

CEO Overconfidence in Real Estate Markets: A Curse or A Blessing?

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Abstract

This paper studies the influence of CEO overconfidence on firms' financial performance and corporate social responsibility (CSR) in the US real estate investment trust (REIT) market. CEO overconfidence has been shown to have both negative and positive influences on firms. This paper is the first to combine the two sides in a single framework. We find that firms with overconfident CEOs tend to have better CSR performance. In addition, better CSR performance can increase firms' financial performance, but this positive relationship is undermined by the existence of overconfident CEOs. Our results not only shed light on the two sides of CEO overconfidence in the real estate sector, but also provide a new prospective for research on the CSR–financial performance relationship.

Keywords: CEO overconfidence; CSR; financial performance; REIT

1. Introduction

Overconfidence is one of the most robust behavioral anomalies in the financial market. It is essential in determining investors' decision-making and market performance. In the decision-making process, overconfident investors attribute the past success to their superior ability instead of by chance; hence, they irrationally trade in the future (Odean 1998; Gervais & Odean 2001; Hilary & Menzly 2006; Statman *et al.* 2006). Such behavior reduces investment profits and utility (Odean 1998; Barber & Odean 2000, 2001). An overconfident investor also overestimates the precision of his private information at the expense of ignoring public information, which leads to suboptimal investment decisions (Daniel *et al.* 1998). In terms of market performance, overconfidence increases market depth and volatility (Odean 1998), generates excessive trading (Odean 1998; Statman *et al.* 2006; Griffin *et al.* 2007), and creates speculative bubbles (Scheinkman & Xiong 2003).

Similar to investors, chief executive officers (CEO) also suffer from overconfidence. Overconfident CEOs are more likely to overinvest than their non-overconfident counterpart. They view external fund as costly so that investment to cash sensitivity is higher in firms with overconfident CEOs (Malmendier & Tate 2005). Due to overconfidence, they believe the value of their firms are undervalued by the market, hence prefer debt financing than equity financing (Malmendier *et al.* 2011). This will lead to biased investment decisions, suboptimal capital structure and weak financial performance. On the other hand, however, overconfident CEO can benefit firms by increasing investment in risky projects, innovation, R&D expenditure, etc. (Galasso & Simcoe 2011; Hirshleifer *et al.* 2012). Studies on the second point mainly focus on innovation-intensive industries, while real estate sector is not usually considered in their sample. However, there is growing interest on corporate social responsibility (CSR) in real estate. CSR is similar to innovation in the sense that both of them require risk-taking decisions and long time commitment. Therefore, we make a hypothesis that CEO overconfidence is also associated with CSR performance.

Since CEO overconfidence is shown to have both positive and negative influence on firms, it's better to study the two effects at the same time. In this paper, we study the influence of CEO overconfidence on financial performance and CSR performance after controlling confounding factors such as CEO and firm characteristics. Additionally, we examine whether overconfidence is a moderator in the CSR–financial performance relationship. Overall, we find

that CEO overconfidence positively influences firms' CSR performance. However, firms with overconfident CEOs have relatively weak financial performance compared with firms with non-overconfident CEOs. Moreover, CSR has a positive influence on financial performance, but the effect is undermined by CEO overconfidence.

This paper contributes to the existing literature in the following ways. First, although there is a wide variety of literature on CEO overconfidence in financial research, the study in the real estate sector is limited. Two papers have just documented the influence of CEO overconfidence on financial performance and financial policy (Eichholtz & Yonder 2015; Yung *et al.* 2015). No literature has yet connected CEO overconfidence with CSR. Our paper contributes to the scarce real estate literature on overconfidence.

Second, CEO overconfidence has both negative and positive sides. However, no study has yet explored the two sides at the same time, either in the real estate market or in the entire financial market. This paper builds a unified framework that encompasses both sides of CEO overconfidence. Hence our results shed light on the comprehensive role of CEO overconfidence in the real estate sector.

The remainder of the paper is structured as follows. Section 2 reviews the overconfidence literature. Section 3 describes data and methodology employed in this study. Section 4 discusses models and estimation results. Section 5 concludes the study.

2. Literature Review

2.1. CEO Overconfidence

Early studies on overconfidence almost exclusively focus on investor overconfidence. Since the pioneering work of Malmendier and Tate (2005), a wide variety of CEO overconfidence studies has appeared. Their topics can be classified in three categories, namely, biased investment decisions, weak financial performance, and innovation.

Biased investment decisions

Malmendier and Tate (2005) classify CEOs who fail to reduce their exposure to their own companies' risk as overconfident CEOs. They find that overconfident CEOs overestimate the return of their investment projects but view external funds as costly. Therefore, they overinvest

when the internal cash flow is abundant. The sensitivity of investment to cash flow is positively affected by CEO overconfidence. After this seminal work, CEO overconfidence studies with extensive focuses emerged. Overconfident CEOs interpret projects with a negative net present value (NPV) as those with positive NPV to delay the recognition of losses (Ahmed & Duellman 2013). Dividend payout is lower when CEOs are overconfident because these CEOs view external financing as costly and tend to allocate more profit to further investment (Deshmukh *et al.* 2013). Overconfident CEOs tend to make low-quality acquisitions (Malmendier & Tate 2008). In summary, empirical findings suggest that overconfidence causes CEOs to make suboptimal decisions.

Weak financial performance

The finding that CEO overconfidence is negatively related to financial performance is not surprising. CEOs are optimistic about firms' future performance and frequently overestimate their contribution because of overconfidence (Libby & Rennekamp 2012). Fund managers who have made successful forecasts in the short run tend to be overconfident in their ability to forecast future earnings (Hilary & Hsu 2011). This inevitably leads to firm underperformance compared with earnings forecast. Chen *et al.* (2014) show that firms with overconfident CEOs fail to generate positive abnormal returns following a significant R&D expenditure increase. Thus, overconfident CEOs' decisions to increase investment in R&D do not produce returns as expected.

