Essays on the Performance of Listed Real Estate Companies

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1 Introduction

1.1 General Motivation

Listed real estate companies represent, especially in the case of institutional investors, a worldwide growing asset class. The market capitalization of listed real estate investments has increased intensively over the last two-decades. For example, in 1995, the FTSE/NAREIT US REIT Index had a market capitalization of $57,541m and in 2016, $1,018,730m (NAREIT, 2017). A Similar pattern of increasing market capitalization can be found for the FTSE EPRA/NAREIT Developed Europe Index, as in 1995, the total market capitalization represented €44,351m and in 2016 €197,885m (EPRA, 2017). Earning money from direct real estate investments can be quite challenging, which leads to an increased demand for indirect real estate vehicles. However, in general, investing in direct real estate has several advantages from which investors in listed real estate benefit, such as the inflation-hedge capability, compared to other investment opportunities (Fama and Schwert, 1977; Liu *et al.*, 1997; Hartzell *et al.*, 1987) or a low correlation with other asset classes, such as stocks and bonds (Ibbotson and Siegel, 1984; Quan and Titman, 1999).

Within the growing indirect real estate market, investors have the choice of investing in real estate investment trusts (REITs), listed real estate operating companies (REOCs), or open-end or closed-end funds. What all these investment opportunities have in common is that they overcome the challenges of direct real estate investment. First, indirect real estate investments simultaneously solve two inherent real estate issues, illiquidity or fungibility and long-term investment horizons, by providing a publicly accessible platform for daily trading. Second, by issuing shares to shareholders, the divisibility of properties and its value is enabled. Hence, each investor has the opportunity to create a risk-return portfolio in accordance to his/her preferences and expectations. Third, listed real estate companies help to overcome the normally substantial intransparency in the real estate sector through disclosure requirements. Additionally, listed companies provide standardized products (shares), which are professionally managed and therefore attract investors around the world.

Furthermore, investors have the choice between investing in existing and already listed real estate companies, and new real estate businesses. In the case of investing in newly listing real estate companies, investors have the unique opportunity to participate in a successful initial public offering (IPO). Assuming that investor's aim is to make profitable and lucrative investments and earn money from the very beginning, a new placement might be a good choice. Hence, the phenomenon that the IPO offer price is systematically below the closing price on the

first trading day – called underpricing –occurs widely and contributes an alternative return for IPO investors. In the real estate sector, the issuing company has the choice between a non-restricted REOC and a legally regulated REIT. In order to create an understanding of IPO performance in the real estate sector itself, a detailed examination of the specific and differing characteristics of the two different business forms is required. Most current research studies on IPO performance in the real estate sector examine either REOCs (Braemisch *et al.*, 2011; Freybote *et al.*, 2008) or REITs (Brobert, 2016; Chan *et al.*, 2013) samples, thus lacking an intra-sector comparison.

After a successful IPO, the shareholders claim their share of financial performance announced in the IPO prospectus. However, the definition of how investment professionals assess corporate success has changed over the last few years. According to the PWC global survey of 438 professional investors and 1,409 CEOs from 2016, 63% of investment professionals and 76% of CEOs agree that corporate success cannot be reduced to financial profit alone. (PWC, 2016) Both parties confirm that financial return is not just about generating good numbers at the end of the fiscal year. Generating sustainable returns in a socially responsible context should also be considered. (RIA, 2017) As a well-developed corporate governance mechanism can be a deciding factor in evaluating overall corporate success such aspects are emerging topics attracting equal attention from politicians, practitioners and researchers. Two major topics in this context, which are already being addressed by certain countries, are gender diversity on the board and compensation arrangements at the management level. For example German policy makers have designed a new legal framework, which obliges listed companies with more than 2,000 employees to increase the female presence in the supervisory board up to 30% (FüPoG, 2015). Similar regulations can be found in France, Italy, Netherlands, Norway and Belgium. In order to control for appropriate management compensation packages, the German government enacted a law in 2009 for “Angemessenheit der Vorstandvergütung” (VorstAG, 2009), and the US Securities and Exchange Commission (SEC) amended its disclosure rules to provide shareholders with an advisory vote on executive compensation (Securities and Exchange Commission, 2011). Unfortunately, research on these two upcoming topics is scarce in the real estate context.

In sum, all kinds of investors desire a certain level of performance, either exclusively financial or from an overall perspective, including sustainable returns. As listed real estate companies help investors overcome certain specific challenges associated with direct real estate investments, this dissertation examines corporate performance and its influencing factors, primarily from the investor perspective. The three research studies comprising this dissertation shed light on the different performance facets of and interactions between listed real estate companies, starting with the commencement date of public listing and continuing with essential relationships in emerging corporate governance topics. In particular, the first paper provides

insights into IPO pricing in a comparative framework for the real estate sector. The second paper applies an innovative approach by firstly identifying the determinants of the proportion of female board members and secondly investigating the gender diversity / financial performance relationship by controlling for potential endogeneity. The final paper examines whether temporally distinct compensation packages are determined by company performance or rather by CEO power mechanisms.

1.2 Research Questions

The following section contains the superordinate research questions addressed in the respective papers of this dissertation.

Paper 1: REITs and REOCs and their Initial Stock Market Performance: a European Perspective

- Is REIT-status a transparency factor which is negatively linked to the initial return at the IPO?
- Is REIT-status still an influencing factor during different timeframes and economic crises, such as the global financial crisis of 2008?
- Can this REIT-transparency status be proven by using different empirical methodologies, such as OLS regression and propensity score matching?
- Does the issuing volume impact the initial return negatively?
- Do firm characteristics influence the initial return?
- Which specific IPO characteristics explain the level of initial returns in the real estate sector?
- Are there intra-sector-specific differences in the IPO pricing?

Paper 2: Gender Diversity and Financial Performance: Evidence from US Real Estate Companies

- What is the impact of an increased percentage of women on the board of directors on financial performance?
- Is there a different impact on financial performance for women in executive as opposed to non-executive positions?
- What constitutes a critical mass of females in top management?
- Is there an optimum gender diversity distribution in the group of executive and non-executive directors?
- Are there property sector differences concerning gender diversity?
- How can the endogeneity problem be controlled for when investigating the gender diversity / firm performance relationship?

Paper 3: The Determinants of Executive Compensation in US REITs: Performance vs. Corporate Governance Factors

- Is there a link between CEO /executive director payment and firm performance?
- Which board of director characteristics influence CEOs and executive directors' compensation levels?
- Do powerful CEOs negotiate pay arrangements which are less sensitive to firm performance, that is, a higher base salary and lower incentive-based compensation?
- What are the critical determinants of monitoring the company's management and their compensation packages?
- Are long-term compensation packages adequately structured in accordance to corporate success?
- Do new disclosure rules introduced after the global financial crisis strengthen the pay-performance link between manager remuneration and firm performance?

1.3 Course of Analysis

This section provides an overview of the three research papers in chronological order, with regard to their purpose and research design, authorship, journal submission and current status, and conference presentations.

Paper 1: REITs and REOCs and their Initial Stock Market Performance: a European Perspective

This paper examines pricing differences between the two real-estate-specific business forms, namely REOC and REIT, by using a sample of 107 European real estate companies over the period 2000-2015. Applying a cross-sectional analysis, this paper examines whether the REIT-status exhibits a transparency bonus, resulting in a lower IPO underpricing.

Authors: Claudia Ascherl and Wolfgang Schaefers
Submission to: Journal of European Real Estate Research (JERER)
Submission: October 11, 2016
Current Status: published in Volume 11 Issue 1
This paper was presented at the 2015 Annual Conference of the European Real Estate Society (ERES) in Istanbul, Turkey. The paper won the price for the Best PhD-Paper at the ERES 2015. The paper was also presented at the 2016 Annual Conference of the American Real Estate Society (ARES) in Denver, USA and the 2016 ERES in Regensburg, Germany.

Paper 2: Gender Diversity and Financial Performance: Evidence from US Real Estate Companies

This paper investigates whether gender diversity, as a component of corporate social responsibility, has an impact on the financial performance or firm valuation of real estate companies. We used a panel dataset of 116 US listed real estate companies over the period 2005-2015, to answer the abovementioned question.

Authors: Liesa Schrand, Claudia Ascherl, Wolfgang Schaefers
Submission to: Journal of Property Research (JPR)
Submission: April 12, 2018
Current Status: under review
This paper was presented at the 2017 ARES in San Diego, USA and as well at the 2017 ERES in Delft, Netherlands.

Paper 3: The Determinants of Executive Compensation in US REITs: Performance vs. Corporate Governance Factors

The main aim of this paper was to investigate whether financial performance or CEO entrenchment mechanisms are the essential influencing factors on CEO and executive director compensation packages. Using panel data comprising 830 firm-year observations over the period 2006-2015, this paper demonstrated the importance of linking C-level compensation to temporally- and appropriate performance measures and changes in compensation arrangements during and after the financial crisis.

Authors: Claudia Ascherl, Liesa Schrand Wolfgang Schaefers
Submission to: Journal of Real Estate Research (JRER)
First Submission: April 12, 2018
Current Status: under review
This paper was presented at the 2018 ARES in Bonita Springs, USA.

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2 REITs and REOCs and their Initial Stock Market Performance: a European Perspective

Abstract

Purpose

The purpose of this study is to examine the differences between initial public offering (IPO) pricing in the real estate sector and to provide insight into how REIT and Real estate operating company (REOC) IPOs perform in a comparative framework.

Design / methodology / approach

The sample consists of 107 European REIT and REOC IPOs from 9 European countries over the period 2000-2015. The initial returns are examined by creating subsamples based on the two business forms, countries and specific timeframes (before, during and after the Global Financial Crisis). A multiple regression analysis is applied to identify the ex-ante uncertainty factors, IPO and firm characteristics, which may impact on the different underpricing levels of REITs and REOCs.

Findings

European property companies are on average significantly underpriced by 4.63%. The results also reveal that REITs provide a significantly lower underpricing of 2.02% than REOCs, with a positive initial return of 5.69%. The causal treatment effect of the legal form of the company and the underpricing is confirmed by propensity score matching. Among the most influencial factors for a lower REIT underpricing, besides the REIT-status itself, are the volatility, offer size and market phase of the IPO. During the Global Financial Crisis (GFC) (2008-2010), underpricing exceeds the initial return for the total sample by approximately 70%.

Originality/value

This is the first study investigating differences in the underpricing level of REITs and REOCs in a European setting, including the GFC as an extraordinary market phase. The authors provide evidence that REIT IPOs compared to REOC IPOs “leave less money on the table”.

2.1 Introduction

For real estate, a popular adage is "location, location, location". In the context of potential listed real estate companies, it is "equity, equity, equity" (EPRA, 2015). The capital demand of real estate companies, combined with their relatively high dividend yields during a time of low yields on fixed income investments, leads to an ongoing popularity of real estate initial public offerings (IPOs) in Europe (EPRA, 2015).

Listed real estate companies have the choice of going public, either as a listed real estate operating company (REOC), or as a real estate investment trust (REIT). With the introduction of REITs in Europe, e.g. France 2003 and UK and Germany 2007, the supply of indirect investment vehicles was augmented. Currently, EPRA is still involved in setting up two new REIT-regimes in Poland and Sweden (EPRA, 2015). As listed real estate companies are geared towards further growth in Europe, IPOs are an important and primary source of raising equity. From an investor perspective, it is important to assess how REIT and REOC IPOs perform within a comparative framework.

For firms, the primary aim of IPOs is to raise as much money as possible. For potential IPO investors, the primary aim is to make a good investment and earn an alternative return. In this context, the literature identified two contrary phenomena for the short- and long-run IPO returns. In the short-run, the initial return is mostly positive, whereas highly underpriced IPOs underperform in the long-run (Brobert, 2016). The phenomenon that the IPO offer price is systematically below the closing price on the first trading day is called *underpricing* and is the main focus of this study. The paper provides new insights into the underpricing phenomenon, by focusing explicitly on the unique performance of listed real estate companies. Especially REIT IPOs are often excluded from consideration, due to the specific regulations[1], which may provide higher transparency for investors compared to other equities. Therefore, this present study provides insight into the IPO pricing differences of European REOCs and REITs by testing hypothesis derived from existing theories. Furthermore, this study attempts to answer the question of whether the GFC, as an extraordinary market phase, had an impact on the underpricing level.

Previous studies on listed real estate companies have investigated either initial returns of REIT IPOs, mostly from the North American or Asian-Pacific markets, or the performance of REOC IPOs, predominately from the European market. The few European studies focus exclusively on REOC IPOs, using various methodological approaches. For example, Braemisch *et al.* (2011)

[1] The legal requirements of REITs mostly refer to the distribution rate, shareholders' limitation, an activity test and conversion into the REIT status.

examine the relationship between the yields and total returns of direct property investments, which can be assigned directly to an IPO. Freybote *et al.* (2008), focus predominantly on the cyclicality of European property IPOs. We extend these previous studies by differentiating between REIT and REOC IPOs in particular. We assume that the REIT-status itself and the strict pre-fixed requirements associated therewith may impact on the initial return on the first trading day. The objective of this study is to assess whether the REIT-status in general has a significant impact on the underpricing level in different countries and market phases, by explicitly investigating IPO pricing differences between REOCs and REITs. This gap is addressed by utilizing a sample of 107 REIT and REOC IPOs from 9 European countries over the period 2000-2015.

The remainder of this study is organized as follows. Section 2 provides an overview of the European REIT-regimes. Section 3 summarizes previous studies on underpricing of REITs and REOCs. Section 4 describes the methodology with the resulting hypotheses. In Section 5, the sample design and descriptive statistics are presented. Section 6 includes the method used to test the hypotheses and shows the results of the regression models and robustness check. Finally, Section 7 concludes and provides an outlook for further investigation.

2.2 REIT background in Europe

Exhibit 2.2 provides an overview of the broad legal and business characteristics of nine European REITs. The European REIT market started 1969 in the Netherlands and the development is still in process, given that in 2013, the youngest European REIT regime was introduced in Ireland.

The nine European REIT regimes have in common that either their incomes, part of their assets or the real estate developments themselves, are restricted. Additionally, all of these REITs have to be listed on a stock exchange. A further similarity is the distribution obligation, which ranges from 50% of the profits in Greece to 95% in France. The disadvantage of this requirement is that a REIT which is incorporated in a country with a high distribution rate cannot fund its growth via retained earnings. Hence, such REITs have to refinance on the capital market, in contrast to property companies or REITs with no or a lower distribution rate. Another consequence of this high distribution rate for REITs is the tax-exempt status, which is the main difference between REITs and REOCs, and may affect the underpricing level. The distribution requirement for REITs in all European countries, in combination with the narrow focus on real estate assets, can imply that each potential investor could form, with greater certainty, an individual opinion about the true value of the REIT. For a REIT investor, whether institutional or private, purchasing a unit of a REIT is attractive and certain, hence providing stable cash

flows with future long-term growth opportunities. (Dimovski, 2016) By investing in a unit of REIT or REOC the investors acquire a long-run perspective a real estate investment and in the short term, REITs or REOCs act like equities (Schaetz and Sebastian, 2009).

In six European countries, REIT-shareholders are limited in their participation, resulting in a high free float. This can be a problem for REITs; hence the free float cannot be controlled. The limit of 10% shares ownership by one investor (Finland, Germany, Ireland, UK) may have the consequence that fewer institutional investors are interested in REIT IPOs in such countries. Thus, the shareholder participation restriction may affect the IPO pricing negatively.

Exhibit 2.1: Overview of legal characteristics of European REITs

	Belgium	Finland	France	Germany	Greece	Ireland	Spain	Turkey	UK
Enacted (type)	1995 / 2014 (SICAFI / SIR)	2009 (FINNISH REIT)	2003 (SIIC)	2007 (G-REIT)	1999 (REIC)	2013 (REIT)	2009 (SOCIMI)	1995 (REIC)	2007 (UK-REIT)
Listing	mandatory	mandatory	mandatory	mandatory	mandatory	mandatory	mandatory	mandatory	mandatory
Share capital (min.)	EUR 1.25 million	EUR 5 million	EUR 15 million	EUR 15 million	EUR 25 million	EUR 25,000	EUR 5 million	TRY 30 million	GBP 50,000
Activity test	Max. 20% of total assets in one real estate project	80% of net income have to constitute renting activities; developments on own account	Developments are not allowed to exceed 20% of gross book value	75% of the assets must be immovable properties; 75% of the income must be derived from real estate sector	80% of the assets must be real estate assets and at least 80% in in Greece or in EEA	75% of market value have to be real estate related; 75% of income must be derived from rental business	80% of the assets must be real-estate related; 80% of income derived from qualified assets	51% of the portfolio must be invested in real-estate-related assets	75% of assets must be immovable properties; 75% of net profit must be derived from real estate assets
Distribution obligation	80% of net profits	90% of net income	95% of tax-exempt profit	90% of net income	50% of net profit	85% of property income	80% as a general rule	No obligation	90% of the rental profits
Shareholders' limitations	No	Direct participation <10% of share capital	60% free float	Shareholder participation < 10%; 15% free float	No	Shareholder participation <10% of the shares	No	Only for company founders	Shareholder participation < 10% of shares
Conversion into REIT status	16.995% tax on capital gains	"Entry Charge" of 20% on unrealized gains on all assets	19% on unrealized capital gains on real estate assets	50% tax benefit on the eliminated hidden reserves	Tax benefits provided by Law 2166/1993	No	No	No	No

Notes: The requirements of European REITs are summarized from the EPRA Global REIT Survey 2016 (EPRA, 2016).

2.3 Studies about REOCs and REITs

The underpricing issue became a subject of early academic research, for instance Ibbotson and Jaffe (1975) or Chalk and Peavy (1987) besides others, and has been widely investigated for common equities in the finance literature. In recent years, researchers have examined the underpricing from various points of view, including variability over time or cycles in the IPO market (Lowry *et al.*, 2010; Colak and Wang, 2008) or different information levels across IPO participants (Engelen and van Essen, 2010; Brau and Fawcett, 2006).

However, there is a growing number of studies focusing on the real estate sector concerning the initial return. Exhibit 2.2 provides an overview of recent research on underpricing within the real estate sector. Most of the studies refer to the North American and Asian-Pacific REIT market, empirical finding on the European REIT market remain scarce.

Exhibit 2.2: Overview of related literature in the real estate sector

Study	Country	Sample size	Avg. initial return (%)	R^2/ Adj. R^2	Time period	Company type
Chan *et al.* (2013)	Global	370	3.24	-/-	1996-2010	REIT
Brobert (2016)	Global	445	3.94	-/0.06	1996-2014	REIT
North America						
Wang *et al.* (1992)	USA	87	-2.82	-/0.31	1971-1988	REIT
Ling & Ryngaert (1997)	USA	85	3.60	-/0.23	1991-1994	REIT
Londerville (2002)	Canada	13	1.71	-/-	1993-1998	REIT
Hartzell *et al.* (2005)	USA	49	0.27	-/0.48	1980-1998	REIT
Dolvin & Pyles (2009)	USA	209	3.72	-/0.29	1986-2004	REIT
Bairagi & Dimovski (2011)	USA	123	3.18	0.21/0.18	1996-2010	REIT
Gokkaya *et al.* (2015)	USA	126	5.23	0.37/0.18	1993-2005	REIT
Asian-Pacific						
Chan *et al.* (2001)	Hong Kong	56	16.21	-/0.02	1986-1997	REOC
Dimovski & Brooks (2006)	Australia	37	1.20	0.26/0.09	1994-1999	REIT
Kutsuna *et al.* (2008)	Japan	40	5.11	-/0.18	2001-2006	REIT
Ahmad-Zaluki & Abidin (2011)	Malaysia	144	26.24	0.45/0.41	2005-2007	REOC & REIT
Wong *et al.*(2013)	Japan, Hong Kong, Singapore & Malaysia	78	3.10	0.24/-	2001-2008	REIT
Europe						
Brounen & Eichholtz (2001)	Europe	83	3.43	-/-	1990-2000	REOC
Brounen & Eichholtz (2002)	UK, France & Sweden	54	2.55	0.65/-	1984-1999	REOC
Freybote *et al.* (2008)	Europe	105	7.26	0.52/-	1994-2006	REOC
Braemisch *et al.* (2011)	Europe	120	6.00	-/0.12	1997-2007	REOC

Chan *et al.* (2013) was the first study to examine REIT underpricing in a global sample, including 370 IPOs from 14 countries covering the four continents of Australia, North America, Europe and Asia during the period 1996-2010. Using a mean comparison test, they demonstrated, that newly-established REIT regimes all over the world exhibited similar low initial return patterns, as they had found in the early stages of the now well-established U.S. REIT market. Precisely, they found a raw initial return of 2.78% for the U.S. REIT market and 3.48% for other international REITs. As an explanation of the similar underpricing level for new- and well-established REIT markets, Chan *et al.* (2013) argue in favor of the fund-like

structure of REITs in general and the underlying asset (real estate) in particular. Following Chan *et al.* (2013), Brobert (2016) also investigated the initial return of 445 REIT IPOs in 26 countries during the period 1996-2014 and found a raw initial return of 3.94%. In contrast to Chan *et al.* (2013), Brobert (2016) analyzed variables proven to explain REIT IPO initial return in a multivariate regression analysis. He showed that in a global context, the issue size has a negative influence on the initial-day return, and that the impact of the debt level is dependent on the prevailing market conditions.

One of the first studies about the IPO initial return in the U.S. REIT market was documented by Wang *et al.* (1992), who reported, in contrast to the general evidence, an overpricing of 2.82% for 87 U.S. REIT IPOs during the period 1970-1988. This result was invariant to a number of influencing factors, such as the offer price, issue size, distribution method, offer period or underwriter reputation. Accordingly, Wang *et al.* (1992) explained the overpricing by means of the ignorance of non-institutional investors, who are predominantly the buyers of overpriced REITs. Reconsidering the U.S. REIT market, Ling and Ryngaert (1997) provide contrary evidence by finding an average underpricing of 3.60% for 85 U.S. REIT IPOs during 1991-1994. As a proxy for uncertainty, they used the reputation of the underwriter, and show that the initial-day return drops as the underwriter has a better reputation.

More recent studies on the U.S. REIT IPO market, such as Bairagi and Dimovski (2011) and Gokkaya *et al.* (2015), showed an underpricing level which is in line with previous studies. Bairagi and Dimovski (2011) examine 123 U.S. REIT IPOs during the period 1996-2010, which includes the GFC. They documented an average underpricing of 3.18% and a value-weighted underpricing of 4.67%, which indicates that the underpricing level is influenced by the factor of offer size. This study supports the finding of Ling and Ryngaert (1997) about the reputation of the underwriters, by using an OLS multivariate regression to determine factors influencing underpricing. For a similar time period, Gokkaya *et al.* (2015) investigated 126 REIT IPOs with a focus on primary (offer-to-open) and secondary market (open-to-close). With an average underpricing (offer-to-close return) of 5.23%, they argue that the lower secondary market returns for REIT IPOs, compared to non-REIT IPOs, may be caused by a higher relative transparency of REITs. All other studies refer either to North America, the Asian-Pacific or the European market, and primarily calculate the underpricing as an offer-to-close return, and do not distinguish between detailed calculation variations of IPO returns.

Research on the IPO initial return in the Asian-Pacific market yields a homogeneous pattern of a positive initial return, but the spread of the return varies from an underpricing of 1.20% (Dimovski and Brooks, 2006) to an underpricing of 26.24% (Ahmad-Zaluki and Abidin, 2011). Dimovski and Brooks (2006) found this insignificant low underpricing for 37 Australian REIT

IPOs during 1994-1999. They explained their result with the absence of valuation uncertainty in the Australian REIT market, which is caused by the high information transparency in the valuation process of the underlying real estate assets. Compared to other studies in the Asian-Pacific market, Ahmad-Zaluki and Abidin (2011) found a very high underpricing of 26.24% in a sample of Malaysian REOC and REIT IPOs. The latest investigation in the Asian market was published by Wong *et al.* (2013), who investigated the relationship between the fraction of shares retained by the sponsor and the underpricing level, by applying a 2SLS estimation with both of these as dependent variables. Their key finding was that both variables impact on each other, which supports e.g. their hypothesis that real estate developer tend to hold a huge part of the issued REIT shares in order to pay off investors for potential moral hazard problems in the aftermarket.

In contrast to the abovementioned studies, which mostly examined the underpricing of the REIT market in various countries, the European studies focused mainly on the underpricing of REOCs. Compared to those REIT studies, the two recent studies of Freybote *et al.* (2008) and Braemisch *et al.* (2011) yielded higher underpricing at 7.26% and 6.00%, respectively. Freybote *et al.* (2008) investigated 105 IPOs of property companies during the period 1994-2006, with a focus on different market phases during the IPO cycle. In almost the same sample period 1997-2007 Braemisch *et al.* (2011) tested signaling models and found that company-specific ex-ante uncertainty proxies impact on the underpricing level of 120 REOC IPOs in Europe, and that property-specific proxies did not help explain the underpricing phenomenon.

The previous literature on IPOs in the real estate sector investigated either the initial return of REITs or REOCs. There is just one study on the Malaysian market, comparing the underpricing level of both business forms. However, as is shown in Table 2, there is a difference in the underpricing level of REITs and REOCs, specifically the average underpricing level of REITs is significantly lower. The focus of this study is on differences in the underpricing levels of REIT and REOC IPOs in Europe. Accordingly, the following methodology was developed to test several proxies for uncertainty, transparency and information asymmetry in the underpricing context of REIT and REOC IPOs.

2.4 Methodology

Theoretical approaches, such as Rock (1986), Beatty and Ritter (1986) or Welch (1989) tried to explain the reasons for, conditions and influencing factors of the underpricing phenomenon.[2]

[2] Ljungqvist (2007) provides an overview of several theories, which tries to explain the reasons for, conditions and influencing factors of the underpricing phenomenon.

Most explanations are based on the asymmetric information theory between the key participants of an IPO process (Ritter and Welch, 2002). However, the underpricing puzzle is not solved yet.

Besides the information level of the participants, underpricing may be affected by the industry sector itself or the business model in which the IPOs take place. Industry sectors such as the financial sector and business models such as the REIT-status are strictly regulated and monitored. Therefore, they may be perceived as less risky, due to the stringent legal requirements, resulting in a lower initial return. Empirical evidence for that theory was given by Buttimer *et al.* (2005), who compared the underpricing level of non-REIT and REIT IPOs and found that the initial return of REITs was significantly lower. In addition to inter-sector comparisons, such as Buttimer *et al.* (2005), an intra-sector investigation might provide additional information on the differences in the initial return for the real estate sector itself. This information is important for potential investors. Precisely, an intra-sector investigation concerning the underpricing phenomenon provides a detailed analysis of the differences in REIT and REOC pricing. Especially the variances between the short-term initial return of the two business sectors can be decisive for specific real estate investors, when considering a listed property investment.

In general, stricter legal requirements and controls imposed on specific sectors or business models imply more certainty for investors, due to a specified business and legal framework. This argument of the regulation hypothesis is consistent with the asymmetric information hypothesis. Beatty and Ritter (1986) showed that greater ex-ante uncertainty about the "true" value of the issuing company leads to increased underpricing. Therefore, if this legal certainty is positively linked to the REIT-status, the underpricing level might be lower for REITs. Uncertainty before an IPO can be caused by the key participants in the IPO process, but it can be dealt with a number of different ways. First, Beatty and Ritter (1986) assumed that the underpricing level is the result of information asymmetry between potential investors and the issuing firm and that this uncertainty can be reduced by voluntarily providing as much information as possible about the upcoming IPO. In contrast to REOCs, the catalogue of requirements for REIT-status provides potential investors with a framework of basic information about the general business model, for instance the distribution rate, shareholder restriction or activity tests. Furthermore, the basic model for REITs is similar in all countries, due to an ex-ante fixed distribution rate, tax advantages at the company level and the publicly available catalogue of requirements. For potential investors, the fixed distribution rate may imply a certain stability in future cash flows and hence a lower valuation uncertainty. In sum, as a legal business form, the REIT-status may have a transparency bonus, which affects the initial return negatively. This relative transparency of REITs in comparison to REOCs may raise confidence in the valuation process of a REIT IPO and result in a more precise company

valuation and lower initial returns. In addition to the fixed distribution rate, the stable business form or rather portfolio may have an impact on the ex-ante uncertainty at the IPO. Most REITs must have a fixed proportion of their portfolio invested in real estate and a fixed proportion of the portfolio can be restructured during a given time frame. Thus, REIT investors set to legal and economic continuity and stability, affecting the initial return in a negative way.

Additionally, potential investors require information on the real estate sector and its unique characteristics, the company's market segment and properties of the portfolio. Assuming that REIT investors are highly informed, through spend sufficient time and money on the information gathering process, their estimated value for the issuing company might be close to the market value. Further, underpricing is used as risk compensation for IPO investors (Brau and Fawcett, 2006). Since REIT investors have a certain information advantage and therefore a smaller risk buffer in comparison to REOCs, IPO REIT underpricing might be accepted to be lower.

In this present study, we investigate intra-sector differences in the underpricing level of the real estate sector. As the abovementioned REITs are a special type of property entity within the real estate sector, which is assumed to be more transparent. Due to a lower ex-ante uncertainty, we expect the following relationship.

H1: The REIT-status is negatively linked to the initial return at the IPO.

Control variables influencing the underpricing level

The main focus of this study is on an intra-sector comparison of underpricing in the real estate sector, with the hypothesis that REIT IPOs are less underpriced than REOC IPOs, due to the regulatory nature of the REIT business model. In order to test for the difference between the underpricing level of REITs and REOCs, we control for ex-ante uncertainty factors, and IPO-specific and company characteristics influencing the IPO initial return.

