabulated). Although the test shows no significance further analysis is implemented, as data outliers may bias a group's mean and lead to insignificant results.
Within my event study, I regress book leverage on the following control variables: `assettang`, `profit`, `size`, `interestcov`.[12] As this OLS is an interim step for further investigations, the results are provided in Table H.1 in Appendix H only. Based on these results, I predict the residuals of this model to implement those in my event study as the new dependent variable. Here, I follow the approach by **Edmans et al. (2007)**. The residuals of the model, displayed in the QQ plot (Appendix H), show an almost normal distribution. Following **Davidson and Mackinnon (1993)**, I use robust standard errors to deal with heteroscedasticity. While having the residuals as the dependent variable in my event study and having controlled for the relevant capital structure determinants, the main focus is on the differences within the lead and lag structure. As the transformation of a REIT triggers capital structure considerations before and after the event, an effect in a relatively narrow ex ante and ex post window is expected. The results are displayed in Table 7.4. The items labeled as `lead` represent the time frame acting as a NON-REIT. The items labeled as `lag` show the coefficients for REITs. My tests reveal that the years before and the years after the REIT status have a statistically (in)significant effect on leverage: In detail, prior the event the coefficient shows a positive effect (`lag2`, although being not significant) on leverage while a statistically significant negative effect exists ex post. Those results are based on an event study that takes `lead(1)` as the reference point. The corresponding results are presented on the left side in Table 7.4. Taking `lead(2)` as the baseline for the event study, the results are presented on the right side of the regression output. Comparing leverage variation with point in time two years prior the event, indicates to some *adaption* or *bunker process*. The results show a highly significant effect in the event and the following years. Transforming into a REIT structure leads to a statistically significant decrease of book leverage ex post. As I test for baseline `lead(1)` and baseline `lead(2)`, I cover considerations of

[12]The variable `growthopp` is not included as reliable year end stock price data and numbers of outstanding stocks is not available for a sufficiently large number of firms.

management discussions in the annual meeting about the transformation process in general. A graphical illustration is given in Figure 7.8 and 7.9 for the point estimates for the baseline `lead(1)` and `lead(2)`.[13]
These interim results further support the notion that regulation as an external mechanism has an impact on a firm's financing decisions.

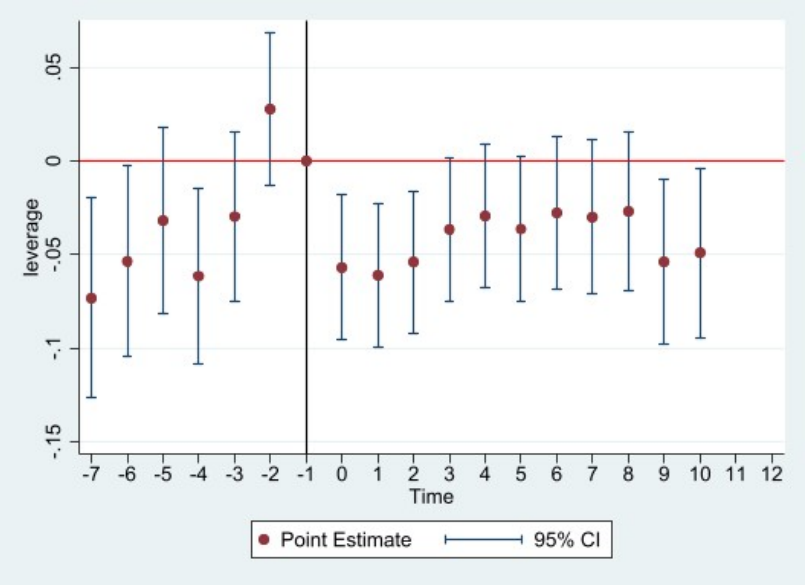

FIGURE 7.8: Point estimate – Residuals of Leverage Event Study baseline (-1)

Notes: Point estimates are displayed along with their 95% confidence intervals. The baseline (omitted) base period is 1 year prior to the event, indicated by the solid vertical line in the plot.

[13]The baseline option in stata specifies the reference point for the event study. This is a baseline omitted category to which all other periods should be compared on the event study output. By default this value is set at lead(1). By considering the variation in outcomes around the adoption of the event compared with a baseline reference period, both event lags and leads are estimated, allowing for a clear visual presentation of the event's causal impact. For further explanation see stata.com.

	residuals LEV baseline (-1)	residuals LEV baseline (-2)
lead7	-0.0733***	-0.1010***
	(0.0272)	(0.0274)
lead6	-0.0536**	-0.0812***
	(0.0258)	(0.0260)
lead5	-0.0319	-0.0596**
	(0.0254)	(0.0256)
lead4	-0.0616**	-0.0893***
	(0.0241)	(0.0243)
lead3	-0.0298	-0.0574**
	(0.0232)	(0.0234)
lead2	0.0276	baseline
	(0.0206)	
lead1	baseline	-0.0276
		(0.0206)
lag0	-0.0569***	-0.0846***
	(0.0198)	(0.0204)
lag1	-0.0610***	-0.0887***
	(0.0196)	(0.0200)
lag2	-0.0541***	-0.0818***
	(0.0194)	(0.0199)
lag3	-0.0366*	-0.0642***
	(0.0195)	(0.0199)
lag4	-0.0295	-0.0572***
	(0.0195)	(0.0199)
lag5	-0.0364*	-0.0640***
	(0.0196)	(0.0200)
lag6	-0.0278	-0.0554*
	(0.0209)	(0.0214)
lag7	-0.0300	-0.0576***
	(0.0211)	(0.0215)
lag8	-0.0270	-0.0546**
	(0.0215)	(0.0219)
lag9	-0.0540**	-0.0816***
	(0.0225)	(0.0229)
lag10	-0.0492**	-0.0768***
	(0.0230)	(0.0233)
constant	0.0362**	0.0639***
	(0.0143)	(0.0149)
observations	1,026	1,026
number of firms	93	93
R-squared (within)	0.0419	0.0419
R-squared (between)	0.0050	0.0050
R-squared (Overall)	0.0159	0.0159

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

TABLE 7.4: Event study for NON-REIT and REIT

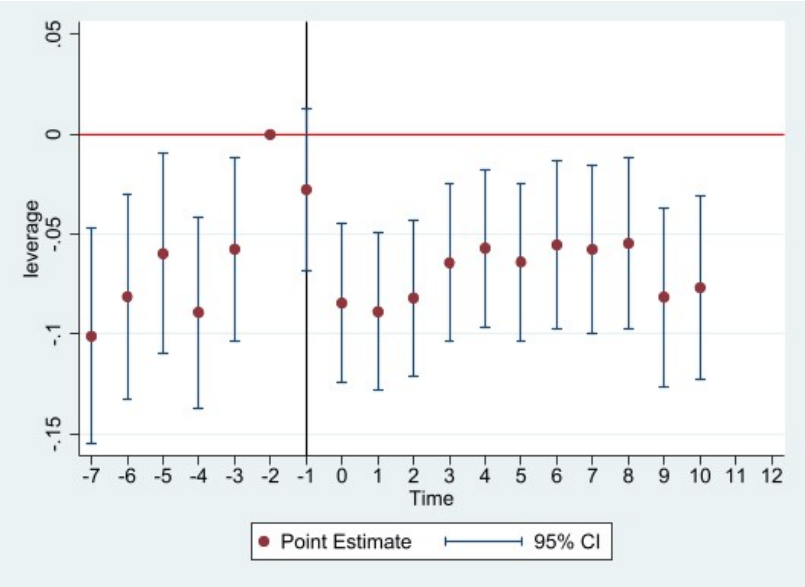

FIGURE 7.9: Point estimate – Residuals of Leverage Event Study baseline (-2)

Notes: Point estimates are displayed along with their 95% confidence intervals. The baseline (omitted) base period is 2 years prior to the event, indicated by the missing data line in the plot.