The above two streams of research focus on the negative side of CEO overconfidence. In real estate research, two recent articles use data from the US REIT market to explore the "value-destruction" side of CEO overconfidence. Their findings are also consistent with the conclusions reached in other markets. Eichholtz and Yonder (2015) find a significantly negative relationship between CEO overconfidence and firm performance. Yung *et al.* (2015) find that firms with overconfident CEOs have small dividend payouts, and that they use more debt financing than equity. These relationships are significant despite REITs' unique dividend policy and capital structure. The effect of overconfidence seems to be strong enough to overcome these regulatory constraints. This finding strongly supports the role of overconfidence in investment decisions by CEOs.

Innovation

The third subtopic of CEO overconfidence studies, “CEO overconfidence and innovation”, warrants attentions from both academia and industry. The first two topics lead to either biased decision making or weak firm performance. The findings in this category suggest that overconfidence may add values to firms. Overconfident CEOs tend to lead firms in an innovative way. Holding the level of investments constant, they obtain more patents and citations (Galasso & Simcoe 2011). Hirshleifer *et al.* (2012) confirm these findings in their studies and further claim that CEO overconfidence may benefit shareholders in the long run by investing more in innovative and risky projects. These conclusions must be interpreted with caution because the positive relation between overconfidence and innovation may only hold true in innovative industries (Hirshleifer *et al.* 2012).

The existing findings on this topic are not related directly to real estate because the real estate sector is unusually treated as an innovation-intensive industry. However, a recent development in real estate research may benefit from overconfidence studies, that is, corporate social responsibility (CSR). Growing interest has been given in sustainable and responsible development and investment in real estate (see the discussions in Fuerst *et al.* [2014] and Deng and Wu [2014]). However, existing studies usually focus on physical and financial characteristics of firms or buildings, and the characteristics of decisions makers (e.g., CEOs) are often overlooked. In the decision-making process, CEOs usually have “total and unconditional control rights” (Stein 2003). Their role is crucial in determining firms’ CSR strategy. Investing on CSR projects is risky and long term. It usually involves a significant amount of capital allocation. Facing such a level of uncertainty and stake, do bolder decision makers have the tendency to take on the challenge as suggested in the overconfidence literature? Researchers and policy makers have been struggling to discover what motivates the adoption of CSR projects (see the review by Revelli and Viviani [2015] for examples). Whether or not CEO overconfidence contributes positively to socially responsible investing is interesting to uncover given the significant role a CEO plays in these decisions.

Although innovation and CSR are different corporate behaviors, they share some common characteristics. First, both are risky and challenging in terms of the uncertainty of potential outcomes. Innovation-related activities require high R&D expenditure, but they cannot guarantee the production of new technologies, new patents, or high financial performance.

Similarly, in the conventional view, CSR investment does no good to shareholders' value. It only gives a good reputation to firms and CEOs. In recent decades, even when the importance of CSR has gained more public attention and when the potential long-term benefits of CSR are crucial to firms' financial performance, whether or not the "invisible" benefits of CSR deserve high investment remains unknown. In psychology studies, people are shown to be more overconfident when facing difficult rather than easy tasks (Griffin & Tversky 1992). Correspondingly, one can expect overconfident CEOs to be more passionate in risky and challenging investments, such as CSR activities. Furthermore, although CSR is rewarding, the investment toward it requires a long time to be converted into observable outcome. During the process, decision makers should constantly commit to efforts toward CSR. Adopting long-term projects, such as innovation or CSR-related activities, tends to appeal to overconfident managers because it may represent their superior managerial "vision" (Hirshleifer *et al.* 2012).

2.2. CSR

CSR has become increasingly popular over the past decades. Many firms have strategically increased CSR investment to gain good reputation, improve employee productivity, and reduce the threat of regulations (Eichholtz *et al.* 2010). Other firms have also done so because of the pressure of activist shareholders or government organizations (Baron 2001). In 2014, Global Fortune 500 companies in the United States and the United Kingdom spent \$15.2 billion on CSR activities.¹ In 2015, 92% of the Global Fortune 250 companies published detailed CSR reports.² On the investor side, more investors have begun to screen firms' CSR criterion before they make investment decisions or use socially responsible investing (SRI) as an investment vehicle. They believe that investing in CSR can add value to their portfolios instead of wasting their money in the old view. According to a 2014 trend report on sustainable and responsible investing, \$6.57 trillion in US-domiciled assets are under the management of SRI strategies, and this value is a 76% increase from \$3.74 trillion in 2012.³

Despite the increasing popularity of CSR, the economic motivations behind CSR are mixed. Two types of opposing views have been proposed. The first view is the stakeholder value maximization view. It suggests that CSR can benefit the welfare of stakeholders such as

¹ <http://www.ft.com/cms/s/0/95239a6e-4fe0-11e4-a0a4-00144feab7de.html - axzz48M3tTFgM>

² <http://www.kpmg.com/CN/en/IssuesAndInsights/ArticlesPublications/Documents/kpmg-survey-of-corporate-responsibility-reporting-2015-O-201511.pdf>

³ http://www.ussif.org/Files/Publications/SIF_Trends_14.F.ES.pdf

workers and suppliers and therefore increase their incentives to support the firm (Deng *et al.* 2013). The second view is the shareholder expense view. In contrast to the first view, it suggests that managers engage in CSR activities to help stakeholders and themselves at the expense of shareholders (Surroga & Tribo 2008; Cronqvist *et al.* 2009).

Correspondingly, whether or not CSR can increase firms' financial performance is inconclusive. On the one hand, evidence shows that CSR can lower the cost of equity (El Ghouli *et al.* 2011; Cajias *et al.* 2014), lower the cost of bank loans (Goss & Roberts 2011), create rent premiums (Eichholtz *et al.* 2010), reduce stock price crash risk (Kim *et al.* 2014), and increase operating performance (Eichholtz *et al.* 2012). However, many studies have found no relationship between CSR and financial performance (see Margolis *et al.* [2009] for a review). Di Giuli and Kostovetsky (2014) even find that high CSR ratings are associated with negative future stock returns and low return on assets (ROA).