Influencing factors derived directly from the ex-ante uncertainty theory are the offer size and the age of the issuing company. Larger IPOs are more likely to be managed professionally. Therefore, the IPO process entails more publicly accessible information, which is necessary to estimate the true value. Consequently, ex-ante uncertainty declines with increased size, which is approximated by the IPO gross proceeds (Beatty and Ritter, 1986). The second proxy directly linked to ex-ante uncertainty is the age of the company. The track record of a company is documented in their annual reports. Established firms can provide potential investors with a

long operating history, which might simplify the information gathering process and consequently the search for true value.

H2: The IPO size and age of the company are negatively related to the initial return.

Additionally, we control for a characteristic concerning the offer price and the risk of aftermarket returns. The offer price itself is used to calculate the initial return as closing price less offer price divided by offer price. Therefore the characteristic that the offer price is in whole dollars or in fraction of dollars is controlled for. Harris (1991) argued that the negotiating partners, here the underwriters and issuing firm, wish to reduce the discussion time or negotiation costs, respectively, associated with the offer price and therefore, frequently agree on an overall price. Integer values might imply that the offer price is based on a possible price range rather than precisely calculated price after a holistic valuation.

The aftermarket standard deviation of the returns for the first 20 days after the IPO is applied to measure the volatility, which is often used as a risk measure in the finance literature. As the underpricing can be interpreted as risk compensation for potential investors, the volatility of the return is a good proxy for the IPO risk. If the market participants agreed with the pre- and after-IPO pricing, the volatility is low and consequently, so too is the underpricing. Accordingly:

H3: An overall offer price and high volatility in the aftermarket returns are positively linked to the underpricing level.

In general, another important factor influencing the underpricing are the overall stock market conditions (Brau and Fawcett, 2006). This present study controls for both general stock market conditions and the specific listed real estate market. As an extraordinary market phase, the GFC is part of the sample period, which is dominated by a high level of uncertainty and distrust between market participants. Market phases of greater uncertainty can impact on two groups of participants, the potential investors who demand higher risk compensation, and potential issuer who would rather "leave less money on the table". Additionally, each IPO sector displays specific cycles, with hot and cold market phases measured by the number of IPOs each year. Buttimer *et al.* (2005) provides evidence that the underpricing level is negatively related to the supply of IPOs. Following Buttimer *et al.* (2005), hot market phases in the real estate sector are defined as those in which ten or more real estate IPOs take place per year.

H4: In times of economic crisis, like the GFC, underpricing level increases and in hot market phases the underpricing level decreases.

A unique characteristic for the real estate sector is the specific investment focus, which represents the properties in which the company is invested. In the context of IPO underpricing, the investment focus of a company impacts the valuation process. Thus, a company with several

business segments might be more complex to evaluate (Freybote *et al.*, 2008). Estimating the value of a diversified real estate company requires advanced knowledge on different property types, such as office, retail, residential or hotels. This complexity constitutes a greater number of uncertainty factors in the valuation process, requiring a higher risk compensation for potential investors. Accordingly:

H5: A diversified investment focus is positively linked to the underpricing level.

2.5 Sample and Summary Statistics

2.5.1 Sample design

In order to obtain a unique dataset with numerous details about the IPOs of European property companies and REITs, the SNL list "completed offerings" is used. In addition, the data sources SNL Real Estate Research, Thomas Reuters Datastream, IPO prospectus, IPO lists of national stock exchanges[3] and annual reports are used to complete the dataset[4].

First of all, we gather firm and IPO characteristics like the international securities identification number (ISIN), date of issue, initial offer price, number of issued shares, legal company form or REIT-status and the investment focus of each company. In the second step the closing price on the secondary market was collected. The last variable of interest was the foundation year of the issuing company. After these three steps, twelve companies of the SNL list "completed offerings" were excluded from the analysis, because of divergent information across various data sources or a lack of information.

The criteria for inclusion in the sample can be summarized as follows:

- REITs and REOCs from Belgium, Finland, France, Germany, Greece, Ireland, Spain, Turkey and United Kingdom are included.
- It has to be the first initial public offering of a company. Therefore, spinoffs, secondary listings or changes in stock exchange segments are excluded.
- All important information for the analysis has to be from independent sources and consistent across various data sources.

The final sample consists of 107 property companies and REITs of 9 European countries over the period 2000-2015. REITs make up 29% of the sample. Precisely, one REIT each from Germany, Finland and Greece, two REITs each from Belgium and Ireland, three from Spain,

[3] Information about the issuing company is provided by the Vienna stock exchange, Frankfurt stock exchange, Euronext Fact Books, OMX Nordic Exchange and London stock exchange.
[4] As most of the needed information is not published in a systematic form or from one source (Rummer, 2006).

four from Turkey and five from France, as well as twelve from the UK, are incorporated into the sample.

2.5.2 Summary statistics of subsample REITs and REOCs

Exhibit 2.3 reports the descriptive statistics of the variables in the sample, divided into the subsamples REITs and REOCs, except for the initial return, which is also represented over the whole sample.

Exhibit 2.3: Descriptive Statistics

		REITs	REOCs
Initial return whole sample (in %)	Min	-6.09	
	Max	29.94	
	Mean	4.63*** (0.00)	
	Std. dev.	6.87	
Initial return subsamples (in %)	Obs.	31	76
	Min	-5.00	6.09
	Max	11.73	29.94
	Mean	2.03*** (0.00)	5.69*** (0.00)
	Std. dev.	4.00	7.51
Gross proceeds (in million €)	Min	1.258	0.60
	Max	1,291.52	1,165.20
	Mean	209.20	207.16
	Std. dev.	250.35	213.25
Volatility (in %)	Min	0.24	0.00
	Max	6.74	8.26
	Mean	1.54	1.69
	Std. dev.	1.31	1.59
Age at IPO	Min	0.00	0.00
	Max	54.00	87.00
	Mean	6.77	7.33
	Std. dev.	11.74	13.60
Hot	Min	0.00	0.00
	Max	1.00	1.00
	Mean	0.71	0.80
	Std. dev.	0.46	0.40
Integer	Min	0.00	0.00
	Max	1.00	1.00
	Mean	0.27	0.29
	Std. dev.	0.45	0.46
Diversified	Min	0.00	0.00
	Max	1.00	1.00
	Mean	0.48	0.63
	Std. dev.	0.51	0.49

Notes: Coefficients of statistical significance at: * 10%, ** 5%, *** 1% levels. The p-value is reported between brackets.

The average initial return on the first day of trading shows a significant underpricing of 4.63%. The underpricing level of this mixed sample is higher than the initial return of the pure REIT study of Bairagi and Dimovski (2011), and lower than Braemisch *et al.* (2011), who only investigated listed property companies. The initial return varies from an overpricing of 6.09% to an underpricing of 29.94%. This present sample includes REOC and REIT IPOs. Looking at the subsamples a clear conclusion can be drawn. It is obvious that the average initial return of REITs (2.02%) is less than half of the initial return of REOCs (5.69%) and both are statistically significant at the 1% level. The underpricing level of the REOC subsample is in line with the result of Braemisch *et al.* (2011). Buttimer *et al.* (2005) reported similar findings and explained the lower underpricing level of REITs by their transparency compared to other stocks. The transparency may originate from the fact that REITs have an obligation to fulfill the legal requirements, in order to retain their tax-exempt status and thus potential investors achieve a higher information level. The subsample result of the initial return supports *H1* in general, that the REIT underpricing is lower.

European property companies raised on average EUR 207 million through their IPOs and REITs raised on average slightly more at EUR 209 million. This finding may support *H1* & *H2*, that REIT-IPOs combined with higher gross proceeds yield a lower underpricing level. However, the spread of the gross proceeds of REOCs from EUR 0.60 million to EUR 1,165.20 million is much higher than the gross proceeds by REIT IPOs. Additionally, the volatility in the aftermarket returns is 0.15 percentage points lower for REITs than for REOCs. In contrast to the results of the gross proceeds and the volatility, REOCs are 0.56 years on average older than REITs when they realize the IPO. This result indicates that the initial return of REOC IPOs is lower compared to REIT IPOs, as we hypothesize that older companies with a longer track record are less underpriced (*H2*).

The data suggest that 71% of the REITs and 80% of the REOCs realized the IPO during a “hot” market phase, which is defined as a year with more than ten real estate IPOs. An IPO during a “hot” market phase indicates a lower initial return. The fact that during “hot” market phases, it is more likely that a REOC IPO will take place compared to a REIT IPO, the initial return of REOC IPOs may decline. Contrary to this finding, the result of overall IPO offer prices indicates that REOC IPOs have a slightly higher probability of higher underpricing compared to REIT IPOs. 29% of the REOC IPOs have a fixed offer price in whole dollars.

About 63% of the REOCs have a diversified business model, in contrast to only 48% of the REITs, implying that REITs have mostly a specialized investment focus. One reason for a majority of diversified REOCs could be that the business segments of the company can balance each other out in times of crisis. Thus, it can be assumed that diversified companies are more

resistant to a crisis and therefore less risky for investors. However, uncertainty in the valuation process before an IPO may be higher for diversified companies, due to the greater complexity of their business model. Therefore, the IPO investors have a preference for higher underpricing to cover the higher uncertainty level. This finding might support *H5* and *H1*, that REITs with a specialized investment focus are less underpriced.

In order to investigate the difference between REITs-regimes in various European countries, Exhibit 2.4 presents the number of REITs and REOCs, the average returns of the first trading day and the standard deviation.

Exhibit 2.4: Initial return of subsample REITs and REOCs

		REITs	REOCs
Belgium	Obs.	2	2
	Mean	4.44 (0.29)	3.17 (0.50)
	Std. dev.	3.03	4.55
Finland	Obs.	1	-
	Mean	0.00 (-)	-
	Std. dev.	-	-
France	Obs.	5	5
	Mean	1.89 (0.33)	4.32 (0.41)
	Std. dev.	3.80	10.46
Germany	Obs.	1	16
	Mean	0.00 (-)	3.93* (0.05)
	Std. dev.	-	7.38
Greece	Obs.	1	2
	Mean	0.00 (-)	5.65 (0.50)
	Std. dev.	-	8.00
Ireland	Obs.	2	3
	Mean	5.35 (0.16)	11.65 (0.34)
	Std. dev.	1.91	16.04
Spain	Obs.	3	4
	Mean	-1.00 (6.35)	1.01 (0.70)
	Std. dev.	3.12	4.72
Turkey	Obs.	4	-
	Mean	0.53 (0.90)	-
	Std. dev.	7.58	-
UK	Obs.	12	44
	Mean	2.90** (0.01)	6.62*** (0.00)
	Std. dev.	3.38	6.84

Notes: Coefficients of statistical significance at: * 10%, ** 5%, *** 1% levels. The p-value is reported between brackets.

It is obvious that in most European countries the average initial return of REITs is lower than the initial return of REOCs. On country level perspective the only exception can be found in the Belgium subsample. In this case, the underpricing of the REITs exceeds the underpricing of the

REOCs. This situation may have been caused by the introduction of a new REIT-form in Belgium in 2014.

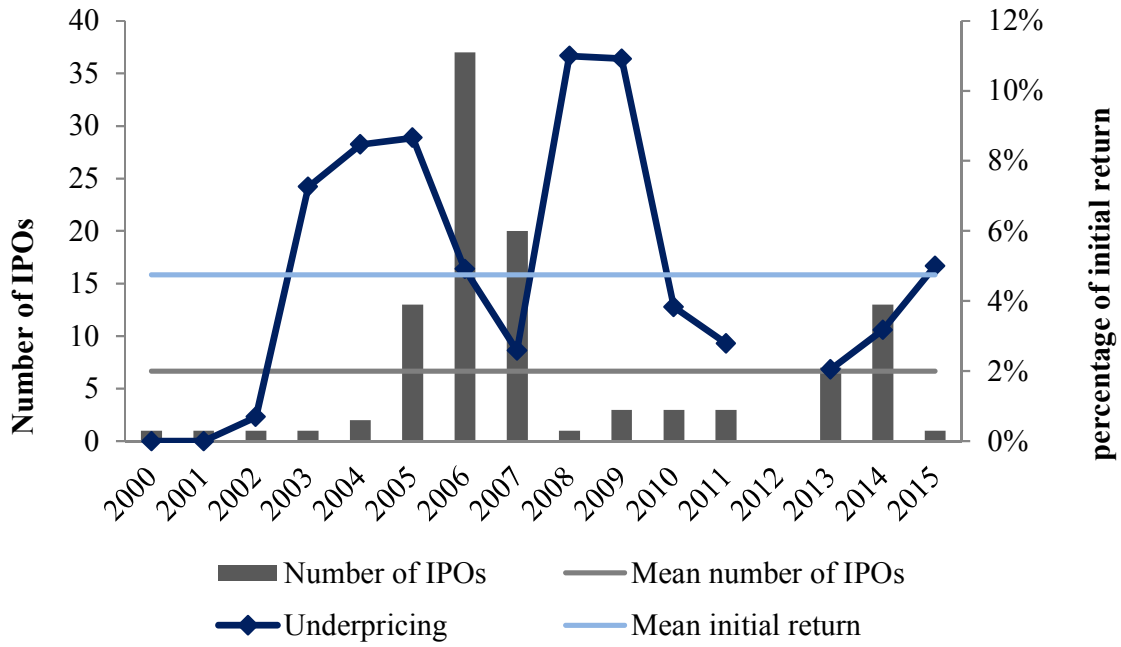
Investigating the number of REITs in each country, it is striking, that the highest number of REIT-IPO are in countries where the conversion to REIT status is not restricted or not high-priced with tax payments, e.g. UK, France, Turkey or Spain. A better performing REIT-market, reflected in a low underpricing, is characterized by an increased number of market participants (e.g. REIT markets in France, Turkey or the UK). Another factor leading to a higher underpricing can be the maturity of the REIT regime. As the Irish REIT regime is the youngest in Europe and has the highest underpricing of 5.35% in the REIT subsample. Additionally, the second highest REIT underpricing of 4.44% was found in Belgium, which can also be attributed to the introduction of a new REIT-regime named Société immobilière réglementée (SIR) in 2014. The REIT-regime SIR differs from the old Société d'investissement en immobilier à capital fixe (SICAFI) in the business model, to the extent that it allows a SIR company to invest in properties, develop and manage them (EPRA, 2016). Counter-intuitively, the Spanish REITs have an overpricing of 1.00%, which cannot be tracked back to any specific legal or business characteristic of Spanish REITs.

The initial return on the first trading day is a short-term valuation, which is not predominantly influenced by market movements on this one day. However, the market phase in which the IPO takes place, as well as the overall market environment (e.g. interest level, yields of fixed income investments) may have an impact on the underpricing. Therefore, a consideration of the initial return in different time frames can increase the explanatory power of the underpricing phenomenon in the real estate sector.

2.5.3 Initial return over different timeframes

The sample period covers fifteen years, which includes the GFC as a significant market movement. Exhibit 2.5 provides an overview of the number of IPOs per year and the time sequence of initial returns during the sample time frame.

Exhibit 2.5: Initial return and number of IPOs



Most IPOs in the European real estate sector took place from 2005-2007. Clearly, 2006 is the year with the highest number of IPOs in the sample, and after 2007, the number of IPOs declines dramatically. The reason for this decrease is probably the GFC, which was caused primarily by the bursting of real estate bubble in the U.S. Interestingly, the underpricing level and number of IPOs reveal a development in opposing directions. In 2008 and 2009, the highest average underpricing level is observed in the sample, simultaneously with the lowest number of IPOs. Investors may have claimed a high initial return, because of an increased risk-level due to both the GFC and distrust between capital market participants during these two years. In order not to "leave a lot of money on the table" fewer issuers conducted an IPO in the crisis years and the few who offered shares accepted a high underpricing.

During the GFC, 13% of the REIT-IPOs during the whole sample period took place, whereas only 4% of the REOC-IPOs. The reason for the higher percentage of REIT-IPOs during the crisis period (2008-2010) may be that in 2007, the REIT-regime was introduced in Germany and UK, which represents large European capital markets.

For a detailed investigation of initial returns in different timeframes, Exhibit 2.6 shows the sample period divided into the four sub-periods, labelled as before the GFC (2000-2004), beginning of the GFC (2005-2007), during the GFC (2008-2010) and after the GFC (2011-2015). The crisis period is defined in accordance with the following events: the bankruptcy of Lehman Brothers in September 2008, nationalization of Hypo Real Estate in October 2009 and the active financial support of European banks until mid 2010. The average initial returns are positive over all sub-periods and show mostly statistical significance at the 10% or 1% level,

with the exception of the time period 2000-2004. In chronological order, underpricing continuously increased until the GFC between 2008 and 2010. Over 2000 to 2004, real estate IPOs were priced by an underpricing of 4.15% and in the second sub-period, the initial return rose a little bit to 4.94%. Accordingly, considering the crisis, higher uncertainty can explain an underpricing of 7.89% in the third sub-period. This result implies, as hypothesized in *H4*, that the GFC had a significant impact on the underpricing of European REITs and REOCs.

Exhibit 2.6: Initial return in different timeframes

Time periods	No.	Min (%)	Max (%)	Median (%)	Mean (%)
2000-2004	6	-1.40	18.34	0.34 (0.37)	4.15 (0.24)
2005-2007	70	-6.09	29.94	3.08*** (0.00)	4.94*** (0.00)
2008-2010	7	-1.99	27.90	2.94* (0.08)	7.89* (0.09)
2011-2015	24	-5.00	11.46	2.70*** (0.00)	2.87*** (0.00)

Notes: Coefficients of statistical significance at: * 10%, ** 5%, *** 1% levels. The p-value is reported between brackets.

In summary, an underpricing is shown for the whole sample, both business forms, in different European countries and various timeframes. However, the level of the underpricing in the European real estate sector is quite moderate.

2.6 Method and Results

2.6.1 Method

In order to test the aforementioned hypotheses, a multiple linear regression model using ordinary least square (OLS) is conducted. The models are as follows:

$$IR_i = \beta_0 + \beta_1 LNPROCEEDS_i + \beta_2 VOLATILITY_i + \beta_3 LN(1+AGE)_i + \beta_4 REIT_i + \beta_5 DIVERSIFIED_i + \beta_6 HOT_i + \beta_7 INTEGER_i + \varepsilon_i \quad \textbf{(1)}$$

$$IR_i = \beta_0 + \beta_1 LNPROCEEDS_i + \beta_2 VOLATILITY_i + \beta_3 LN(1+AGE)_i + \beta_4 REIT_i + \beta_5 RESIDENTIAL_i + \beta_6 OFFICE_i + \beta_7 INDUSTRIAL_i + \beta_8 RETAIL_i + \beta_9 OTHERS_i + \beta_{10} HOT_i + \beta_{11} INTEGER_i + \varepsilon_i \quad \textbf{(2)}$$

$$IR_i = \beta_0 + \beta_1 LNPROCEEDS_i + \beta_2 VOLATILITY_i + \beta_3 LN(1+AGE)_i + \beta_4 REIT_i + \beta_5 RESIDENTIAL_i + \beta_6 OFFICE_i + \beta_7 INDUSTRIAL_i + \beta_8 RETAIL_i + \beta_9 OTHERS_i + \beta_{10} HOT_i + \beta_{11} INTEGER_i + \beta_{12} INTERACTION_i + \varepsilon_i \quad \textbf{(3)}$$

The natural logarithm is used, in order to minimize the influence of outliers and reduce asymmetry (Chatterjee and Price, 1995). ε_i is the error term, and we assumed ~ $N(0,\sigma^2)$.

The dependent variable initial return (*IR*) is calculated as the percentage change between the closing price on the first trading day and the offer price. (Beatty and Ritter, 1986, Freybote *et al.*, 2008, Gokkaya *et al.* 2015) Additionally, the abnormal return, measured as the difference between initial return and the market return of the corresponding FTSE EPRA/NAREIT index for the IPO date, is considered. As the market return, the country-specific FTSE EPRA/NAREIT index series are used.[5] These index series are available for most European countries, and if there were no country-specific index series available, the FTSE EPRA/NAREIT Europe Index was applied.

Equation (1) is the base model. In equation (2), the variable DIVERSIFIED is replaced by those controlling for the specific investment focus in the sample. Equation (3) is an extension of equation (2) with REIT-interaction variables. The primary variable of interest is REIT. This binary variable equals 1, if the property company has REIT-status. In all three model specifications, various firm and IPO variables are included to control for their influence on the underpricing IR. With regard to the IPO characteristics of a company, LNPROCEEDS represents the issuing volume, which is measured by multiplying the offer price by the number of issuing shares. As a risk measure, the variable VOLATILITY is included, measured as the standard deviation of the aftermarket return for the period of 20 days after IPO. LN(AGE+1) represents the age of a company, measured by the year of going public minus the foundation year plus 1. In order to control for the different property sectors in equation (1), the binary variable DIVERSIFIED is included. This binary variable equals 1, if the company has a diversified investment focus. For an in-depth analysis of real estate companies in equation (2) and equation (3), specific investment focuses are controlled for, such as RESIDENTIAL, OFFICE, INDUSTRIAL, RETAIL, OTHERS. The variable HOT is equal to 1, if the IPO takes place in a year with more than 10 IPOs. The years 2005, 2006, 2007 and 2014 are defined as hot market phases. A proxy for the offer price is the variable INTEGER being equal to 1, if the offer price is in whole numbers. The variables REIT*LNPRO, REIT*VOLA and REIT*HOT represent the interaction variables in equation (3).

[5] For the classification to the corresponding country-specific FTSE EPRA/NAREIT index series, the IPO-listing at the stock exchange is decisive. The following FTSE EPRA/NAREIT index series were available on a daily basis: FTSE EPRA/NAREIT Belgium/Luxembourg Index, FTSE EPRA/NAREIT Finland Index, FTSE EPRA/NAREIT France Index, FTSE EPRA/NAREIT Germany Index, FTSE EPRA/NAREIT Greece Index, FTSE EPRA/NAREIT Ireland Index, FTSE EPRA/NAREIT Spain Index.

2.6.2 Regression model of initial return on the first day of trading

In addition to these descriptive results, a multiple linear regression is used to verify the isolated impact of control variables and the REIT-status on the initial return. Thus, the regression controls for IPO-specific variables, company characteristics and the market phase in which the IPO take place. In Exhibit 2.7, four alternative regression specifications are reported, in order to explain the expected initial return. Additionally, the regression results with REIT-interaction variable are reported in Exhibit 2.8. As dependent variable, the absolute initial return is used for the results in Exhibit 2.7 and Exhibit 2.8, but we find the same results with the market-adjusted initial return as dependent variable.

All models in Exhibit 2.7 and Exhibit 2.8 are tested for multicollinearity and for heteroscedastic residuals. The results for the multicollinearity tests are shown in the correlation matrix (see Exhibit 2.9) with the p-value and also with the Variance Inflation Factor (VIF) in Exhibit 2.7 and Exhibit 2.8. The correlation varies between -0.52 and 1.00. According to Kennedy (2003) the rule of thumb for multicollinearity is 0.80, so that a correlation coefficient above 0.80 is interpreted as indicating a multicollinearity problem in the regression. The widely used threshold value for the multicollinearity problem is a VIF $\geq$ 10, suggested by Chatterjee and Price (1995). For testing the heteroscedasticity, the White test was applied and the results are reported in Exhibit 2.7 and Exhibit 2.8. All tests show that the results are unbiased by specification failure. In order to test for misspecification in the models, the Ramsey's Regression Specification Errors Test (RESET) is conducted for all models in Exhibit 2.7 and Exhibit 2.8. The results for the RESET show that there is no misspecification in any model.

Exhibit 2.7: Multiple regression analysis on the first day initial return

	Model 1	Model 2	Model 3	Model 4
INTERCEPT	0.2257*** (3.28)	0.2571*** (3.59)	0.2224*** (3.24)	0.2124*** (3.22)
LNPROCEEDS	-0.0093** (-2.58)	-0.0100*** (-2.74)	-0.0093** (-2.58)	-0.0086** (-2.46)
VOLATILITY	0.7401** (2.10)	0.7465** (2.13)	0.7697** (2.16)	0.8265*** (2.42)
LN(AGE+1)	-0.0111*** (-2.75)	-0.0128*** (-3.10)	-0.0102** (-2.54)	-0.0114*** (-2.87)
REIT	-0.0302*** (-2.68)	-0.0272** (-2.41)	-0.0274** (-2.30)	-0.0312*** (-2.82)
INTEGER	-0.0039 (-0.34)	-0.0012 (-0.10)	0.0007 (0.06)	
DIVERSIFIED	0.0122 (1.11)		0.0106 (0.98)	
RESIDENTIAL		-0.0231 (-1.56)		
OFFICE		-0.0163 (-0.68)		
INDUSTRIAL		0.0299 (1.32)		
RETAIL		-0.0302 (-1.54)		
OTHERS		-0.0023 (-0.11)		
HOT	-0.0074 (-0.60)	-0.0144 (-1.13)		
YEAR2005			0.0228 (1.24)	
YEAR2006			-0.0135 (-0.96)	
YEAR2007			-0.0135 (-0.85)	
YEAR2014			-0.0075 (-0.41)	
N	106	106	106	106
R^2	0.22	0.27	0.26	0.21
Adjusted R^2	0.17	0.18	0.19	0.18
AIC	-3.02	-3.00	-3.01	-3.06
Max. VIF	1.16	1.22	1.83	1.07
White test	1.25 (0.21)	1.52 (0.07)	1.86 (0.06)	1.12 (0.35)

Notes: Coefficients of statistical significance at: * 10%, ** 5%, *** 1% levels. The t-statistic is reported in brackets for each coefficient. The p-value is reported between brackets for the White test. By means of the White test, the following null hypothesis is assumed: H_0: Var ($\varepsilon \mid x$) = σ^2 (homoscedasticity).

The first regression Model 1 includes all variables of equation (1), of which the coefficients of LNPROCEEDS, VOLATILITY, LN(AGE+1) and REIT are statistically significant at the 5% or 1% levels. These variables remain statistically significant in Models 2, 3 and 4 as well. Thus, the results are stable after controlling for specific property types in Model 2, considering the hot market phase in detail in Model 3, and applying a stepwise regression to verify the best model (Model 4).

The hypothesis that bigger IPOs are less underpriced (*H2*), is supported by a negative and significant coefficient of LNPROCEEDS at the 5% or 10% level over Models 1-3. An increasing offer size leads to a decreasing initial return. This result implies that IPOs with a higher volume are associated with more recoverable assets and more efficient management (Braemisch *et al.*, 2011), which both signify a higher professionality level. The hypothesis that older companies are less underpriced (*H2)* can be verified by a statistically significant negative coefficient of LN(AGE+1). Hence, older listed property companies have a longer track-record, which reduces the ex-ante valuation uncertainty through increased information materials. In sum, more information about the IPO, either due to a longer track record or high professionality, help potential investors to a make a better pre-IPO valuation.

The result of the positive significant coefficient VOLATILITY supports the third hypothesis that a higher standard deviation of the aftermarket return is associated with a higher valuation uncertainty in the pre-IPO phase. Based on the general risk return relationship, this positive sign of VOLATILTY was expected. Hence, potential investors claim more risk compensation in the form of underpricing, in case of a high volatility in the aftermarket returns.

The coefficient of DIVERSIFIED is positively related to the initial return, but not significant at an appropriate level. In Model 2, the different property types, except for the coefficient INDUSTRIAL, have a negative impact on the underpricing, but they are as well not statistically significant. Accordingly, *H5* and the results of various statistically significant risk levels across different property types noted by Ling and Ryngart (1997) cannot be supported.

A more detailed analysis of the hot market phases is given by including in Model 3, the variables YEAR2005, YEAR2006, YEAR2007 and YEAR2014, instead of HOT. However, no coefficients reach a significance level. Thus, *H4* that hot market phases decrease the underpricing level, cannot be confirmed.

The binary variable REIT provides evidence that the REIT-status itself is associated with a transparency bonus and leads to decreased IPO-underpricing of REITs. The coefficient REIT shows a negative sign and is highly statistically significant at the 1% or 5% level. This result

supports *H1* and it is in line with the findings of Dolvin and Pyles (2009) and Ahmad-Zaluki and Abidin (2011).

Exhibit 2.8: Multiple regression analysis on the first day initial return with interaction variables

	Model 5	Model 6	Model 7
INTERCEPT	0.2496*** (3.49)	0.2429*** (3.45)	0.2474*** (3.42)
LNPROCEEDS	-0.0096*** (-2.63)	-0.0096*** (-2.67)	-0.0101** (-2.72)
VOLATILITY	0.7511** (2.14)	1.0618*** (2.97)	0.7814** (2.20)
LN(AGE+1)	-0.0128*** (-3.13)	-0.0122*** (-3.02)	-0.0127*** (-3.04)
RESIDENTIAL	-0.0237 (-1.60)	-0.0266* (-1.84)	-0.0232 (-1.54)
OFFICE	-0.0157 (-0.65)	-0.0194 (-0.82)	-0.0147 (-0.60)
INDUSTRIAL	0.0297 (1.31)	0.0308 (1.39)	0.0303 (1.32)
RETAIL	-0.0300 (-1.52)	-0.0315 (-1.63)	-0.0337* (-1.70)
OTHERS	-0.0022 (-0.10)	-0.0036 (-0.17)	-0.0034 (-0.16)
INTEGER	-0.0009 (-0.08)	-0.0032 (-0.28)	-0.0000 (-0.00)
HOT	-0.0145 (-1.14)	-0.0129 (-1.03)	-0.0053 (-0.40)
REIT*LNPRO	-0.0015** (-2.43)		
REIT*VOLA		-1.6132*** (-3.02)	
REIT*HOT			-0.0254** (-1.90)
N	106	106	106
R^2	0.27	0.29	0.25
Adjusted R^2	0.18	0.21	0.16
AIC	-3.00	-3.03	-2.98
Max. VIF	1.22	1.20	1.24
White test	1.52 (0.07)	1.47 (0.09)	1.55 (0.06)

Notes: Coefficients of statistical significance at: * 10%, ** 5%, *** 1% levels. The t-statistic is reported in brackets for each coefficient. The p-value is reported between brackets for the White test. By means of the White test, the following null hypothesis is assumed: H_0: Var ($\varepsilon \mid x$) = σ^2 (homoscedasticity).