In the following, I present a structural break model to test for differences in book leverage for several points in time. Here, the main focus is based on the statistically significant points in time defined in my event study and a narrow time frame around the event. Data is clustered by specific time frames that are presented in Table 7.5 and are tested separately:

variable	time frame
`sTen4minus`	-7 to -4
`sTen2minus`	-4 to -2
`sTen0minus`	-2 to 0
`STen2plus`	0 to +2
`STen6plus`	+2 to +6
`STen10plus`	+6 to +10

TABLE 7.5: Structural break model – time frames

The negative points in time refer to the existence of a firm as a NON-REIT. The point in time 0 represents the event. The positive points in time are characterised by REITs. The time frames for NON-REITs and REITs are not symmetric due to lack of sufficiently many observations. Knowing that a REIT transformation is discussed in advance, leads to financial re-negotiations by the management ex ante and a transformation process of two years ex post. This is the most relevant period within the REIT application process.
Again, I base my analysis on the predicted residuals of leverage from my base model acting as the dependent variable. The untabulated *Chow test* confirms the existence of a structural break between NON-REITs and REITs. In the piecewise regression, I estimate six slopes and six intercepts for a total of twelve regression parameters. At each of the five points (-4, -2, 0, 2, and 6) along the tenure axis, the rolling window must be equal from the left and right. The piecewise linear regression using a linear spline will have six parameters rather than twelve. The results of the piecewise linear estimation, displayed in Figure 7.10, is a continuous leverage-time profile with kinks at the five knot points. From an economic view, the continuity is highly desirable. The overall slope will be smooth, without implausible jumps at the knot points.[14] For the structural breaks for the period -4 to -2 and -2 to 0, I find statistically significant results. In Table 7.6 the results from the structural break model are summarized:

[14]By using a spline function the following holds: A linear spline will be continuous but not differentiable at the knot points.

	residuals LEV
sTen4minus	-0.0014
	(0.0120)
sTen2minus	0.0395***
	(0.0143)
sTen0minus	-0.0389***
	(0.0128)
STen2plus	0.0057
	(0.0110)
STen6plus	0.0021
	(0.0053)
STen10plus	-0.0024
	(0.0062)
constant	-0.0248
	(0.0646)
Observations	1,026
R-squared	0.0133
Adj. R-squared	0.0075

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

TABLE 7.6: Structural break model for NON-REIT and REIT

Remark: Structural break model with coefficients and standard errors: Predicted leverage, splined.

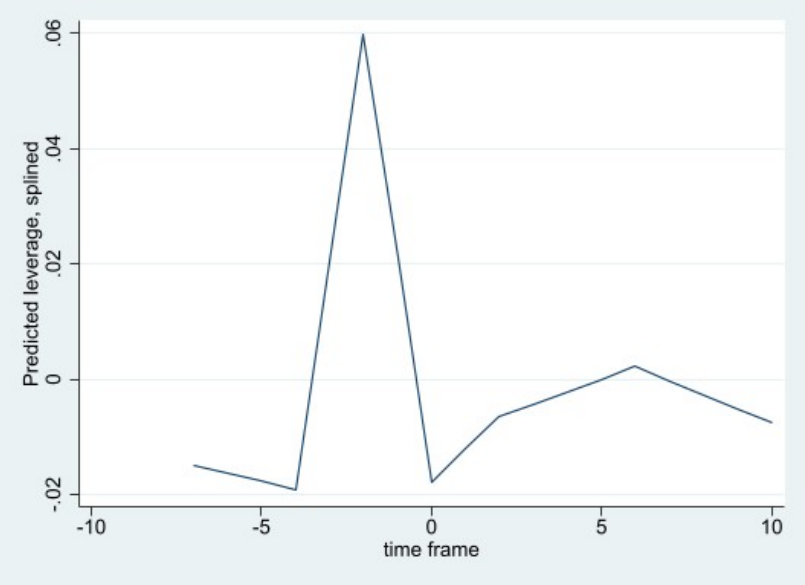

FIGURE 7.10: Piecewise linear leverage – NON-REIT and REIT profile

The REIT regime allows for an *adaption process* after the event. This means that REITs have the possibility to comply with all restrictions within a time frame of usually two years without being sanctioned. The results in Table 7.6 show that this period is not used as the coefficient is not significant. In contrast, the event study shows statistically negative coefficients for the years after the event, regardless a baseline of -1 or -2 is applied to.

If I run further analysis with total equity (standardized) as the dependent variable, the structural break model shows a significant positive coefficient for the first two years period after the event. This is in line with decreasing leverage ratios to comply with the REIT status. Leverage decreases due to capital increases and/or due to an increase in total assets. In this case, lower leverage ratios are triggered by changes in total equity while analysis including total assets (standardized) as the dependent variable shows no effect.[15]

To support my results from the event study and the structural break model, I concentrate on the REIT sub-sample only. The aim is to show that regulated industries do not follow traditional capital structure theories in the first place. Regulation and restrictions on the distribution of operating income and leverage ratios show a statistically significant effect on leverage. Again, I run several OLS regression models to test for regulatory variable combination. In sum, the outputs support the results given in Chapter 6.1.2 Table 6.5. This means, that countries that have higher requirements on the distribution of operating income and leverage restrictions in place have on average lower leverage ratios. Countries with no restrictions on leverage ratios but high mandatory profit distribution requirements show significantly higher leverage ratios. Here, I follow the approach by **Dogan et al. (2019)**.[16]

[15] As those analyses are not the focus within this chapter, further regression outputs are untabulated.

[16] Detailed information can be found in Appendix H showing all regression models on the REIT sub-sample. The most remarkable result represents the increase in R-squared. Running a regression without any regulatory variables lead to a R-squared of 16.77%, while the implementation of those variables lead to an increase of almost 8% in R-Squared in both model variations. Chapter 6 covers a large set of analyses of different variable combinations, while this analysis concentrates on the impact of profit distribution and leverage restrictions only. Since this chapter is based on a separate and smaller sample compared to chapter 6, the aim is to show that my results from further analyses are also applicable to my smaller sub-sample while not being covered again in detail.