CEO overconfidence and CSR

Managerial decisions in CSR are crucial for firms' CSR strategy. As the most powerful person in the management board, the CEO sometimes can "unilaterally decide" a firm's CSR strategy. A wide variety of studies relate CEO characteristics to CSR. Huang (2013) finds that firms' CSR performance is associated with CEOs' educational background, tenure, and gender. Jiraporn and Chintrakarn (2013) relate CEO power to CSR and find that a powerful CEO has significantly higher CSR engagement than a less powerful one. However, the level of CSR investment decreases after CEO power reaches a threshold. Jian and Lee (2015) find that CEOs are rewarded with high compensation for investing in optimal CSR but receive low compensation for excessive CSR investment. Deckop *et al.* (2006) use pay structure to explain CSR. They argue that a short-term pay focus is negatively associated with CSR, whereas a long-term pay focus is positively related to CSR. In terms of pay structures among members of an executive team, firms with low payment disparity have higher CSR, whereas those with high payment disparity have lower CSR.

In addition to these "observable" CEO characteristics, CEO psychological characteristics may influence firm decisions, particularly CSR strategy. This statement is consistent with the upper echelons theory, which claims that executives' psychological characteristics are crucial determinants of firms' behavior and performance (Hambrick & Mason 1984; Hambrick 2007). However, the empirical evidence on the effect of managerial behavioral bias on CSR is limited.

Tang *et al.* (2015) claim to be the first to link CSR to managerial psychological bias. They find that CEO hubris is negatively associated with socially responsible investment but is positively associated with socially irresponsible investment.

CEO overconfidence as a moderator of CSR–financial performance relationship

We have shown that CSR has various influences on firm financial performance, although the results remain mixed. In addition, as the decision makers of firms, CEOs have behavioral bias that can be incorporated into firms' CSR strategy and firm financial performance. Therefore, CEO overconfidence may also moderate the CSR–financial performance relationship. To the best of our knowledge, no study has yet explored this moderating effect of CEO overconfidence. However, the study of the moderating effect of CEO overconfidence is greatly significant to both CSR research and CEO overconfidence research.

First, managerial overconfidence has drawn increasing attention in the past decade. Section 2.1 shows that many financial market phenomena are found to be related to managerial overconfidence (see also the discussion in Baker *et al.* [2012]). The CSR–financial performance relationship is an important topic in finance, and CEO traits are shown to be crucial in determining corporate outcomes. Therefore, adding CEO overconfidence to the studies of the effect of CSR on financial performance can help better understand the relationship between the two. Does managerial overconfidence reinforce or undermine the relation?

Second, previous studies documented various “value-destruction” sides of managerial overconfidence in financial perspectives and one “bright” side of managerial overconfidence: innovation. By introducing CEO overconfidence to CSR studies, we can add a new element, either a positive or a negative one, to overconfidence studies, which is a contribution to managerial overconfidence studies.

3. Data and Methodology

3.1. Data

The sample in this study are US REITs, all of which have the four-digit SIC code of 6798. Data are obtained from the intersection of Execucomp, MSCI ESG (formerly KLD), CRSP, and Compustat. Several steps are performed before the final database is formed. First, we obtain

the CEO compensation data from Execucomp. Second, for every firm–year observation in Execucomp, we use the Compustat firm identifier “GVKEY” to merge it with financial data from Compustat and fiscal year-end price data from CRSP.⁴ Third, we merge the abovementioned database with the MSCI ESG rating data. The last step is not straightforward. Only three firm identifiers are found in the MSCI ESG database: company name, ticker, and CUSIP. The first two identifiers are inconsistent because different databases may use different firm names and ticker names, and the same ticker name can be assigned to different firms. Some CUSIP values in the MSCI ESG database are missing or misreported, so they do not match for all observations. To solve this problem, we use the company ticker to link the two databases and then manually compare the CUSIP and company names for each observation.

The final database consists of 884 firm–year observations from 2001 to 2014, including financial and CSR rating information of 103 firms and compensation data of 156 CEOs.

3.2. Measurement CEO overconfidence

In CEO overconfidence research, the measurements of overconfidence can be obtained from both objective and subjective information. The first type of measure is based on the idea that overconfident CEOs are not able to diversify their high idiosyncratic risk. CEOs are already highly exposed to their own firms’ risk. Therefore, failure to diversify the risk is considered to be associated with overconfidence. Examples include CEOs who fail to exercise their vested and “deep-in-the-money” stock options and those who are net buyers of their own firms’ stocks (Malmendier & Tate 2005, 2008). The second type of measure is derived from CEO’s earnings forecast. Overconfident CEOs overestimate the future firm performance under their management. Therefore, they often make irrationally high earnings forecast. Thus, the level of overconfidence can be reflected by the proportion of earnings forecasts that exceed the realized earnings. These two types of measurements are taken from readily available market data. The objective information can enhance the reliability and replicability of the findings. Alternatively, the third type of measure is obtained from the subjective rating of confidence. This line of research counts the press description of CEOs to determine the level of overconfidence (Galasso & Simcoe 2011; Malmendier *et al.* 2011; Shu *et al.* 2013). First, they choose some overconfidence-related keywords, such as “confident,” “confidence,” “optimistic,” and “optimism,” and some non-overconfidence-related keywords, such as “reliable,” “cautious,”

⁴ Firm identifier “GVKEY” for CRSP database can be obtained from the CRSP/Compustat Merged Database.

“practical,” “frugal,” “conservative,” and “steady”. Second, the overconfidence measure is determined by the difference between the counts of these two types of keywords. Similar to investor overconfidence, there are also studies that designed some psychological questions to calculate the overall score of overconfidence (Menkhoff *et al.* 2006).

Referring to Malmendier and Tate (2005), we use the option-based measure of CEO overconfidence. A CEO who fails to exercise vested options that are at least 67% in the money is classified as an overconfident CEO. This is because CEOs are already highly exposed to their firms’ idiosyncratic risk. Rational CEOs prefer to diversify their risk by exercising their vested and “deep-in-the-money” options. However, overconfident CEOs will not do so in the hopes that their firms will have better performance under their management. Therefore, those who fail to exercise their vested options that are at least 67% in the money are classified as overconfident. The fraction of 67% is a threshold that corresponds to a CRRA value of 3 according to Hall and Murphy (2002). In consistent with Hirshleifer *et al.* (2012), a CEO who is identified as overconfident remains so for the full sample period because overconfidence is a personal trait.