More insight into the IPO-pricing differences of REITs and REOCS are provided by the interaction variables in Models 5-7. All interaction variables, REIT*LNPRO, REIT*VOLA and REIT*HOT, show a negative impact on the initial return. The highest negative impact is demonstrated by the coefficient of REIT*VOLA. Thus, for REITs, an increased standard deviation in the aftermarket decreases the IPO-underpricing. This result provides evidence that the negative impact of the REIT-status on the underpricing is more influential than increased aftermarket volatility. The transparency factor of the REIT-status outweighs the risk associated with the aftermarket returns. The interaction between REIT-status and the LNPROCEEDS show that, an increased offer size decreases the underpricing of REITs more negatively than the underpricing of REOCs. The size is a quite important factor for an REIT issuing company to leave less money on the table. Thus, REIT IPOs are more efficient for the issuer perspective, if a certain offer size is reached. Interestingly, the interaction between the market phase HOT and the REIT-status, yields a negatively significant sign at the 5% level. A REIT IPO which is scheduled in a year, in which 10 real estate IPOs or more take place, will mean that the REIT leaves less money on the table compared to REOC IPOs. Consequently, especially in a "booming" IPO-phase, it is profitable to get listed as a REIT. The underpricing level of REITs is sensitive to IPO supply per year.[6]

[6] Country and period dummies and other interaction variables (REIT*AGE, REIT*DIVERSIFIED, REIT*YEAR2005, REIT*YEAR2006, REIT*YEAR2007, REIT*YEAR2014) have been tested, but we did not obtain any significant results.

Exhibit 2.9: Correlation matrix

Correlation Probability	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.
1. IR1	1.00															
2. LN	-0.23															
PROCEEDS	(0.02)	1.00														
	0.20	-0.11														
3. VOLATILITY	(0.04)	(0.27)	1.00													
	-0.21	-0.01	0.22													
4. LN(1+AGE)	(0.03)	(0.88)	(0.02)	1.00												
	0.14	0.14	0.17	-0.05												
5. DIVERSIFIED	(0.16)	(0.15)	(0.09)	(0.62)	1.00											
	-0.14	-0.13	-0.15	-0.04	-0.52											
6. RESIDENTIAL	(0.16)	(0.19)	(0.13)	(0.71)	(0.00)	1.00										
	-0.08	0.02	-0.02	0.06	-0.26	-0.10										
7. OFFICE	(0.39)	(0.84)	(0.85)	(0.51)	(0.01)	(0.32)	1.00									
	0.11	0.04	-0.05	0.10	-0.29	-0.11	-0.05									
8. INDUSTRIAL	(0.27)	(0.67)	(0.64)	(0.32)	(0.00)	(0.27)	(0.58)	1.00								
	-0.10	-0.01	-0.04	-0.13	-0.36	-0.13	-0.07	-0.07								
9. RETAIL	(0.33)	(0.94)	(0.72)	(0.17)	(0.00)	(0.17)	(0.49)	(0.45)	1.00							
	0.01	-0.13	-0.01	0.16	-0.32	-0.12	-0.06	-0.07	-0.08							
10. OTHERS	(0.96)	(0.17)	(0.89)	(0.11)	(0.00)	(0.24)	(0.55)	(0.51)	(0.41)	1.00						
	-0.04	0.13	-0.02	-0.02	0.19	0.07	-0.04	-0.15	-0.19	-0.08						
11. INTEGER	(0.71)	(0.20)	(0.80)	(0.84)	(0.05)	(0.49)	(0.68)	(0.12)	(0.05)	(0.40)	1.00					
	0.01	-0.08	-0.02	-0.02	0.18	-0.13	0.01	0.13	-0.24	-0.04	0.04					
12. HOT	(0.91)	(0.39)	(0.81)	(0.81)	(0.06)	(0.18)	(0.89)	(0.18)	(0.01)	(0.70)	(0.69)	1.00				
	-0.26	-0.02	-0.06	-0.01	-0.15	0.12	0.06	-0.06	0.11	0.00	-0.02	-0.11				
13. REIT	(0.01)	(0.83)	(0.57)	(0.96)	(0.12)	(0.20)	(0.56)	(0.52)	(0.27)	(0.99)	(0.82)	(0.26)	1.00			
	-0.27	0.03	-0.05	-0.01	-0.14	0.10	0.07	-0.07	0.11	-0.00	-0.01	-0.12	1.00			
14. REIT*LNPRO	(0.01)	(0.76)	(0.58)	(0.90)	(0.16)	(0.30)	(0.49)	(0.50)	(0.24)	(0.97)	(0.94)	(0.23)	(0.00)	1.00		
	-0.22	-0.01	0.28	0.11	-0.00	-0.04	0.01	-0.01	0.06	-0.01	-0.08	-0.04	0.71	0.70		
15. REIT*VOLA	(0.02)	(0.92)	(0.00)	(0.26)	(0.97)	(0.71)	(0.89)	(0.88)	(0.53)	(0.96)	(0.43)	(0.68)	(0.00)	(0.00)	1.00	
	-0.20	-0.06	-0.02	0.02	-0.06	0.11	0.11	-0.02	-0.07	-0.04	0.06	0.27	0.79	0.78	0.60	
16. REIT*HOT	(0.04)	(0.57)	(0.85)	(0.85)	(0.53)	(0.28)	(0.25)	(0.84)	(0.50)	(0.71)	(0.57)	(0.01)	(0.00)	(0.00)	(0.00)	1.00

Notes: The p-value is reported between brackets.

2.6.3 Robustness of results

In order to confirm the impact study, that the initial return is negatively influenced by the REIT status of a listed property company, a robustness check in the form of propensity score matching is conducted. This matching is used to estimate the causal link between the legal form REIT and the underpricing level. By comparing groups named REITs and REOCs, which only differ in their legal form and are similar in the other characteristics, like gross proceeds or offer price, the treatment effect of the REIT status on the initial return can be measured.

For the estimation of the propensity score, a probit regression is applied with the REIT variable as dependent. The probit regression is favored over the logit regression due to the standard normal distribution assumption in probit models (Wooldrige, 2010). In order to avoid selection bias and to comply with the Conditional Independence Assumption (CIA), all control variables from Model 2 are included in the probit regression (Rosenbaum and Rubin, 1983).

In the next step, the matching algorithm called radius matching is chosen, which is somewhere between the one-to-one matching, named nearest neighbour matching (NN), and the mean difference method, named kernel matching. The matching partner from the comparison group is chosen if the propensity score is within the caliper or radius (Dehejia and Wahba, 2002). Comparing the NN, where the distance of the propensity scores is the decision criterion for the matching partner, radius matching has the big advantage of avoiding bad matches on the one hand and simultaneously raising the matching quality by adjusting the radius on the common support region, on the other hand (Caliendo and Kopeinig, 2008).

The region of common support of the REITs and REOCs ranges from 0.1602 to 0.4877 and covers 105 property companies of the sample size. Two observations are discarded from the analysis, because the density distribution is the highest in this abovementioned interval. In accordance with Long (1997), a sample above 100 observations is adequate for estimating the propensity scores by applying a probit regression. As our sample consists of 105 observations, which are used in the probit regression, we fulfill this condition and ultimately the results are resilient. Accordingly, the overlap of both groups is sufficient, the test of balancing property is satisfied and the radius for the matching is set at 0.02.

For the estimation of the treatment effect, the average treatment effect on the treated (ATT) is applied. ATT is widely used evaluation parameter for measuring the value of difference between control and comparison groups (Caliendo and Kopeinig, 2008). Exhibit 2.10 provides the results of the ATT.

Exhibit 2.10: ATT estimation with radius matching method

No. treatment	No. control	ATT	Std. Error	t-statistic
31	74	-0.028***	0.010	-2.766

Notes: Coefficients of statistical significance at: * 10%, ** 5%, *** 1% levels.

The ATT is -0.028 and significant at the 1% level. Thus, the underpricing is lower for REIT IPOs compared to REOC IPOs. Consequently, this legal form in the real estate sector constitutes a causal treatment effect on the IPO initial return or in other words, the difference in the underpricing level of REITs and REOCs is caused by the legal form. Additionally, these results support the hypothesis that the legal business form REIT implies a transparency bonus which negatively affects the IPO returns (*H1*).

In summary, the result of the propensity score matching analysis confirms the regression results, that REIT IPOs are less underpriced.

2.7 Conclusion and Outlook

This study investigated the IPO performance of REIT and REOCs in a comparative framework. The focus was especially on the influential pricing factors surrounding the REIT-status and the GFC as an extraordinary market phase.

107 European REITs and REOCs generated an average statistically significant underpricing of 4.63%. The gross proceeds, the volatility of aftermarket returns and the company age at the IPO date represent important determinants of the amount of money, which European property companies "left on the table". Additionally, we provide evidence that REIT IPOs are less underpriced compared to REOC IPOs. The subsample REITs yield an underpricing of 2.02%, whereas REOCs are underpriced by 5.69%. The reason for the lower underpricing of REITs can be attributed to their unique business form with more legal requirements, or as Chan *et al.* (2013) pointed out, REITs display a similar structure to funds combined with owning re-usable properties. To be specific the legal requirements, such as ex-ante fixed distribution rate or fixed real estate portion of the whole portfolio, contribute to reducing ex-ante uncertainty factors and to increasing the transparency in the valuation process of REITs. Most influencing factors for a lower REIT underpricing, besides the REIT-status itself, are interaction variables with the volatility, offer size and market phase in which the IPO takes place. Additionally, the different regulations of the European REIT regimes also influence the REIT underpricing level in each investigated country. Furthermore, during the GFC (2008-2010), the highest underpricing of

7.89% is observed, which exceeds the initial return for the total sample by approximately 70%, which indicates that GFC was a market phase with a higher uncertainty level. The causal treatment effect of the legal form (REIT) of the company and the underpricing is confirmed by propensity score matching as a robustness check. In sum, the hypothesis that the REIT-status implies a transparency bonus which negatively affects the IPO underpricing can be support.

These results on REIT and REOC IPOs should be of particular interest for potential investors, issuing property companies and IPO managers. As the listed European real estate market is a growing one, potential investors gain the opportunity to earn more money on the first day of trading by focusing on REOC IPOs. Moreover, it is more favorable for property companies to go public as a REIT and "leave less money on the table". IPO managers should balance the pros and cons of going public as a REIT with regard to the transparency bonus, which impacts on the uncertainty factors of pricing.

Undoubtedly, the underpricing phenomenon has not yet been investigated exhaustively. Therefore, future research should concentrate on examining further uncertainty factors, such as market sentiment, or the secondary offering of listed property companies in order to increase the explanatory power of underpricing. Despite these opportunities for extension, this present study provides a better understanding of the IPO pricing of European REITs and REOCs.

2.8 References

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3 Gender Diversity and Financial Performance: Evidence from US Real Estate Companies

Abstract

Our paper is the first to identify the determinants that explain the presence of women on the board of directors, and to study the relationship between gender diversity and financial performance in a real estate context. Using a unique panel dataset of 116 US listed real estate companies over the period 2005–2015, we demonstrate that gender diversity has a positive and significant impact on the market-based performance measures Tobin's Q and Price/NAV. Thus, stock market participants expect higher future earnings from firms with increased female representation. This is especially true for gender diversity in executive positions. Additionally, our results indicate that the gender diversity / performance relationship is non-linear. Real estate companies with 30% women in the group of executives outperform homogeneous male groups by 10.5%, as measured by Tobin's Q. Thus, a certain level of female representation is needed to generate an impact. However, gender diversity does not have an impact on accounting-based measures, neither on ROA nor on FFO/SHARE. Thus, this positive influence of women in leadership might be reflected more adequately in investor perceptions than in actual financial realities. Our results are robust after controlling for endogeneity as well as other board and firm characteristics.

3.1 Introduction

In recent years, there has been a decisive investment trend towards socially responsible investments. Alongside financial returns, numerous investors seek to generate a positive social and environmental impact. By applying a so-called 'Impact Investing' strategy, investors support the mission and governance of the company. As one example of an impact investment opportunity, State Street Global Advisors created the SSGA Gender Diversity Index ETF (ticker: SHE) in 2016. With the aim of increasing gender diversity in companies' senior leadership, this exchange-traded fund (ETF) invests exclusively in US large-cap companies with a relatively high proportion of women in both executive and non-executive positions.

However, increasing the number of women in senior leadership positions has been slow in the United States, compared to some European countries, which have seen dramatic changes, due to quota legislation (e.g. Norway, Spain, France) or other regulatory disclosure requirements or recommendations (e.g. Austria, United Kingdom). Recent data shows that just 5.2% of US companies in the S&P 500 are led by a woman CEO and only 21.2% of corporate board seats are occupied by female directors (Catalyst, 2017).

Yet, even with a small number of women as board members, the finance literature indicates that female directors influence a company's performance, although there is no unanimous opinion as to whether this influence is positive (Campbell & Mínguez-Vera, 2008; Carter *et al.*, 2003; Terjesen *et al.*, 2015) or negative (Adams & Ferreira, 2009; Shrader *et al.*, 1997). More recent studies reveal that more gender-diverse boards will only enhance financial performance if a certain 'critical mass' of female representation is reached (Joecks *et al.*, 2013; Torchia *et al.*, 2011).

The real estate context provides a desirable setting for an investigation of this nature. First, there is a lack of consensus in the finance literature on how exactly gender diversity effects performance, which can partly be explained by examining different institutional settings or business sectors. Since prior research shows that listed real estate company corporate governance structures are different from other industry sectors (Bauer *et al.*, 2010; Feng *et al.*, 2005; Gosh & Sirmans, 2003; Kohl & Schaefers, 2012), it is likely that diversity ratios and women's impact may also differ across industries. Hence, results from the car industry or banking sector may not apply to the real estate industry. While the financial implications of gender diversity have been investigated in many industry sectors such as banking (Pathan *et al.*, 2013), microfinance institutions (Oystein Strom *et al.*, 2014) or construction (Arena *et al.*, 2015), empirical investigations on the real estate industry are scarce. Second, publicly traded real estate companies provide a homogenous sample in terms of performance. By focusing on companies in a single industry, inter-industry heterogeneity can be reduced (Gosh & Sirmans,

2003). Since industry factors strongly effect performance variability (Mishra & Nielsen, 2000), unequal performance levels across industries may prevent researchers from establishing a consistent effect of gender diversity on financial performance. Third, given the increasing numbers of women employees in various real estate property sectors (Crew Network, 2015), there is an obvious need to analyze the development and status quo of women within the real estate industry. An in-depth real estate analysis can shed light on which property sectors benefit particularly from gender diversity in top management teams.

The impact of gender diversity on financial performance is tested on a unique panel dataset of 116 US listed real estate companies in the period 2005 - 2015. We follow previous gender studies that measure firm performance in terms of the accounting-based measure return on assets (ROA) or the market-based measure Tobin's Q (Adams & Ferreira, 2009; Campbell & Mínguez-Vera, 2008; Carter *et al.*, 2010; Terjesen *et al.*, 2015). The research design is extended to real estate performance measures, such as funds from operations per share (FFO/SHARE) and price per net asset value (PRICE/NAV). The central challenge for the empirical analysis is that the gender diversity variable is possibly endogenously determined, since women who are suitable for a senior management position may explicitly select better-performing firms as their employer, or financially successful firms may be more likely to hire female directors (Dezsö & Ross, 2012). This sample selection or reverse causality problem is disentangled by the application of a two-stage Heckman (1976) procedure.

Our results indicate that gender diversity is an endogenous variable, since the likelihood of a company having a female director depends on firm attributes such as board size, CEO / chairman duality, insider ownership, director independence and firm size. With regard to the gender diversity / performance relationship, we find that investors expect higher future earnings of firms with an increased share of female directors, since female directors are significantly positive related to Tobin's Q. However, the gender diversity variables do not have a significant impact on the accounting-based measures, neither on ROA nor on FFO/SHARE. It seems that within the gender diversity / performance relationship, one has to distinguish explicitly between 'objective' accounting-based and 'subjective' market-based measures (Haslam, Ryan, Kulich, Trojanowski, & Atkins, 2010). In the context of gender diversity, a positive influence of women on the board of directors might be reflected more adequately in investor perceptions than in actual accounting performance data. Moreover, the theory that stock market participants expect higher future earnings from firms with increased female representation is especially true for gender diversity in executive positions. Particularly executives are in the spotlight of investors, since they are the company's leaders who are responsible for strategic direction and therefore the subject of considerable media attention. Consistent with 'tokenism theory', we find that in the case of real estate companies, a critical mass is generally reached in balanced ($x \geq 30\%$

women) executive teams. In order to provide an in-depth real estate analysis, we subdivided the sample into different property sectors, so as to examine which sectors benefit most from gender diversity. We find that a balanced executive team outperforms a homogeneous male group by 36.9% for the health care sector, 15.5% for the retail sector and 12.9% for the hotel sector. This positive association stresses the importance of a diverse leadership team for real estate sectors, which are more consumer-orientated or with a high proportion of female employees.

This study extends the existing corporate governance literature by examining gender diversity in the board of directors in a real estate context. Taking into account the methodological weaknesses of previous research on the gender diversity / performance link, this study analyses panel data, includes an extensive set of board and firm control variables which may affect financial performance, and accounts for the possibility of endogeneity by employing a two-stage Heckman (1976) procedure. Moreover, we are the first to test the 'tokenism theory' of Kanter (1977a, 1977b) for US listed real estate companies and their different property focuses.

The remainder of this paper is organized as follows. The related literature and hypothesis Section discusses the existing research on the gender diversity / performance relationship and develops testable hypotheses. The methodology Section considers the sample design, variables from the multivariate analysis and the model specification. In the results Section, we report univariate statistics, present results from the multivariate analysis and discuss the implications of the results. The final Section concludes.

3.2 Related literature and hypotheses

A large and growing stream of research investigates how women in high-level leadership roles affect a firm's financial performance, but the empirical evidence on the relationship is ambiguous. Several economic reasons promote the advancement of women in management positions. Among these arguments is the fact that only a small number of women occupy a corporate board seat, which implies that there is a huge, untapped pool of board candidates or rather underutilized female talents (Simpson *et al.*, 2010). If almost only men are considered as potential board candidates, the quality of board appointments may be impaired, since women's abilities and knowledge are not taken into consideration sufficiently. Females in senior positions may serve as role models, and thus encourage women in lower positions to strive for higher career levels (Burke & McKeen, 1996; Hillman *et al.*, 2007). Thus, the existence of female role models is of particular importance to company mentoring and career-support programs for women employees.

The advantages of having a gender-diverse board can be explained in consideration of decision-making and stakeholder theory. Decision making theory suggests, that with women's distinct attributes, boardrooms gain an increased variety of perspectives and a broader range of knowledge, skills and experience, which fosters creativity and innovation as well as the quality of decision-making (Cox & Blake, 1991; Robinson & Dechant, 1997). Thus, narrow, monolithic group thinking and self-assurance, rather likely in homogeneous boards, can be reduced by considering women's divergent views and their different approach to complex issues (Carter *et al.*, 2003). With regard to the multifaceted problems in the real estate industry, a female perspective can be a valuable contrast to that of male counterparts. Therefore, the inclusion of varying perspectives, may be especially important for real estate company sectors, which are particularly consumer-orientated (e.g. retail), or for those sectors where women represent the majority of the workforce (e.g. heath care).

In turn, stakeholder theory argues that firms need to cooperate with their stakeholders and consider stakeholder's needs within the management decision-making process (Clarkson, 1995; Donaldson & Preston, 1995; Freeman, 1983). Thus, developing good relations with women stakeholders and matching board composition to the diversity of customers, shareholders and employees, can create a competitive advantage (Carter *et al.*, 2003). Appointments of the women stakeholder group, may also be an asset for the corporate image. The increasing popularity of socially responsible investments shows that investors do pay attention to companies' ethical behaviour and gender diversity in their investment decisions. Bear *et al.* (2010) and Reguera-Alvarado *et al.* (2017) show that by considering women in high-level leadership roles as a positive investment factor, investors raise the demand for shares of highly gender-diverse companies and ultimately raising their price.

Based on these theories in favour of a higher female representation in top management positions, several studies have found a positive impact of the percentage of women on the board of directors on various performance measures (Campbell & Mínguez-Vera, 2008; Carter *et al.*, 2003; Terjesen *et al.*, 2015). However, the positive effects of gender diversity may be neutralized by certain disadvantages of heterogeneous teams. Greater diversity is a potential source of intragroup conflict (Lau & Murnighan, 1998). A clash of divergent opinions and more critical questioning may lead to prolonged and less efficient board meetings, resulting in delayed decision-making. Reduced board effectiveness may also result from reduced group cohesion, since the level of trust and loyalty are likely to depend on the similarity of board members (Williams & O'Reilly, 1998). Accordingly, female representation in top management teams may have no significant effect (Carter *et al.*, 2010; Rose, 2007) or even a negative effect on financial performance (Adams & Ferreira, 2009; Shrader *et al.*, 1997).

These mixed results of previous studies can be explained in various ways. First, these studies differ in their sample design, such as time period, examined countries and industry sectors. Second, there is no uniform statistical method[7] applied by all studies and third, there is no identical measurement of performance[8] or gender[9] diversity.

Apart from the aforementioned lack of consensus, the critical mass theory (Kanter, 1977a, 1977b) postulates that the benefits of gender diversity outweigh the disadvantages of heterogeneous teams, if a certain threshold of female representation is reached. In her studies, Kanter (1977a, 1977b) created four groups (uniform, skewed, tilted and balanced), which differ concerning their gender composition. A uniform group is a homogeneous one with exclusively male or female members. The individuals of such a group, as well as the group as a whole, can develop their / its own uniqueness, although all members of a uniform group have a salient characteristic in common, such as gender or race. Skewed groups have a dominant proportion of one type of person, which takes control of the group and its culture. The few non-integrated group members are called 'tokens', for example, one women in a group of six men. Tilted groups display a less extreme group composition in terms of gender, compared to skewed ones. Hence, the 'token woman' status changes to a female minority group, which can impact on the group's culture by creating alliances. As a minority, women are no longer seen as representatives of their social type, but as individuals. In balanced groups, the minority and majority turns into subgroups, in which gender loses importance.

In real estate companies, women in leadership positions often find themselves in a skewed group, where a woman's situation can be described as 'tokenism'. Accordingly, a 'token woman' is not seen as an individual, but rather as representing the 'women category'. Kanter (1977a, 1977b) stated three typical tendencies facing 'tokens': hypervisibility, polarization and assimilation. In daily business, hypervisibility is associated with increased pressure on the female representative. Hence, each decision, reaction or failure receives increased and often excessive attention. Second, polarization refers to the sense of community and self-consciousness of the dominating part of the group, which increases by aligning commonalities and differences to the 'token'. Finally, the tendencies of hypervisibility and polarization may result in assimilation, which often involves 'tokens' being seen as mere stereotypes or representatives for their social type or rather their gender.

[7] The statistical methods applied in the discussed studies are mean comparison test, anova, pooled OLS, panel data fixed effects, 2SLS, 3SLS and GMM.

[8] The most widely used performance measures are return on assets (ROA), return on equity (ROE), return on sales (ROS), return on investment (ROI), earnings before interest and tax (EBIT), stock price growth, Tobin's Q and market to book value.

[9] Gender diversity is measured in terms of binary variables for the presence of at least one woman in the boardroom, the percentage of women in the boardroom or specific diversity indices (e.g. Blau-Index).

Hypotheses

In a male-dominated real estate sector, we assume that a sole woman on the board of directors does not have much influence on decision-making, since tokenism is likely to prevail. With an increased share of women, the quality of the decision-making process might improve through a broader variety of perspectives. Accordingly, firms which effectively exploit the advantages of heterogeneous teams may demonstrate improved performance. Therefore, we hypothesize that:

H1: *An increased percentage of women on the board of directors has a positive impact on financial performance.*

In addition to the board gender-composition analysis, we extend previous literature by explicitly distinguishing between executive and non-executive positions. In contrast to non-executive directors, who are responsible for monitoring and advisory tasks, executive directors operate the daily business and take crucial corporate decisions. Consequently, we argue that the variety of perspectives which women bring into the board is especially important for the group of executives, since a culture of debate is crucial for thorough decision-making. Therefore, we hypothesize:

H2: *An increased share of women in executive positions has a greater impact on financial performance than an increased share of women in non-executive positions.*

We extend hypotheses *H1* and *H2* by accounting for a possible non-linear relationship between gender diversity and financial performance. We assume that a critical mass of female representation is reached when the female status changes from 'token woman' to a female minority group. In this context, we also assume that a separate analysis of executive and non-executives positions leads to different impacts on financial performance. With regard to the critical mass of female representation, we hypothesize that:

H3: *Women's contribution in leadership teams*[10] *has a positive impact on financial performance, in particular when 'tokenism' no longer prevails (i.e. tilted or balanced teams).*

In a further step, we run an in-depth real estate analysis to examine which property sectors benefit particularly from gender diversity. The reason behind our expectation of different performance outcomes is twofold. First, unequal performance levels and variations can be observed for different property sectors. Therefore, we control for companies' specific property focus within the industry. Second, companies which have a strong female client base, should also represent their clients' needs in its leadership structure. Thus, female consumer-orientated

[10] In the context of critical mass theory, 'teams' refer to the board of directors, as well as the group of executives and non-executives.

companies that are matched in the sense of having management with the same traits (in this case gender), will perform better (Oystein Strom *et al.*, 2014). In the analysis of different property sectors, we focus explicitly on company decision-makers, the group of executives, since they create and define the strategy.

H4: For property sectors which are more consumer-orientated (health care, hotel, residential and retail), we expect a positive impact of female executives.

We empirically examine the abovementioned hypotheses by simultaneously optimizing the caveats of previous analyses, and assessing the financial impacts of gender diversity in a real estate context. This study applies panel data fixed effects, includes an extensive set of board and firm control variables and accounts for the possibility of endogeneity.

3.3 Methodology

3.3.1 Sample design

We start the sample selection process, using the constituent list of the FTSE EPRA / NAREIT United States Index. The index's admission criteria ensures a homogeneous sample with regard to the features of real estate companies (e.g. market capitalization). In order to avoid survivorship bias, current and historical companies of the FTSE EPRA / NAREIT United States Index are included in the sample. Another requirement is that the companies have been publicly traded for more than five contiguous years during 2005-2015. The initial sample consists of 206 US listed real estate companies. The dataset was developed by combining various sources. Accounting and stock market data are collected from Thomson Reuters Datastream and SNL. Data on corporate governance mechanisms is first extracted from the Bloomberg database and, secondly, from the company's proxy statements (DEF 14A). The availability of corporate governance data restricts us to 2005 as the first year of our sample. After the selection process, our final sample includes 116 US publicly traded real estate companies, resulting in 1,276 firm-year observations.

3.3.2 Measures

3.3.2.1 Performance variables

Previous gender diversity studies can generally be divided into two groups, which either use accounting-based measures or market-based ones, specifically Tobin's Q (Adams & Ferreira, 2009; Campbell & Mínguez-Vera, 2008; Carter *et al.*, 2010; Terjesen *et al.*, 2015). The central difference between these types of performance measure is that, while accounting-based

measures display financial realities from a backward-looking perspective, market-based measures represent a firm's future earnings. Thus, market-based measures, which reflect investor expectations of future cash-flows, are rather 'subjective' in contrast to 'objective' audited accounting-based measures (Haslam *et al.*, 2010).

With regard to accounting-based measures, our study applies return on assets (ROA), which represents a company's profitability by stating the achieved accounting income for shareholders. ROA is calculated by dividing net income by total assets. We also use the most important performance indicator for the real estate industry, namely funds from operations per share (FFO/SHARE). In accordance with NAREIT guidelines, this metric is calculated as GAAP net income excluding gains or losses from sales of properties or debt restructuring, and adding back real estate depreciation.

With regard to market-based performance measures, we apply Tobin's Q und price per net asset value (NAV). Tobin's Q is defined as a ratio of the market value of a firm's assets to the replacement costs of its assets (Tobin, 1969). Following Kohl and Schaefers (2012) and Perfect and Wiles (1994) among others, the ratio is calculated as the sum of market value of equity and book value of debt, divided by the book value of total assets. Price per net asset value (NAV) represents the ratio of the market price to the book value of equity. For real estate companies the NAV is quite similar to the book value of equity. Specifically, the PRICE/NAV is calculated by the market valuation divided by the NAV. In principal, Tobin's Q is an entire-company-orientated measure, whereas Price/NAV is equity-orientated.

3.3.2.2 Diversity variables

The likelihood that a company has a female director is measured by WOMAN BOARD. This binary variable equals to 1, if at least one woman occupies a corporate board seat. In the performance regressions, gender diversity is measured by the percentage of female board directors (% WOMEN). Additionally, we examine the composition of the board in terms of its gender distribution. In accordance with critical mass theory (Kanter, 1977a, 1977b), we create the following four binary variables:

- UNIFORM BOARD refers to a homogeneous male board.
- SKEWED BOARD refers to a male-dominated board with less than 15% female directors.
- TILTED BOARD refers to a less extreme domination of men in the board, with a female representation ranging from 15% to less than 30%.

