Corporate Real Estate Holdings and Firm Returns
of Shariah Compliant Firms

AKINSOMI Omokolade[1], ONG Seow Eng and IBRAHIM Muhammad Faishal

The University of the Witwatersrand. South Africa.

The National University of Singapore. Singapore.

School of Construction Economics and Management
The University of the Witwatersrand, South Africa

Department of Real Estate
National University of Singapore

March 2013.

[1]Akinsomi Omokolade is at the School of Construction Economics and Management, the University of Witwatersrand, South Africa, 1 Jan Smuts Avenue, Johannesburg. Ong Seow Eng and Ibrahim Muhammad Faishal are at the Department of Real Estate, National University of Singapore. 4 Architecture Drive, Singapore. 117566. Corresponding Author is Akinsomi Omokolade and can be reached at kola.akinsomi@wits.ac.za. We are indebted to the comments of Professor Graeme Newell of the University of Western Sydney, this improved our work significantly.

Corporate Real Estate Holdings and Firm Returns
of Shariah Compliant Firms

ABSTRACT

In this paper we examine corporate real estate ownership of Shariah Compliant firms in the United States. We investigate the constituents of the Dow Jones Islamic Market Index (DJIM) which conform to Shariah principles particularly non-real estate firms which are listed on the New York Stock Exchange (NYSE) and the National Association of Securities Dealers Automated Quotations (NASDAQ) and their corporate real estate ownership characteristics from 1996 to 2009. In our analysis we investigate over 1,000 US Shariah compliant companies and their corporate real estate ownership structure from 1996 to 2009.

We find a strong correlation with Shariah restricted variables and corporate real estate ownership of Shariah compliant firms. Leverage is significantly positively correlated with corporate real estate ownership (CREO) while Cash + interesting bearing securities are negatively correlated with CREO. We do not find any significant correlation with accounts receivables and CREO.

Furthermore we attempt to understand the role of corporate real estate ownership in firm performance particularly systematic risk and idiosyncratic component of return. We find in line with previous studies that a negative relationship between systematic risk and CREO in Shariah compliant firms, however this result is inconsistent when we examine our results based on industry classification. In addition, we find that the CREO of Shariah compliant firms do no explain the idiosyncratic return of Shariah compliant firms as we find a flat relationship between the idiosyncratic component of return (alpha) and corporate real estate ownership.

Our results that CREO do not play any role in explaining the firm returns in Shariah compliant firms are robust even when we control for Shariah restrictive variables.

Section I Introduction

Corporate real estate ownership in the past decades has received attention in real estate research and studies. Non-real estate firms own large amounts of real estate and several studies have looked into how this may affect the firm performance since the core business of the firm is not in real estate. In the US economy alone, there is an estimated value of $US8.8 trillion of non residential structures (this includes value of building excluding the value of land) . The main objective for public listed firms is that they maximize shareholder value by effective use of scarce capital (Linneman, 1998). Therefore the use of capital to finance a factor of production such as real estate may have a considerable effect on the ability of the firms to maximize shareholder value. Corporate real estate is used by firms to achieve certain objectives such as a source of cash when firm are in distress, a source of capital which may be disposed off to fuel growth opportunities and investments, and corporate real estate has the ability to improve the firm's market performance (Machlica and Borunch, 1989). Shariah compliant firms have a restriction in the use of debt of 33%. These non real estate companies use less debt for several reasons including that they may belong to the technology industry in which less debt is the norm in this industry and firms tap into other sources of capital such as equity and retained earnings, also they may be unattractive to banks and may not be able to secure debt financing.