Empirically, we use the Execucomp database to construct the overconfidence measure. First, the realizable value per option is calculated as the total realizable value of unexercised exercisable options divided by their total number. Second, the estimated exercise price is calculated as the fiscal year-end share price minus the realizable value per option calculated in the first step. Finally, the degree of “in-the-money” is the value of share price divided by exercise price minus 1.

$$\begin{aligned}
 \text{average option value} &= \frac{\text{unexercised exercisable value of options}}{\text{number of unexercised exercisable options}} \\
 oc &= \frac{\text{Share price at the end of fiscal year}}{\text{share price at the end of fiscal year} - \text{average option value}} - 1 \\
 &= \frac{\text{average option value}}{\text{share price at the end of fiscal year} - \text{average option value}}
 \end{aligned}$$

After *oc* variable is calculated, an overconfidence indicator (*ocdummy*) is created for each CEO. If a CEO is identified as overconfident in a certain year, then *ocdummy* will be 1 for the whole career; otherwise, *ocdummy* will be 0.

3.3. Measurement of CSR performance

The MSCI ESG database is used to form the measure of corporate social performance. Initiated in 1991, MSCI ESG is one of the longest continuous ESG rating databases and widely used in academic studies on CSR. Based on the in-depth information from company disclosure, government, media, NGOs, and other stakeholder sources, MSCI ESG provides statistical ratings for a wide range of CSR-related items.

The database organizes items into two major categories: qualitative issues and controversial business issues. Seven categories are found in the qualitative issues area, including environmental performance, community, human rights, employee relations, diversity, product, and corporate governance. In each of the seven categories, MSCI ESG raises several strengths and concerns (the number and the type of strength and concern may vary) with binary ratings of 1 or 0. A strength variable with a value of 1 indicates an identified strength in a given year for that firm. The same applies to a concern variable. In the controversial business issues area, the database only has concerns in the following aspects: alcohol, gambling, tobacco, firearms, the military, and nuclear power. For each aspect, MSCI ESG assigns a binary variable indicating whether or not the firm is involved in certain controversial businesses.

To obtain a full view of a firm's CSR profile in a given year, we aggregate all ratings in strengths and concerns to a single CSR score. Several methods are used in the CSR-related literature. The commonly used method form the aggregate CSR score for each firm-year by subtracting the number of concerns from the number of strengths (El Ghoul *et al.* 2011; Kim *et al.* 2014; Jha & Cox 2015). However, as noted by Cajias *et al.* (2014), such an approach is not appropriate for real estate firms because some of the general ESG criteria are highly irrelevant to real estate firms. They revise the average aggregation method to a weighted average approach. The relative importance of each ESG criterion is determined by the total number of non-zero value appearing in the sample period for real estate firms only. This can ensure that some irrelevant issues in real estate (e.g., human rights violations) will only have a small proportion in the aggregate score. To be consistent with their approach, we calculate the aggregate CSR score using the following procedure.

First, ESG rating data are collected in the whole sample period. Second, the concern rating of 1 is converted to -1 to reflect the negative effect of concern variables on CSR. Finally, the weighted average of all the strength values and concern values of each firm is calculated. The

weighting parameter is calculated as the summation of the value of the specific indicator variable across every firm–year divided by the summation of the value of all indicator variables across every firm–year.

4. Empirical analysis

This section presents the empirical analysis of the relationship among CEO overconfidence, CSR and financial performance.

4.1. Variable definitions and descriptive statistics

The variables employed in this research include CEO information, firm financial information, and firm CSR ratings. CEO information consists of overconfidence dummy, salary, bonus, gender, and CEO tenure. Financial information includes firm size, cash asset ratio, leverage ratio, capital expenditure asset ratio, and Tobin's q. CSR score is an aggregate indicator of a firm's CSR performance. Table 1 summarizes the definitions and descriptive statistics of these variables.

Table 1. Variable definitions and descriptive statistics

Variable	Definition	Obs	Mean	Std. Dev.	Min	Max
ocdummy	overconfidence dummy	884	0.3541	0.4785	0.0000	1.0000
score	CSR score	884	−0.0909	0.1239	−0.3594	0.1412
salary	CEO salary	884	607.2114	264.8369	0.0000	1459.6150
bonus	CSO bonus	884	385.5578	793.5763	0.0000	7500.0000
female1	female CEO or not	884	0.0271	0.1626	0.0000	1.0000
yasceo	CEO tenure	834	8.0372	5.8677	0.0000	28.0000
size	log(total assets)	884	8.1794	0.9926	5.2971	10.4141
ch_at	cash/total assets	791	0.0201	0.0282	0.0000	0.2449
lt_at	total debt scaled by total assets	884	0.5596	0.1584	0.0317	1.2073
capx_at	capital expenditure/total assets	878	0.0069	0.0278	0.0000	0.3167
tobinq	(market value of equity + total assets − book value of equity)/ total assets	884	1.4411	0.3794	0.7331	3.7214
roa	return on assets	884	0.0291	0.0301	−0.1039	0.2759
oc_score	interaction term between ocdummy and score	884	−0.0291	0.0831	−0.3594	0.1198

4.2. Estimation methods and results

CEO overconfidence and CSR

We use the two-sample t-test to test the mean difference of CSR between firms with overconfident CEOs and firms with non-overconfident CEOs. Table 2 summarizes the results. It is significant that firms with overconfident CEOs have a higher mean CSR score.

Table 2. Two-sample t-test on CSR

Group	Obs.	Mean	SE
0 (<i>ocdummy</i> = 0)	571	−0.0957	0.0052
1 (<i>ocdummy</i> = 1)	313	−0.0821	0.0070
total	884	−0.0909	0.0042
diff = mean(0)-mean(1)		−0.0135	0.0087
H0: diff = 0		t = −1.5551	
H1: diff < 0		p-value = 0.0601	

To further investigate whether or not CEO overconfidence is related to CSR, we run the regression of CSR score on the overconfidence dummy and an array of control variables. Table 3 summarizes the results using the fixed-effects (FE) method and pooled ordinary least squares (OLS) method. On average, firms with overconfident CEOs have a significantly higher CSR score. The results are slightly different in the OLS and FE models. The FE estimator is more reliable because firm-specific unobservable factors may exist. Another finding from the two models is that large firms have a relatively high CSR score.