- BALANCED BOARD refers to heterogeneous board with more than 30% female directors.

This categorization approach is also applied to the group of executive and non-executive directors.

3.3.2.3 Board and firm control variables

We include various board and firm structure variables in our models, so as to control for their influence on the presence of a woman on the board of directors, as well as on the performance metrics. With regard to board or governance characteristics of a company, CEO DUALITY represents an indicator variable for the power-sharing between CEO and chairman. % INDEPENDENT denotes the percentage of independent directors which do not have any business or employment relationship with the company[11]. INSIDERS represents the percentage of equities held by current officers and directors. MAJORSHARE is a proxy for ownership concentration, which is defined by substantial shareholders who own at least 5% of the outstanding shares that are not predominantly owned by insiders. The variable BMEETING measures the total number of board meetings during a fiscal year, including all special meetings. BOARDSIZE is measured by the natural logarithm of the sum of directors on the board. We further subdivide the board of director positions into executive and non-executive positions. EXECUTIVES and NON-EXECUTIVES are measured by the natural logarithm of the sum of executive or non-executive directors, respectively. The variables BOARDSIZE, EXECUTIVES and NON-EXECUTIVES represent the 'exclusion variable' in the first stage probit models of the Heckman (1976) procedure.

Concerning the firm structure variables, FIRMAGE is measured by the years for which a company has been listed on the stock exchange. In order to control for the specific characteristics of REITs, such as distribution obligation, tax efficiency and investment regulations, we include the binary variable REIT. The variable FIRMSIZE is a proxy for future growth opportunities, which is measured by the sum of total assets. We measure firm risk with two different variables. First, VOLATILITY, which is the standard deviation of the stock return, based on the weekly values divided by the mean price and multiplied by 40, and secondly LEVERAGE, which is the ratio of total debt to total assets. Finally, we control for the liquidity, which is the ratio of traded shares to shares outstanding.

[11] Our definition of an independent board member is in accordance with New York Stock Exchange's independence requirements.

3.3.3 Model specification

With regard to the gender diversity / performance relationship, endogeneity problems can arise in different forms.

Omitted unobservable variables could affect the selection of women in leadership positions, as well as the corporate performance at the same time, which may lead to spurious correlations between gender diversity and firm financial performance. To address the problem of omitted variable bias, we apply fixed effect panel estimation with period and firm dummies.[12] This approach accounts for time-constant firm heterogeneity, caused by unobserved firm characteristics (e.g. corporate culture) and for time-varying heterogeneity caused by omitted variables which are constant over firms, but change over time (e.g. crisis or changes in government regulation).

The association between female leadership and the performance metrics may be driven be reverse causality. On the one hand, it is possible that financially successful firms are more likely to hire female directors, since they attract a higher level of public attention, and therefore experience more pressure to conform to a certain level of female representation in boardrooms. On the other hand, since female representation in top management is scarce, women who are suitable for a senior management position may self-select into better performing firms (Dezsö & Ross, 2012). Finally, sample selection bias may arise if qualified women do not seek a board director position, even though being as eligible as the observed female directors. Following current gender literature (e.g. Hutchinson *et al.*, 2015; Oystein Strom *et al.,* 2014; Srinidhi *et al.,* 2011), we control for sample selection bias by applying a two-stage Heckman (1976) procedure. In a first step of this procedure, we apply probit estimation to predict the factors associated with female leadership. We then compute the inverse Mill's ratio (MILLS) from the predicted values for the likelihood that a company has a female director. In a second step, MILLS is included in the performance regressions, in order to control for the performance between companies with and without female directors.

[12] We apply the Hausmann test to determine the existence of a correlation between the unobserved effects and the explanatory variables. Since the unobserved heterogeneity is correlated with the observed variables, the fixed effects method is applied.

3.3.3.1 First-stage probit model

We run the following probit regression to predict the presence of females on the board of directors:

$$\Pr(woman\ board_{i,t} = 1) = \Phi\left[\alpha + \beta\ board\ size_{i,t} + \gamma\ controls_{i,t} + \varepsilon_{i,t}\right] \quad \textbf{(1)}$$

In the above equation, Φ denotes the probit function, *i* the firm, *t* the year (2005–2015) and ε the error term. *Controls* refers to a variety of board and firm structure variables as described in Section 'Measures'. The two-stage Heckman (1976) procedure is especially robust in cases where the variables in the first and second stage equations are not the same. Therefore, we need to include a variable in the first stage, which has an impact on the likelihood of a company having a female director (first stage), but no impact on the financial performance of a company (second stage). Since the probability of a woman occupying a corporate board seat is higher for larger boards, we use the *board size* as an 'exclusion variable'. We do not expect the size of the board to directly affect the dependent performance variables in the second stage. The included board and firm controls in the first stage are identical to those in the performance regressions in the second stage.

3.3.3.2 Second-stage fixed effects model

The proposed hypotheses are tested by estimating the following fixed effects regression model:

$$performance_{i,t} = \alpha + \beta\ gender\ diversity_{i,t} + \gamma\ controls_{i,t} + mills_{i,t} + \delta_i + \tau_t + \varepsilon_{i,t} \quad \textbf{(2)}$$

In this model, *i* denotes the firm, and *t* the year (2005-2015). *Mills* represents the inverse Mills ratio, which is estimated from the first stage probit model so as to account for sample selection bias. δ refers to *firm* fixed effects and τ to *time* fixed effects for the years 2005 to 2015 and ε represents the error term. *Performance* refers, on the one hand, to the market-based performance measures Tobin's Q and Price per NAV and, on the other hand, to the accounting-based performance measures ROA and FFO per share. *Gender diversity* denotes either the percentage of women on board or Kanter's critical mass board groups. *Controls* represents a broad set of firm characteristics (e.g. LEVERAGE, FIRMSIZE and VOLATILITY) and board characteristics (e.g. INSIDERS, MAJORSHARE and CEO_DUALITY) with a potential impact on financial performance.

The fixed effects specification (2) is estimated with robust standard errors, which are valid in the presence of heteroscedasticity and serial correlation of arbitrary forms for panels with a small T and a large N (Arellano, 1987). Furthermore, a diagnostic test for multicollinearity is

performed. All explanatory variables have variance inflation factors (VIF) below 10, suggesting that multicollinearity is not a problem in this regression analysis.

3.4 Results

3.4.1 Descriptive Statistics

Exhibit 3.1 provides an overview of descriptive statistics for the whole sample. The variables are sorted by 'performance variables, 'female participation variables' and 'board and firm control variables' and provide the key statistics: number of observations, median, mean, standard deviation, maxima and minima.

On average, a US listed real estate firm yields a Tobin's Q ratio of 1.245 and an ROA of 2.9%. The real-estate-specific measures provide an average Price/NAV ratio of 1.389 and a FFO per share ratio of 2.411. Approximately 58% of the firms have at least one woman on the board of directors. On average, a US listed real estate company has 9.4% female representation on the board of directors. The average board size comprises 8 directors, thereof 75% independent directors. The boards meet on average about seven times per year. More than half of the US listed real estate companies have separate CEO and board chair positions. About 7.5% of the shares are owned by insiders and about one third by major shareholders. Most of the companies included in the sample have REIT status and have been listed for about 14.9 years on the stock exchange. The average total assets of a US listed real estate company amount to $ 4.705 billion. The average company's gearing is about 50%, liquidity about 20% and stock price volatility 5%.

Exhibit 3.1: Summary statistics

Panel A: Performance Variables						
	Obs.	**Median**	**Mean**	**Std. Dev.**	**Max.**	**Min.**
TOBINSQ	1,119	1.184	1.245	0.360	3.710	0.585
PRICE/NAV	1,128	1.344	1.389	3.463	17.540	-76.380
FFO/SHARE	1,054	1.950	2.411	2.534	3.114	-1.059
ROA	1,133	0.026	0.029	0.039	0.390	-0.166
Panel B:Female Participation Variables						
WOMAN BOARD	1,151	1.000	0.577	0.494	1.000	0.000
% WOMEN BOARD	1,151	0.100	0.094	0.097	0.429	0.000
Panel C: Board and Firm Control Variables						
BOARDSIZE	1,151	8.000	8.421	2.036	15.000	4.000
CEO DUALITY	1,151	0.000	0.467	0.499	1.000	0.000
% INDEPENDENT	1,148	0.750	0.755	0.162	4.814	0.000
INSIDERS	1,151	0.036	0.075	0.100	0.665	0.000
MAJORSHARE	1,134	0.350	0.345	0.147	0.895	0.000
BMEETING	1,147	7.000	7.774	3.741	32.000	0.000
REIT	1,276	1.000	0.883	0.321	1.000	0.000
FIRMSIZE (in $000)	1,157	2,871,835	4,704,973	5,395,736	33,324,574	194,139
FIRMAGE	1,276	14.000	14.864	1.086	42.000	0.000
LEVERAGE	1,157	0.504	0.499	0.168	1.079	0.000
LIQUIDITY	1,123	0.151	0.179	0.112	0.886	0.011
VOLATILITY	1,152	4.073	5.021	3.150	39.248	1.000

Exhibit 3.1 gives an overview of the descriptive statistics of all variables. TOBINSQ is the natural logarithm of the sum of the market value of equity plus debt, divided by the book value of total assets. PRICE/NAV is the natural logarithm of the market valuation divided by the NAV. FFO/SHARE is the natural logarithm of the funds from operations (as reported by the company) divided by the number of shares outstanding. ROA is the ratio of net income to total assets. WOMAN BOARD is a binary variable equal to 1 if at least one female director occupies a corporate board seat, 0 otherwise. % WOMEN BOARD represents the percentage of women in the board of directors. BOARDSIZE represents the natural logarithm of the sum of directors on the board. CEO DUALITY is a binary variable equal to 1 if a firm's CEO is simultaneously chair of the board, 0 otherwise. % INDEPENDENT is the percentage of independent directors on the company's board. INSIDERS represents the percentage of outstanding shares currently held by insiders (including relatives). MAJORSHARE is the percentage of majority shareholders who own 5% or more of outstanding shares. BMEETING represents the natural logarithm of the number of all board meetings during a fiscal year. REIT is a binary variable equal to 1 if the company has REIT status, 0 otherwise. FIRMSIZE is the natural logarithm of total assets. FIRMAGE is the natural logarithm of the firm's age, whereby age is measured by the years since listing on the stock exchange. LEVERAGE is the ratio of total debt to total assets. LIQUIDITY represents the ratio of traded shares to shares outstanding. VOLATILITY is the standard deviation of the share price, based on the weekly values, divided by the mean price and multiplied by 40.

With regard to the correlation matrix, Exhibit 3.2 presents the correlation coefficients of the independent variables in the second stage performance regressions. By examining the correlations among these variables, we run a first test of multicollinearity. A widely used threshold, indicating multicollinearity issues, is reached at a correlation coefficient of 0.8 (absolute value) or above. The highest correlation coefficient of 0.829 is reported between the binary variable WOMAN BOARD and the percentage of women on the board (% WOMAN BOARD). This does not pose any problem, since these two variables are never simultaneously in the same regression.[13] Further correlations vary from -0.264 between the percentage of independent directors and the percentage of insiders, to a correlation coefficient of 0.643 between a company's liquidity and price volatility.

Firms which have at least one woman on the board of directors are larger, have more board members and a longer company history. However, these positive relations are difficult to interpret in one direction, as larger (correlation coefficient of 0.315) and older firms (correlation coefficient of 0.219) have larger boards. Thus, it is possible that the probability of a female board member simply be driven by the board size. In addition, companies with a higher rate of independent board members are more likely to have a woman on the board. Ownership structure is also related to the presence of a female director. Thus, firms with a higher percentage of major shareholders (own more than 5% of the outstanding shares), are more likely to have a female board member. However, an increased percentage of insiders may lead to less female board members. Finally, the volatility of the share price is lower if the firm has at least one woman on the board.

[13] WOMAN BOARD is the dependent variable in the first stage probit model and % WOMEN BOARD is the independent variable of particular interest in the second stage performance regression.

Exhibit 3.2: Correlation matrix

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.
1. WOMAN BOARD	1.000														
2. % WOMEN BOARD	0.829***	1.000													
3. BOARDSIZE	0.296***	0.118***	1.000												
4. % INDEPENDENT	0.229***	0.196***	0.139***	1.000											
5. CEO DUALITY	-0.077**	-0.041	0.088***	-0.004	1.000										
6. INSIDERS	-0.155***	-0.168***	0.111***	-0.264***	-0.079**	1.000									
7. MAJORSHARE	0.075**	0.021	0.008	0.121***	-0.044	-0.211***	1.000								
8. BMEETING	0.068**	0.071**	-0.027	0.090**	-0.048	-0.113***	-0.061**	1.000							
9. REIT	-0.023	-0.006	-0.069**	-0.064**	-0.076**	-0.051*	0.019	0.030	1.000						
10. FIRMSIZE	0.315***	0.231***	0.414***	0.152***	-0.102***	-0.155***	0.087***	0.095***	0.013	1.000					
11. LEVERAGE	0.025	-0.101***	0.236***	0.065**	0.029	0.152***	0.021	-0.042	0.264***	0.194***	1.000				
12. VOLATILITY	-0.076**	-0.091***	0.033	-0.074**	0.011	0.014	0.029	0.035***	-0.042	0.042	0.201***	1.000			
13. LIQUIDITY	0.056*	0.010	0.099***	0.047	-0.112***	-0.171***	0.128***	0.020	-0.025	0.308***	0.175***	0.643***	1.000		
14. ROA	-0.030	0.027	-0.163***	-0.030	0.091***	0.112***	-0.196***	-0.050	-0.051*	-0.105***	-0.325***	-0.280***	-0.254***	1.000	
15. FIRMAGE	0.219***	0.169***	0.226***	0.209***	-0.008	0.038	0.013	0.010	-0.066**	0.166***	0.055*	-0.077**	-0.021	0.153***	1.000

Exhibit 3.2 provides the correlation coefficients. WOMAN BOARD is a binary variable equal to 1 if at least one female director occupies a corporate board seat, 0 otherwise. % WOMEN BOARD represents the percentage women on the board of directors. BOARDSIZE represents the natural logarithm of the sum of directors on the board. % INDEPENDENT is the percentage of independent directors on the company's board. CEO DUALITY is binary variable equal to 1 if a firm's CEO is simultaneously chair of the board, 0 otherwise. INSIDERS represents the percentage of outstanding shares currently held by insiders (including relatives). MAJORSHARE is t percentage of majority shareholders who own 5% or more of outstanding shares. BMEETING represents the natural logarithm of the number of all board meetings during a fiscal year. REIT is a binary variable equal to 1 if t company has REIT status, 0 otherwise. FIRMSIZE is the natural logarithm of total assets. LEVERAGE is the ratio of total debt to total assets. VOLATILITY is the standard deviation of the share price, based on the weekly valu divided by the mean price and multiplied by 40. LIQUIDITY represents the ratio of traded shares to shares outstanding. ROA is the ratio of net income to total assets. FIRMAGE is the natural logarithm of the firm's age, where age is measured by the years since listing on the stock exchange. ***, ** and * denote statistical significance at p-value<0.01, p-value<0.05 and p-value<0.1, respectively.

Exhibit 3.3 shows the results of the mean-comparison tests between firms with and without female directors. We test whether the mean of various characteristics differs between these two groups. Most of the tested variables display significant mean differences, which are consistent with the pattern found in the correlation table. Larger and older firms tend to have women on the board. Firms with a larger board and more independent board members are more likely to have female directors. On the one hand, the ownership structure shows that firms with a higher percentage of insider shareholders are less likely to have a woman on the board. On the other hand, a higher percentage of major shareholders increases the probability of female representation on the board. Moreover, if the position of CEO and board chair is represented by one person, firms are less likely to have female board members. An initial indication of a significant relationship between female directors and market-based performance measures is provided by a significant mean difference for TOBINSQ and PRICE/NAV. The mean value of those market-based measures is higher for firms with women on the board of directors.

Exhibit 3.3: Mean-comparison of firms with and without female directors

Variable	Mean for WOMAN BOARD = 1 (n = 654)	Mean for WOMAN BOARD = 0 (n = 469)	Difference	t-stats
BOARDSIZE	8.923	7.737	-1.19***	-10.19
% INDEPENDENT	0.769	0.728	-0.04***	-6.41
CEO DUALITY	0.426	0.524	0.10***	3.28
INSIDERS	0.061	0.095	0.03***	5.68
MAJORSHARE	0.353	0.335	-0.02**	-2.05
BMEETING	7.900	7.602	-0.30	-1.33
REIT	0.940	0.949	0.01	0.65
FIRMSIZE (in $000)	5,973,566	2,968,765	-3,004,801***	-9.65
LEVERAGE	0.506	0.490	-0.02	-1.60
VOLATILITY	4.957	5.293	0.34*	1.76
LIQUIDITY	0.186	0.171	-0.01**	-2.13
FIRMAGE	17.620	13.552	-4.07***	-6.62
TOBINSQ	1.292	1.181	-0.11***	-5.12
PRICE/NAV	1.561	1.152	-0.41*	-1.95
ROA	0.027	0.031	0.00	1.48
FFO/SHARE	2.377	2.454	0.08	0.49

Exhibit 3.3 shows the mean differences of firms with a woman on the board (WOMAN BOARD = 1) or not (WOMAN BOARD = 0). BOARDSIZE represents the natural logarithm of the sum of directors on the board. % INDEPENDENT is the percentage of independent directors on the company's board. CEO DUALITY is a binary variable equal to 1 if a firm's CEO is simultaneously chair of the board, 0 otherwise. INSIDERS represents the percentage of outstanding shares currently held by insiders (including relatives). MAJORSHARE is the percentage of majority shareholders who own 5% or more of outstanding shares. BMEETING represents the natural logarithm of the number of all board meetings during a fiscal year. REIT is a binary variable equal to 1 if the company has REIT status, 0 otherwise. FIRMSIZE is the natural logarithm of total assets. LEVERAGE is the ratio of total debt to total assets. VOLATILITY is the standard deviation of the share price, based on the weekly values, divided by the mean price and multiplied by 40. LIQUIDITY represents the ratio of traded shares to shares outstanding. FIRMAGE is the natural logarithm of the firm's age, whereby age is measured by the years since listing on the stock exchange. TOBINSQ is the natural logarithm of the sum of the market value of equity plus debt, divided by the book value of total assets. PRICE/NAV is the natural logarithm of the market valuation divided by the NAV. FFO/SHARE is the natural logarithm of the funds from operations (as reported by the company) divided by the number of shares outstanding. ***, ** and * denote statistical significance at p-value<0.01, p-value<0.05 and p-value<0.1, respectively.

3.4.2 Main regression results

3.4.2.1 Impact of women on the board of directors

Exhibit 3.4 shows the first stage regression results for the likelihood that a firm has a woman on the board of directors. Models 1 and 2 merely differ in their proxy for profitability; Model 1 includes ROA, Model 2 Tobin's Q. We follow the gender literature in determining the board and firm variables that may impact on the likelihood that a company has a female director (Campbell & Mínguez-Vera, 2008; Carter *et al.*, 2003; Dimovski *et al.*, 2013; Hillman *et al.*, 2007). With regard to the number of director position, more leadership positions being available

may increase the likelihood of females occupying those positions (BOARDSIZE). Moreover, larger companies may face more societal pressure to increase their boardroom diversity, so that we control for organizational size (FIRMSIZE). The special regulatory requirements that are associated with the REIT status, may also impact on the likelihood of female representation. If women choose to work in a more transparent environment, we assume a positive impact of the REIT variable. Furthermore, women are often associated with risk aversion (Faccio *et al.*, 2016). If women are indeed more risk averse, they would be less likely to occupy a board seat of a high-risk firm. Therefore, we include LEVERAGE and VOLATILITY as proxies for firm risk. We also control for the liquidity of a company (LIQUIDITY), and include firm age (FIRMAGE) in our models. Older firms may have more conservative structures with boardrooms that might resemble an 'old boys network'. Assuming that firms with deep-rooted conservative structures are not inclined to appoint female directors, we expect a negative relationship between FIRMAGE and WOMAN BOARD. Based on the premise that women do not yet belong to this 'old boys network', they conform more to independent director characteristics. Therefore, we expect an increased female representation in firms with a high percentage of independent directors (% INDEPENDENT). Since institutional shareholders increasingly emphasize diversity, we expect major shareholders (MAJORSHARE) to have a positive impact on female board appointments. Additionally, board diversity can be influenced by powerful insider ownership concentration (INSIDERS). Since most of the insider shareholders are men, a high percentage of insider equity owner may lead to a decreased number of female directors. Once again, we assume that company insiders are more likely to appoint boardroom candidates from within their 'old boys network'. The impact of CEO DUALITY on the variable WOMAN BOARD is not clearly determined in advance. On the one hand, the availability of leading board positions increases the probability of a female board appointment. On the other hand, a CEO who also holds the board chair position, is powerful in enforcing strategic decisions, in this context, a diversity policy. We include market-based (TOBINSQ) and accounting-based (ROA) performance metrics, since it may be that performance precedes diversity. If women choose to serve on the boards of more profitable companies with higher future cash flows, ROA and TOBINSQ should have a positive impact on the presence of female directors.

In most cases, our coefficients show the expected sign. Thus, larger real estate companies with a larger board and a higher share of independent directors are more likely to employ female directors. The coefficient of CEO DUALITY is negative and statistically significant. Thus, the probability of female board members decreases if the CEO is simultaneously the board chair. Additionally, firms with a high insider ownership concentration are more likely to have a male-dominated board, which supports our prediction. Model 2 may support the theory of women

being more risk averse, since LEVERAGE has a negative impact on the presence of women on boards. However, in Model 1, the coefficient on LEVERAGE is not significant and the coefficient on VOLATILITY is not significant in both models. Interestingly, in Model 1 the probability of female representation on the board increases for older companies. This result contradicts our prediction, although the significance level of 10% is low. We find a positive and significant relationship between TOBINSQ and WOMAN BOARD, which implies that profitable firms in terms of market performance are more attractive for female board members. However, the accounting-based measure ROA does not influence the likelihood of female representation on the board.

Exhibit 3.4: Heckman procedure: 1st-stage analysis

	WOMAN BOARD	
	1	2
BOARDSIZE	1.342*** (6.35)	1.559*** (7.33)
% INDEPENDENT	1.870*** (4.19)	1.573*** (3.50)
CEO DUALITY	-0.196** (-2.28)	-0.240*** (-2.77)
INSIDERS	-1.563*** (-3.29)	-1.911*** (-4.02)
MAJORSHARE	0.103 (0.34)	0.256 (0.86)
REIT	-0.119 (-0.37)	-0.278 (-0.85)
FIRMSIZE	0.299*** (5.41)	0.272*** (4.88)
LEVERAGE	-0.391 (-1.32)	-0.679** (-2.32)
VOLATILITY	-0.030 (-1.54)	-0.002 (-0.08)
LIQUIDITY	-0.208 (-0.39)	-0.197 (-0.37)
FIRMAGE	0.094* (1.73)	0.015 (0.27)
ROA	0.039 (0.03)	
TOBINSQ		0.944*** (4.82)
INTERCEPT	-8.007*** (-9.00)	-7.640*** (-8.69)
Observations	1,061	1,062
Pseudo R^2	0.15	0.17
LR	222.53***	246.90***

Exhibit 3.4 provides the results of the first stage Heckman procedure (pooled probit regression) for the likelihood of a company having a woman on the board of directors. WOMAN BOARD is a binary variable equal to 1 if at least one female director occupies a corporate board seat, 0 otherwise. BOARDSIZE represents the natural logarithm of the sum of directors on the board. % INDEPENDENT is the percentage of independent directors on the company's board. CEO DUALITY is a binary variable equal to 1 if a firm's CEO is simultaneously chair of the board, 0 otherwise. INSIDERS represents the percentage of outstanding shares currently held by insiders (including relatives). MAJORSHARE is the percentage of majority shareholders who own 5% or more of outstanding shares. REIT is a binary variable equal to 1 if the company has REIT status, 0 otherwise. FIRMSIZE is the natural logarithm of total assets. LEVERAGE is the ratio of total debt to total assets. VOLATILITY is the standard deviation of the share price, based on the weekly values, divided by the mean price and multiplied by 40. LIQUIDITY represents the ratio of traded shares to shares outstanding. FIRMAGE is the natural logarithm of the firm's age, whereby age is measured by the years since listing on the stock exchange. ROA is the ratio of net income to total assets. TOBINSQ is the natural logarithm of the sum of the market value of equity plus debt, divided by the book value of total assets. ***, ** and * denote statistical significance at p-value<0.01, p-value<0.05 and p-value<0.1, respectively. z-statistics are shown in parentheses.

Exhibit 3.5 presents the estimation results for the second-stage regressions (2) with the market-based performance measures (TOBINSQ, PRICE/NAV), as well as the accounting-based performance measures (ROA, FFO/SHARE) as the dependent variables. With regard to our main hypothesis *H1*, we include the percentage of women on the board of directors (%WOMEN

BOARD) as our independent variable of primary interest. We control for potential endogeneity by including the inverse mills ratio (MILLS) in all four models, which is not significant in any model except for the FFO/SHARE regression. In principle, the regressions do not suffer from sample selection bias.

With regard to our four models, we only find a significant and positive association between women on the board of directors and the financial performance measure TOBINSQ. A positive link between gender diversity and Tobin's Q indicates that the stock market expects higher future earnings from firms with an increased share of women. Thus, investors believe the economic advantages of board gender diversity to outweigh the disadvantages. Additionally, our results support the arguments of Bear *et al.* (2010) and Reguera-Alvarado *et al.* (2017), that investors pay attention to companies' ethical behavior in their investment decisions. Considering women in the boardroom as a positive investment variable, socially responsible investors increase the demand for those companies' shares and ultimately their market values. With regard to the accounting-based measures, board gender diversity may not influence actual financial performance data like FFO/SHARE or ROA, because other financial factors, such as a company's total assets or capital structure, are more suitable for explaining these financial realities. In sum, these results shows that within the gender diversity / performance relationship, it is necessary to distinguish explicitly between 'objective' accounting-based and 'subjective' market-based measures (Haslam *et al.*, 2010). Thus, market-based measures are probably the more appropriate performance measures in the context of gender diversity, since the positive influence of female directors might relate more to investor perceptions than to financial realities. Therefore, we focus exclusively on market-based measures as dependent variables in our further analysis.

Exhibit 3.5: Heckman procedure: 2nd-stage analysis

	Market-based performance measures		Accounting-based performance measures	
	TOBINSQ	PRICE/NAV	FFO/SHARE	ROA
% WOMEN BOARD	0.281* (1.91)	0.221 (0.79)	0.147 (0.52)	-0.020 (-1.01)
% INDEPENDENT	0.123 (0.62)	0.121 (0.33)	0.009 (0.03)	-0.002 (-0.11)
CEO DUALITY	0.017 (0.36)	-0.003 (-0.04)	-0.000 (-0.00)	-0.000 (-0.05)
INSIDERS	-0.124 (-0.59)	-0.443 (-1.03)	-0.436 (-1.00)	0.052** (2.07)
MAJORSHARE	-0.122 (-1.49)	-0.173 (-1.16)	-0.200 (-1.54)	-0.020** (-2.24)
BMEETING	-0.023 (-1.51)	-0.046 (1.57)	-0.061 (-1.33)	0.004 (0.92)
REIT	0.177*** (2.60)	0.241* (1.88)	0.377*** (5.76)	0.037*** (6.10)
FIRMSIZE	-0.127*** (-3.27)	-0.273*** (-3.37)	0.682*** (9.44)	0.002 (0.42)
LEVERAGE	0.260*** (2.76)	1.168*** (5.65)	0.080 (0.38)	-0.101*** (-5.96)
VOLATILITY	-0.011*** (-4.04)	-0.047*** (-8.71)	-0.006 (-0.64)	-0.001 (-1.35)
LIQUIDITY	-0.080 (-0.82)	0.073 (0.32)	-0.310 (-1.19)	-0.003 (-0.16)
FIRMAGE	0.097*** (3.14)	0.166*** (3.09)	0.092 (-1.30)	0.002 (0.56)
ROA	0.925*** (3.06)	1.434** (2.42)		
TOBINSQ			1.077*** (8.78)	0.066*** (6.51)
MILLS	0.082 (0.63)	0.135 (0.56)	0.212* (1.70)	0.002 (0.21)
INTERCEPT	1.479** (2.11)	3.289*** (2.27)	-9.736*** (-8.11)	-0.006 (-0.06)
Observations	1,060	1,052	972	1,060
R^2	0.85	0.86	0.84	0.57
Adj. R^2	0.83	0.84	0.81	0.51

Exhibit 3.5 shows the results of the second stage Heckman procedure (panel regression with period and cross-section fixed effects). The dependent performance measures are represented by market-based (TOBINSQ and PRICE/NAV) and accounting-based measures (FFO/SHARE and ROA). TOBINSQ is the natural logarithm of the sum of the market value of equity plus debt, divided by the book value of total assets. PRICE/NAV is the natural logarithm of the market valuation divided by the NAV. FFO/SHARE is the natural logarithm of the funds from operations (as reported by the company) divided by the number of shares outstanding. ROA is the ratio of net income to total assets. % WOMEN BOARD represents the percentage of women in the board of directors. % INDEPENDENT is the percentage of independent directors on the company's board. CEO DUALITY is a binary variable equal to 1 if a firm's CEO is simultaneously chair of the board, 0 otherwise. INSIDERS represents the percentage of outstanding shares currently held by insiders (including relatives). MAJORSHARE is the percentage of majority shareholders who own 5% or more of outstanding shares. BMEETING represents the natural logarithm of the number of all board meetings during a fiscal year. REIT is a binary variable equal to 1 if the company has REIT status, 0 otherwise. FIRMSIZE is the natural logarithm of total assets. LEVERAGE is the ratio of total debt to total assets. VOLATILITY is the standard deviation of the share price, based on the weekly values, divided by the mean price and multiplied by 40. LIQUIDITY represents the ratio of traded shares to shares outstanding. FIRMAGE is the natural logarithm of the firm's age, whereby age is measured by the years since listing on the stock exchange. MILLS is the inverse mills ratio estimated from the probit model to account for sample selection bias. ***, ** and * denote statistical significance at p-value<0.01, p-value<0.05 and p-value<0.1, respectively. Heteroscedasticity and autocorrelation-corrected t-statistics are shown in parentheses.