The main contribution of this paper is to investigate empirically the implications of Shariah compliance conditions on Shariah investors from the perspective of the role corporate real estate ownership plays on Shariah compliant non-real estate US firms. Although there are several research studies on the effect of corporate real estate ownership on the returns of firms as well as the general riskiness to the level of corporate real estate ownership, there is little or no knowledge on how Shariah conditions may have an effect on the subsequent corporate real estate ownership of Shariah compliant non real estate firms and what role this linkages may play in the risks and returns of Shariah compliant firms. It is not known to what extent the direct effect on Shariah financial ratios restrictions has on corporate real estate holding and subsequently the effect on shareholder wealth on Shariah investors. In our study we have opted to investigate the US Shariah compliant firms for several reasons including that: a) the highest number of Shariah compliant firms exists in the United

States, b) the US market is one of the most oldest and developed in the world, hence data is readily available to able to answer our research questions.

Research Questions:

    i)   What is the corporate real estate ownership of US Shariah compliant non-real estate companies from 1994 to 2009?

    ii)   How do Shariah conditions affect the corporate real estate ownership of Shariah compliant non-real estate companies

    iii)   How does the level of the corporate real ownership due to the conditions of restrictions affect the Shariah compliant firm's financial performance?

Prior studies have examined the relationship between corporate real estate ownership and firm returns and have highlighted the importance of real estate ownership in explaining adjusted risk returns of firms. Deng and Gyourko (2000) find a negative significant relationship between the idiosyncratic component of returns and corporate real estate ownership for risky firms with high beta and high cost of capital firms during the period investigated from 1984 to 1993. In further studies, Brounen and Eicholtz (2000) find a negative but non-significant relationship between corporate real estate ownership and risk-adjusted stock performance in aggregate data; however they find that certain industries do exhibit a negative and significant relationship such as the communications and business services sector and some industries have positive relationship between CREO and risk-adjusted returns such as the transportation sector.

Further studies also show that a return penalty exists for certain type of firms that hold a high concentration of real estate specifically riskier firms. Liow (2004) investigates corporate real estate and stock performance in 75 non-real estate firms listed on the Singapore stock exchange, in line with the findings of Deng and Gyourko (2000), the study concludes that ownership of real estate by non-real estate firms can be associated with low returns, higher total and systematic risks and poorer abnormal return.

Our study is similar to the investigations above in that our interest also lies in understanding the relationships between risk-adjusted returns and corporate real estate ownership. However our study seeks to further the knowledge on corporate real estate ownership by examining Shariah compliant firms for the first time. Secondly we are

also interested in the relationships between certain financial variables and corporate real estate ownership; this is the first time the financial variables which may drive corporate real estate ownership are examined. Thirdly our research also furthers the investigation into differences and effects of corporate real estate ownership and returns between different industries particularly those that are highly-levered.

In our initial first stage analysis we attempt to understand the degree to which Shariah conditions play a role in the ownership of corporate real estate. Hence we examine each Shariah financial restrictions including specific financial ratios such as total debt divided by trailing 24-month average market capitalization, the sum of a company's cash and interest bearing securities divided by trailing 24 month average market capitalization and accounts receivables divided by trialing 24 month average market capitalization which must not be more than 33%. Do Shariah compliant firms with a higher or lower financial ratio restrictions exhibit differences in real estate ownership?

Why would Shariah compliant firms CREO be any different?
There are several reasons why the ownership of real estate in Shariah compliant firms may differ from non-Shariah firms, particularly in the financial restriction of leverage (<33%), leverage is positively related to real estate ownership, and real estate is useful to firms as a source of collateral to secure leverage, it is possible that firms who have low leverage, have low CREO and thus would result to other forms of financing rather than leverage. The relationship between financial restrictions of Shariah compliant firms such as cash+ interest- bearing securities, accounts receivable and corporate real estate ownership remains unknown, hence we can only speculate as to their relationships in developing our hypothesis.
In understanding the effect of Shariah conditions on corporate real estate ownership, only further tests can answer our empirical question. We do know that firms are financially restricted to be considered as Shariah compliant, one of the restricted financial ratios (leverage) has a strong relationship with real estate ownership. It is likely that differences in CREO are more profound in industries with higher use of leverage such as Oil and gas extraction, building construction, manufacturing firms, transportation services, communication, entertainment services and health services (Deng and Gyuorko, 2000). If firms in these industries are financially restricted, we

examine further if this may in any way influence the corporate real estate ownership between Shariah and non-Shariah firms.