Table 3. Regression results of CEO overconfidence on CSR

	Fixed effect	Pooled OLS
salary	−0.00006*	0.00001
bonus	−0.00002*	−0.00002***
age	0.00106	0.00058
female1	−0.11002**	0.02642
yasceo	−0.00234	−0.00178***
size	0.04188**	0.02678***
ch_at	−0.20996**	−0.00023
lt_at	−0.06018	−0.04858*
capx_at	0.01043	−0.07655
ocdummy	0.03409**	0.02082***
Year fixed effect	Yes	--
Firm fixed effect	Yes	--

Notes: * p < 0.1, ** p < 0.05, *** p < 0.01

Relationship among CEO overconfidence, CSR, and financial performance

In investigating the relationship among CEO overconfidence, CSR, and financial performance, the following equation is estimated. As various studies show that financial performance can be influenced by both CEO overconfidence and CSR, we use it as the dependent variable. It is consistent with the focus of this study. The measure for financial performance is Tobin's q ratio because it is one of the most commonly used proxies for firms' financial performance (Eichholtz *et al.* 2012; Eichholtz & Yonder 2015; Yung *et al.* 2015). Its lagged term is included as a regressor to capture the dynamic nature of financial performance. To capture the potential moderating effect of CEO overconfidence on the CSR–financial performance relationship, we create an interaction term *oc_score*, which is the product of *ocdummy* and *score*. Financial control variables are included as right-hand side variables. μ_i is the firm fixed effect, and v_{it} is the error component.

$$\begin{aligned} tobinq_{it} = & \beta_0 + \beta_1 tobinq_{it-1} + \beta_2 score_{it} + \beta_3 ocdummy_{it} + \beta_4 oc_score_{it} + \beta_5 size_{it} \\ & + \beta_6 ch_at_{it} + \beta_7 lt_at_{it} + \beta_8 capx_at_{it} + \mu_i + v_{it} \end{aligned}$$

The estimation methods are dynamic panel data models that incorporate the dynamic relationship between financial performance and CSR, and account for the endogeneity issue. Dynamic panel data models have recently received increasing attention in corporate finance research (Flannery & Hankins 2013). The details of these models can be found in the Appendix.

The dynamic panel data models are applied for two reasons. First, in addition to the effect of CSR, overconfidence, and an array of control variables, the lag of financial performance in the previous year affects financial performance. A model with a dynamic nature can better fit the objectives of this research. Second, although CSR can influence firm performance, the causality relation of the opposite direction may also hold. This endogeneity issue of CSR is prevalent in related research (see, e.g., El Ghouli *et al.* [2011]). In either difference generalized method of moments (GMM) or system GMM of the dynamic panel approaches, the endogeneity issue of the right-hand-side variables can be addressed by including the lagged level as instruments for the difference equation and lagged difference as instruments for the level equation.

Table 4 summarizes the estimation results. The one-step and two-step estimators are reported for each estimation. Columns (1) and (2) report the Arellano–Bond difference GMM estimator.

Columns (3) and (4) report the Blundell–Bond system GMM estimator. The coefficients of CSR score are positive and highly significant in all the four columns. This finding confirms the hypothesis that REITs with higher CSR rating have better financial performance. The overconfidence dummy is significantly negative in the difference GMM models, reflecting the negative effect of managerial overconfidence on financial performance. This result is in accordance with the findings of Eichholtz and Yonder (2015). However, the coefficient remains insignificant in system GMM models. The interaction term between CEO overconfidence and CSR performance is negative and significant across models, thus indicating that the existence of overconfident CEOs undermines the positive effect of CSR on financial performance.

4.3. Robustness checks on the results

Dropping time-invariant dummy variables

A potential problem in this analysis is the inclusion of a dummy variable in the dynamic panel data model. Intuitively, differencing a dummy variable may generate zeros for almost all observations in a firm. This may cause the weak instrument problem. Roodman (2009) note that introducing explicit FE dummies in a dynamic panel with short time period may cause inaccurate estimation. In our dataset consisting of 103 firms and 156 CEOs, CEOs have either one or zero for their whole career in a firm. Unless a firm changes its CEO, there are little variations in *ocdummy*. Therefore, at least 50 firms do not change their CEOs over the sample period. For these firms, *ocdummy* is an explicitly FE dummy variable.

To verify the robustness of the findings, we run another four models without the variable *ocdummy*. The results are summarized in columns (5) to (8). Consistent with the results when *ocdummy* is included, the coefficients of CSR rating remain significantly positive for all models, and the interaction term is negative across models. This finding seems to offer an improvement to models 1–4.

Table 4. Dynamic panel data models result – Tobin's q as proxy for financial performance

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	AB 1-step	AB 2-step	BB 1-step	BB 2-step	AB 1-step	AB 2-step	BB 1-step	BB 2-step
tobinq(-1)	0.2860***	0.2905***	0.6837***	0.6850***	0.2795***	0.2826***	0.6893***	0.6904***
score	0.6321***	0.5999***	0.4552***	0.4418***	0.5989***	0.5768***	0.4798***	0.4724***
size	-0.0955	-0.0986	-0.0175	-0.0170	-0.0796	-0.0831	-0.0147	-0.0147
ch_at	0.4512**	0.5249**	0.7215***	0.7179***	0.4367*	0.5052**	0.7577***	0.7637***
lt_at	-1.1388***	-1.1527***	-0.0089	-0.0129	-1.1697***	-1.1656***	0.0041	-0.0024
capx_at	-1.3844	-1.3909	-0.0805	-0.1035	-1.3811	-1.3931*	-0.1013	-0.1205
oc_score	-0.5536***	-0.5389***	-0.3076*	-0.3007*	-0.4914***	-0.4827***	-0.4004***	-0.4032***
ocdummy	-0.1168*	-0.1121*	0.0407	0.0435				
cons			0.6233***	0.6181***			0.5989***	0.6003***
N.Instruments	79		100		78		99	
N.Obs	589		689		589		689	
AR(1)	0.000	0.009	0.000	0.000	0.000	0.009	0.000	0.000
AR(2)	0.025	0.073	0.072	0.090	0.024	0.069	0.077	0.094
Hansen J	0.287	0.287	0.707	0.707	0.272	0.272	0.703	0.703