Hypothesis revisited

In the following, I would like to refer back to my hypotheses, which I presented in Chapters 4 and 7.3. As a reminder, the table shows my hypotheses and notes in the outer column whether the hypothesis cannot be rejected by the empirical analysis. The hypotheses relating to my main analyses are no more considered in this paragraph.

TABLE 7.7: Hypotheses REIT status

Hypothesis		analysis	supported
H6	The REIT Classification (IPO) has a negative impact on leverage.	Table 7.4	✓
H7	Leverage is reduced before REIT classification.	Table 7.6	✓
H8	Leverage is reduced after the REIT classification.	Table 7.4	✓[17]

The first hypothesis focuses on whether the REIT status has an impact on leverage. REITs are regulated firms that are restricted in their financing decisions, profit distribution and further aspects already discussed in detail. Intuitively, transformation into a REIT structure impacts a firm's leverage. The results from the event study reveal a statistically negative effect on leverage. As a consequence, hypothesis H6 cannot be rejected.
Implementing a structural break model shows a statistically positive and negative effect on leverage. In the time frame -4 to -2 NON-REITs further raise leverage. Possible reasons for that may be the realization of projects and investments in times in which additional regulation does not apply. Here, the concept of a *bunker process* becomes visible. Two years prior applying for REIT status, the opposite effect occurs. As Figure 7.10 shows, a decrease of leverage is visible, leading to an adaption process of leverage over time. To comply with the regulation in place and to follow the already existing industry constituents, the firm starts to reduce leverage. Further analysis

[17] Depending on the model, the hypothesis cannot be rejected.

states that the change in leverage can be explained by an increase of total equity. Hypothesis H8 concentrates on the time frame 0 to +2. As the coefficients in the event study show a statistically negative effect, the hypothesis cannot be rejected. But, taking the structural break model into consideration leads to contrary results. Here, no statistically significant effect is visible.
In sum, my analyses in this chapter further support the notion that REIT status does have an impact on leverage and capital structure decisions in general.

Chapter 8

Conclusion and Implications

This thesis deals with REITs, their capital structure and the effects on leverage that regulatory requirements might have. The data used results from a combination of Thomson Reuters data with hand-collected data regarding the REIT status, regulatory information and law variables. Overall, leverage is analysed across 20 countries in the years 2007 to 2018. Company data from REITs from the Americas, Asia-Pacific, Europe and Africa is used. The analysis looks at book leverage on a country level and regulatory level. Country specific data, manually extracted from yearly EPRA reportings, is merged with company data in order to analyse the influence of different REIT restrictions on a firm's leverage.
Observing statistically significant differences in means across NON-REITs and REITs, causes motivation for further investigations. My results show that variables beyond traditional capital structure determinants impact the leverage of REITs. I find that explicit restrictions on leverage and the distribution of profits have a significant effect on leverage decisions. This supports the notion that the restrictions from the EPRA reportings are mandatory. I test for various combinations of regulatory variables that show both in isolation as well as in combination significant effects on leverage.
My main result is the following: Firms that operate under regulation that specifies a maximum leverage ratio, in addition to mandatory high dividend distributions, have on average lower leverage ratios. Further the existence of sanctions has a negative effect on REITs' leverage ratios, indicating that regulation is binding. The analysis clearly shows that traditional capital structure determinants are of second order relevance. This relationship highlights the impact on leverage and financing decisions caused by regulation. These effects are supported by further analysis. Results based on an event study show that REITs have statistically lower leverage ratios compared to NON-REITs. Those tests are valid taking `lead1` and `lead2` as a baseline. Based on a structural break model, the following effect becomes apparent: REITs increase their leverage ratios in years prior REIT status. Empirical results show statistically significant results in the period -4 to -2, that is followed by a decrease within the period -2 to 0. As a consequence, the ex ante time frame is characterised by a *bunker* and *adaption process*, followed by the transformation in the event. Using an event study and a structural break model, the analysis highlights the dominance of country-specific regulation.

The existing database, the available information from the EPRA reportings and the current status quo of this work, provide a variety of starting points for further research. For this reason, the rest of this chapter describes further procedures in more detail and lists various steps that will have to be taken before an analysis at the desired level of rigor can be performed. It also points to potential difficulties the project might face.

Data collection, panel issues and further research questions:

- For further investigations on the variable `shareholderreq` one should collect data concerning the number and distribution of shareholders. An in-depth analysis requires data from Thomson Reuters Datastream to be extracted and verified. Further analysis should cover the implications of ownership composition then.[1]

- The same applies to an analysis of the management compensation. **Ghosh and Sirmans (2006)** state that evidence on governance and compensation in regulated industries is limited. This motivates further analysis in case data about the distribution of management compensation across firm and time is available.[2]

- In general, *funds from operations* (FFO) is a unique earnings measure for REITs. It was first defined in 1991 by the National Association of Real Estate Investment Trusts (NAREIT). The main assets of a REIT are by regulation and in the sense of their main business focus properties. While there is usually a massive depreciation expense counted against a REIT's net income due to depreciations, it is not really an expense at all. FFO provides a more accurate picture of the REIT's profitability since it adds back the depreciation expense and makes a few other smaller adjustments. The weakness of this metric is that capital expenditures required to maintain the existing portfolio of properties is not included. The adjusted FFO (AFFO) is calculated to estimate a REIT's value. It has the advantage of being more precise in measuring residual cash flow available to shareholders and estimating value. Further it is a better predictor of future ability to pay dividends. Since there is no uniform definition of AFFO, most calculations simply subtract capital expenditures. In the present analysis,

[1] **Rajan and Zingales (1995)** argue that the existence of a large shareholder body on the board of directors should reduce the extent of agency costs between managers and shareholders. This leads to facilitated equity issues. The aversion towards debt can be increased in case these shareholders may be undiversified. In the field of a firm's ownership body, the theory covers further aspects regarding blockholdings and ownership control. **Morri and Christanziani (2009)** find that a strong pressure from the takeover market may force firms to increase profitability by enlarging the balance sheet with debt.

[2] REITs offer a set of several unique regulatory aspects that influence the field of management compensation and agency costs. Distribution requirement limits a REIT manager's access to free cash flow and reduces agency costs investigated by **Jensen (1986)**.

I have tried to include FFO and/or AFFO as variables. Controlling for FFO leads to a dramatic reduction of the number of observations. As a consequence, this variable has been ignored in this analysis. Any rigorous attempt to analyse FFO and/or AFFO would require a time consuming process of hand-collecting the relevant data.[3]

[3]**Delcoure and Dickens (2004)** use this ratio and find that a REIT's debt ratio is negatively related to the ratio of FFO to total assets. As a first indication the authors conjecture that business risk is important to explain a REIT's leverage ratio. However, **Harrison et al. (2011)** find that FFO to total assets ratio is also used as a proxy for profitability. Including this variable needs to be done with caution due to multicollinearity concerns.