Hypothesis 1: Positive relationship between leverage and corporate real estate ownership

We predict a positive relationship between corporate real estate ratios and leverage ratios. Hence if Shariah compliant firms are restricted in debt usage we should find that this may have linkages to the level of corporate real estate ownership in comparison to general firms. Cheong and Kim (1997) make mention in their paper that their exist situations in which changes in real estate value would greatly affect debt value, specifically where loans are made against real estate as a collateral.

This is because Shariah compliant firms are less prone to debt use; this may transcend to a lack of real estate ownership, real estate is collatarelizable assets which are often used to secure leverage from banks.

Hypothesis 2: There is a negative relationship between corporate real estate ratios and cash plus interest-bearing ratios.

Shariah compliant firms are restricted in the level of cash ratios we should find that firms with higher cash ratios would have less corporate real estate ownership.

In our predictions of our results, we should find that the conditions in which general firms are expected to satisfy to become Shariah compliant could result in a lower real estate ownership by firms, conditions such as restriction in the level of leverage which may starve up much needed capital financing which firms may need to finance capital-intensive factors of production such as real estate, or in retrospect the restriction in the level of debt may be as a result of firms not owning enough real estate which is a means to securing leverage in the form of collaterals. We also predict further that if a reduction of real estate ownership by Shariah compliant non-real estate firms is identified, then we ought to find that Shariah non-real estate firms should be less risky, hence this less risky firms should have lower betas hence lower expected returns. This intuition is similar to the findings of Tuzel (2010) which find that firms which have high real estate ownership as part of its capital is riskier than a firm which owns low real estate ownership as they have higher betas, hence investor demand a premium for firms with high real estate ownership.

Hypothesis 3: There is a negative significant relationship between corporate real estate ownership and idiosyncratic component of return in Shariah compliant firms.

Previous studies find a negative relationship between corporate real estate ownership and firm performance. We test this hypothesis on Shariah compliant firms, although previous results show a significant negative relationship, we suspect that the Shariah restrictions in Shariah compliant firms may have an effect on this relationship.

If our hypothesis 1 is true that leverage is an important factor in the ownership of real estate by Shariah compliant firms, then we ought to find that restrictions in leverage in Shariah compliant firms may reduce corporate real estate ownership, since prior studies have shown a positive relationship between leverage and CREO (see Deng and Gyourko, 2000). However this intuition is dependent on the differences between leverage ratios of Shariah compliant firms and non-Shariah firms, we predict that difference in corporate real estate ownership would be significant in highly indebted industries.

Hypothesis 4: There is a negative significant relationship between outperformance and high risk firms with high real estate concentration

If hypothesis 3 is true, then we can test if high risk firms with high real estate ownership may result in higher return penalties. Deng and Gyourko (2000) find that firms with high real estate concentrations and high betas (level of risk) experience lower returns.

Section 2 Literature Review

A number of studies have looking into the role corporate real estate ownership plays in firm performance. Deng and Gyourko (2000) find that there is a negative relationship between the idiosyncratic component of return (alpha) and the ownership of corporate real estate by non real estate firms, in other words, according to the findings of the study, non real estate firms who own a high concentration of real estate experience lower returns. Brounen and Eichholtz (2005) investigate corporate real estate ownership across industries in an international context (across nine countries and five continents). The study focuses on the effect of CREO on stock performance

of non-real estate companies, they find corporate real estate ownership generally decrease the risks and returns of non-real estate firms, however the authors conclude that not all returns of non-real estate firms based on industry classification are affected by corporate real estate ownership.

Sieler et al (2001) investigate the impact of real estate ownership of US firms between 1985 to 1994 and find an insignificant negative relationship between CREO and systematic risks (beta) and risk adjusted return.

Tuzel (2010) employs a general equilibrium production model and in the empirical test on the equilibrium model find that the returns of firms in the same industry with a high real estate capital ratio exceed that with firms with low real estate capital ratio by 3-6% annually when other factors such as size, momentum, value are considered and controlled for.