Notes: * p < 0.1, ** p < 0.05, *** p < 0.01

Table 5. Dynamic panel data models result – ROA as proxy for financial performance

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	AB 1-step	AB 2-step	BB 1-step	BB 2-step	AB 1-step	AB 2-step	BB 1-step	BB 2-step
roa(-1)	0.3276***	0.3610***	0.3673***	0.3853***	0.3213***	0.3513***	0.3824***	0.4016***
score	0.0468*	0.0417*	0.0553***	0.0505***	0.0460*	0.0372*	0.0590***	0.0548***
size	-0.0041	-0.0063	-0.0039**	-0.0035**	-0.0035	-0.0052	-0.0036**	-0.0031**
ch_at	0.0858	0.0058	0.0773	0.0534	0.0840	0.0009	0.0812	0.0575
lt_at	-0.0925***	-0.0749**	-0.0361***	-0.0365**	-0.0934***	-0.0760**	-0.0339***	-0.0323***
capx_at	0.0033	0.0013	0.0412	0.0460	-0.0047	-0.0058	0.0390	0.0429
oc_score	-0.0458**	-0.0404*	-0.0431**	-0.0344*	-0.0411*	-0.0309	-0.0538***	-0.0472**
ocdummy	-0.0118**	-0.0148**	0.0039	0.0047				
cons			0.0709***	0.0661***			0.0682***	0.0617***
N.Instruments	47		68		46		67	
N.Obs	589		689		589		689	
AR(1)	0.000	0.002	0.000	0.000	0.001	0.002	0.000	0.000
AR(2)	0.847	0.953	0.937	0.953	0.813	0.901	0.990	0.980
Hansen J	0.318	0.318	0.425	0.425	0.311	0.311	0.396	0.396

Notes: * p < 0.1, ** p < 0.05, *** p < 0.01

Using alternative proxy for financial performance

We further use the ROA of each firm as an alternative proxy for financial performance to verify the robustness of our previous findings. We present the results in Table 5. The coefficient of lagged dependent variables is positive and significant. The magnitude is quite close to each other in all eight models (all within the range of 0.33 to 0.40), which shows the significant dependence of financial performance on its own lag. CSR has a positive and significant influence on financial performance, with coefficients across models range between 0.0372 to 0.0590. This confirms that positive CSR could add value to REITs' financial performance.

The results on *ocdummy* and *oc_score* are also consistent with the previous findings. In models with both overconfidence dummy and interaction term, the overconfidence dummy is negative and significant in AB models but insignificant in BB models. The interaction terms between overconfidence and CSR remain significantly negative across models, reflecting the moderating role of overconfidence: the existence of overconfidence CEOs undermines the positive influence of CSR on financial performance.

5. Conclusions

A growing body of literature discusses the influence of CEO overconfidence on biased investment decisions, weak financial performance and innovation in the financial market. However, evidence is lacking in the real estate sector. This study considers the “value-destruction” side (i.e., weak financial performance) and “bright” side (i.e., CSR) of CEO overconfidence at the same time. We separate the net effect of each side to shed light on the role of CEO overconfidence. To the best of our knowledge, this study is the first to combine the two sides in a single framework and the first in behavioral economics to associate CSR–financial performance with CEO overconfidence.

In summary, the relationships among overconfidence, CSR, and firm performance are threefold. First, in both pooled OLS and firm FE models, firms with overconfident CEOs tend to have better CSR performance. This is similar to the relationship between CEO overconfidence and innovation. The finding provides the evidence of a positive effect of CEO overconfidence in the real estate sector. Second, the effect of CSR on increasing firm financial performance is significant across all model settings. Although studies of the relationship between the two are mixed, our finding in the REIT sector supports the positive influence of CSR on firm

performance. Third, we find the positive relationship between CSR and financial performance identified in the previous step varies across firms. The existence of overconfident CEOs undermines the positive effect of CSR on financial performance.

References

- Ahmed, A.S., Duellman, S., 2013. Managerial Overconfidence and Accounting Conservatism. *Journal of Accounting Research* 51, 1-30
- Ahn, S.C., Schmidt, P., 1995. Efficient Estimation of Models for Dynamic Panel-Data. *Journal of Econometrics* 68, 5-27
- Anderson, T.W., Hsiao, C., 1982. Formulation and Estimation of Dynamic-Models Using Panel Data. *Journal of Econometrics* 18, 47-82
- Arellano, M., Bond, S., 1991. Some Tests of Specification for Panel Data - Monte-Carlo Evidence and an Application to Employment Equations. *Review of Economic Studies* 58, 277-297
- Arellano, M., Bover, O., 1995. Another Look at the Instrumental Variable Estimation of Error-Components Models. *Journal of Econometrics* 68, 29-51
- Baker, M., Wurgler, J., Yuan, Y., 2012. Global, local, and contagious investor sentiment. *Journal of Financial Economics* 104, 272-287
- Baltagi, B.H., 2013. *Econometric Analysis of Panel Data*. John Wiley & Sons.
- Barber, B.M., Odean, T., 2000. Trading is hazardous to your wealth: The common stock investment performance of individual investors. *Journal of Finance* 55, 773-806
- Barber, B.M., Odean, T., 2001. Boys will be boys: Gender, overconfidence, and common stock investment. *Quarterly Journal of Economics* 116, 261-292
- Baron, D.P., 2001. Private politics, corporate social responsibility, and integrated strategy. *Journal of Economics & Management Strategy* 10, 7-45
- Blundell, R., Bond, S., 1998. Initial conditions and moment restrictions in dynamic panel data models. *Journal of Econometrics* 87, 115-143