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Appendix A

Market Overview

country	2008	2012	2019
Belgium	4.4	5.82	16.324
France	45.9	45.35	51.01
Netherlands	7.9	6.712	21.514
United Kingdom	26.3	33.865	63.988
Australia	46.7	71.764	86.776
Hong Kong	24.1	15.294	33.879
Japan	24.1	37.423	118.827
Singapore	11.9	28.977	58.904
South Africa	1.5	4.1811	20.636
Canada	14.3	39.062	53.17
United States of America	180.1	454.789	1040.06

TABLE A.1: Market capitalisation €bn for sub-sample EPRA REIT

Appendix B

Hofstede and Schwartz

The Hofstede dimensions originally proposed by Geert Hofstede in 1984 describe cultural differences categorized by different dimensions. Comparable to the research by **Chui et al. (2002)**, I implement these dimensions in my investigations to analyse the effect on corporate capital structure decisions.[1] In combination to the Hofstede dimensions I analyse the dimensions of Schwartz. The Schwartz dimensions modeled by Shalom Schwartz in 1994 identify seven cultural values in three pairs. Again, the results are not tabulated since for both approaches no reliable data and interpretation exists.
The dimensions covered in my untabulated regressions are the following:

[1]The results by Hofstede are very old and needs to be interpreted with caution. The data used in his model is based on an employee survey at IBM that might not be representative for describing cultures properly.

TABLE B.1: Variables and sources - Hofstede and Schwartz

variable	definition	data source	author
pdi	Power distance Index (pdi) expresses the degree to which the less powerful members of a society accept and expect that power is distributed unequally.	Geert Hofstede Research and Values Survey Modul, 2020 and Hofstede insights,2020	Chui et al. (2002)
idv	Individualism versus Collectivism (idv): Individualism can be defined as a preference for a loosely-knit social framework in which individuals are expected to take care of only themselves and their immediate families. Collectivism represents a preference for a tightly-knit framework in society in which individuals can expect their relatives or members of a particular ingroup to look after them in exchange for unquestioning loyalty.	Geert Hofstede Research and Values Survey Modul, 2020 and Hofstede insights,2020	Chui et al. (2002)
mas	Masculinity versus Femininity (mas): The Masculinity side of this dimension represents a preference in society for achievement, heroism, assertiveness, and material rewards for success. Society at large is more competitive. Its opposite, Femininity, stands for a preference for cooperation, modesty, caring for the weak and quality of life. Society at large is more consensus-oriented.	Geert Hofstede Research and Values Survey Modul, 2020 and Hofstede insights,2020	Chui et al. (2002)
uai	Uncertainty avoidance Index (uai): The Uncertainty Avoidance dimension expresses the degree to which the members of a society feel uncomfortable with uncertainty and ambiguity.	Geert Hofstede Research and Values Survey Modul, 2020 and Hofstede insights,2020	Chui et al. (2002)

further information see next page

TABLE B.1: Variables and Sources - Hofstede and Schwartz

Embedd	Embeddedness focuses on sustaining the social order, avoiding changes and retaining traditions. Further embeddedness cultures value tradition, obedience and security.	Schwartz Culture Dimensions	Schwartz, S.H. (1992)
AffAuto	Affective Autonomy covers the independent pursuit of pleasure and seeking enjoyment without censure.	Schwartz Culture Dimensions	Schwartz, S.H. (1992)
IntelAuto	Intellectual Autonomy covers the independent pursuit of ideas and thoughts no matter it is on a theoretical or political basis.	Schwartz Culture Dimensions	Schwartz, S.H. (1992)
Mastery	Mastery reflects the individual's succes through personal actions. Mastery cultures are characterized through independence, courage, ambition, drive and competence.	Schwartz Culture Dimensions	Schwartz, S.H. (1992)
Harm	Harmony cultures describe individuals who are happy to accept their place in the world and focus more on group relations than individuals.	Schwartz Culture Dimensions	Schwartz, S.H. (1992)
Hiera	Hierarchy reflect clear social orders, with people representing superior positions while others are in inferior positions. The individual itself accepts its position within the hierarchy.	Schwartz Culture Dimensions	Schwartz, S.H. (1992)
Egali	Egalitarianism represents an overall equality and it is expected to show concern for the society.	Schwartz Culture Dimensions	Schwartz, S.H. (1992)

end

Appendix C

Identification Strategy by Leary and Roberts (2014)

In order to be able to analyse the connection between the peer effect and capital structure decisions and to avoid the reflection problem, **Leary and Roberts (2014)** set up a two-step identification strategy.

1. In the first step, a differentiation is made between the exogenous or correlated effect and the endogenous effect. Here, the authors use the financial policies and the idiosyncratic component of the stock returns of competitors. Their results show that the idiosyncratic stock returns are strongly negatively correlated with the leverage ratio and its changes. Thus managers react to the firm-specific information in stock prices when making financing decisions. Furthermore, research shows that firms' capital structure decisions are strongly positively influenced by the way their peers are financed. **Leary and Roberts (2014)** were able to show in their research that companies change their leverage ratio by an average of ten percentage points per standard deviation change in the leverage ratio of competitors. The leverage ratio thus shows the greatest influence among the observable determinants. The commonalities in the leverage ratio among peers are determined by commonalities in the financing decisions of companies. Companies issue more equity or debt capital if peers issue the same security. This allows conclusions to be drawn about a prevailing endogenous effect.

2. In the second step, they investigate how peer effects arise and can be explained. Here, **Leary and Roberts (2014)** distinguish between actions and characteristics as two channels through which firms react to the financial policy or the characteristics of their peers. Related results show that peer effects in the context of capital structure decisions operate through the actions of peers and that changes in peers' characteristics have less relevance. In summary, an endogenous effect can be identified in their study when considering the reflection problem to explain the peer effect. This result is supported by the actions of peers who influence firms' capital structure decisions.

Appendix D

Total Sample

Variable	VIF 1	1/VIF
reitnonreit	1.92	0.520767
size	1.39	0.719693
assettang	1.33	0.752255
growthopp	1.31	0.765265
law	1.30	0.769797
age	1.19	0.838709
profit	1.10	0.910824
interestcov	1.09	0.920320
Mean VIF	1.33	

TABLE D.1: Variance inflation factor regression – total sample)

Remark: Total Sample: Variance Inflation Factor for Regression Model 1.

Variable	Obs	W′	V′	z	Prob>z
assettang	10,453	0.74923	1458.344	19.294	0.00001
profit	12,199	0.07141	6243.335	23.361	0.00001
growthopp	11,601	0.16806	5335.389	22.872	0.00001
size	12,200	0.99415	39.307	9.814	0.00001
interestcov	8,155	0.88536	528.339	16.359	0.00001
age	12,032	0.91663	553.297	16.869	0.00001

TABLE D.2: Shapiro-Francia Wilk test for normal data – total sample

Remark: The normal approximation to the sampling distribution of W′ is valid for $10 \leq n \leq 5{,}000$ under the log transformation.