Cheong and Kim (1997) examine data from Korea and find that an increase in real estate prices does have an effect on firm value as well as firm investment behavior. The study examines increase in the value of real estate and finds that expectations for real estate price increase would result in firm value loss; the value loss according to the study is as a result of increasing potential investments for future growth opportunities.

Liow (2004) examine the role that corporate real estate ownership plays in the performance of non- real estate firms in Singapore and find that corporate real estate ownership is associated with lower returns, high systematic risk and poorer abnormal returns.

The impact of corporate real estate ownership on firm performance remains unclear and inconclusive. Prior studies using US data have shown an insignificant/significant negative relationship between CREO and firm performance. Of recent the study by Brounen and Eicholtz (2005) document a significant negative relationship in an international context. The unique characteristics of Shariah compliant firms have prompted us to revisit this research topic and extend the literature on the role of real estate ownership in firms' performance.

Section 3 Data and Methodology

3.1 Data

In our study, our data is collected from the NYSE, NASDAQ and AMEX stock exchange which were downloaded from the Center for Research in Security Prices (CRSP), the CRSP provides a comprehensive database on stock prices. We collect new data for Shariah compliant companies from the Dow Jones Islamic Index, the information provided by the Dow Jones Islamic Index includes firms that fully comply with qualitative screenings including firms that do not engage in certain type of activities which are non-permissible according to Shariah law as well as quantitative screenings which including the restrictions imposed on general firms including leverage (<33%) , accounts receivables(<33%) and cash including interest-bearing securities (<33%). Account information of each Shariah compliant firm is then collected from Compustat.

We measure the corporate real estate ownership (CRE0) as ratio of property, plant and equipment (PPE) divided by total asset measured in book value, this method formula for quantifying CREO is previously used in corporate real estate literature[2]

$$CREO = \frac{PPE}{Total\ Asset} \qquad (1)$$

Real estate is an illiquid asset as it takes months to years to acquire or dispose of assets due to search costs, asymmetric information etc; moreover it takes years to develop a property. Therefore it would be somewhat fictitious to answer our research questions by measuring real estate ratio annually therefore we measure real estate ratio on intermittent breaks of three years as seen in Brounen and Eichholtz (2005), however extended to 4 years to accommodate for the last year in our data sample. In our study we gather stock performance and balance sheet information in 1996, 1999, 2002, 2005, 2009 of Shariah compliant firms which are constituents of the Dow Jones Islamic Index.

---

[2] Deng and Gyourko (2000), Liow (2004) and Brounen and Eichholtz (2005) employ this ratio to quantify corporate real estate in firms.

3.2 Methodology

Our strategy in this study is to test if restrictions (financial ratios) on Shariah compliant firms in table 1 may have any subsequent relationship or effect on the firm's corporate real estate ownership. We aim to test if Shariah compliant firms which are restricted in financial ratios including leverage do in fact own less corporate real estate ownership and consequently how this may affect performance (returns) in the long-run. Our strategy is applied to other Shariah restrictions including cash + interest-bearing securities and accounts receivables. Are Shariah conditions associated with lower corporate real estate ownership? And subsequently how do these linkages affect performance (returns).

We test this by examining 1070 Shariah compliant non real estate companies. We use data from 1996 to 2009 time period.

The first part of the analysis would examine if Shariah restrictions have an effect on corporate real estate ownership using single-variate and multi-variate regression analysis.

$$CREO_i = f\ (SIZE_i, IND_i, LEVERAGE_i, CASH + INTEREST_i, ACCOUNT\ RECEIVABLES_i). \quad (1)$$

The equation above would test hypothesis 1-2, However for hypothesis 3, we run a t-test to understand if the financial restrictions in Shariah compliant firms leads to lower corporate real estate ratios compared to non- Shariah firms as seen below.

$$CREO_i (Shariah\ Compliant\ firms) = CREO_i\ (Non-Shariah\ firms)........ (2)$$