- Cajias, M., Fuerst, F., McAllister, P., Nanda, A., 2014. Do Responsible Real Estate Companies Outperform Their Peers? *International Journal of Strategic Property Management* 18, 11-27
- Chen, S.S., Ho, K.Y., Ho, P.H., 2014. CEO Overconfidence and Long-Term Performance Following R&D Increases. *Financial Management* 43, 245-269
- Cronqvist, H., Heyman, F., Nilsson, M., Svaleryd, H., Vlachos, J., 2009. Do Entrenched Managers Pay Their Workers More ? *Journal of Finance* 64, 309-339
- Daniel, K., Hirshleifer, D., Subrahmanyam, A., 1998. Investor psychology and security market under- and overreactions. *Journal of Finance* 53, 1839-1885
- Deckop, J.R., Merriman, K.K., Gupta, S., 2006. The effects of CEO pay structure on corporate social performance. *Journal of Management* 32, 329-342
- Deng, X., Kang, J.K., Low, B.S., 2013. Corporate social responsibility and stakeholder value maximization: Evidence from mergers. *Journal of Financial Economics* 110, 87-109
- Deng, Y.H., Wu, J., 2014. Economic returns to residential green building investment: The developers' perspective. *Regional Science and Urban Economics* 47, 35-44
- Deshmukh, S., Goel, A.M., Howe, K.M., 2013. CEO overconfidence and dividend policy. *Journal of Financial Intermediation* 22, 440-463
- Di Giuli, A., Kostovetsky, L., 2014. Are red or blue companies more likely to go green? Politics and corporate social responsibility. *Journal of Financial Economics* 111, 158-180
- Eichholtz, P., Kok, N., Quigley, J.M., 2010. Doing Well by Doing Good? Green Office Buildings. *American Economic Review* 100, 2492-2509
- Eichholtz, P., Kok, N., Yonder, E., 2012. Portfolio greenness and the financial performance of REITs. *Journal of International Money and Finance* 31, 1911-1929
- Eichholtz, P., Yonder, E., 2015. CEO Overconfidence, REIT Investment Activity and Performance. *Real Estate Economics* 43, 139-162

- El Ghoul, S., Guedhami, O., Kwok, C.C.Y., Mishra, D.R., 2011. Does corporate social responsibility affect the cost of capital? *Journal of Banking & Finance* 35, 2388-2406
- Flannery, M.J., Hankins, K.W., 2013. Estimating dynamic panel models in corporate finance. *Journal of Corporate Finance* 19, 1-19
- Fuerst, F., Kontokosta, C., McAllister, P., 2014. Determinants of green building adoption. *Environment and Planning B-Planning & Design* 41, 551-570
- Galasso, A., Simcoe, T.S., 2011. CEO Overconfidence and Innovation. *Management Science* 57, 1469-1484
- Gervais, S., Odean, T., 2001. Learning to be overconfident. *Review of Financial Studies* 14, 1-27
- Goss, A., Roberts, G.S., 2011. The impact of corporate social responsibility on the cost of bank loans. *Journal of Banking & Finance* 35, 1794-1810
- Griffin, D., Tversky, A., 1992. The Weighing of Evidence and the Determinants of Confidence. *Cognitive Psychology* 24, 411-435
- Griffin, J.M., Nardari, F., Stulz, R.M., 2007. Do investors trade more when stocks have performed well? Evidence from 46 countries. *Review of Financial Studies* 20, 905-951
- Hall, B.J., Murphy, K.J., 2002. Stock options for undiversified executives. *Journal of Accounting & Economics* 33, 3-42
- Hambrick, D.C., 2007. Upper echelons theory: An update. *Academy of Management Review* 32, 334-343
- Hambrick, D.C., Mason, P.A., 1984. Upper Echelons - the Organization as a Reflection of Its Top Managers. *Academy of Management Review* 9, 193-206
- Hilary, G., Hsu, C., 2011. Endogenous overconfidence in managerial forecasts. *Journal of Accounting & Economics* 51, 300-313

- Hilary, G., Menzly, L., 2006. Does past success lead analysts to become overconfident? *Management Science* 52, 489-500
- Hirshleifer, D., Low, A., Teoh, S.H., 2012. Are Overconfident CEOs Better Innovators? *Journal of Finance* 67, 1457-1498
- Huang, S.K., 2013. The Impact of CEO Characteristics on Corporate Sustainable Development. *Corporate Social Responsibility and Environmental Management* 20, 234-244
- Jha, A., Cox, J., 2015. Corporate social responsibility and social capital. *Journal of Banking & Finance* 60, 252-270
- Jian, M., Lee, K.W., 2015. CEO compensation and corporate social responsibility. *Journal of Multinational Financial Management* 29, 46-65
- Jiraporn, P., Chintrakarn, P., 2013. How do powerful CEOs view corporate social responsibility (CSR)? An empirical note. *Economics Letters* 119, 344-347
- Kim, Y., Li, H.D., Li, S.Q., 2014. Corporate social responsibility and stock price crash risk. *Journal of Banking & Finance* 43, 1-13
- Libby, R., Rennekamp, K., 2012. Self-Serving Attribution Bias, Overconfidence, and the Issuance of Management Forecasts. *Journal of Accounting Research* 50, 197-231
- Malmendier, U., Tate, G., 2005. CEO overconfidence and corporate investment. *Journal of Finance* 60, 2661-2700
- Malmendier, U., Tate, G., 2008. Who makes acquisitions? CEO overconfidence and the market's reaction. *Journal of Financial Economics* 89, 20-43
- Malmendier, U., Tate, G., Yan, J., 2011. Overconfidence and Early-Life Experiences: The Effect of Managerial Traits on Corporate Financial Policies. *Journal of Finance* 66, 1687-1733
- Margolis, J.D., Elfenbein, H.A., Walsh, J.P., 2009. Does it Pay to Be Good...And Does it Matter? A Meta-Analysis of the Relationship between Corporate Social and Financial Performance.