Variable	Obs	Mean	Std.dev.	Min	Max
residleveragetotalsample	7,629	-2.13e-11	0.1655862	-0.6743844	0.6281027

TABLE D.3: Summary statistics of residuals of leverage – total sample

Smaller group	D	p-value
`residleveragetotalsample`	0.0153	0.028
`Cumulative`	-0.0068	0.498
`Combined K-S`	0.0153	0.055

TABLE D.4: One-sample Kolmogorov-Smirnov test against theoretical distribution

Remark: normal((residleveragetotalsample+2.13e-11)/0.1655862). Existence of normal distribution. Supported by QQ-Plot.

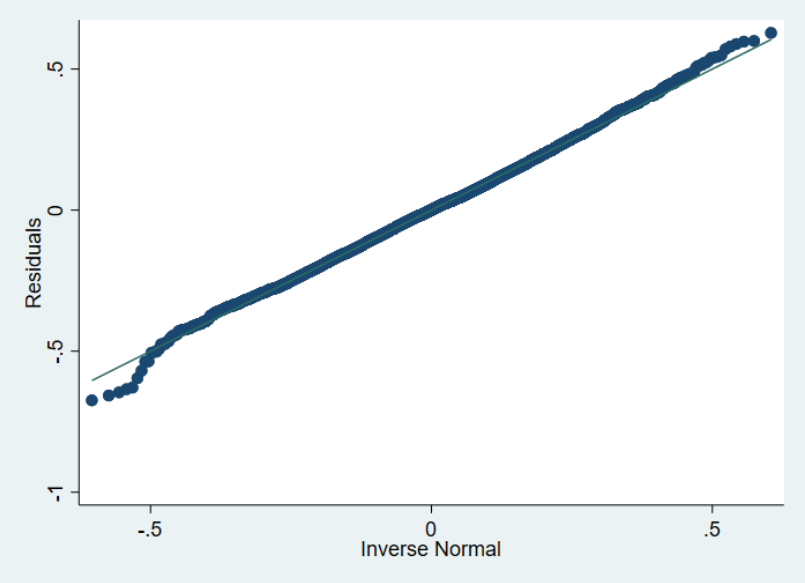

FIGURE D.1: Residuals of leverage – total sample

Appendix E

REIT

E.1 REIT without herding

Variable	VIF 1	1/VIF
incometax	5.34	0.187204
developedcountry	4.00	0.250258
sanction	3.96	0.252622
law	3.32	0.301425
shareholderreq	2.94	0.339636
assettang	2.93	0.341649
size	2.60	0.385112
profitdistribution	2.40	0.415983
growthopp	2.11	0.472867
leveragerestr	1.99	0.501374
taxshield	1.81	0.553248
rating	1.45	0.691140
interestcov	1.27	0.787672
profit	1.25	0.797645
age	1.21	0.828828
capitalincrease	1.05	0.950153
Mean VIF	2.48	

TABLE E.1: Variance inflation factor regression for Model 1 – REIT

Variable	Obs	W′	V′	z	Prob>z
assettang	4,272	0.76075	563.283	16.537	0.00000
profit	5,492	0.18607	2397.271	20.478	0.00000
growthopp	4,993	0.90551	255.703	14.546	0.00000
size	5,493	0.98099	56.000	10.593	0.00000
interestcov	3,887	0.85220	319.716	15.012	0.00000
age	5,328	0.097901	60.174	10.772	0.00000

TABLE E.2: Shapiro-Francia test for normal data for Model 1 – REIT

Remark: The normal approximation to the sampling distribution of W′ is valid for $10 \leq n \leq 5{,}000$ under the log transformation.

Variable	Obs	Mean	Std.dev.	Min	Max
`residleveragereit`	3,353	4.32e-11	0.1290075	-0.888723	0.8110034

TABLE E.3: Summary statistics of residuals of leverage in Model 1 – REIT

Smaller group	D	p-value
`residleveragereit`	0.0529	0.000
`Cumulative`	-0.0317	0.001
`Combined K-S`	0.0529	0.000

TABLE E.4: One-sample Kolmogorov-Smirnov test against theoretical distribution – REIT

Remark: normal((residleveragereit-4.32e-11)/0.1290075)

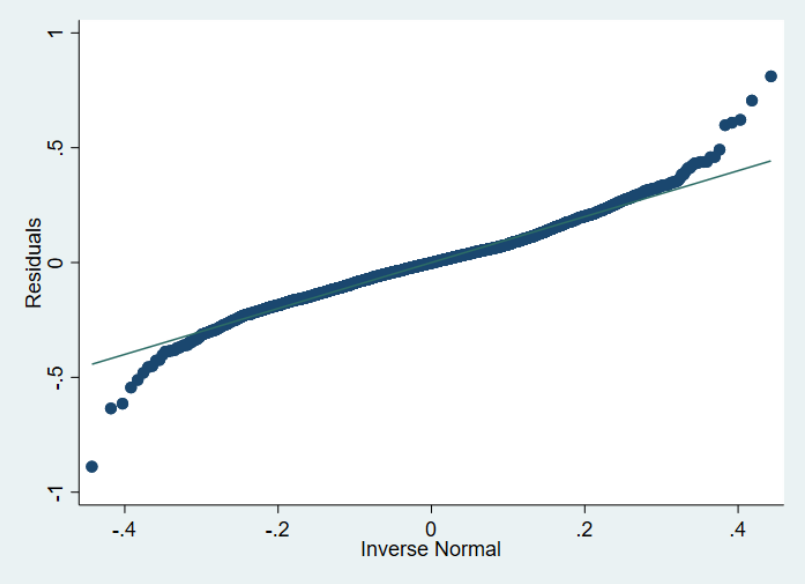

FIGURE E.1: Residuals of leverage – REIT

E.2 REIT with herding

Variable	VIF 1	1/VIF
developedcountry	7.78	0.128480
herding	6.75	0.148206
incometax	6.03	0.165908
sanction	5.33	0.187462
shareholderequ	3.49	0.286688
law	3.33	0.300421
assettang	3.18	0.314887
size	2.75	0.363685
leveragerestr	2.61	0.383378
profitdistribution	2.45	0.408029
growthopp	2.11	0.472829
taxshield	1.91	0.523227
rating	1.45	0.689922
interestcov	1.28	0.782454
profit	1.25	0.797255
age	1.21	0.828754
capitalincrease	1.05	0.949303
Mean VIF	3.17	

TABLE E.5: Variance inflation factor regression for Model 1 – REIT

Variable	Obs	W′	V′	z	Prob>z
assettang	4,272	0.76075	563.283	16.537	0.00000
profit	5,492	0.18607	2397.271	20.478	0.00000
growthopp	4,993	0.90551	255.703	14.546	0.00000
size	5,493	0.98099	56.000	10.593	0.00000
interestcov	3,887	0.85220	319.716	15.012	0.00000
age	5,328	0.97901	60.174	10.772	0.00000
herding	5,493	0.84287	462.886	16.151	0.00000

TABLE E.6: Shapiro-Francia test for normal data for Model 1 – REIT

Remark: The normal approximation to the sampling distribution of W′ is valid for $10 \leq n \leq 5{,}000$ under the log transformation.