3.4.2.2 Impact of women in executive and non-executive positions

We extend the board gender-composition analysis by explicitly distinguishing between executive and non-executive positions. Exhibit 3.6 summarizes the first-stage regression results for the likelihood that a company has a female executive or female non-executive director. The two-stage Heckman (1976) procedure requires an 'exclusion variable' in the first stage, which has no impact on the financial performance measures in the second stage. We assume that the number of executive directors (# EXECUTIVES), as well as the number of non-executive directors (# NON-EXECUTIVES), has a positive impact on the likelihood of a female executive director and a female non-executive director, respectively. We do not expect both # EXECUTIVES and # NON-EXECUTIVES to directly affect the dependent performance variables in the second stage.

The detailed analysis of women in executive (Model 3) and non-executive (Model 4) positions confirms the preceding probit model results for the presence of women on the board of directors. Model 3 shows that the number of executives has a positive significant impact on the likelihood of a female executive director. The availability of more leading positions enables higher female representation in the group of executives. The same applies to women in non-executive positions (Model 4).

Interestingly, major shareholders have a positive impact on the presence of a female executive director, but a negative impact on a female non-executive director. Thus, the assumption that institutional shareholders demand boardroom diversity, holds especially for executive positions. The size of a firm displays ambiguous results. In order to conform to societal pressure to increase gender diversity, larger firms appoint females rather to non-executive positions than to executive ones. With regard to ROA, we observe that the likelihood of having a female executive director increases with higher company profitability. However, this accounting-based performance measure has no impact on the presence of female non-executive directors. Since the group of executives has an immediate effect on financial realities, suitable women for executive positions may deliberately choose companies that are performing well, as their employer. The Mills ratios calculated from Models 3 and 4 are used in the second-stage performance regressions to control for the performance between companies with and without female executive directors or female non-executive directors.

Exhibit 3.6: Heckman procedure: 1st-stage analysis for the group of executives and non-executives

	WOMAN EXECUTIVES	WOMAN NON-EXECUTIVES
	3	4
# EXECUTIVES	1.265*** (9.61)	
# NON-EXECUTIVES		0.494*** (2.79)
% INDEPENDENT	1.337*** (3.02)	2.006*** (4.27)
CEO DUALITY	0.141* (1.68)	-0.488*** (-5.70)
INSIDERS	-1.167** (-2.29)	-2.025*** (-4.10)
MAJORSHARE	0.932*** (3.09)	-0.716** (-2.36)
REIT	0.102 (0.38)	-0.744** (-2.21)
FIRMSIZE	-0.212*** (-4.32)	0.420*** (7.67)
LEVERAGE	-0.194 (-0.68)	0.340 (1.11)
VOLATILITY	-0.002 (-0.13)	-0.018 (-0.94)
LIQUIDITY	-0.300 (-0.56)	-0.799 (-1.47)
FIRMAGE	0.184*** (3.41)	0.002 (0.04)
ROA	2.388*** (1.99)	-2.329 (-1.64)
INTERCEPT	-1.091 (-1.37)	-7.169*** (-8.06)
Observations	1,061	1,061
Pseudo R^2	0.11	0.17
LR	151.12***	248.86***

Exhibit 3.6 provides the results of the first-stage Heckman procedure (pooled probit regression) for the group of executives and non-executives. WOMAN EXECUTIVES is a binary variable equal to 1 if a company has at least one female executive director, 0 otherwise. WOMAN NON-EXECUTIVES is a binary variable equal to 1 if a company has at least one female non-executive director, 0 otherwise. # EXECUTIVES represents the natural logarithm of the sum of executive directors. # NON-EXECUTIVES represents the natural logarithm of the sum of non-executive directors. % INDEPENDENT is the percentage of independent directors on the company's board. CEO DUALITY is a binary variable equal to 1 if a firm's CEO is simultaneously chair of the board, 0 otherwise. INSIDERS represents the percentage of outstanding shares currently held by insiders (including relatives). MAJORSHARE is the percentage of majority shareholders who own 5% or more of outstanding shares. REIT is a binary variable equal to 1 if the company has REIT status, 0 otherwise. FIRMSIZE is the natural logarithm of total assets. LEVERAGE is the ratio of total debt to total assets. VOLATILITY is the standard deviation of the share price, based on the weekly values, divided by the mean price and multiplied by 40. LIQUIDITY represents the ratio of traded shares to shares outstanding. FIRMAGE is the natural logarithm of the firm's age, whereby age is measured by the years since listing on the stock exchange. ROA is the ratio of net income to total assets. ***, ** and * denote statistical significance at p-value<0.01, p-value<0.05 and p-value<0.1, respectively. z-statistics are shown in parentheses.

Turning to our second hypothesis *H2*, we examine the performance effects of women in the board of directors in detail. To do so, we distinguish explicitly between the female proportions in executive, as well as in non-executive positions (Exhibit 3.7). Consistent with our findings in the board-composition analysis, we do not find any significant results for the accounting-based

measures ROA and FFO/SHARE. Moreover, our results show that female executives (% WOMEN EXE) have a significant positive impact on TOBINSQ (at 1% level) as well as PRICE/NAV (at 5% level). However, we could not find any significant results for the percentage of female non-executive directors (% WOMEN NON-EXE) on financial performance. Consequently, the theory that stock market participants expect higher future earnings from firm's with increased female representation is especially true for gender diversity in executive positions. This might be explained by the fact that executives bear the responsibility for strategic corporate decisions and the day-to-day business. Thus, they are highly visible and the subject of considerable media attention, leading to coverage of market analysts and interest of investors. Furthermore, in comparison to women in less visible leadership positions, female executive directors especially qualify as role models. In such a role model function, successful female executives may encourage female employees to strive for higher career levels, therefore increasing the pool of female talents and board candidates (Hillman *et al.*, 2007). Since executive diversity is a strong signal of company commitment to diversity, it might be especially appreciated by socially responsible investors.

Exhibit 3.7: Heckman procedure: 2nd-stage analysis for the group of executives and non-executives

	Executives		Non-Executives	
	TOBINSQ	PRICE/NAV	TOBINSQ	PRICE/NAV
% WOMEN EXE	0.243*** (3.22)	0.318** (2.37)		
% WOMEN NON-EXE			0.140 (1.21)	0.030 (0.14)
% INDEPENDENT	0.006 (0.05)	-0.100 (-0.55)	0.138 (0.68)	0.128 (0.34)
CEO DUALITY	0.029 (0.95)	0.014 (0.35)	0.014 (0.30)	-0.005 (-0.06)
INSIDERS	0.087 (0.55)	-0.063 (-0.20)	-0.134 (-0.62)	-0.444 (-1.01)
MAJORSHARE	-0.142** (-2.32)	-0.231** (-2.05)	-0.126 (-1.51)	-0.174 (-1.16)
BMEETING	-0.024* (-1.66)	-0.049* (-1.74)	-0.022 (-1.47)	-0.046 (-1.56)
REIT	0.180*** (5.44)	0.251*** (3.79)	0.172** (2.50)	0.238* (1.85)
FIRMSIZE	-0.157*** (-6.05)	-0.320*** (-6.17)	-0.128*** (-3.13)	-0.276*** (-3.31)
LEVERAGE	0.229** (2.29)	1.130*** (5.37)	0.260*** (2.68)	1.166*** (5.59)
VOLATILITY	-0.011*** (-4.27)	-0.045*** (-9.35)	-0.011*** (-4.21)	-0.047*** (-8.78)
LIQUIDITY	-0.033 (-0.45)	0.175 (0.91)	-0.085 (-0.88)	0.068 (0.29)
FIRMAGE	0.080*** (2.62)	0.136** (2.52)	0.095*** (3.08)	0.165*** (3.07)
ROA	0.910*** (3.24)	1.347*** (2.59)	0.913*** (2.94)	1.433** (2.38)
MILLS	-0.087*** (-2.74)	-0.191*** (-3.37)	0.088 (0.66)	0.135 (0.55)
INTERCEPT	2.205*** (5.44)	4.52*** (5.24)	1.594*** (3.20)	3.363** (2.25)
Observations	1,060	1,052	1,060	1,052
R^2	0.85	0.86	0.85	0.86
Adj. R^2	0.84	0.84	0.83	0.84

Exhibit 3.7 shows the results of the second-stage Heckman procedure (panel regression with period and cross-section fixed effects) for women in the group of executives and non-executives. TOBINSQ is the natural logarithm of the sum of the market value of equity plus debt, divided by the book value of total assets. PRICE/NAV is the natural logarithm of the market valuation divided by the NAV. % WOMEN EXE and % WOMEN NON-EXE represents the percentage of women in the group of executives and non-executives, respectively. % INDEPENDENT is the percentage of independent directors on the company's board. CEO DUALITY is a binary variable equal to 1 if a firm's CEO is simultaneously chair of the board, 0 otherwise. INSIDERS represents the percentage of outstanding shares currently held by insiders (including relatives). MAJORSHARE is the percentage of majority shareholders who own 5% or more of outstanding shares. BMEETING represents the natural logarithm of the number of all board meetings during a fiscal year. REIT is a binary variable equal to 1 if the company has REIT status, 0 otherwise. FIRMSIZE is the natural logarithm of total assets. LEVERAGE is the ratio of total debt to total assets. VOLATILITY is the standard deviation of the share price, based on the weekly values, divided by the mean price and multiplied by 40. LIQUIDITY represents the ratio of traded shares to shares outstanding. FIRMAGE is the natural logarithm of the firm's age, whereby age is measured by the years since listing on the stock exchange. ROA is the ratio of net income to total assets. MILLS is the inverse mills ratio estimated from the probit model to account for sample selection bias. ***, ** and * denote statistical significance at p-value<0.01, p-value<0.05 and p-value<0.1, respectively. Heteroscedasticity and autocorrelation-corrected t-statistics are shown in parentheses.

3.4.3 Alternative test

3.4.3.1 Impact of different gender compositions in the group of executives and non-executives

With regard to the 'tokenism theory' of Kanter (1977a, 1977b), it may be that the gender diversity / performance relationship is non-linear. Thus, we expect uniform (0% women) and skewed (0% < x < 15% women) groups to show a non-significant or negative impact on the market performance. In contrast, within tilted (15% ≤ x < 30% women) or balanced (x ≥ 30% women) groups, a certain critical mass of female representation is reached, whereby the benefits of diverse groups outweigh the disadvantages of heterogeneous teams. To address this issue, we rerun both stages of the Heckman (1976) procedure for both the group of executives and non-executives, including four groups that vary in their gender composition. The results of the 'tokenism' analysis are displayed in Exhibit 3.8, with uniform groups representing the reference category. We include the usual set of firm and board controls and the inverse Mill's ratio as estimated from the probit model in Exhibit 3.6 in all regression models. In accordance with our previous results, the Kanter categorization for the group of non-executive directors shows that women in non-executive positions do not seem to influence market-based performance (TOBINSQ and PRICE/NAV). However, with regard to the gender composition in the group of executives, we find that firms with a balanced executive team outperform homogeneous male groups by 10.4%, as measured by Tobin's Q (at 1% level) and by 10.9%, as measured by Price/NAV (at 5% level). The coefficients for the two other executive groups (SKEWED and TILTED) are not statistically different from zero. Thus, we verify *H3* that a female 'token' has no impact on the market performance. Even a female minority group does not contribute to higher market performance. Hence, our analysis for the group of executives verifies the 'token woman theory', that a certain female representation is needed to generate an impact. In the case of real estate companies, a critical mass of female executives is reached in balanced groups (> 30% women).

Exhibit 3.8: Heckman procedure: 2nd-stage analysis for 'tokenism'

	Executives		Non-Executives	
	TOBINSQ	PRICE/NAV	TOBINSQ	PRICE/NAV
SKEWED	-0.005 (-0.24)	-0.019 (-0.47)	0.024 (1.14)	0.026 (0.61)
TILTED	0.024 (1.35)	0.035 (0.93)	0.033 (1.31)	0.027 (0.59)
BALANCED	0.104*** (2.98)	0.109** (2.06)	0.060 (1.51)	0.015 (0.17)
Observations	1,060	1,052	1,060	1,052
Controls	included	included	included	included
MILLS	included	included	included	included
R^2	0.86	0.86	0.85	0.86
Adj. R^2	0.84	0.84	0.83	0.84

Exhibit 3.8 shows the results of the second-stage Heckman procedure (panel regression with period and cross-section fixed effects) with a focus on different gender compositions in the group of executives and non-executives. TOBINSQ is the natural logarithm of the sum of the market value of equity plus debt, divided by the book value of total assets. PRICE/NAV is the natural logarithm of the market valuation divided by the NAV. UNIFORM is a binary variable equal to 1 for homogeneous male groups, 0 otherwise and represents the reference category in all regressions. SKEWED is a binary variable equal to 1 if the percentage of women varies from 1% to less than 15%, 0 otherwise. TILTED is a binary variable equal to 1 if the percentage of women varies from 15% to less than 30%, 0 otherwise. BALANCED is a binary variable equal to 1 if the percentage of women is at least 30%, 0 otherwise. MILLS is the inverse mills ratio estimated from the probit model to account for sample selection bias. ***, ** and * denote statistical significance at p-value<0.01, p-value<0.05 and p-value<0.1, respectively. Heteroscedasticity and autocorrelation-corrected t-statistics are shown in parentheses.

3.4.3.2 Impact of different gender compositions in real estate property sectors

Exhibit 3.9 provides an in-depth analysis of real estate companies' different property sectors. Panel A shows the results of the mean-comparison test for the average percentage of female executives, classified by different property sectors. In our sample, women occupy on average 9.2% of executive positions. With 14.75% and 14.17% of women in the group of executives, the property sectors health care and residential, respectively, show a significantly higher female representation than the sample's average percentage of women in the group of executives. The sectors office, hotel and industrial account for the smallest mean percentage of female executives in comparison the overall sample average.

Panel B displays the regression results for the performance effects of female executives in different property sectors. The group of executives is subdivided by its gender composition into uniform, skewed, tilted and balanced groups, whereas uniform represents the reference category. As hypothesized in *H4*, it is important for profitable companies to consider customer needs through the management team. In the regressions of the health care, retail and hotel subsample, the coefficients for the balanced group of executives show the expected positive signs. A balanced executive team outperforms a homogeneous male group by 36.9% (health care), 15.5% (retail) and 12.9% (hotel), as measured by Tobin's Q. This positive association stresses the importance of a diverse leadership team for real estate sectors which are more

consumer-orientated. Furthermore, these findings are also of particular interest for real estate sectors with a diverse workforce, e.g. the health care sector, where women account for the majority of employees. Interestingly, companies with a residential property focus do not seem to benefit particularly from gender-diverse management. This might be explained by the fact that the consumer base for housing is relatively equally distributed between women and men. Interestingly, the subsample industrial shows a positive performance effect for skewed (0% < x < 15% women) executive teams. However, this subsample becomes small and loses its significance for more than 30% female representation in the group of executives. Moreover, with only 92 observations in the industrial subsample, extreme values may bias the results. In conclusion, female leadership connects the firm to its customers and employees, which is then rewarded by investors.

Exhibit 3.9: Mean-comparison and 2nd-stage Heckman procedure for different property sectors

Panel A: Mean-comparison for different property sectors concerning the percentage of women in the group of executives (% WOMEN EXE)

	Health care	Residential	Retail	Industrial	Office	Hotel	Mixed
	14.75*** (-5.10)	14.17*** (-5.15)	9.09 (0.12)	5.44*** (2.98)	7.12** (2.41)	6.14*** (3.01)	7.93 (1.41)

Panel B: Heckman procedure – 2nd-stage analysis for different gender compositions in the group of executives

	TOBINSQ						
	Health care	Residential	Retail	Industrial	Office	Hotel	Mixed
SKEWED	-0.002 (-0.03)	-0.001 (-0.05)	-0.011 (-0.35)	0.326*** (2.78)	-0.054 (-1.19)	0.053 (1.52)	0.031 (0.47)
TILTED	0.105 (1.45)	0.029 (1.39)	0.040 (1.22)	-0.061 (-1.04)	0.010 (0.26)	0.104** (2.21)	0.053 (1.25)
BALANCED	0.369*** (2.83)	0.027 (0.90)	0.155*** (2.88)	0.079 (0.54)	0.022 (0.42)	0.129** (2.24)	0.126** (2.20)
Observations	118	140	259	92	179	129	143
Controls	included	included	included	Included	included	included	included
Mills	included	included	included	Included	included	included	included
R^2	0.89	0.92	0.89	0.92	0.85	0.92	0.92
Adj. R^2	0.84	0.89	0.87	0.88	0.80	0.88	0.89

Exhibit 3.9 provides a mean-comparison test for real estate companies' different property sectors (Panel A) and the results of the second-stage Heckman procedure (panel regression with period and cross-section fixed effects) for different gender compositions in the group of executives with Tobin's Q as dependent variable (Panel B). TOBINSQ is the natural logarithm of the sum of the market value of equity plus debt, divided by the book value of total assets. The property sectors are defined by following the SNL classification: 'health care'; 'office'; 'hotel'; 'residential' (multi-family and manufactured homes); 'retail' (shopping center, regional malls and other retail); 'industrial' (logistics and self-storage); 'mixed' (miscellaneous). UNIFORM is a binary variable equal to 1 for homogeneous male groups, 0 otherwise and represents the reference category in all regressions. SKEWED is a binary variable equal to 1 if the percentage of women varies from 1% to less than 15%, 0 otherwise. TILTED is a binary variable equal to 1 if the percentage of women varies from 15% to less than 30%, 0 otherwise. BALANCED is a binary variable equal to 1 if the percentage of women is at least 30%, 0 otherwise. MILLS is the inverse mills ratio estimated from the probit model to account for sample selection bias. ***, ** and * denote statistical significance at p-value<0.01, p-value<0.05 and p-value<0.1, respectively. For Panel A, the t-statistics are shown in parentheses. For Panel B heteroscedasticity and autocorrelation-corrected t-statistics are shown in parentheses.

3.5 Conclusion

This study extends the current corporate governance literature by demonstrating that investors pay increased attention to gender diversity in their investment decisions. We offer new insights into the relationship between gender diversity in boardrooms and firm financial performance by focusing on the US real estate industry. Using a sample of 116 US publicly traded real estate companies from 2005 till 2015, this study is the first to examine the development and status quo of women in real estate leadership roles, and their contribution to performance. Whereas in 2005, the percentage of women on the board of directors accounted for 7.64%, in 2015, female representation in the board reached 11.55%. The real estate sector, although traditionally male-dominated, has shown a gradual improvement in the inclusion of women on boards over the last few years.

We test several hypotheses to determine whether real estate companies benefit from a diversified board of directors. To control for endogeneity within this relationship, we first need to investigate the factors that impact on a real estate company's female representation. We find that the likelihood of having a female director increases for larger firms with larger boards, and with an increased share of insiders and independent board members. Moreover, if the CEO is simultaneously board chair, the probability of female board members decreases.

The results also demonstrate that the gender diversity / performance relationship depends on the measure of performance. More specifically, the hypothesis proposed above, that women have a positive impact on financial performance, is not supported by the accounting-based performance measures. Gender diversity evidently does not have an impact, neither on ROA nor on FFO/SHARE. However, we find a significant and positive association between the percentage of women in the board of directors and the market-based performance Tobin's Q. In addition, by explicitly distinguishing between the female proportions in the group of executives and non-executives, we find that the positive association between women and market-based performance is driven by females in executive, rather than non-executive positions. Since executive diversity is a strong signal of company commitment to diversity, it might be appreciated and valued particularly by socially responsible investors. Finally, our results reveal that the gender diversity / performance relationship is non-linear. Real estate companies with a balanced executive team ($x \geq 30\%$ women) outperform homogeneous male teams by 10.4%, as measured by Tobin's Q or 10.9%, as measured by PRICE /NAV. These findings are consistent with the 'tokenism theory' that a certain level of female representation is needed to generate an impact. In the case of real estate companies, 30% of women in the group of executives represents the critical mass. Our results are of particular interest to real estate sectors with a strong consumer orientation and a high proportion of women in the workforce, such as retail, hotel and health care.

In conclusion, we suggest that real estate companies promote more women into executive positions, since the results of the present study show that companies with a diverse leadership increase their shareholder value. A strong commitment to diversity ultimately leads to an improved corporate image. Especially investors who apply an ‘impact investing strategy’ create a demand for the shares of such companies.

Future research could extend the diversity analysis to women participation at the middle management level. It would be interesting to examine how women in middle management positions affect financial performance. Moreover, the real estate corporate governance literature would also benefit from an investigation of further diversity dimensions, such as race, religion, age and education.

3.6 References

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4 The Determinants of Executive Compensation in US REITs: Performance vs. Corporate Governance Factors

Abstract

The paper examines whether executive compensation packages within the real estate industry are determined merely by performance or also by CEO power mechanisms that have an essential influence on board-level negotiations. We offer original into management compensation arrangements during and after the financial crisis. The relative importance of bonuses within CEO compensation contracts has been more than halved after the crisis. Simultaneously, after the financial crisis, equity-based compensation became increasingly important. Concerning the pay-for-performance link our results show no relationship during the financial crisis. However, after the crisis, we show a strong significant link between remuneration packages and corporate success.

4.1 Introduction

The financial crisis of 2007/2008 revealed that managers had been rewarded for excessive short-term risk-taking (Clementi *et al.*, 2009; Bebchuk *et al.*, 2010). The devastating consequences of the financial crisis have triggered a heated debate on executive compensation, and especially on the effectiveness of performance based compensation. In 2011, the Securities and Exchange Commission (SEC) adopted amendments to its disclosure rules (Securities and Exchange Commission, 2011). The 'Say-on-Pay' rule now provides shareholders with an advisory vote on executive compensation. Hence, through regulation, the SEC is attempting to strengthen shareholder engagement in listed companies, provide a framework for effective pay-for-performance arrangements and finally, increase transparency. However, the practical implementation of pay-for-performance arrangements after the financial crisis has so far not been assessed systematically. This paper aims to fill this void by empirically examining C-level compensation packages in the US real estate industry. Previous research on compensation has built upon the arguments of agency theory (Jensen and Meckling, 1976; Bloom and Milkovich, 1998) and/or managerial power theory (Bebchuk *et al.,* 2002). The former proclaims that CEO/executive compensation is primarily determined by company performance. Managerial power theory, however, considers the significant influence of CEO's on board member's decisions, and ultimately on the level of their own compensation and pay sensitivity to performance. The question then is which of these two theories apply to real estate companies.

A large number of studies have examined the pay-for-performance relationship empirically in the context of REITs. The literature, however, provides ambiguous findings, with evidence that agency theory and managerial power theory both play a valuable role in explaining distinct compensation patterns within the real estate industry. For example, Ghosh and Sirmans (2005) find that independent directors - a determinant in monitoring CEO power - are associated with higher remuneration packages, whereas Feng *et al.* (2010) find an insignificant relationship between independent directors and compensation, while other studies do not even control for this monitoring variable (e.g., Pennathur *et al.*, 2005; Griffith *et al.*, 2011). Hence, a thorough assessment of the compensation determinants within the real estate industry is needed, taking into consideration the explanatory validity of agency theory and managerial power theory in the context of compensation levels and its sensitivity to firm performance. We extend the current literature by investigating the pay-performance relationship with respect to the entire group of executive directors, alongside a detailed analysis of CEO compensation. Additionally, we show that after the financial crisis the relevance of cash and value-driven performance ratios, such as FFO and Tobin's Q increase.

The remainder of the paper is organized as follows. Section two reviews the theoretical reasoning and relevant literature on this topic, followed by the methodology of the panel data analysis in the third Section. The data are described in Section four. The results are displayed in Section five and the conclusion in Section six.

4.2 Literature review

4.2.1 Theoretical background

Agency problems arise due to the separation of company ownership (stockholders) and control (managers). Since listed real estate companies commonly have dispersed stockholders, company owners cannot efficiently control the daily operations of the company. Thus, from an agency perspective, the central challenge is to align the manager's objectives of achieving maximum compensation, while simultaneously mitigating personal losses to the owner's interest of maximizing performance (Bloom and Milkovich, 1998).

According to Jensen and Meckling (1976), the structure of the compensation contract should provide appropriate incentives for the manager to make decisions that maximize stockholder wealth. Therefore, the board of directors engages in arm's-length negotiations with CEO and executives over compensation policies, in order to mitigate agency problems. Based on agency theory, executive compensation is determined primarily by company performance.

This view is challenged by the managerial power theory of Bebchuk *et al.* (2002). They argue that boards of directors cannot be expected to bargain at arm's length with managers, because a powerful CEO significantly impacts on board member decisions, especially in circumstances where the board of directors is relatively less independent. Since directors' positions are associated with reputation, networks, and compensation, directors generally prefer to retain their position, and thus may negotiate compensation contracts that are more favourable to executives. CEOs exert a powerful influence on this re-election process and if, in addition, such tendencies as loyalty and collegiality prevail within boards, directors may comply with the CEO and approve substantial pay arrangements. (Main *et al.*, 1995; O'Reilly and Main, 2010) Consequently, executives exert considerable influence on the amount of their own remuneration and the level of sensitivity to performance (fixed vs. variable compensation).

Real estate companies provide a desirable setting for analysing both theories, since REITs are heavily regulated. Particularly the fact that a single shareholder cannot own more than 10 percent of REIT shares results in predominantly dispersed ownership within REITs. Thus, the role of institutional shareholders or independent directors in monitoring the company's management can be accorded more importance than in other industries. Moreover, by focusing

on a single industry, we significantly reduce firm heterogeneity in terms of variability in performance, risk and board characteristics. In this way, examining real estate companies provides an interesting and valuable setting for examining the relationship between compensation and both performance and board characteristics.

4.2.2 Determinants of CEO and executive compensation within the real estate industry

There is a growing body of literature on the determinants of REIT CEO and executive compensation. Most work focuses on the pay-for-performance relation, although recent studies also deal with the monitoring role of the board of directors.

Hardin (1998) finds senior executive cash compensation to be determined by REIT firm size, senior management's stock ownership, the amount of dividends paid to the senior executive and the number of years since the initial public offering. Chopin *et al.* (1995) model executive compensation as a function of size, revenue and unexpected profit, and find a positive relationship between REIT revenue and size, and CEO compensation. Scott *et al.* (2001) examine the impact of the market-based performance measure total shareholder return on REIT executives' base salary and incentive compensation. Their findings indicate that size, more so than performance, is a significant determinant of the base salary, although incentive-based compensation is highly elastic to performance. In contrast to prior research which applies the OLS method, Pennathur *et al.* (2005) apply the Tobit method to estimate the determinants of CEO compensation. They find that REIT CEOs who increase FFO and earnings per share receive larger option awards. Moreover, CEOs are rewarded with larger stock-based compensation schemes for riskier investments, measured by variability in returns.

Ghosh and Sirmans (2005) are the first to test the role of board-of-director characteristics on REIT CEO compensation. Applying a simultaneous equation model, they find that CEOs receive higher compensation schemes in REITs where the board monitors only weakly, due to its large size, the presence of older directors and absence of blockholders. Consistent with prior research, firm size and performance, as measured by return on assets, are significant explanatory variables in explaining CEO compensation. Using a REIT sample from 2001, Feng *et al.* (2007) similarly include board-independence monitoring variables to investigate the determinants of director compensation. Their results show that higher equity-based director compensation is associated with improved performance. Moreover, larger firms with an independent nomination committee award more equity-based compensation to directors. However, they find no relationship between director compensation and board size, the presence of outside directors, CEO duality, or CEO tenure and ownership. Similarly, Feng *et al.* (2010)

focus on the relationship between the presence of institutional shareholders and CEO compensation. They find evidence that institutional ownership is associated with greater CEO option awards. Thus, institutional shareholders incentivize CEOs by establishing a pay-for-performance link, but they also pay higher CEO cash compensation (salary + bonus).

Using a REIT sample from 2000 till 2006, Griffith *et al.* (2011) are the first to apply panel fixed-effects regression to study the impact of performance and CEO power on changes in CEO compensation. They find that performance, measured by shareholder total return, Tobin's q and changes in FFO, does not influence CEO salary, while CEO power variables, such as CEO tenure and age, CEO duality, CEO stock ownership, all have significant effects. However, performance in addition to CEO power affects CEO option awards and finally, CEO bonuses are determined predominantly by performance.

This study extends the REIT literature on executive compensation by answering the following research questions: First, current literature does not specify the most appropriate indicator of REIT management performance with regard to C-Level compensation. Do REITs apply contingent payment contracting relying on market-based or specific real estate performance measures? Second, do certain board-of-director characteristics allow CEOs to bargain for higher compensation levels?