- Menkhoff, L., Schmidt, U., Brozynski, T., 2006. The impact of experience on risk taking, overconfidence, and herding of fund managers: Complementary survey evidence. *European Economic Review* 50, 1753-1766
- Nickell, S., 1981. Biases in Dynamic-Models with Fixed Effects. *Econometrica* 49, 1417-1426
- Odean, T., 1998. Volume, volatility, price, and profit when all traders are above average. *Journal of Finance* 53, 1887-1934
- Revelli, C., Viviani, J.L., 2015. Financial performance of socially responsible investing (SRI): what have we learned? A meta-analysis. *Business Ethics-a European Review* 24, 158-185
- Roodman, D., 2009. How to do xtabond2: An introduction to difference and system GMM in Stata. *Stata Journal* 9, 86-136
- Scheinkman, J.A., Xiong, W., 2003. Overconfidence and speculative bubbles. *Journal of Political Economy* 111, 1183-1219
- Shu, P.G., Yeh, Y.H., Chiang, T.L., Hung, J.Y., 2013. Managerial Overconfidence and Share Repurchases. *International Review of Finance* 13, 39-65
- Statman, M., Thorley, S., Vorkink, K., 2006. Investor overconfidence and trading volume. *Review of Financial Studies* 19, 1531-1565
- Stein, J.C., 2003. Agency, Information and Corporate Investment. *Handbook of the Economics of Finance*
- Surroga, J., Tribo, J.A., 2008. Managerial entrenchment and corporate social performance. *Journal of Business Finance & Accounting* 35, 748-789
- Tang, Y., Qian, C.L., Chen, G.L., Shen, R., 2015. How CEO hubris affects corporate social (ir)responsibility. *Strategic Management Journal* 36, 1338-1357
- Yung, K., Li, D.D., Sun, Q.S., 2015. CEO overconfidence and financial policies of real estate investment trusts (REITs). *Journal of Property Research* 32, 384-406

Appendix: Dynamic panel data models

The dynamic panel data models are characterized by the following equations in which a lagged term of the dependent variable appears among the regressors.

$$y_{it} = \alpha y_{it-1} + \mathbf{x}_{it}'\beta + \varepsilon_{it},$$

$$\varepsilon_{it} = \mu_i + v_{it},$$

where μ_i denotes the unobserved individual effects, v_{it} represents the idiosyncratic error component, and \mathbf{x}_{it} is a vector that may contain both endogenous variables and exogenous variables.

Estimating the model using traditional approaches may lead to a biased estimator, that is, the dynamic panel bias (Nickell 1981), because of the dynamic relationship. The dependent variable is a function of the unobserved individual effect; therefore, the lagged dependent variable is also correlated with the error term. Thus, the OLS estimator is biased and inconsistent. A way to remove the individual fixed effects is using the within transformation in the FE approach. However, although the mean deviation transformation eliminates the individual fixed effects, $\ddot{y}_{it-1} = y_{it-1} - (y_{i1} + \dots + y_{iT-1})/(T-1)$ is still correlated with $\ddot{v}_{it} = v_{it} - (v_{i2} + \dots + v_{iT})/(T-1)$ (the latter contains v_{it-1} , which is correlated with y_{it-1} in \ddot{y}_{it-1}). An alternative transformation is the first-difference transformation. In fact, Anderson and Hsiao (1982) propose a first-difference based 2SLS estimator. They first use the first-difference transformation to remove the fixed effects as shown in the following equation. Thereafter, they use y_{it-2} as the instrument for Δy_{it-1} in the difference equation to perform the 2SLS estimation. In this approach, y_{it-2} is correlated with Δy_{it-1} but not with Δv_{it} . Therefore, the instruments are valid.

$$\Delta y_{it} = \alpha \Delta y_{it-1} + \Delta \mathbf{x}_{it}'\beta + \Delta v_{it}.$$

Although the Anderson–Hsiao estimator is consistent, it has some drawbacks. It is not an efficient estimator in the sense that it does not make use of all the available moment conditions (Ahn & Schmidt 1995). In addition, it does not consider the covariance structure of Δv_{it} (Baltagi 2013).

Arellano and Bond (1991) propose the difference GMM estimator, which is more efficient than the Anderson–Hsiao estimator. Instead of including only one lag variable as the instrument for observation in each time, they include all available lags of the untransformed variables as instruments. For example, they use y_{i1} as the instrument for $\Delta y_{i3} = \alpha \Delta y_{i2} + \Delta \mathbf{x}'_{i3} \beta + \Delta v_{i3}$; y_{i2} and y_{i1} as the instruments for $\Delta y_{i4} = \alpha \Delta y_{i3} + \Delta \mathbf{x}'_{i4} \beta + \Delta v_{i4}$; ...; y_{it-2}, \dots, y_{i2} and y_{i1} as the instruments for $\Delta y_{it} = \alpha \Delta y_{it-1} + \Delta \mathbf{x}'_{it} \beta + \Delta v_{it}$. Thereafter, they apply GMM to the equations. In the initial step of GMM regression, they assume that v_{it} are i.i.d., so that the covariance matrix of the differenced error takes the following form:

$$\begin{pmatrix} 2 & -1 & & \\ -1 & 2 & -1 & \\ & -1 & 2 & \ddots \\ & & \ddots & \ddots \end{pmatrix}.$$

One can use this covariance matrix to construct the weighting matrix in GMM and obtain the one-step GMM estimator.

One can also obtain a two-step GMM estimator by first obtaining the residuals from the first-step GMM regression and then using the residuals to construct a sandwich proxy for the covariance matrix for the second-step GMM estimation. The two-step estimator is shown to be efficient and robust to any pattern of heteroscedasticity.

Although the difference GMM performs well in estimating dynamic panel models, if the dependent variable is persistent over time, then the lagged levels will convey only little information about the current changes. This limitation is the so-called weak instrument problem. In the later studies of Arellano and Bover (1995) and Blundell and Bond (1998), a set of additional moment conditions is raised to solve the weak instrument problem. In addition to using lagged levels as instruments for differences in the Arellano–Bond model, the Blundell–Bond estimator also uses lagged differences as an instrument for the levels. This extended version is usually called the system GMM estimator.