The second part of our analysis investigates if Shariah compliant firms enjoy return premiums with their real estate concentration; this is a follow-up from our first stage of analysis where we attempt to link Shariah restrictions to real estate concentration. In the latter part of our analysis we propose a two stage regression as seen in Deng and Gyourko (2000) to estimate the idiosyncratic component of return and systematic risk as seen in equation 1, subsequently in equation 2 we examine if the idiosyncratic component as derived in equation 1 has a relationship with corporate real estate ownership.

$$ERET_{it} = \alpha_i + \beta_i\ EMKT_{it} + \epsilon_{it} .... (3)$$

Where $ERET_{it}$ is monthly excess return of Shariah compliant firm, it is measured by the difference between monthly returns and 1 month T-Bill rate; α_i is measured as the idiosyncratic component of monthly excess return; β_i is the systematic risk; $EMKT_{it}$ is the monthly excess market return from the market portfolio; ϵ is the error term of the equation which follows a normal standard distribution.

$$\beta_i = f(CREO_i, SIZE_i, IND_i, PERFROMANCE_i)\ldots\ldots\ldots (4)$$

$$\widehat{\alpha}_i = f(CREO_i, SIZE_i, IND_i, FIRMBETA_i, PERFROMANCE_i)\ldots\ldots (5)$$

Equation 4 and 5 as seen above examines the relationship between the systematic risk (β_i) and idiosyncratic components of return($\widehat{\alpha}_i$) which is obtained from estimation of the first stage regression in equation 1 and $CREO_i$ which is the real estate ownership of firms, other variables are included in the equation include $SIZE_i$ which is the market capitalization as at year end, prior studies have shown that returns of firms may vary due to SIZE (Fama and French, 1993). We also include industry dummies (IND_i), $FIRMBETA_i$ is a dummy variable represents firm's beta, 1 for firms with beta lower than commercial real estate beta ((0.8 to 0.9), Gyuorko and Keim, 1992), we also interact firm beta dummy with corporate real estate ownership to understand if corporate real estate differs for low and high risk firms. $PERFROMANCE_i$ is a dummy variable, 1 are for firms which suffered at minimum of 10% drop during sample period.

3.3 Summary Statistics

Table 1 reports the mean of the CREO and Shariah restriction variables of Shariah compliant firms from 1996 to 2009. Shariah compliant firms are categorized into 18 industries according to SIC classifications. Table 1 shows the average of each variable in a yearly basis, while the number of observations is also specified.

The number of observations in each industry is disparate in our sample; we find that some industries such as electronic/electrical, materials and business services are well represented in our sample with high number of observations. However industries such

as building and heavy construction, Electric/Gas and textiles/apparels have low number of observations, hence a level of caution is necessary when analyzing these industries.

Corporate real estate ratio of the data sample of Shariah compliant firms from 1996 to 2009 is an average of 0.31, within the period investigated (1996-2009) 1999 recorded the highest CREO ratio of 0.34 and the lowest CREO ratio was in 2002 with a ratio of 0.29. CREO figures fluctuate during the years investigated as well as across industries, industries such as Mining/Oil & Gas extraction, Electric and Gas and Communications have high CREO ratio which exceed 0.50. However for some industries such as Building and Heavy Construction, Durable and non-durable goods, and business services CREO ratio is less than 0.25. These results are not surprising as industries which are involving in mining or gas and oil exploration tend to have more real estate than business services which may tend to lease real estate and business space rather than own.

In our investigations, CREO reduce by one percentage point from 1996 to 2009, however the highest variation is between 1999 to 2002 at 5%, and in most industries we observe reductions in the levels of CREO ownership. We interpret these results as firms reducing their corporate real estate ratios during the period investigated; however four industries increased their corporate real estate ownership including the mining and oil gas extraction, rubber and leather products, and apparel / accessory and retail stores.