This paper adds to the literature by examining both the REIT CEO pay-for- performance relationship, and the validity of managerial power theory in a real estate context. We extend prior research by adding further corporate governance variables, such as the number of compensation committee meetings, a dummy indicating whether the CEO is also the founder of the company or the tenure of the longest-serving board member. These variables consider the power of different participants in the pay-setting process. Furthermore, we not only focus on CEO compensation, but also investigate the determinants of different types of executive director compensation. We are the first to investigate whether cash, long-term and equity compensation is adequately linked to different performance time horizons. Specifically, we extend the literature by using a post-financial-crisis sample, as one could argue that the extent of board monitoring and the pay-for-performance sensitivity changed after the crisis.

4.3 Methodology

4.3.1 Data

As primary inclusion criteria for this study, sample companies had to be listed in the FTSE EPRA / NAREIT United States Index, which ensures a homogeneous real estate sample with regard to the listing criteria of size and income composition. The initial sample consists of 116

US publicly traded real estate companies. The dataset for this study was created by using various sources. The CEO and executive compensation information was provided by ExecuComp. Firm and financial performance data are from Compustat, SNL and Thomson Reuters Datastream. Data on the corporate governance mechanisms were collected primarily from Bloomberg, and secondly from the company's proxy statement (DEF 14A). Our dataset was limited by the availability of corporate governance information. In total, the final sample comprises 83 US listed real estate companies over the sample period 2006 to 2015, resulting in 830 firm-year observations.

4.3.2 Variables

4.3.2.1 Compensation variables

Previous pay-for-performance research commonly focuses on total CEO compensation and its distinct components (see Ghosh and Sirmans, 2005; Feng *et al.*, 2010; Griffith *et al.*, 2011). This study investigates both CEO compensation and that of the entire group of executive directors, as executives are crucial participants in daily company decision-making processes and therefore part of the agency problem. To analyse the pay-performance relationship from different time-horizon perspectives, we distinguish between short-term and long-term compensation components. Additionally, we construct a variable for equity compensation to evaluate incentive-based components. This approach yields three sets of estimates each, for CEO and executive directors. Natural logarithm is applied for all compensation variables.

With regard to short-term compensation, this study investigates total current cash compensation (*TCC CEO* and *TCC EXE*), which is the sum of base salary and cash bonus for a fiscal year. The base salary is a fixed component of total compensation, whereas the cash bonus is generally dependent on previous-year performance. The second compensation measure includes long-term compensation components (*TDC CEO* and *TDC EXE*), and is calculated by the sum of base salary, cash bonus, restricted stock grants, stock options granted, long-term incentive pay-outs (LTIP) and all other total. The LTIP are determined by company's long-term growth plan, which generally sets performance goals for a long-term time horizon of 3 years or more. For each year going forward, potential rewards will be paid out in cash or stock, contingent on achieving the stipulated goals. The "all other" total represent the most inclusive component in long-term compensation, comprising fringe benefits, other personal benefits such as company car, severance pay or relocation benefits and countervailing benefits. Finally, incentive-based equity compensation (*EQUITY CEO* and *EQUITY EXE*) is defined as the value of stocks and

options granted, as reported in the company's financial statements. According to ASC 718 (formerly FAS 123R), companies are required to disclose their equity grants at fair value.

4.3.2.2 Performance measures

Company performance is measured using five different variables. First, we apply the accounting-based measure funds from operations (*FFO*).[14] In this way, FFO might be the most appropriate performance measure in the real estate industry, since it serves as an improved approximation of cash flows by not deducting depreciation, amortization, non-recurring revenue and expenses (Ben-Shahar *et al.*, 2011).

The second measure of performance is Tobin's q (*TOBINSQ*), which is defined as the ratio of the market value of firm assets to the replacement costs of its assets (Tobin, 1969). Tobin's q is calculated as the ratio of the sum of market value of equity and book value of debt, divided by the book value of total assets. Hence, a Tobin's q ratio greater than 1.0 indicates higher future growth opportunities (Feng *et al.*, 2010).

To capture the influence of current and past performance on our compensation measures, we apply total return to shareholders, measured in different time-horizons. Specifically, the average total return to shareholders over one, three or five years (*TSR1YR, TSR3YR, TSR5YR*) might have a mixed relationship with short-term, long-term and equity compensation.

Following previous literature on agency theory, the link between CEO/executive compensation and firm performance should align management goals, such as maximizing compensation, with those of shareholder's, such as creating sustainable firm performance. Hence, in pay-for-performance contracts, CEO or executive compensation is a positive increasing function of firm performance. Based on agency theory, we predict that a better performing company rewards the CEO and executive directors with higher compensation levels, especially equity compensation.

4.3.2.3 Corporate Governance variables

In order to control for the distinct power mechanisms within the pay-setting process, we include a broad set of corporate governance variables in our model. Generally, corporate governance variables can be categorized either according to CEO entrenchment mechanisms (CEO/chairman duality, CEO/founder duality, CEO age, CEO tenure, CEO ownership) or board control mechanisms (longest board member tenure, blockholders and institutional investors, independent shareholders, size of the board, number of compensation committee meetings). We

[14] Following the NAREIT guidelines, FFO is calculated as GAAP net profits excluding gains or losses from sales of properties or debt restructuring, and adding back real estate depreciation and amortization.

predict that these mechanisms influence the ability of CEO's and executives to negotiate higher compensation arrangements.

CEO DUALITY is a proxy for the CEO being simultaneously chairman of the board. This power clustering in the CEO position may increase the CEO's influence in pay negotiations and the nomination process of new directors (Main *et al.*, 1995; O'Reilly and Main, 2010). A similarly powerful position for enforcing strategic decisions is *CEO FOUNDER,* which captures a dual role as CEO and founder of the company. We predict that *CEO DUALITY* as well as *CEO FOUNDER,* are positively associated with CEO/executive compensation.

The age of the CEO and executive directors, as well as their length of tenure, may also be a determinant of strengthening managerial power. Therefore, we include *CEO AGE*, *EXE AGE, CEO TENURE,* as well as the tenure of the longest serving board member (*BOARD MEMBER TENURE*), in our regression models. The age of the CEO or executive directors can either be a proxy for working experience or an indicator of the length of time to retirement (Linck *et al.*, 2008; Fernandes *et al.*, 2013). Thus, the effect of CEO or executive age on the firm performance can be ambiguous. We use the CEO's time in office *(CEO TENURE)* to control for the CEO's managerial entrenchment. As collaboration and collegiality among board members intensify over time, longer tenured CEOs are expected to have more influence over board members (Bebchuk and Fried, 2003; Bebchuk and Fried, 2004). Thus, we expect a positive impact of CEO tenure on compensation. We also control for the tenure of the longest-serving board member, which can be an underestimated counterpart to the CEO tenure. Hence, a long-serving board member may have seniority status and be capable of convincing other board members to contradict CEO decisions.

Concerning the effects of ownership variables, *CEO OWN*, *EXE OWN*, *MAJORSHARE* and *INSTITUTIONALS* are employed. Increased share ownership empowers CEOs or executives with voting rights and greater control of the company. Thus, higher CEO/executive shareholdings might impede external control and monitoring, which could lead to excessive managerial compensation packages (Ozkan, 2011). Therefore, we include the percentage of shares owned by the CEO and executives *(CEO OWN* and *EXE OWN)* and expect a positive association with CEO/executive compensation. Ozkan (2011), as well as Griffith *et al.* (2011), find a significant non-monotonic relation between CEO/executive ownership and compensation. Consequently, we also include the quadratic model of these variables (*CEO OWN²*, *EXE OWN²)* to control for a non-linear relationship.

A key structural governance feature in constraining the power of CEOs is blockholder ownership. Therefore, we include *MAJORSHARE* to control for the percentage of substantial shareholders who own more than 5% percent of company's shares. In comparison to dispersed

shareholders, large, concentrated owners have considerable wealth at stake. Hence, they are motivated to actively monitor management decisions and exert influence in cases of poor governance.

However, the unique regulatory structure of REITs inhibits the formation of large blockholders, since a single shareholder cannot own more than 10 percent of REIT shares. Thus, the role of institutional shareholders in monitoring the company's management is likely to be more important than in other industries. We include *INSTITUTIONALS,* which represents the percentage of shares held by all institutional investors. On the one hand, since institutional investor portfolios are closely tied to the performance of firms they invest in, they may act as active monitors by limiting managerial power through their voting rights and hostile takeover threats. On the other hand, institutional investors may act as momentum traders by "voting with their feet", instead of imposing disciplinary actions on management (Feng *et al.,* 2010). We predict that higher levels of concentrated, or rather institutional ownership, in the case of REITS, are negatively associated with CEO/executive compensation.

In the real estate sector, the presence of independent directors is also likely to be a critical determinant of monitoring the company's management. By including *%INDEPENDENT,* we control for the share of independent directors on the board. Directors are considered independent if they are not currently employed by the company and have no other affiliations with it. A board composed of independent directors is supposed to ensure effective internal monitoring and enhanced corporate governance, since company outsiders should be less sensitive to the influence of corporate insiders, and free of conflicts of interest (Dalton *et al.*, 1998). However, independent directors may be less willing to challenge the CEO, as tendencies like loyalty and collegiality between board members evolve over time and directors generally prefer to retain their position within the re-election procedure (Main *et al.*, 1995; O'Reilly and Main, 2010). Nevertheless, we hypothesize that independent directors act as efficient monitors in setting market-conform executive compensation arrangements and expect a negative association with CEO/executive compensation.

The number of directors within the board (*BOARDSIZE)* is also likely to raise CEO power. Larger boards might be ineffective in monitoring, due to a lack of mutual interaction, as well as internal coordination and communication problems, which may require more time and effort to build consensus (Bebchuk and Fried, 2004; Yermack, 1996; Zahra and Pearce, 1989). Therefore, we expect these collective-action problems of larger boards to provide CEOs with more power, resulting in higher CEO/executive compensation.

The last corporate governance variable is *COMPMEETINGS*, which is measured by the natural logarithm of the total number of compensation committee meetings during a fiscal year. A

larger number of compensation-committee meetings might imply disagreements on the level of compensation and a varying level of performance sensitivity among participants within the pay-setting process. Thus, we expect a negative impact of *COMPMEETINGS* on CEO/executive compensation.

4.3.2.4 Firm control variables

Given the well-documented relationship between the size of a firm and compensation (e.g. Jensen and Murphy, 1990; Mehran, 1995; Sapp, 2008), we expect a positive association between FIRMSIZE, measured by the natural logarithm of total company assets value, and the compensation level. We also include the volatility of stock returns (*VOLATILITY*), calculated as the standard deviation of weekly stock returns, in order to control for firm risk. More volatile companies may invest in riskier assets in the hope of higher returns. If CEOs or executive directors are rewarded for taking risks, we expect the impact of volatility on CEO/executive compensation to be positive. Finally, control variables for the company's specific property type are added, since there may not only be returns variability, but also differences in the compensation level between various property types. These binary variables equal 1, if the investment focus of the company is either one of the following: *RESIDENTIAL*, *RETAIL*, *INDUSTRIAL*, *OFFICE*, *HOTEL*, *HEALTH CARE* or *DIVERSIFIED*.

4.3.3 Model specification

Apart from corporate governance and performance variables, distinct observable and unobservable firm, board, industry and country characteristics influence the pay-setting-process and ultimately the C-level compensation contract. As a result, compensation arrangements can be determined endogenously by firm performance, or both dependent and independent variables can be effected by omitted unobservable characteristics at the same time (Frydman and Jenter, 2010).

First, we account for this potential endogeneity problem by using lagged performance variables in the regressions. Second, we apply a panel data fixed-effects methodology with year and property-type dummies. Two estimation procedures, fixed-effects model and random effects model, enable us to address the problem of omitted unobservable variable bias. The application of one of the two models depends on the existence of a correlation between the unobserved effects and the explanatory variables. While fixed effects should be applied if unobservable heterogeneity is correlated with the observed explanatory variables, random effects is the appropriate model if there is no correlation between the unobserved effects and the observed

independent variables. After applying the Hausman test, the use of fixed-effects models is approved.

To investigate the determinants of CEO and executive compensation, the following panel data fixed-effects model is estimated:

$$Compensation_{i,t} = \alpha + \beta\ Performance_{i,t-1} + \gamma\ Corporate\ Governance_{i,t} + \vartheta\ Firm\ Controls_{i,t} + \delta_i + \tau_t + \varepsilon_{i,t},$$

where i denotes the firm, and t the year (2006-2015). The dependent variable *Compensation* refers to the distinct compensation types of CEO's and executives: *TCC CEO*, *TCC EXE*, *TDC CEO*, *TDC EXE*, *EQUITY CEO* and *EQUITY EXE*. *Performance* denotes either *TOBINSQ*, the average shareholder total return over one, three and five years (*TSR1YR, TSR3YR, TSR5YR*) or the real-estate-specific measure FFO. *Corporate Governance* represents a broad set of CEO power variables (e.g. *CEO DUALITY, CEO TENURE, CEO OWN)* and board control variables (e.g. *MAJORSHARE, INSTITUTIONALS, %INDEPENDENT*). *Firm controls* refers to *FIRMSIZE* and *VOLATILITY*. The models include property type dummies δ to control for differences in compensation level between companies with a distinct property focus. τ refers to the time fixed-effects for the period of 2006 to 2015 and ε is the error term.

4.4 Results

4.4.1 Descriptive statistics

In Exhibit 4.1, we provide the summary statistics of performance measures in Panel A, CEO's and executive's distinct compensation types in Panel B, corporate governance variables in Panel C and firm control variables in Panel D. Comparing the one, three and five-year total shareholder returns, the one-year return yields the highest average *TSR1YR* of 12.1%. The US listed real estate companies in the sample generate on average an FFO of $277.75 million and a Tobin's q ratio of 1.28. Average cash compensation is $963.5 thousand for CEO's and $3.1 million for the group of executives. Boards' average number of executive directors is 5.81, so that an average executive director is rewarded with a total cash compensation of $536.9 thousand. The CEO's long-term compensation totals on average $4.40 million, which is more than double an average executive director's long-term compensation of $1.90 million. The same pattern is evident within equity compensation arrangements (fair value of stocks and options granted), which values on average $2.50 million for CEO's and $1.07 million for an average executive director. Approximately 16.4% of the CEOs have a dual-role as CEO, and board chair and 26.4% of the CEOs are simultaneously the company founder. The board consists of independent directors to the extent of two-thirds. On average, compensation

committees meet five times per year. The CEO is on average 56 years old. The longest tenured board member serves approximately 18 years, which is more than double the CEO's tenure of 8.3 years. The boards of US listed real estate companies comprise 8.5 members on average. The percentages of shares owned by the CEO and executive directors are negligibly small at 1.5% and 0.9%, respectively. Blockholders who own more than 5% of company's shares, represent one third of all shareholders. Moreover, at approximately 82% share ownership, institutional investors are the largest shareholder group. The average total assets of the sample companies amount to $5.340 billion. The stock price volatility oscillates around 4.9%. Concerning the sample property types, retail companies comprise the largest subsample at 27.7%.

Exhibit 4.1: Summary Statistics

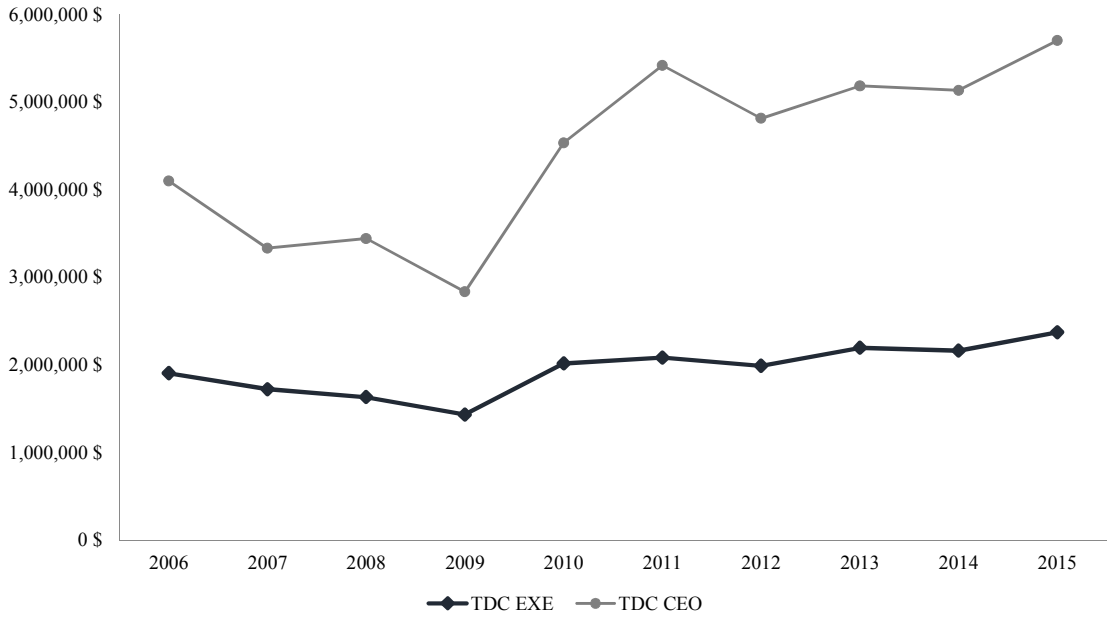
	Median	Mean	Std. Dev.
Panel A: Performance variables			
TSR1YR	0.128	0.121	0.393
TSR3YR	0.117	0.104	0.173
TSR5YR	0.114	0.106	0.133
FFO (in $000)	163,757	277,748	372,054
TOBINSQ	1.209	1.276	0.353
Panel B: Compensation variables			
TCC CEO (in $000)	719.616	963.503	891.176
TCC EXE (in $000)	2,351.965	3,119.184	2,563.317
TDC CEO (in $000)	3,159.223	4,462.725	6,531.393
TDC EXE (in $000)	8,345.042	11,384.211	11,865.399
EQUITYCOMP CEO (in $000)	1,500.000	2,585.002	5,586.868
EQUITYCOMP EXE (in $000)	3,909.335	6,217.971	8,620.947
Panel C: Corporate governance variables			
CEO DUALITY	0.000	0.164	0.499
CEO FOUNDER	0.000	0.264	0441
CEO AGE	54.000	55.733	8.511
EXE AGE	52.000	52.268	4.700
CEO TENURE	7.000	8.292	6.143
BOARD MEMBER TENURE	16.000	17.760	9.588
CEO OWN	0.008	0.015	0.029
EXE OWN	0.003	0.009	0.024
MAJORSHARE	0.347	0.341	0.141
INSTITUTIONALS	0.844	0.817	0.220
BOARD SIZE	8.000	8.483	2.044
% INDEPENDENT	0.750	0.752	0.103
COMPMEETINGS	5.000	5.041	2.552
Panel D: Firm control variables			
FIRMSIZE (in $000)	3,220,826	5,340,497	5,953,524
VOLATILITY	4.065	4.922	2.723
RETAIL	0.000	0.277	0.448
RESIDENTIAL	0.000	0.145	0.352
INDUSTRIAL	0.000	0.084	0.278
OFFICE	0.000	0.169	0.375
HOTEL	0.000	0.096	0.295
HEALTH CARE	0.000	0.120	0.326
DIVERSIFIED	0.000	0.108	0.311

Notes: The table reports descriptive statistics for the sample of 830 observations over the period of 2006-2015. Panel A comprises the performance measures, Panel B the compensation measures, Panel C the corporate governance variables and Panel D the firm control variables.

Exhibit 4.2 depicts the development of CEO and executive director long-term compensation (*TDC*) from 2006 to 2015. Over the whole sample period, the mean of a CEO's TDC is far above an average executive director's TDC, which is not surprising, given that the CEO bears more responsibility. From 2008 to 2009, both TDCs decrease as a consequence of the global

financial crisis. After 2009 and until 2015, the data show a positive trend for both TDCs. However, there is a huge increase in CEO TDC from 2009 to 2011, whereas the long-term compensation of an executive director remains moderate at roughly the same level. A more detailed breakdown of the different compensation components is given in Exhibit 4.3.

Exhibit 4.2: Development of Long-Term Compensation

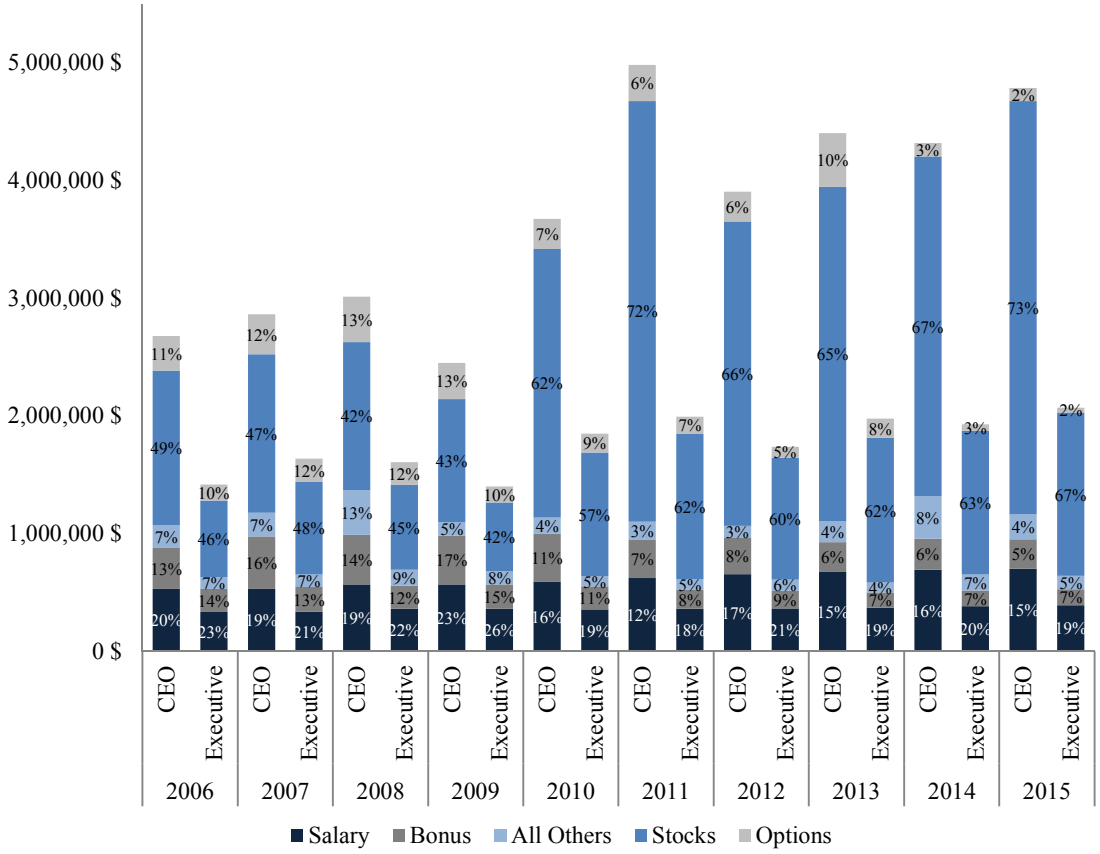


Notes: The exhibit shows the development of long-term compensation from 2006 to 2015. TDC represents long-term compensation components, and is calculated by the sum of base salary, cash bonus, restricted stock grants, stock options granted, long-term incentive pay-outs (LTIP) and all other total.

Exhibit 4.3 represents the main compensation components (salary, cash bonus, all others, stocks grants and option grants) and their relative importance during the sample period. In order to compare the main compensation components of a CEO's and an average executive director, the compensation of the group of executive directors is divided by the average number of executives. The salary proportion of both CEO and an average executive director varies between 12% and 26%, although changes over time are marginal. Thus, this compensation component is not sensitive to changing market conditions or crises. Interestingly, for executive directors, the salary component represents a larger proportion of the whole compensation package than for the CEO, implying that for CEO's, more than for executives, incentive-based compensation is a crucial component for aligning management with shareholder interests. The relative importance of a cash bonus within CEO compensation contracts has been more than halved from 13% in 2006 to 5% in 2015. The same pattern can be observed within the executive

director compensation packages. The bonus decrease can be explained by the simultaneously fundamental increase in stock grants within compensation arrangements. Over the whole sample period, stock grants comprise the largest component within compensation contracts. This finding shows that equity compensation is the most influential part in current C-level remuneration packages, suggesting that within the real estate industry, compensation packages align management interests with those of the company shareholders.

Exhibit 4.3: Main Components of CEO and Executive Compensation



Notes: The exhibit decomposes compensation of CEOs and executives into salary, bonus, all others, stocks and options for the period 2006-2015.

Exhibit 4.4: Comparison of CEO and Average Executive Director Compensation by Property Types

Property Types	Health care	Residential	Retail	Industrial	Office	Hotel	Diversified
CEO TCC	719,737*** (2.77)	652,909*** (4.14)	1,029,951 (-1.33)	1,162,955** (-1.99)	1,484,548** (-7.86)	726,712** (2.35)	654,960*** (3.42)
CEO TDC	4,116,211 (0.53)	3,517,401* (1.70)	4,930,990 (-1.27)	4,708,294 (-0.33)	6,008,710*** (-3.09)	4,009,745 (0.61)	2,566,954*** (2.86)
CEO EQUITY	2,583,291 (0.00)	2,068,336 (1.05)	2,967,089 (-1.20)	2,236,609 (0.54)	3,337,293* (-1.71)	2,357,275 (0.35)	1,521,474* (1.83)
EXE TCC	328,797*** (4.82)	417,739*** (3.20)	575,941 (-1,57)	629,656* (-1.87)	839,742*** (-9.35)	379,490*** (3.17)	380,186*** (3.51)
EXE TDC	1,528,906** (2.13)	1,688,188 (1.57)	2,018,127 (-0.50)	2,202,081 (-1.05)	2,701,383*** (-4.76)	1,843,963 (0.50)	1,332,395*** (3.03)
EXE EQUITY	891,212 (1.21)	879,728 (1.47)	1,091,979 (-0.25)	1,145,937 (-0.44)	1,472,245*** (-3.45)	1,084,196 (-0.08)	741,228** (2.13)

Notes: The table provides a compensation comparison by property types for CEOs and an average executive director. *TCC* is the total current cash compensation, which is the sum of base salary and cash bonus for a fiscal year. *TDC* is the long-term compensation, and is calculated by the sum of base salary, cash bonus, restricted stock grants, stock options granted, long-term incentive pay-outs (LTIP) and all other total. *EQUITY* is the value of stocks and options granted, as reported in the company's financial statements. Coefficients of statistical significance at: * 10%, ** 5%, *** 1% levels. The t-statistics are reported in parentheses.

Exhibit 4.4 provides an in-depth analysis of real estate companies' different property sectors by displaying the mean-comparison results for average cash, long-term and equity compensation

for CEO's and for an average executive director. In our sample, the largest remuneration packages for CEOs as well as executive directors, are provided by companies with an office focus. The cash, long-term and equity compensation in the office sector is significantly different to the average sample compensation. Hence, in the office sector, a CEO earns on average $1,484,548 cash compensation and an executive director on average $839,742. Over all three compensation categories, CEO remuneration is approximately twice that of an average executive director. This result emphasizes the outstanding responsibility position of CEO's in the group of executives. Similar patterns in the compensation level can be found within all other property-type subgroups. The second highest cash compensation, which is significantly different from the sample average, is paid to CEOs and executive directors in industrial real estate companies. Companies in the hotel sector pay the third highest CEO cash compensation and residential real estate companies reward the third largest executive cash compensation packages. CEOs hired by diversified real estate companies earn less, than the other property types.

4.4.2 Main regression model

The results of the panel fixed-effects regression with regard to the distinct compensation types for the CEO's and executive directors' are displayed in Exhibit 4.5 - Exhibit 4.10. To ensure that our coefficient estimates are not affected by multicollinearity, the variance inflation factor (VIF) is calculated. All VIF are below 10, indicating that multicollinearity is not a problem in our models. To analyse the pay-performance relationship from different time horizon perspectives, we distinguish between short-term and long-term compensation components. Additionally, we construct a variable for equity compensation, in order to evaluate incentive-based compensation components. This approach yields three sets of estimates each for CEO and executive directors. All models show high explanatory power with an R^2 ranging from 0.49 to 0.74.