Variable	Obs	Mean	Std.dev.	Min	Max
residleveragereitherding	3,353	-1.03e-11	0.1266575	-0.876653	0.7961491

TABLE E.7: Summary statistics of residuals of leverage in Model 1 – REIT

Smaller group	D	p-value
residleveragereitherding	0.0569	0.000
Cumulative	-0.03221	0.001
Combined K-S	0.0569	0.000

TABLE E.8: One-sample Kolmogorov-Smirnov test against theoretical distribution

Remark: normal((residleveragereitherding+1.03e-11)/0.1266575)

I lag all independent variables by one period in order to alleviate potential endogeneity problems.[1] The Table E.9 reports the results from the pooled OLS model with one year lagged and unlagged explanatory variables for the REIT sample between 2007-2018.

[1] **Berg and Gider (2017); Frank and Goyal (2009); Rajan and Zingales (1995)**.

	LEV		LEV
L.assettang	0.0058	assettang	0.0094
	(0.0097)		(0.0097)
L.profit	-0.1406*	profit	-0.1255*
	(0.0776)		(0.0739)
L.growthopp	0.0527***	growthopp	0.0602***
	(0.0106)		(0.0602)
L.size	0.0088***	size	0.0112***
	(0.0020)		(0.0018)
L.interestcov	-0.0757***	interestcov	-0.0849***
	(0.0055)		(0.0055)
age	-0.00907*	age	-0.0062
	(0.0047)		(0.0043)
capitalincrease	-0.0437***	capitalincrease	-0.0341***
	(0.00504)		(0.0047)
rating	-0.0339***	rating	-0.0318***
	(0.00513)		(0.0048)
law	0.0537***	law	0.055***
	(0.0098)		(0.0090)
taxshield	-9.50e-05	taxshield	-0.0011**
	(0.000471)		(0.0005)
leveragerestrc	-0.0361***	leveragerestrc	-0.039***
	(0.0082)		(0.0078)
profitdistribution	-0.0144*	profitdistribution	-0.0117*
	(0.00754)		(0.007)
incometax	-0.0075	incometax	-0.0176
	(0.0136)		(0.0122)
shareholderreq	-0.0309***	shareholderreq	-0.0381***
	(0.0098)		(0.0092)
L.herding	0.681***	herding	0.7175***
	(0.0473)		(0.0435)
sanction	0.0490***	sanction	0.0451***
	(0.0101)		(0.0089)
Constant	0.0875*	Constant	0.0388
	(0.0501)		(0.0465)
observations	2,945	Observations	3,353
R-squared	0.4355	R-squared	0.4498

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

TABLE E.9: OLS model REITs with lagged and unlagged explanatory variables

Appendix F

NON-REIT

Variable	VIF 1	1/VIF
size	1.53	0.653707
developedcountry	1.50	0.668102
law	1.42	0.704993
taxshield	1.36	0.736085
rating	1.35	0.738660
growthopp	1.30	0.770701
assettang	1.20	0.832970
profit	1.18	0.848707
age	1.13	0.882130
interestcov	1.08	0.921869
capitalincrease	1.04	0.960082
Mean VIF	1.28	

TABLE F.1: Variance inflation factor regression for Model 1 Table 6.12 – NON-REIT

Variable	Obs	W′	V′	z	Prob>z
assettang	6,707	0.71025	1112.488	18.087	0.00001
profit	6,707	0.0751	3551.165	21.080	0.00001
growthopp	6,092	0.13081	3051.109	20.568	0.00001
size	6,707	0.99524	18.262	7.490	0.00001
interestcov	4,671	0.94085	162.216	12.837	0.00001
age	6,706	0.80240	758.576	17.100	0.00001
taxshield	6,707	0.94432	213.799	13.834	0.00001

TABLE F.2: Shapiro-Francia test for normal data for Model 1 Table 6.12 – NON-REIT

Remark: The normal approximation to the sampling distribution of W′ is valid for $10 \leq n \leq 5{,}000$ under the log transformation.

Variable	Obs	Mean	Std.dev.	Min	Max
`residleveragenonreit`	4,224	-9.16e-13	0.1676538	-0.5870551	0.554

TABLE F.3: Summary statistics of residuals of leverage in Model 1 – NON-REIT

Smaller group	D	p-value
`residleveragenonreit`	0.0133	0.225
`Cumulative`	-0.0095	0.464
`Combined K-S`	0.0133	0.445

TABLE F.4: One-sample Kolmogorov-Smirnov test against theoretical distribution NON-REIT

Remark: normal((residleveragereit+9.16e-13)/0.1676538). Existence of normal distribution. Supported by QQ-Plot.

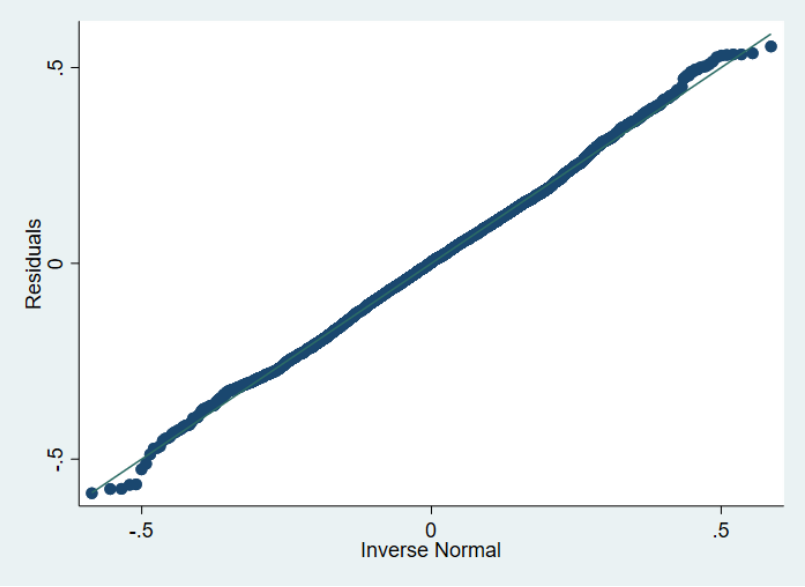

FIGURE F.1: Residuals of leverage – NON-REIT

	(1) leverage
assettang	0.0748***
	(0.0127)
profit	0.0040
	(0.0076)
growthopp	-0.0134***
	(0.0042)
size	0.0708***
	(0.0034)
interestcov	-0.0201***
	(0.0013)
capitalincrease	-0.0153***
	(0.0032)
age	-0.0495
	(0.0436)
taxshield	0.0045***
	(0.0007)
constant	-0.7888***
	(0.1578)
observations	4,224
Number of id	549
R-squared (within)	0.1959
R-Squared (between)	0.1561
R-squared (Overall)	0.1456

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

TABLE F.5: Fixed Effect Model – NON-REIT

Remark: Fixed Effect Model NON-REIT Sample. Hausman test suggests a fixed effect model.