Shariah compliant firms are leverage, cash and account receivable constrained[3], and therefore we examine the Shariah ratios within our sample period. Leverage ratios are measured by ratio of total debt (long term plus debt in current liability) divided by common share outstanding multiplied by share price. We find that the average leverage ratio of Shariah compliant firms is 0.24; the leverage ratios between the sample periods 1996 to 2009 vary from 0.21 to 0.28. We observe higher leverage ratios among industries; such as Mining & Oil Gas Extraction at 0.46 and health services at 0.51, industries such as retail stores and apparel & accessory stores have lower leverage ratios at 0.11 and 0.15 respectively. Industries with higher leverage

---

[3] For firms to be considered Shariah compliant they must comply with certain restrictions including leverage (<33%), accounts receivables (<33%) and cash including interest-bearing securities (<33%), the denominator for the ratio is the average 24month market capitalization of the firm.

ratios in our sample tend to be highly industrialized; these firms tend to rely on multiple financing options as they are more likely to own rather than lease real estate, assets and customized valuable equipments and machineries.

Shariah compliant firms are also restricted by cash + interest bearing securities and account receivables which must not exceed 33%. During 1996-2009, in aggregate terms both Shariah ratios peaked at 2002 at 0.14 and 0.12 respectively.

Section 4 Empirical Findings and Analysis

4.1 Stock Performance of Shariah complaint Firms

To answer our research question as highlighted in section 1, we collect excess stock returns (stock returns less 3month treasury bill) of each Shariah compliant firms as well as the excess CRSP value-weighted market return. We collect this data, so as to run individual stock returns alongside the market return to derive the idiosyncratic component (out-performance) and beta (risk). The relationships between CREO and idiosyncratic risks alongside beta would be examined in latter parts of the study. Table 2 shows average returns of Shariah compliant firms during the years 1996, 1999, 2002, 2005 and 2009, the alpha (outperformance) and beta (risk) from the single-variate regression (see equation 3) is also tabulated.

We find in our analysis Shariah compliant firms outperform the CRSP market from 1996 to 2009, 1999 recorded the highest return (idiosyncratic component) of 0.03. The beta of Shariah compliant firms varied from a high of 1.47 in 2002 to a low of 1.10 in 2009 with an overall average of 1.35, we find that the systematic risks of Shariah compliant firms tend to be higher than the CRSP market. We identify variations in systematic risk (beta), although we generally tend to find that returns of Shariah compliant firms tend to be riskier than the market returns.

However, we find that industries such as chemical and allied products, electric & gas, health services and retail stores have low systematic risks compare to movements in the market returns. The product demands for these industries are stable as they can be considered as essentials which don't fluctuate sporadically.

The first column of table 2 shows average returns of Shariah compliant firms during the period investigated, we find the highest fluctuation of returns between 2005 and 2009, which also corresponds to the highest beta variation.

4.2 Correlations between Corporate Real Estate Ownership, Alpha (Out-performance) Beta (Risk) and Shariah Variables

Our interest in this study lies in the relationship between corporate real estate ownership and firm performance (returns and risk) of Shariah compliant firms. Hence this part of the study outlines the correlation analysis between CREO, alpha, beta and Shariah restriction variables.

Table 3 column 1 highlights the correlation coefficients between CREO and the idiosyncratic component of return (alpha), we find that CREO and alpha tend to be generally negatively correlated except in five industries[4] were a positive correlation is documented, this industries tend to be more low yield industries. In aggregate terms, we find a negative insignificant correlation with alpha and CREO in Shariah compliant firms from 1996 to 2009.

 Brounen and Eicholtz (2005) find a significant negative correlation between CREO and alpha, however we document from our findings that correlations between CREO and alpha for Shariah complaints firms are negative but not significant.

We find that this insignificance is often the case in most industries however a number of industries show a negative significant relationship such as Mining and Oil & Gas, Retail and Health Services which tend to be high yield industries. The results reaffirm the notion that real estate may not contribute highly to the returns of a firm in comparison to its core activity. Furthermore we observe that the correlation between CREO and returns in Shariah compliant firms is closer to zero at -0.029 which is disparate to earlier results of CREO literature.