4.4.2.1 Total current cash compensation

Exhibit 4.5 and Exhibit 4.6 contain the results for cash compensation regressions *TCC CEO* and *TCC EXE*, respectively. The impact of performance measures shows a similar pattern for CEO's and executives cash compensation. Short-term compensation arrangements are primarily driven by the average total return to shareholders over one year (*TSR1YR*). As expected, the maximization of shareholder wealth in the short-term is a key determinant in explaining the cash salary and bonus of CEO's and the whole group of executives. In contrast to Griffith *et al.* (2011), we find that *FFO* and *TOBINSQ* do not influence the total cash compensation, neither

CEO's nor the executives'. Most of the CEO entrenchment mechanisms show high power in explaining CEO and executive cash compensation. Interestingly, *CEO TENURE* reveals no impact on CEO cash compensation, but a positive impact on executive cash compensation. As collegiality among board members may intensify over time, longer tenured CEOs tend to negotiate higher short-term cash compensation for the group of executives than merely for themselves. The tenure of the longest serving board member is only marginally significant within the CEO cash compensation regressions. The negative coefficient of *BOARD MEMBER TENURE* implies that the seniority status of a long serving board member enables directors to fulfil an active monitoring role within the pay-setting process. *CEO DUALITY* displays an unexpected result, since the dual-role as CEO and chairman affects both CEO and executive cash compensation adversely. Thus, CEO's who similarly occupy the chairman position do not exploit their power position in pay negotiations. However, an equally powerful position is *CEO FOUNDER*, which has a positive influence on CEO as well as executive cash compensation. Thus, within the real estate industry, a founder's influence over cash compensation packages is significantly strong. In line with the findings of Pennathur and Shelor (2002), older CEO's are associated with significantly less cash compensation. Such CEOs are probably wealthier, and thus less dependent on negotiating high cash compensation packages (Ghosh and Sirmans, 2005). However, the average age of executive directors does not influence executives' cash compensation. In line with Griffith *et al.* (2011), the positive coefficient on CEO ownership (*CEO OWN*), along with the negative coefficient for the quadratic term *CEO OWN²,* suggest that CEO ownership positively affects cash compensation at a declining rate. In contrast to Hardin (1998), who finds a positive relationship between director stock ownership and compensation, our coefficients on *EXE OWN* and *EXE OWN²* are insignificant. Surprisingly, the increase in the number of board members does not result in ineffective monitoring and higher CEO cash compensation, in contrast to what was demonstrated by Ghosh and Sirmans (2005). Our findings for *BOARDSIZE* show just the opposite - monitoring requires capacity and a less familiar environment. Group cohesion and loyalty are more likely to prevail in smaller boards. Therefore a small board is less motivated to curb generous cash compensation packages within the C-Suite. Contrary to our expectations, the number of compensation committee meetings has a significant positive impact on CEO/executive compensation, implying that compensation contracts might have been renegotiated upwards. Inconsistent with our expectations, but in line with Feng *et al.* (2010), independent directors have no impact on CEO or on executive cash compensation, therefore neither enhancing nor impairing monitoring. The impact of blockownership and institutional investors on the executive cash compensation is insignificant. However, contrary to our expectations, but in line with Feng *et al.* (2010), *MAJORSHARE* and *INSTITUTIONALS* are positively associated with CEO cash compensation. Implying that institutional shareholders are willing to pay higher cash compensation to retain CEOs (Feng *et*

al., 2010). Moreover, the results indicate that our firm controls *FIRMSIZE* and *VOLATILITY* do indeed positively influence CEO's as well as executives' cash compensation. This result confirms past empirical studies that larger firms attract the best talents and reward management for taking risks.

Exhibit 4.5: CEO Total Current Cash Compensation

	Model I	Model II	Model III	Model IV	Model V
TSR1YR	0.172* (1.66)				
TSR3YR		0.131 (0.62)			
TSR5YR			0.002 (0.01)		
FFO				-0.058 (-1.25)	
TOBINSQ					-0.024 (-0.32)
CEO DUALITY	-0.157*** (-3.18)	-0.159*** (-3.04)	-0.154*** (-3.02)	-0.131*** (-2.63)	-0.147*** (-2.78)
CEO FOUNDER	0.116* (1.93)	0.152** (2.37)	0.174*** (2.73)	0.128** (2.14)	0.161** (2.48)
CEO AGE	-0.338* (-1.90)	-0.449** (-2.34)	-0.427** (-2.26)	-0.335* (-1.87)	-0.513*** (-2.68)
CEO TENURE	0.030 (1.00)	0.042 (1.29)	0.047 (1.49)	0.036 (1.15)	0.013 (0.40)
BOARD MEMBER TENURE	-0.082* (-1.69)	-0.053 (-0.95)	-0.050 (-0.84)	-0.044 (-0.90)	-0.068 (-1.37)
CEO OWN	7.892*** (4.53)	6.407*** (3.41)	4.335** (2.33)	7.767*** (4.41)	8.953*** (4.83)
CEO OWN²	-18.53*** (-3.56)	-13.058** (-2.36)	-8.447 (-1.56)	-18.222*** (-3.48)	-20.214*** (-3.63)
MAJORSHARE	0.449*** (2.64)	0.508*** (2.78)	0.410** (2.28)	0.484*** (2.77)	0.492*** (2.71)
INSTITUTIONALS	0.105 (0.93)	0.180 (1.53)	0.212* (1.78)	0.029 (0.25)	0.205* (1.71)
BOARD SIZE	-0.465*** (-4.04)	-0.699*** (-5.56)	-0.825*** (-6.54)	-0.569*** (-4.84)	-0.587*** (-4.78)
% INDEPENDENT	0.086 (0.37)	0.003 (0.01)	-0.142 (-0.57)	0.110 (0.46)	0.164 (0.66)
COMPMEETINGS	0.164*** (3.38)	0.216*** (4.12)	0.219*** (4.28)	0.164*** (3.41)	0.162*** (3.19)
FIRMSIZE	0.335*** (12.04)	0.369*** (12.47)	0.382*** (13.02)	0.398*** (7.04)	0.372*** (12.31)
VOLATILITY	0.025** (2.03)	0.025* (1.89)	0.016 (1.19)	0.023* (1.87)	0.022* (1.75)
RETAIL	0.406*** (5.01)	0.439*** (5.04)	0.432*** (4.99)	0.392*** (4.82)	0.423*** (4.79)
RESIDENTIAL	0.018 (0.20)	0.069 (0.74)	0.082 (0.89)	0.032 (0.36)	0.037 (0.39)
INDUSTRIAL	0.338*** (3.57)	0.355*** (3.49)	0.349*** (3.46)	0.355*** (3.73)	0.381*** (3.74)
OFFICE	0.504*** (5.50)	0.51*** (5.24)	0.499*** (5.12)	0.5*** (5.38)	0.518*** (5.28)
HOTEL	0.241** (2.30)	0.242** (2.11)	0.183 (1.55)	0.161 (1.48)	0.250** (2.26)
HEALTH CARE	0.377*** (4.09)	0.355*** (3.55)	0.364*** (3.65)	0.374*** (4.07)	0.367*** (3.71)
INTERCEPT	7.65*** (8.36)	7.631*** (7.81)	7.721*** (7.95)	7.106*** (6.44)	7.663*** (7.78)
Period fixed effects	Yes	Yes	Yes	Yes	Yes
F-statistic	14.09	15.45	16.59	14.01	14.77
R²	0.50	0.53	0.57	0.50	0.51
Adj. R²	0.46	0.50	0.53	0.47	0.48

Notes:

$$TCC\ CEO_{i,t} = \alpha + \beta\ Performance_{i,t-1} + \gamma\ Corporate\ Governance_{i,t} + \vartheta\ Firm\ Controls_{i,t} + \delta_i + \tau_t + \varepsilon_{i,t}$$

TCC CEO is the total current cash compensation for CEO_i in year *t*. $Performance$ is measured by five variables: *TSR1YR, TSR3YR, TSR5YR, FFO* and *TOBINSQ*. *TSR1YR, TSR3YR, TSR5YR* are the average shareholder total return over one, three and five years. *FFO* is the accounting-based measure funds from operations. *TOBINSQ* is calculated as the ratio of the sum of market value of equity and book value of debt, divided by the book value of total assets. $Corporate\ Governance$ is measured by: *CEO DUALITY* is a dummy variable where 1 indicates that the CEO is simultaneously chairman of the board; *CEO FOUNDER* is a dummy variable where 1 indicates that the CEO is simultaneously founder of the company; *CEO AGE* is the age of the CEO. *CEO TENURE* is the CEO's time in office; *BOARD MEMBER TENURE* is the tenure of the longest serving board member; *CEO OWN* is the percentage of shares owned by the CEO; *MAJORHSARE* is the percentage of substantial shareholders who own more than 5% percent of company's shares; *INSTITUTIONALS* is the percentage of shares held by all institutional investors; *BOARD SIZE* is the number of directors within the board; *% INDEPENDENT* is the share of independent directors on the board; *COMPMEETINGS* is the natural logarithm of the total number of compensation committee meetings during a fiscal year. *FIRMSIZE* and *VOLATILITY* are the $Firm\ Controls$. *FIRMSIZE* is the natural logarithm of total company assets value. *VOLATILITY* is the standard deviation of weekly stock returns.δ represents property type dummies. τ represents time dummies for the years 2006 to 2015. Coefficients of statistical significance at: * 10%, ** 5%, *** 1% levels. The t-statistics are reported in parentheses.

Exhibit 4.6: Executive Director's Total Current Cash Compensation

	Model I	Model II	Model III	Model IV	Model V
TSR1YR	0.192** (2.00)				
TSR3YR		0.302 (1.63)			
TSR5YR			0.326 (1.32)		
FFO				-0.041 (-0.97)	
TOBINSQ					0.003 (0.04)
CEO DUALITY	-0.126*** (-2.79)	-0.130*** (-2.81)	-0.126*** (-2.69)	-0.108** (-2.37)	-0.119*** (-2.62)
CEO FOUNDER	0.109** (2.00)	0.105* (1.87)	0.116** (1.99)	0.120** (2.21)	0.110** (2.01)
EXE AGE	0.235 (0.85)	0.317 (1.09)	0.414 (1.38)	0.232 (0.85)	0.207 (0.76)
CEO TENURE	0.056** (2.04)	0.064** (2.24)	0.063** (2.19)	0.059** (2.09)	0.052* (1.85)
BOARD MEMBER TENURE	-0.060 (-1.28)	-0.036 (-0.69)	-0.031 (-0.52)	-0.031 (-0.66)	-0.060 (-1.32)
EXE OWN	1.652 (0.63)	0.274 (0.10)	-1.328 (-0.46)	1.476 (0.56)	2.158 (0.82)
EXE OWN^2	-5.169 (-0.55)	-0.131 (-0.01)	4.843 (0.49)	-4.570 (-0.49)	-6.867 (-0.74)
MAJORSHARE	0.052 (0.33)	0.085 (0.53)	0.011 (0.07)	0.066 (0.41)	0.033 (0.21)
INSTITUTIONALS	0.067 (0.65)	0.040 (0.39)	0.069 (0.63)	0.015 (0.14)	0.073 (0.71)
BOARD SIZE	-0.094 (-0.90)	-0.141 (-1.28)	-0.202* (-1.76)	-0.181* (-1.71)	-0.103 (-0.99)
% INDEPENDENT	-0.188 (-0.86)	-0.168 (-0.74)	-0.197 (-0.83)	-0.207 (-0.94)	-0.190 (-0.88)
COMPMEETINGS	0.110** (2.47)	0.129*** (2.76)	0.134*** (2.84)	0.114** (2.58)	0.102** (2.34)
FIRMSIZE	0.306*** (12.41)	0.309*** (12.17)	0.317*** (12.08)	0.351*** (6.92)	0.309*** (12.45)
VOLATILITY	0.031*** (2.77)	0.035*** (2.97)	0.034*** (2.76)	0.028** (2.49)	0.025** (2.35)
RETAIL	0.327*** (4.43)	0.304*** (3.94)	0.289*** (3.64)	0.317*** (4.29)	0.325*** (4.28)
RESIDENTIAL	-0.003 (-0.04)	-0.014 (-0.17)	-0.016 (-0.19)	0.008 (0.09)	-0.002 (-0.02)
INDUSTRIAL	0.095 (1.10)	0.064 (0.71)	0.056 (0.60)	0.109 (1.25)	0.104 (1.19)
OFFICE	0.666*** (8.08)	0.634*** (7.51)	0.632*** (7.22)	0.664*** (7.96)	0.663*** (8.01)
HOTEL	0.107 (1.12)	0.063 (0.62)	0.008 (0.08)	0.043 (0.43)	0.129 (1.37)
HEALTH CARE	0.102 (1.20)	0.084 (0.94)	0.087 (0.95)	0.099 (1.17)	0.103 (1.20)
INTERCEPT	6.908*** (6.37)	6.493*** (5.78)	6.085*** (5.32)	6.591*** (5.51)	7.024*** (6.47)
Period fixed effects	Yes	Yes	Yes	Yes	Yes
F-statistic	16.42	15.76	15.72	16.51	16.32
R^2	0.54	0.54	0.55	0.54	0.53
Adj. R^2	0.50	0.50	0.51	0.51	0.50

Notes:

$$TCC\ EXE_{i,t} = \alpha + \beta\ Performance_{i,t-1} + \gamma\ Corporate\ Governance_{i,t} + \vartheta\ Firm\ Controls_{i,t} + \delta_i + \tau_t + \varepsilon_{i,t}$$

TCC EXE is the total current cash compensation for the group of $executive\ directors_i$ in year *t*. $Performance$ is measured by five variables: *TSR1YR, TSR3YR, TSR5YR, FFO* and *TOBINSQ*. *TSR1YR, TSR3YR, TSR5YR* are the average shareholder total return over one, three and five years. *FFO* is the accounting-based measure funds from operations. *TOBINSQ* is calculated as the ratio of the sum of market value of equity and book value of debt, divided by the book value of total assets. $Corporate\ Governance$ is measured by: *CEO DUALITY* is a dummy variable where 1 indicates that the CEO is simultaneously chairman of the board; *CEO FOUNDER* is a dummy variable where 1 indicates that the CEO is simultaneously founder of the company; *EXE AGE* is the average age of executive directors. *CEO TENURE* is the CEO's time in office; *BOARD MEMBER TENURE* is the tenure of the longest serving board member; *EXE OWN* is the percentage of shares owned by the executive directors; *MAJORHSARE* is the percentage of substantial shareholders who own more than 5% percent of company's shares; *INSTITUTIONALS* is the percentage of shares held by all institutional investors; *BOARD SIZE* is the number of directors within the board; *% INDEPENDENT* is the share of independent directors on the board; *COMPMEETINGS* is the natural logarithm of the total number of compensation committee meetings during a fiscal year. *FIRMSIZE* and *VOLATILITY* are the $Firm\ Controls$. *FIRMSIZE* is the natural logarithm of total company assets value. *VOLATILITY* is the standard deviation of weekly stock returns. δ represents property type dummies. τ represents time dummies for the years 2006 to 2015. Coefficients of statistical significance at: * 10%, ** 5%, *** 1% levels. The t-statistics are reported in parentheses.

4.4.2.2 Total long-term compensation

Exhibit 4.7 and Exhibit 4.8 present the results for the long-term compensation measures *TDC CEO* and *TDC EXE*. As expected, long-term remuneration packages are linked to the long-term-orientated performance ratio *TSR5YR*. Besides this highly significant (p-value<0.01) long-term relationship between pay and performance, we similarly found a positive impact of the operative company profit *FFO* and the market-based performance measure *TOBINSQ* on long-term payments to CEOs and executive directors. However, these metrics have no impact on short-term cash payments, as measured by *TCC CEO* and *TCC EXE* (see Exhibit 4.5 and Exhibit 4.6). As these measures should reflect a long-term and sustainable company-performance perspective, it makes good economic sense to link long-term compensation contracts of CEOs and executive directors to long-term performance. Hence, greater future growth opportunities and a higher market valuation are positively linked to CEO's and executive directors' long-term compensation.

Some CEO entrenchment mechanisms change their impact with regard to the long-term compensation components *TDC CEO* and *TDC EXE*. The two dual-role variables, *CEO DUALITY* and *CEO FOUNDER* lose their explanatory power when considering CEO and executive director long-term compensation. However, the tenure of the CEO has a positive impact on *TDC CEO* and *TDC EXE*. Hence, in comparison to short-term compensation, it appears that CEOs use their long trajectory in the C-Suite to negotiate higher long-term compensation packages for themselves as well as for fellow executives. We found a consistently negative impact of *BOARD MEMBER TENURE* on *TDC CEO* and *TDC EXE*, suggesting that the longest-serving board member plays an important role in monitoring excessive compensation arrangements. Unlike the results for cash compensation, we found a positive significant link between share ownership by executive directors *(EXE OWN)* and long-term compensation contracts. Through an increased amount of shares, executive directors use their voting rights and strategic power to bargain for higher long-term remuneration packages. Interestingly, there is no significant non-monotonic relationship for executive shareholdings and *TDC EXE*. The positive impact of institutional investors, either as a major blockholder or not, tends to be stronger on *TDC CEO* and *TDC EXE*. This result is in line with Feng *et al.* (2010), suggesting that institutional investors, rather than constraining generous compensation contracts, motivate management by paying higher long-term compensation alongside higher cash compensation. The explanatory power of *BOARDSIZE*, *FIRMSIZE* and *VOLATILITY* remains unchanged, compared to *TCC CEO* and *TCC EXE.*

Exhibit 4.7: CEO Total Long-Term Compensation

	Model I	Model II	Model III	Model IV	Model V
TSR1YR	0.224 (1.58)				
TSR3YR		0.348 (1.26)			
TSR5YR			1.120*** (3.01)		
FFO				0.110*(1.78)	
TOBINSQ					0.177* (1.89)
CEO DUALITY	-0.064 (-0.94)	-0.064 (-0.93)	-0.074 (-1.04)	-0.024 (-0.36)	-0.068 (-0.98)
CEO FOUNDER	-0.083 (-1.01)	-0.065 (-0.78)	-0.008 (-0.09)	-0.079 (-0.99)	-0.049 (-0.58)
CEO AGE	-1.341*** (-5.55)	-1.265*** (-5.04)	-1.301*** (-4.98)	-1.405*** (-5.87)	-1.542*** (-6.22)
CEO TENURE	0.091** (2.19)	0.098** (2.28)	0.081* (1.83)	0.075* (1.81)	0.072* (1.68)
BOARD MEMBER TENURE	-0.173*** (-2.59)	-0.141* (-1.91)	-0.135 (-1.61)	-0.177*** (-2.71)	-0.175*** (-2.68)
CEO OWN	12.807*** (5.39)	12.028*** (4.87)	11.403*** (4.42)	14.122*** (6.00)	13.207*** (5.51)
CEO OWN²	-19.499*** (-2.73)	-17.284** (-2.35)	-15.062** (-1.99)	-23.063*** (-3.28)	-18.622** (-2.56)
MAJORSHARE	0.619*** (2.65)	0.681*** (2.82)	0.763*** (3.04)	0.748*** (3.20)	0.606** (2.57)
INSTITUTIONALS	0.526*** (3.50)	0.499*** (3.30)	0.568*** (3.52)	0.418*** (2.80)	0.617*** (4.05)
BOARD SIZE	-0.442*** (-2.84)	-0.498*** (-3.05)	-0.431** (-2.50)	-0.517*** (-3.33)	-0.391** (-2.47)
% INDEPENDENT	0.491 (1.55)	0.505 (1.55)	0.515 (1.49)	0.457 (1.46)	0.435 (1.37)
COMPMEETINGS	0.298*** (4.64)	0.312*** (4.66)	0.317*** (4.60)	0.298*** (4.75)	0.33*** (5.13)
FIRMSIZE	0.65*** (17.08)	0.652*** (16.71)	0.656*** (16.07)	0.53*** (7.02)	0.664*** (17.02)
VOLATILITY	-0.012 (-0.71)	-0.017 (-0.95)	-0.013 (-0.74)	-0.012 (-0.73)	-0.010 (-0.61)
RETAIL	0.612*** (5.50)	0.629*** (5.46)	0.628*** (5.19)	0.575*** (5.27)	0.591*** (5.16)
RESIDENTIAL	0.140 (1.15)	0.167 (1.34)	0.140 (1.08)	0.173 (1.45)	0.100 (0.81)
INDUSTRIAL	0.36*** (2.77)	0.374*** (2.77)	0.391*** (2.77)	0.338*** (2.64)	0.327** (2.46)
OFFICE	0.37*** (2.94)	0.4*** (3.10)	0.487*** (3.57)	0.308** (2.47)	0.37*** (2.89)
HOTEL	0.484*** (3.36)	0.563*** (3.70)	0.525*** (3.18)	0.329** (2.25)	0.431*** (2.99)
HEALTH CARE	0.451*** (3.64)	0.392*** (3.01)	0.285** (2.08)	0.443*** (3.66)	0.371*** (2.92)
INTERCEPT	5.332*** (4.24)	4.971*** (3.83)	4.727*** (3.48)	7.182*** (4.85)	5.502*** (4.29)
Period fixed effects	Yes	Yes	Yes	Yes	Yes
F-statistic	29.99	29.03	29.99	28.87	31.69
R^2	0.68	0.68	0.70	0.67	0.69
Adj. R^2	0.65	0.66	0.67	0.65	0.66

Notes:

$$TDC\ CEO_{i,t} = \alpha + \beta\ Performance_{i,t-1} + \gamma\ Corporate\ Governance_{i,t} + \vartheta\ Firm\ Controls_{i,t} + \delta_i + \tau_t + \varepsilon_{i,t}$$

TDC CEO is the total long-term compensation for CEO_i in year *t*. See Exhibit 4.5 for variable definitions.
Coefficients of statistical significance at: * 10%, ** 5%, *** 1% levels. The t-statistics are reported in parentheses.

Exhibit 4.8: Executive Director's Total Long-Term Compensation

	Model I	Model II	Model III	Model IV	Model V
TSR1YR	0.135 (1.41)				
TSR3YR		0.271 (1.22)			
TSR5YR			0.993*** (3.37)		
FFO				0.115** (2.58)	
TOBINSQ					0.242*** (3.75)
CEO DUALITY	-0.019 (-0.41)	-0.039 (-0.69)	-0.044 (-0.77)	-0.008 (-0.16)	-0.054 (-1.12)
CEO FOUNDER	-0.104* (-1.92)	-0.034 (-0.50)	0.017 (0.25)	-0.094 (-1.63)	-0.085 (-1.47)
EXE AGE	-0.248 (-0.91)	-1.247*** (-3.65)	-1.286*** (-3.66)	-0.628** (-2.20)	-0.548* (-1.92)
CEO TENURE	0.090*** (3.24)	0.084** (2.44)	0.064* (1.83)	0.075** (2.48)	0.073** (2.47)
BOARD MEMBER TENURE	-0.160*** (-3.38)	-0.116* (-1.82)	-0.089 (-1.23)	-0.174*** (-3.48)	-0.159*** (-3.31)
EXE OWN	5.858** (2.23)	8.256** (2.50)	7.044** (2.07)	7.622*** (2.72)	5.997** (2.16)
EXE OWN²	-11.461 (-1.23)	-13.194 (-1.14)	-9.830 (-0.83)	-14.702 (-1.48)	-7.876 (-0.80)
MAJORSHARE	0.354** (2.26)	0.328* (1.69)	0.391** (1.97)	0.493*** (2.89)	0.397** (2.40)
INSTITUTIONALS	0.106 (1.05)	0.518*** (4.26)	0.513*** (4.04)	0.197* (1.82)	0.265** (2.50)
BOARD SIZE	-0.215** (-2.08)	-0.081 (-0.62)	0.002 (0.01)	-0.264** (-2.37)	-0.140 (-1.29)
% INDEPENDENT	-0.112 (-0.52)	-0.404 (-1.49)	-0.263 (-0.94)	-0.419* (-1.81)	-0.333 (-1.47)
COMPMEETINGS	0.101** (2.33)	0.283*** (5.22)	0.258*** (4.70)	0.169*** (3.70)	0.168*** (3.73)
FIRMSIZE	0.523*** (21.34)	0.627*** (20.69)	0.615*** (19.64)	0.465*** (8.71)	0.571*** (22.09)
VOLATILITY	-0.008 (-0.71)	-0.003 (-0.18)	0.002 (0.14)	-0.008 (-0.66)	-0.005 (-0.44)
RETAIL	0.444*** (6.02)	0.618*** (6.70)	0.587*** (6.17)	0.491*** (6.27)	0.436*** (5.47)
RESIDENTIAL	0.145* (1.81)	0.153 (1.55)	0.115 (1.14)	0.187** (2.19)	0.094 (1.10)
INDUSTRIAL	0.257*** (2.96)	0.304*** (2.81)	0.303*** (2.72)	0.271*** (2.93)	0.202** (2.19)
OFFICE	0.453*** (5.47)	0.534*** (5.23)	0.587*** (5.55)	0.476*** (5.35)	0.486*** (5.54)
HOTEL	0.381*** (3.94)	0.461*** (3.77)	0.417*** (3.19)	0.259** (2.45)	0.369*** (3.69)
HEALTH CARE	0.395*** (4.74)	0.138 (1.31)	0.069 (0.63)	0.342*** (3.87)	0.302*** (3.38)
INTERCEPT	5.613*** (5.16)	6.362*** (4.72)	6.406*** (4.68)	7.156*** (5.63)	5.243*** (4.57)
Period fixed effects	Yes	Yes	Yes	Yes	Yes
F-statistic	31.03	37.39	37.53	35.46	36.94
R^2	0.68	0.73	0.74	0.71	0.72
Adj. R^2	0.66	0.71	0.72	0.69	0.70

Notes:

$$TDC\ EXE_{i,t} = \alpha + \beta\ Performance_{i,t-1} + \gamma\ Corporate\ Governance_{i,t} + \vartheta\ Firm\ Controls_{i,t} + \delta_i + \tau_t + \varepsilon_{i,t}$$

TDC EXE is the total long-term compensation for the group of $executive\ directors_i$ in year *t*. See Exhibit 4.6 for variable definitions.
Coefficients of statistical significance at: * 10%, ** 5%, *** 1% levels. The t-statistics are reported in parentheses.

4.4.2.3 Total equity compensation

Finally, the results for incentive-based equity compensation (*EQUITY CEO* and *EQUITY EXE*) are displayed in Exhibit 4.9 and Exhibit 4.10. Generally, incentive-based compensation should motivate CEOs and executive directors to create value over a long time horizon. Consequently, we expect stock and option grants to be positively linked to long-term and value-driven growth. Our findings confirm this expectation by demonstrating that the market-based performance measures *TSR5YR* and *TOBINSQ* are positively related to *EQUITY CEO* and *EQUITY EXE*. Additionally, medium-term performance, measured by *TSR3YR,* has a similarly positive impact on *EQUITY EXE*, however, the influence is marginal. Consequently, equity compensation is a reward for creating long-term company value. Interestingly, the proxy for CEO entrenchment *(CEO FOUNDER)* shows a negative impact on *EQUITY CEO.* If a CEO is simultaneously the company founder, it might be likely that he/she already owns a sufficient amount of company shares. Therefore, a *CEO FOUNDER* may not bargain for higher equity compensation for himself/herself. The impact of *CEO TENURE, BOARD MEMBER TENURE, CEO OWN, CEO OWN², EXE OWN* and *EXE OWN²* remains unchanged compared to *TDC CEO* and *TDC EXE.* Contrary to Feng *et al.* (2010), who find that institutional investors use greater pay-performance sensitivity to align their interests with those of shareholders, we find no impact of *MAJORSHARE* and *INSTITUTIONALS* on equity compensation.

Exhibit 4.9: CEO Total Equity Compensation

	Model I	Model II	Model III	Model IV	Model V
TSR1YR	0.257 (1.32)				
TSR3YR		0.462 (1.16)			
TSR5YR			1.423*** (2.69)		
FFO				0.091 (0.93)	
TOBINSQ					0.270** (2.18)
CEO DUALITY	0.022 (0.24)	0.044 (0.46)	0.014 (0.14)	0.061 (0.64)	0.017 (0.19)
CEO FOUNDER	-0.348*** (-3.04)	-0.335*** (-2.87)	-0.317** (-2.58)	-0.317*** (-2.75)	-0.296** (-2.56)
CEO AGE	-1.023*** (-3.00)	-0.889** (-2.53)	-0.887** (-2.41)	-1.177*** (-3.36)	-1.174*** (-3.41)
CEO TENURE	0.16*** (2.79)	0.164*** (2.78)	0.147** (2.44)	0.151** (2.58)	0.140** (2.44)
BOARD MEMBER TENURE	-0.421*** (-4.47)	-0.382*** (-3.69)	-0.366*** (-3.07)	-0.408*** (-4.27)	-0.398*** (-4.39)
CEO OWN	16.505*** (4.90)	15.699*** (4.52)	15.423*** (4.23)	18.178*** (5.27)	16.475*** (4.89)
CEO OWN²	-26.472*** (-2.72)	-24.287** (-2.44)	-23.603** (-2.29)	-30.361*** (-3.07)	-24.942** (-2.56)
MAJORSHARE	0.080 (0.25)	0.234 (0.71)	0.388 (1.13)	0.198 (0.59)	0.137 (0.43)
INSTITUTIONALS	0.151 (0.71)	0.100 (0.47)	0.001 (0.00)	0.130 (0.59)	0.194 (0.91)
BOARD SIZE	-0.061 (-0.28)	-0.144 (-0.62)	0.035 (0.14)	-0.146 (-0.64)	-0.015 (-0.07)
% INDEPENDENT	-0.167 (-0.39)	-0.137 (-0.31)	-0.031 (-0.07)	-0.164 (-0.37)	-0.173 (-0.40)
COMPMEETINGS	0.156* (1.69)	0.178* (1.87)	0.172* (1.75)	0.164* (1.76)	0.184** (1.99)
FIRMSIZE	0.723*** (13.98)	0.72*** (13.60)	0.687*** (12.28)	0.649*** (5.63)	0.714*** (13.65)
VOLATILITY	-0.017 (-0.74)	-0.022 (-0.93)	-0.016 (-0.66)	-0.021 (-0.91)	-0.016 (-0.72)
RETAIL	0.528*** (3.56)	0.506*** (3.31)	0.429*** (2.66)	0.504*** (3.36)	0.458*** (3.05)
RESIDENTIAL	-0.001 (-0.01)	-0.003 (-0.02)	-0.090 (-0.52)	0.021 (0.13)	-0.062 (-0.38)
INDUSTRIAL	0.151 (0.85)	0.139 (0.76)	0.136 (0.71)	0.148 (0.82)	0.083 (0.47)
OFFICE	0.488*** (2.83)	0.503*** (2.87)	0.527*** (2.86)	0.427** (2.41)	0.459*** (2.67)
HOTEL	0.483** (2.55)	0.608*** (3.06)	0.593*** (2.74)	0.369* (1.85)	0.426** (2.28)
HEALTH CARE	0.145 (0.87)	0.014 (0.08)	-0.083 (-0.45)	0.121 (0.72)	0.076 (0.45)
INTERCEPT	2.977* (1.72)	2.521 (1.42)	2.752 (1.47)	4.274* (1.96)	3.289* (1.90)
Period fixed effects	Yes	Yes	Yes	Yes	Yes
F-statistic	18.11	17.89	17.17	17.29	18.36
R²	0.59	0.59	0.60	0.58	0.59
Adj. R²	0.55	0.56	0.56	0.55	0.56

Notes:

$$EQUITY\ CEO_{i,t} = \alpha + \beta\ Performance_{i,t-1} + \gamma\ Corporate\ Governance_{i,t} + \vartheta\ Firm\ Controls_{i,t} + \delta_i + \tau_t + \varepsilon_{i,t}$$

EQUITY CEO is the total equity compensation for CEO_i in year *t*. See Exhibit 4.5 for variable definitions.
Coefficients of statistical significance at: * 10%, ** 5%, *** 1% levels. The t-statistics are reported in parentheses.