I lag all independent variables by one period in order to alleviate potential endogeneity problems.[1] The Table F.6 reports the results from the pooled OLS model with one year lagged and unlagged explanatory variables for the NON-REIT sample between 2007-2018.

	LEV		LEV
L.assettang	0.0386***	assettang	0.0481***
	(0.0127)		(0.0121)
L.profit	-0.00638	profit	0.0044
	(0.0104)		(0.0071)
L.growthopp	0.00282	growthopp	-0.0028
	(0.00623)		(0.0058)
L.size	0.0253***	size	0.0262***
	(0.00204)		(0.0019)
L.interestcov	-0.0408***	interestcov	-0.044***
	(0.00188)		(0.0018)
age	-0.0443***	age	-0.0471***
	(0.00653)		(0.0061)
capitalincrease	-0.0126**	capitalincrease	-0.0008
	(0.00594)		(0.0056)
rating	0.0629***	rating	0.0551***
	(0.00843)		(0.0079)
law	-0.0523***	law	-0.0516***
	(0.00853)		(0.008)
taxshield	0.00172***	taxshield	0.0017***
	(0.000575)		(0.0005)
L.herding	0.526***	herding	0.5721***
	(0.0645)		(0.0582)
developedcounty	0.0379***	developedcounty	0.0397***
	(0.00670)		(0.0061)
constant	-0.0695	constant	-0.0982**
	(0.0513)		(0.047)
observations	3,755	observations	4,224
R-squared	0.3081	R-squared	0.3370

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

TABLE F.6: OLS model with lagged and unlagged explanatory variables – NON-REIT

[1] **Berg and Gider (2017); Frank and Goyal (2009); Rajan and Zingales (1995)**.

Appendix G

Herding

Table G.1 shows the OLS regression results for REITs only with leverage being the dependent variable. Although my independent variables are not normal distributed, the residuals of the model, displayed in the QQ plot (unreported) show an almost normal distribution. Again, here I follow the approach by **Davidson and Mackinnon (1993)** and use robust standard errors to deal with heteroskedasticity.[1] The results show that `herding` explains a significant proportion of the variance in the data. An increase in the industry median leverage has an positive effect on leverage. Common capital structure variables such as `growthopp`, `size`, `interestcov`, `capitalincrease`, `law` and `rating` are all significant on a 1% confidence interval.
I estimate the following OLS regression model for the REIT sample:

[1] OLS regression model with vce(hc3). This method tends to produce better results when the variables are heteroskedastic. Vce(hc3) produces confidence intervals that tend to be even more conservative.

	Model 1 LEV	Model 2 LEV	Model 3 LEV
assettang	0.0086	0.0294***	0.0907***
	(0.0095)	(0.0087)	(0.0069)
profit	-0.1154	-0.0969	-0.3751***
	(0.0755)	(0.0745)	(0.0777)
growthopp	0.0579***	0.0567***	0.0743***
	(0.0093)	(0.008)	(0.0071)
size	0.0118***	0.0083***	0.0112***
	(0.0019)	(0.0015)	(0.0014)
interestcov	-0.0853***	-0.0829***	-0.0820***
	(0.0056)	(0.0055)	(0.0048)
capitalincrease	-0.0348***	-0.033***	
	(0.0047)	(0.0048)	
age	-0.0059	-0.0075*	
	(0.0043)	(0.0044)	
leveragerestrc	-0.0275**		
	(0.0116)		
profitdistribution	-0.0185		
	(0.0073)		
incometax	-0.0047		
	(0.0144)		
shareholderrequ	-0.0358***		
	(0.0096)		
sanction	0.0618***		
	(0.0120)		
herding	0.6383***	0.6571***	
	(0.0623)	(0.0470)	
law	0.0496***	0.0515***	
	(0.0096)	(0.0075)	
taxshield	-0.0011**	-0.0006	
	(0.0005)	(0.0004)	
rating	-0.0320***	-0.0308***	
	(0.0048)	(0.0048)	
developedcountry	0.0332	0.0049	
	(0.0204)	(0.0100)	
constant	0.0321	0.0975**	0.2857***
	(0.0468)	(0.0402)	(0.0332)
Observations	3,353	3,353	3,458
R-squared	0.4505	0.4371	0.3379

TABLE G.1: OLS pooled regression REIT

Remark: OLS pooled regression estimates of the impact of capital structure determinants (including herding) and regulation on leverage for REITs during 2007-2018. The dependent variable is leverage (LEV) defined as REIT's book debt divided by the sum of total assets. Robust standard errors, clustered by firm ID, are given in parentheses under the coefficients. *, ** and *** indicate significance at the 10%, 5% and 1% levels, respectively.

For NON-REITs the results are as follows: Comparable to the OLS regression results of the REIT sample, the variable `herding` explains mainly the variance in the model. An increase in the industry median leverage has a significantly positive effect on leverage for NON-REITS.

	Model 1 LEV	Model 2 LEV	Model 3 LEV
assettang	0.0481***	0.0477***	0.1062***
	(0.0121)	(0.0118)	(0.012)
profit	0.0044	0.0271	0.0298
	(0.0071)	(0.0271)	(0.0474)
growthopp	-0.0028	0.0174**	0.0244***
	(0.0058)	(0.0074)	(0.0093)
size	0.0262***	0.0244***	0.0241***
	(0.0019)	(0.0016)	(0.0017)
interestcov	-0.044***	-0.0476***	-0.0418***
	(0.0018)	(0.0018)	(0.0019)
capitalincrease	-0.0008		
	(0.0056)		
age	-0.0471***		
	(0.0061)		
herding	0.5721***	1.0565***	
	(0.0582)	(0.0444)	
law	-0.0516***		
	(0.008)		
taxshield	0.0017**		
	(0.0005)		
rating	0.0551***		
	(0.0079)		
developedcountry	0.0397***		
	(0.0061)		
constant	-0.0982	-0.4325	0.0871**
	(0.047)	(0.039)	(0.036)
Observations	4,224	4,225	4,225
R-squared	0.3370	0.2800	0.2005

TABLE G.2: NON-REIT OLS pooled regression model

Remark: OLS pooled regression estimates of the impact of capital structure determinants and regulation on leverage for NON-REITs during 2007-2018.