Exhibit 4.10: Executive Director's Total Equity Compensation

	Model I	Model II	Model III	Model IV	Model V
TSR1YR	0.266 (1.61)				
TSR3YR		0.658* (1.89)			
TSR5YR			1.258*** (2.66)		
FFO				0.119 (1.47)	
TOBINSQ					0.285** (2.45)
CEO DUALITY	0.087 (1.12)	0.082 (0.93)	0.075 (0.83)	0.124 (1.58)	0.061 (0.70)
CEO FOUNDER	-0.147 (-1.55)	-0.140 (-1.32)	-0.097 (-0.86)	-0.121 (-1.28)	-0.146 (-1.37)
EXE AGE	-1.196** (-2.57)	-1.412*** (-2.65)	-1.465*** (-2.63)	-1.288*** (-2.78)	-1.386*** (-2.68)
CEO TENURE	0.124*** (2.61)	0.131** (2.45)	0.115** (2.07)	0.103** (2.13)	0.116** (2.15)
BOARD MEMBER TENURE	-0.244*** (-2.96)	-0.197** (-1.98)	-0.168 (-1.46)	-0.254*** (-3.07)	-0.296*** (-3.34)
EXE OWN	14.857*** (3.20)	15.81*** (3.01)	15.019*** (2.72)	16.642*** (3.55)	16.625*** (3.19)
EXE OWN²	-31.116* (-1.92)	-30.892* (-1.7)	-29.052 (-1.53)	-36.63** (-2.25)	-30.334* (-1.67)
MAJORSHARE	0.170 (0.63)	0.345 (1.14)	0.410 (1.30)	0.340 (1.22)	0.365 (1.21)
INSTITUTIONALS	0.029 (0.17)	-0.064 (-0.34)	-0.117 (-0.58)	-0.011 (-0.06)	-0.017 (-0.09)
BOARD SIZE	-0.288 (-1.61)	-0.265 (-1.29)	-0.139 (-0.64)	-0.394** (-2.16)	-0.230 (-1.14)
% INDEPENDENT	-0.275 (-0.74)	-0.270 (-0.64)	-0.175 (-0.39)	-0.415 (-1.10)	-0.505 (-1.22)
COMPMEETINGS	0.147* (1.92)	0.203** (2.34)	0.201** (2.24)	0.161** (2.10)	0.282*** (3.34)
FIRMSIZE	0.696*** (16.61)	0.711*** (15.06)	0.688*** (13.76)	0.583*** (6.21)	0.702*** (14.89)
VOLATILITY	-0.023 (-1.21)	-0.0120(-0.55)	-0.012 (-0.53)	-0.028 (-1.46)	-0.007 (-0.32)
RETAIL	0.346*** (2.71)	0.337** (2.32)	0.272* (1.77)	0.338*** (2.64)	0.320** (2.20)
RESIDENTIAL	0.005 (0.04)	-0.021 (-0.14)	-0.089 (-0.55)	0.055 (0.40)	-0.038 (-0.24)
INDUSTRIAL	0.062 (0.42)	0.036 (0.21)	0.001 (0.01)	0.063 (0.42)	0.019 (0.11)
OFFICE	0.547*** (3.74)	0.599*** (3.66)	0.624*** (3.62)	0.528*** (3.54)	0.541*** (3.30)
HOTEL	0.388** (2.39)	0.452** (2.40)	0.457** (2.22)	0.224 (1.32)	0.344* (1.92)
HEALTH CARE	0.182 (1.28)	-0.003 (-0.02)	-0.100 (-0.58)	0.158 (1.10)	0.064 (0.40)
INTERCEPT	5.387*** (2.89)	5.566*** (2.65)	5.912*** (2.71)	7.196*** (3.46)	5.602*** (2.69)
Period fixed effects	Yes	Yes	Yes	Yes	Yes
F-statistic	19.60	18.66	17.80	19.10	18.40
R^2	0.59	0.59	0.59	0.59	0.57
Adj. R^2	0.56	0.55	0.55	0.56	0.54

Notes:

$$EQUITY\ EXE_{i,t} = \alpha + \beta\ Performance_{i,t-1} + \gamma\ Corporate\ Governance_{i,t} + \vartheta\ Firm\ Controls_{i,t} + \delta_i + \tau_t + \varepsilon_{i,t}$$

EQUITY EXE is the total equity compensation for the group of $executive\ directors_i$ in year *t*. See Exhibit 4.6 for variable definitions.
Coefficients of statistical significance at: * 10%, ** 5%, *** 1% levels. The t-statistics are reported in parentheses.

4.4.3 Alternative tests

The global financial crisis began in late 2007 and revealed severe shortcomings in corporate governance mechanisms, especially the rewarding of managers for excessive short-term risk taking. The listed real estate sector provides an optimal setting for comparing time-varying pay-performance sensitivities, given that particularly the bursting of the real estate bubble was the crucial trigger for the crisis, which led to the most disastrous price falls in history. The timeframes are subdivided into one period displaying the core effects of the crisis from 2007-2010 and another period from 2012-2015, which covers the recovery years after the crisis. The year 2011 is not included, because, as of this year, new laws induced by the crisis became effective, e.g. the SEC "Say-on-Pay" rule. Hence, we provide time-balanced sub-samples.

Exhibit 4.11 and Exhibit 4.12 show the results of pay-performance sensitivity during and after the financial crisis for long-term and equity compensation components of executive directors. The results are the same for CEO's long-term and equity compensation (not reported).[15] Consistent with the main model, we apply a fixed-effects panel approach and control for potential endogeneity by using lagged performance ratios. During the financial crisis, the results show no significant relationship between compensation and performance. For the post-crisis period, we find a positive significant impact for the performance metrics *FFO* and *TOBINSQ* on both executive remuneration types, either long-term or equity compensation. Compared to a non-significant pay-performance link for the crisis period 2007-2010, the post-crisis results demonstrate an intensified pay-for-performance relationship. Astute investment decisions by a company's management lead to enhanced firm performance, and ultimately to increased long-term and equity compensation. Hence, contemporary long-term and equity remuneration packages are more closely linked to corporate success, either cash (*FFO*) or value-driven (*TOBINSQ*) ratio, than during the crisis.

The results for corporate governance variables and firm controls are predominately stable for the sub-periods. However, for equity compensation (see Exhibit 4.12) the differential impact of certain variables during and after the crisis is clearly observable. Apparently, *CEO FOUNDER* as well as *EXE AGE* only have a significant impact during the crisis, whereas *CEO TENURE* gains explanatory power in the post-crisis period. We find that institutional investors have a positive influence on *EQUITY EXE* exclusively in the post-crisis sub-period. Thus, institutional investors may have recognized that, by allowing higher equity compensation, executives behave rather like shareholders, aligning the interests of management and company owners. The central monitoring role, either during or after the crisis, is assumed by the longest-serving board member. *BOARDSIZE* exclusively displays a negative sign in the post-crisis sub-period; hence a

[15] Tables can be provided on request.

CEO-friendly atmosphere tended to prevail in small boards during the crisis. The significant coefficient of COMPMEETINGS during the crisis period suggests that there was certainly a sufficient need for discussion concerning the negotiation and arrangement of compensation contracts.

Exhibit 4.11: Comparison of Executive Directors' Total Long-Term Compensation During and After the Crisis

	Model I		Model II	
	During 2007-2010	After 2012-2015	During 2007-2010	After 2012-2015
FFO	0.069 (0.92)	0.281*** (2.92)		
TOBINSQ			-0.188 (-1.25)	0.351*** (3.73)
CEO DUALITY	-0.096 (-1.00)	0.046 (0.58)	-0.122 (-1.38)	0.004 (0.05)
CEO FOUNDER	-0.182 (-1.56)	0.124 (1.31)	-0.207* (-1.88)	0.095 (1.02)
EXE AGE	-1.327** (-2.20)	-0.925** (-2.02)	-1.086* (-1.94)	-0.646 (-1.40)
CEO TENURE	-0.057 (-0.74)	0.069 (1.59)	0.000 (0.65)	0.069 (1.58)
BOARD MEMBER TENURE	-0.302*** (-2.71)	-0.234*** (-2.95)	-0.278*** (-2.81)	-0.209*** (-2.76)
EXE OWN	14.437*** (2.95)	24.753* (1.66)	11.85*** (2.64)	12.866 (0.88)
EXE OWN²	-29.016* (-1.82)	-76.428 (-0.18)	-24.092 (-1.65)	224.902 (0.54)
MAJORSHARE	0.714** (2.01)	0.316 (1.18)	0.467 (1.48)	0.281 (1.08)
INSTITUTIONALS	0.481** (2.18)	0.706*** (4.31)	0.437** (2.23)	0.697*** (4.35)
BOARD SIZE	-0.070 (-0.32)	-0.135 (-0.72)	-0.010 (-0.05)	-0.067 (-0.37)
% INDEPENDENT	-0.315 (-0.68)	-0.306 (-0.78)	0.024 (0.06)	-0.270 (-0.69)
COMPMEETINGS	0.250 *** (2.89)	0.302*** (3.86)	0.201** (2.56)	0.336*** (4.30)
FIRMSIZE	0.494*** (5.18)	0.409*** (3.68)	0.567*** (11.28)	0.650*** (14.9)
VOLATILITY	0.027 (1.48)	-0.049 (-1.45)	0.018 (1.04)	-0.046 (-1.37)
RETAIL	0.894*** (5.28)	0.474*** (3.95)	0.875*** (5.45)	0.441*** (3.66)
RESIDENTIAL	0.383** (2.25)	-0.031 (-0.24)	0.364** (2.28)	-0.096 (-0.73)
INDUSTRIAL	0.323 (1.56)	0.303** (2.24)	0.348* (1.88)	0.224 (1.63)
OFFICE	0.768*** (4.31)	0.266* (1.86)	0.818*** (4.96)	0.327** (2.34)
HOTEL	0.139 (0.48)	0.336** (2.24)	0.468* (1.95)	0.413*** (2.90)
HEALTH CARE	0.523*** (2.79)	0.005 (0.04)	0.62*** (3.54)	-0.015 (-0.11)
INTERCEPT	8.90*** (3.31)	7.041*** (3.27)	7.045*** (3.05)	3.33* (1.83)
Period fixed effects	Yes	Yes	Yes	Yes
F-statistic	18.16	22.95	19.18	23.80
R^2	0.76	0.74	0.76	0.74
Adj. R^2	0.72	0.71	0.72	0.71

Notes: This table reports the regression results for the two sub-periods during (2007-2010) and after (2012-2015) the financial crisis.

$$TDC\ EXE_{i,t} = \alpha + \beta\ Performance_{i,t-1} + \gamma\ Corporate\ Governance_{i,t} + \vartheta\ Firm\ Controls_{i,t} + \delta_i + \tau_t + \varepsilon_{i,t}$$

TDC EXE is the total long-term compensation for the group of $executive\ directors_i$ in year *t*. See Exhibit 4.6 for variable definitions.
Coefficients of statistical significance at: * 10%, ** 5%, *** 1% levels. The t-statistics are reported in parentheses.

Exhibit 4.12: Comparison of Executive Directors' Equity Compensation During and After the Crisis

	Model I		Model II	
	During 2007-2010	After 2012-2015	During 2007-2010	After 2012-2015
FFO	-0.054 (-0.41)	0.484*** (3.81)		
TOBINSQ			-0.009 (-0.03)	0.532*** (4.11)
CEO DUALITY	0.151 (1.05)	0.154 (1.49)	0.089 (0.51)	0.077 (0.72)
CEO FOUNDER	-0.403** (-2.31)	0.191 (1.48)	-0.544** (-2.53)	0.128 (0.97)
EXE AGE	-2.945*** (-3.30)	-0.584 (-0.95)	-3.071*** (-2.80)	-0.207 (-0.32)
CEO TENURE	-0.038 (-0.34)	0.122** (2.12)	0.000 (0.28)	0.142** (2.39)
BOARD MEMBER TENURE	-0.372** (-2.20)	-0.419*** (-3.99)	-0.537*** (-2.70)	-0.375*** (-3.60)
EXE OWN	24.719*** (3.35)	55.178*** (2.72)	30.372*** (3.38)	32.585 (1.57)
EXE OWN²	-59.044** (-2.50)	-509.361 (-0.92)	-70.483** (-2.46)	39.09 (0.07)
MAJORSHARE	0.630 (1.17)	0.297 (0.84)	0.745 (1.16)	0.162 (0.45)
INSTITUTIONALS	-0.322 (-0.98)	0.337 (1.56)	-0.471 (-1.23)	0.390* (1.78)
BOARD SIZE	0.203 (0.60)	-0.534** (-2.15)	0.191 (0.48)	-0.430* (-1.71)
% INDEPENDENT	0.155 (0.23)	0.011 (0.02)	0.010 (0.01)	-0.059 (-0.11)
COMPMEETINGS	0.240* (1.79)	0.105 (0.99)	0.439*** (2.74)	0.159 (1.44)
FIRMSIZE	0.553*** (3.58)	0.358** (2.42)	0.526*** (5.35)	0.810*** (13.41)
VOLATILITY	-0.002 (-0.09)	-0.054 (-1.19)	0.015 (0.44)	-0.050 (-1.08)
RETAIL	0.899*** (3.63)	0.155 (0.97)	0.946*** (3.07)	0.142 (0.85)
RESIDENTIAL	0.262 (1.04)	-0.176 (-1.00)	0.149 (0.48)	-0.272 (-1.48)
INDUSTRIAL	0.077 (0.26)	0.092 (0.51)	0.089 (0.25)	-0.007 (-0.04)
OFFICE	1.035*** (3.82)	0.226 (1.14)	0.945*** (2.90)	0.351* (1.74)
HOTEL	0.503 (1.22)	0.019 (0.09)	0.705 (1.56)	0.197 (1.01)
HEALTH CARE	0.531* (1.92)	-0.095 (-0.53)	0.395 (1.16)	-0.128 (-0.68)
INTERCEPT	14.675*** (3.71)	5.360* (1.88)	15.222*** (3.38)	-1.279 (-0.51)
Period fixed effects	Yes	Yes	Yes	Yes
F-statistic	8.37	15.94	7.19	16.09
R^2	0.61	0.68	0.56	0.67
Adj. R^2	0.54	0.63	0.48	0.63

Notes: This table reports the regression results for the two sub-periods during (2007-2010) and after (2012-2015) the financial crisis.

$$EQUITY\ EXE_{i,t} = \alpha + \beta\ Performance_{i,t-1} + \gamma\ Corporate\ Governance_{i,t} + \vartheta\ Firm\ Controls_{i,t} + \delta_i + \tau_t + \varepsilon_{i,t}$$

EQUITY EXE is the total equity compensation for the group of $executive\ directors_i$ in year *t*. See Exhibit 4.6 for variable definitions.
Coefficients of statistical significance at: * 10%, ** 5%, *** 1% levels. The t-statistics are reported in parentheses.

4.5 Conclusion

This paper examines whether compensation packages within the real estate industry are determined merely by performance or also by CEO power mechanisms that have an essential influence on board-level negotiations about executive compensation. Especially the arrangement of compensation contracts after the financial crisis has so far not been assessed systematically. This paper aims to fill this void by analysing a comprehensive set of performance, CEO entrenchment as well as board-control variables, some of which have never been covered for the US real estate industry. Compensation arrangements were analysed for a sample of 83 US listed real estate companies between 2006 and 2015, the most comprehensive US sample to date. After controlling for a possible endogenous determination of compensation arrangements by applying a panel data fixed-effects methodology and using lagged performance variables, our findings can be summarized as follows:

Total cash compensation of CEOs and executive directors is primarily driven by the performance ratio of total return to shareholders over one year (*TSR1YR*). Furthermore, several CEO-entrenchment and board-control proxies such as *CEO DUALITY*, *CEO OWN*, *CEO OWN²*, *MAJORSHARE*, *BOARD SIZE*, *COMPMEETINGS* give explanatory power to *TCC CEO* and *TCC EXE*. Total cash compensation is similarly driven by *FIRMSIZE* and *VOLATILITY,* which confirms past empirical studies that larger firms attract the best talents and rewards the C-Suite for taking risks.

Principally, the performance ratios of total return to shareholders over five years (*TSR5YR*), operative company profit *(FFO)* and future growth opportunities proxy *TOBINSQ* have a significant positive impact on *TDC CEO* and *TDC EXE*. Hence, long-term compensation packages for CEOs and executive directors are tied to long-term company performance. With regard to our CEO entrenchment mechanisms, we find that CEOs exploit their long experience within the firm *(CEO TENURE)* to negotiate higher long-term pay for themselves, as well as for fellow executive directors. In contrast to institutional investors or major blockholders, the longest-serving board member assumes a leading role in monitoring excessive pay arrangements. In line with Feng *et al.* (2010), we find that institutional investors motivate and retain management by paying higher long-term compensation together with higher cash compensation.

We also show that incentive-based compensation, such as stock and option grants, are positively linked to long-term and value-driven growth performance ratios (*TSR5YR* and *TOBINSQ)*. Consequently, equity compensation is a reward for creating long-term company value. Results concerning the CEO entrenchment mechanisms remain the same as for *TDC CEO* and *TDC EXE,* except for the variable *CEO FOUNDER,* which yields a negative impact on *EQUITY CEO.* A CEO who is simultaneously the company founder, may not bargain for higher equity

compensation for himself/herself, since he/she might already own a sufficient amount of company shares. Contrary to Feng *et al.* (2010), who find that institutional investors use incentive-based compensation to align management interests to those of shareholders, we find no impact of *MAJORSHARE* and *INSTITUTIONALS* on equity compensation.

The analysis of two different time sub-samples subdivided into 'during financial crisis' (2007-2010) and 'after financial crisis' (2012-2015) demonstrates impressively that the implementation of pay-for-performance contracts is an essential consequence of the crisis.

In conclusion, our results reveal that the U.S. listed real estate sector has learned its lessons from the dramatic disaster of the financial crisis, a period of exaggerated remuneration packages with regard to economic incentives and short-term risk taking. CEO's and executive directors' compensation contracts should be closely linked to both short- and long-term performance measures, in order to align management interests with those of company owners.

Further research may extend this study by investigating a sample which comprises a longer timeframe after the global financial crisis in order to validate whether the pay-performance link is sustainable. Additionally, it would be interesting to examine whether the pay-performance link can also be found in the compensation arrangement of the middle management within real estate companies.

4.6 References

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5 Conclusion

In the following section, each executive summary provides an overview of one paper within this dissertation, including the research purpose and design, data framework and key findings. The dissertation concludes with final remarks and an outlook for further research on the performance of listed real estate companies.

5.1 Executive Summary

Paper 1: REITs and REOCs and their Initial Stock Market Performance: a European Perspective

The main aim of this study is to examine the initial return on the IPO date, by explicitly distinguishing between the two business forms in the real estate sector, namely REOC and REIT. Within this comparative framework, the research question is considered as to whether the REIT-status, with its legal requirements, impact the initial return on the first trading day. Given these fixed requirements in the REIT business form, investors desire a more certain investment due to the legal framework, which provides basic information to potential investors about the business form in general. In accordance with the ex-ante uncertainty theory of Beatty and Ritter (1986), who showed that the underpricing level can be decreased by providing as much information as possible about the upcoming IPO, several uncertainty proxies were tested. Applied to the real estate sector, the REIT-status may implicitly have a transparency bonus, which is negatively linked to the initial return on the first trading day.

In order to provide insight into the IPO performance of REITs and REOCs, a pan-European sample comprising 107 listed real estate companies from 9 European countries over the period of 2000-2015 is used. For the cross-section analysis, a multiple regression model is applied to identify influential pricing factors surrounding REIT-status, such as ex-ante uncertainty factors, IPO and firm characteristics. In order to verify the empirical finding of the OLS regression, a propensity score matching (PSM) algorithm – a new type of empirical method in real estate research – is conducted to create a REIT and REOC subsample with comparable initial return levels. Additionally, this study sheds light into the pricing mechanism in high uncertaintly market phases by investigating the IPO performance during the Global Financial Crisis (GFC).

The study contributes to the existing underpricing literature in the real estate sector by providing additional information on IPO pricing differences based on an intra-sector analysis. The pricing

variances of REITs and REOCs during the short-term horizon of the initial return on the first trading day can be a decisive factor in the preparatory phase of an IPO. First, the most striking finding is that the REIT-status constitutes a transparency bonus which leads to a lower underpricing level for REIT IPOs compared to REOCs and hence to leaving less money on the table in the case of a REIT IPO. That is, potential investors can make more money by investing in REOC IPOs, whereas from an issuing company perspective, the REIT business form is the better choice for a successful IPO. Secondly, besides the REIT-status itself, characteristics such as price volatility, issuing volume and company age have to be taken into account. Third, the results support the timing hypothesis, meaning that the market phase is a decisive influencing factor in the IPO pricing of real estate companies. In sum, given that the European listed real estate market is growing, these findings are of particular importance for potential investors, the issuing company and IPO managers.

Paper 2: Gender Diversity and Financial Performance: Evidence from US Real Estate Companies

The second paper of this dissertation investigates whether female directors, either executive or non-executive, influence a company's financial performance or value. In recent years, there has been an upcoming trend for investors to include social responsibility characteristics in their investment decisions and therefore to dovetail the positive social impact and profitability of their investments. Some European countries support this investment trend by passing new laws which obligate companies to impose quotas, e.g. Germany, Norway, Spain and France. Compared to European countries, there are no similar regulatory disclosure requirements in the largest real estate market, that of the US, which render this market particularly appropriate for investigating the influence of female board members on the company's performance, without any bias due to legal quotas. Additionally, the current finance literature presents ambiguous results, with, for example, Campbell & Mínguez-Vera (2008) and Terjesen *et al.* (2015) providing a positive link, whereas Adams & Ferreira (2009) and Shrader *et al.* (1997) found a negative gender diversity / performance relationship.

The homogeneous real estate sample for this present research is based on the constituent list of the FTSE EPRA / NAREIT United States Index for the period 2005-2015. The final sample comprises 116 US listed real estate companies, resulting in 1,276 firm-year observations for the panel analysis. The relationship between gender diversity and financial performance is analyzed with varying gender-diversity and firm-performance proxies. Gender diversity is either

measured by a dummy variable taking the value 1 if there is at least one woman on the board of directors, by the percentage of female directors on the board or by dummy variables created on the critical mass theory following Kanter (1977a, 1977b). For firm performance, either accounting-based measures, such as return on assets (ROA), market-based ones, such as Tobin's Q or a real-estate-specific-one, such as funds from operations per share (FFO/SHARE) and price per net asset value (PRICE/NAV), are used.

Fixed-effects panel estimation with period and firm dummies is applied in order to control for omitted unobservable variables. The second potential issue which may arise from investigating the relationship between the presence of women on the board and firm performance is reverse causality. In order to control for this association, the two-stage Heckman (1976) procedure is applied, which is an innovative approach in the real estate research.

The results of the first stage in the Heckman procedure indicate that the woman dummy variable is endogenous and that the likelihood of female presence on the board is influenced by firm characteristics such as board size, CEO / chairman duality, insider ownership, director independence and firm size. The results in the second stage of the Heckman procedure show that there is a significant positive link between gender diversity on boards and the market-based performance measures Tobin's Q and Price/NAV. These findings indicate that stock market participants expect higher future earnings from real estate companies with an increased share of female board members, which is especially true for executive positions. However, these findings also reveal that 'objective' accounting-based measures, such as ROA or FFO/SHARE, are not affected by board gender diversity and hence, a distinction between 'subjective' market-based and 'objective' accounting-based performance is essential in this context (Haslam *et al.*, 2010). This real estate study was the first to investigate the gender diversity / performance relationship from a non-linear perspective by examining the 'tokenism theory' of Kanter (1977a, 1977b). The critical mass for positively impacting on the financial performance of a real estate company is reached at 30% or more women on the board. An in-depth real estate analysis showed that the property sectors of hotel, retail and health-care benefit more than average from female executive directors.

In sum, these results stress the importance of gender diversity on leadership teams for the real estate sectors in the US, which is especially true in consumer-orientated property sub-sectors, and is reflected in investor perceptions.

Paper 3: The Determinants of Executive Compensation in US REITs: Performance vs. Corporate Governance Factors

The third section of this dissertation examines the pay-performance relationship, by simultaneously controlling for the CEO power mechanism, which can exert an essential influence on the CEO and executive director compensation packages. This study is the first to consider these essential corporate governance variables, such as CEO entrenchment proxies or board / firm ownership, in an in-depth investigation of the whole C-level compensation, differentiating between short-, long-term and equity incentive compensation components. In the financial literature, there are studies showing that managers were rewarded for excessive risk-taking in the short-term, before the financial crisis of 2007/2008. (Bebchuk *et al.*, 2010; Acharya *et al.*, 2016) However, linking remuneration packages to timely and appropriate performance measures should be any company's aim. In order to provide insight into whether similar patterns can be found in the real estate sector or whether pay-performance sensitivity has changed over time, the sample period of this study comprises timeframes during and after the financial crisis.

Based on a panel dataset, including 830 firm-year observations, the influencing factors of C-level compensation arrangements of US listed real estate companies during the period of 2006 to 2015 are analyzed. As the compensation contracts can be determined endogenously by financial performance, or omitted unobservable factors can effect dependent or independent variables, (Frydman and Jenter, 2010) potential endogeneity issues can arise. Potential endogeneity problems are controlled for first by using one-year lagged performance variables in the multiple regression analysis and second, by applying the fixed-effects method with year and property-type dummies.

This study sheds light onto management compensation arrangements in the real estate sector after the financial crisis, which has so far not been systematically addressed and investigated. In the pre- and post-crisis investigation, a descriptive analysis shows that the relative importance of cash bonuses in CEO compensation arrangements has been more than halved after the financial crisis, by a simultaneously increasing importance of equity-based compensation components. In an in-depth empirical analysis, the results show that the cash compensation is driven primarily by the total shareholder return of one year and also by the certain CEO entrenchment and board control proxies. Second, in contrast to cash compensation, the long-term CEO and executive director compensation is linked to total shareholder return over five years, the real-estate-specific ratio of operative profit *FFO* and the market-based performance measure Tobin's Q. Additionally, CEOs with long tenure use their experience to negotiate

significantly higher long-term compensation for themselves and the group of executive directors. In the analysis of equity compensation, a positive link between CEO and executive director incentive-based compensation and the total shareholder return of five years and the Tobin's Q, can be provided.

To sum up, it should be noted that in the US real estate sector, short-term and long-term remuneration packages - long-term in general and equity-based compensation- in particular, are temporally appropriately linked to performance measures with a similar time horizon. This finding is impressively supported by the alternative test, which shows that there was no pay-for-performance link during the financial crisis, whereas after the crisis, a strong significant relationship can be found. Thus, the implementation of pay-performance sensitivity for C-level remuneration is a consequence of the financial crisis, and the link between remuneration packages and corporate success is essential for management incentive schemes.

5.2 Final Remarks and Further Research

This present dissertation contributes, with its three sections, to a better understanding of facets of corporate success in the context of listed real estate companies. The significant worldwide growth of the listed real estate sector constitutes a considerable asset class for institutional investors, which supports the relevance of analyzing omnipresent determinates of company performance. In particular, the first performance investigation of IPO initial return serves as a major starting point for listed real estate companies, either as a REOC or REIT. However, REOC IPOs are more profitable for investors, due to greater initial returns. Furthermore, it is shown that corporate governance and social responsibility are an upcoming topic impacting on company performance and investor perceptions. In this context, the examination of the gender diversity / performance relationship shows that investors expect a positive performance impact originating from increased female presence on management boards. The final section of this dissertation demonstrates that managers have to obtain adequate compensation incentives in order to decide in shareholders' best interest. In addition, the remuneration packages changed in two ways after the financial crisis, first from a cash-bonus orientation towards equity-based compensation, and second, ensuring a stronger link between remuneration packages and corporate success after the crisis.

This dissertation addresses an important aspect of company performance in the context of listed real estate companies. However, useful and indeed interesting research topics still remain in this field. Further research on initial IPO return could comprise examining further uncertainty factors, such as market sentiment, and extending the investigation by applying textual analysis to IPO prospects. This new technical application in research could help further insight into IPO

pricing and answer the question of why the underpricing phenomenon has not yet been solved. With regard to further equity-raising on the capital market, which is especially important for REITs with legal requirements on firm leverage, a comparison of IPO return and returns at a secondary offering, might be useful. In terms of the two corporate governance topics, a research extension of gender diversity and pay-performance remuneration could be conducted by analyzing middle management positions, which, besides the C-level, is the most influential part of daily business. In particular, the diversity literature would benefit from an investigation including other dimensions, such as race, religion, age or education. In sum, this present dissertation and the existing related literature investigate performance and performance relationships of listed real estate companies quit comprehensively, but further research is most certainly needed.

5.3 References

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