	REIT LEV	NON-REIT LEV
assettang	0.0038	0.0477***
	(0.0071)	(0.0118)
profit	-0.1950***	0.0255
	(0.0697)	(0.0271)
growthopp	0.0363***	0.0174**
	(0.0067)	(0.0074)
size	0.0073***	0.0244***
	(0.0014)	(0.0016)
interestcov	-0.0756***	-0.0475***
	(0.0049)	(0.0018)
herding	0.6432***	1.0565***
	(0.0389)	(0.0444)
constant	0.1024***	-0.4325***
	(0.0356)	(0.039)
Observations	3,458	4,225
R-squared	0.4047	0.2800

TABLE G.3: Comparison REIT NON-REIT

Remark: Comparison of OLS pooled regression estimates of the impact of capital structure determinants for REITs and NON-REITs during 2007-2018.

Appendix H

Event Study and Structural Break Model

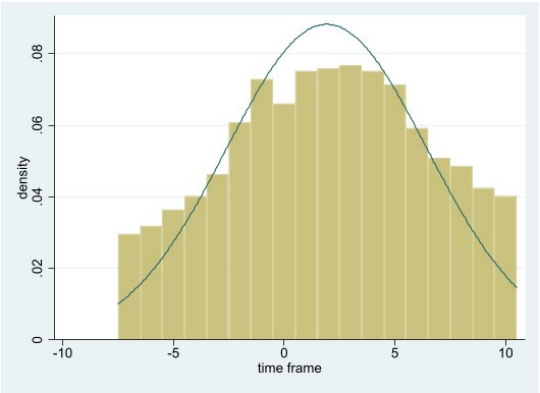

FIGURE H.1: Density of NON-REIT and REIT within time frame

	LEV
assettang	0.1116***
	(0.0119)
profit	-0.2847***
	(0.0948)
size	0.0109**
	(0.0044)
interestcov	151.2349***
	(52.1595)
constant	0.1790*
	(0.0929)
Observations	1,026
R-squared	0.1058

TABLE H.1: OLS pooled regression NON-REIT and REIT - Event Study

Remark: OLS pooled regression estimates of the impact of capital structure determinants on leverage for NON-REITs and REITs within the time frame of -7 to 10. The dependent variable is leverage (LEV) defined as REIT's book debt divided by the sum of total assets. Robust standard errors, clustered by firm ID, are given in parentheses under the coefficients. *, ** and *** indicate significance at the 10%, 5% and 1% levels, respectively.

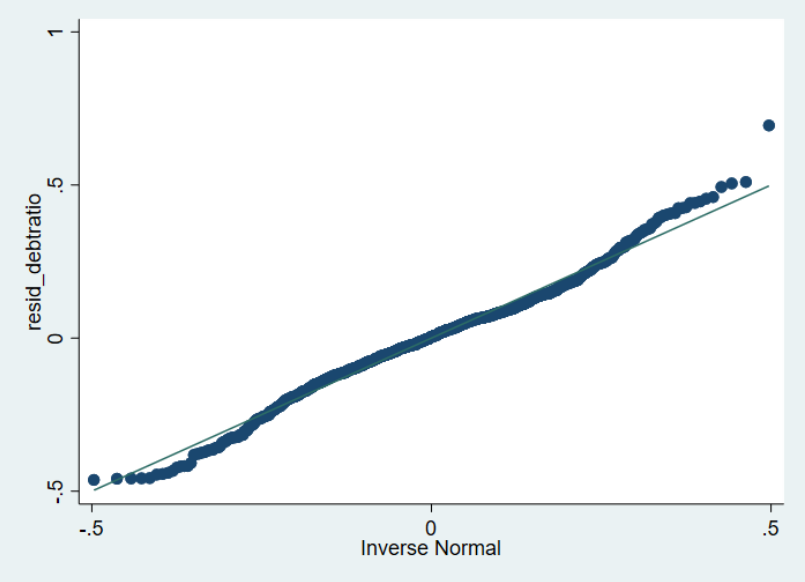

FIGURE H.2: Residuals of leverage – Event Study

	LEV
assettang	0.0988***
	(0.0121)
profit	-0.4361***
	(0.1145)
size	0.0111**
	(0.0048)
interestcov	-860.3939**
	(401.7628)
constant	0.1844*
	(0.1027)
observations	724
R-squared	0.1677

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

TABLE H.2: OLS capital structure determinants – Event Study REIT sub-sample

	LEV	LEV
assettang	0.0666***	0.0414***
	(0.0133)	(0.0145)
profit	-0.4654***	-0.4093***
	(0.1107)	(0.1118)
size	0.0165***	0.0091**
	(0.0047)	(0.0045)
interestcov	-889.3691**[1]	-786.1949*
	(393.1888)	(408.4576)
payoutlevrestr	-0.1241***	
	(0.0130)	
payoutNOlevrestr		0.1031***
		(0.0126)
constant	0.1008	0.1749*
	(0.0999)	(0.0959)
observations	724	724
R-squared	0.2193	0.2292

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

TABLE H.3: OLS capital structure determinants and **Dogan et al. (2019)** approach – Event Study REIT sub-sample

CURRICULUM VITAE

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EDUCATION

Since 08/2019 **PhD Student, Research Group in Finance, Trier University (Germany)**

- Supervisor: Prof. Axel Adam-Müller
- Research: Capital Structure (Tax Incentives in Real Estate Investment Trusts)
- Tutor in Finance (undergraduate and postgraduate level)
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07/2019 **Master degree in Financial Management, Trier University**
Main subjects included: Finance, Accounting
Overall grade: 1.5
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08/2017 **Bachelor degree in Business Administration, Trier University**
Main subjects included: Finance, Accounting
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PROFESSIONAL EXPERIENCE (ACADEMIC)

10/2017 - 08/2019 **Research Assistant, Research Group in Finance, Trier University (Germany)**

- Research on Real Estate
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10/2022 – 02/2023	Undergraduate tutor (1st year module, up to 200 students)
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Research Assistant, Research Group in Banking and Finance, Trier University

04/2019 - 07/2019	Data preparation for the PANDA Survey conducted by Prof. Marc Oliver Rieger

Student Member, Committee on Appointment of Honorary Professors, Trier University

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Student Member of Organizing Committee, Annual Meeting 2018, German Finance Association, Trier

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PROFESSIONAL EXPERIENCE (NON-ACADEMIC)

02/2017 - 03/2020 **Junior Officer, VP Bank S.A., Luxembourg, Operations Support, Middle Office**

- Analysing internal control systems
- Cost and fees documentation and billing process of clients
- Preparation of withholding tax declaration of funds
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- Preparation of trainings for and coaching of junior members of staff

11/2015 - 07/2016 **Student Assistant, Union Investment Luxembourg S.A., Luxembourg**

- Withholding tax declarations as depositary bank for clients

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08/2013 - 07/2015 **Bank Apprenticeship, TARGOBANK GmbH & Co KGaA, Trier**

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Scholarship - Deloitte-Stiftung Deutschland 2016/2017

Computing Skills: Experienced user of Microsoft Office products, Latex
Statistical software: R, Stata
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