We compute the correlations between CREO and beta (risk), our results shows that in aggregate terms there exists a statistically significant negative correlation between CREO and risk. The correlation results are interpreted as firms with higher CREO tend to be less risky or alternatively that less risky firms tend to own high CREO. However we find that the correlation coefficients between CREO and risk vary between industries, Shariah compliant firms based on industry classifications tend to also exhibit a positive correlation between CREO and beta in 10 out of 19 industries examined.

---

[4] Shariah complaint firms in five industries show a positive insignificant correlation between alpha and CREO including Textiles and Apparels, Materials, Communications, Electric and Gas and Business services.

In our initial correlation results we find similar results in aggregate terms with general firms (Brounen and Eicholtz, 2005), however disparate results according to industrial classifications is evident in Shariah compliant firms. The difference in results particularly the insignificant negative correlation between CREO and the idiosyncratic component of return (alpha) may be as a result of the restrictions in which Shariah compliant firms must adhere to. We examine the correlation between CREO and Shariah restrictive variables in the final column of table 3.

To be considered as Shariah compliant, firms must operate in permissible activities as well as fulfill the quantitative criteria of less than 33% leverage, Cash + interest bearing securities and account receivables to an average market capitalization of 24months. Hence we examine the correlations between CREO and Shariah variables, earlier studies have highlighted a positive relationship between CREO and leverage ratios.

The correlation results between CREO and leverage is positive and significant at the 1% level, in our sample data we find that firms that have higher leverage would tend to have higher CREO. An alternative argument is that firms with higher CREO may have higher leverage since CREO serve as good collateral for securing leverage. This result can be seen across all industry classifications, since importance of leverage on CREO cannot be overstated, we are interested in understanding how this Shariah restriction may affect CREO and subsequently its importance in its relationship with returns in Shariah compliant firms.

Furthermore we explore the correlation between CREO and other Shariah restrictive variables and we observe a negative correlation significant at the 1% level between CREO and cash + interesting bearing securities, firms with high cash ratios would tend to own less CREO. An alternative view is that firms with high CREO have lower cash ratios, as excess cash may have been used to re-invest in CREO. The negative correlation cuts across most industry class.

The correlation between accounts receivables and CREO is positive albeit close to zero and insignificant. We also find that across industry classifications there is variation in correlation coefficients which alternates between positive and negative, hence the relation between accounts receivables and CREO cannot be ascertained.

According to our correlation between Shariah restrictive variables, we find a strong statistically significant positive relationship between leverage and CREO. A high leveraged firm would own more CREO; an interesting question thus arises, if Shariah

compliant firms are restricted in leverage would this affect CREO and to what extent would the returns of firms be affected. We seek to explore this question in the next subsection.

4.3 Regression Analysis and Results

Table 4 shows the multi-variate regressions between beta and CREO, in aggregate terms; we develop two techniques to measure CREO as seen in Deng and Gyourko (2000). In the first method we employ a continuous form in measuring CREO, while the second method involves the measurement of CREO in dichotomous dummy variable in which firms with CREO higher than the median CREO takes a value of 1. In the multi-variate model in table 4, Beta is the dependent variable and we run it on CREO including other variables such as size of the firm, leverage, cash + interesting bearing securities and poor-performing firms which is a dummy variable.

In our multi-variate regressions we also control for industry fixed effects and yearly effects, we further our analysis to include regressions on each industry, and we run the regression on ten industries in which we have sufficient data to carry out our analysis. Before we address the correlations between CREO and beta (risk) in our multivariate results, we discuss the results of other independent control variables in the model. We measure Size as the log of market capitalization of each Shariah compliant firm, in aggregate terms we find a negative significant correlation between beta and Size, the larger the firms the less risky they are. The result is evident among all industries investigated excluding apparel and accessory stores which show a positive insignificant correlation.

Leverage is measured by the ratio of total to common shares outstanding multiplied by share price. The coefficient of leverage in aggregate terms is negative and insignificant for all Shariah firms but significant for firms with high real estate concentration, the results show that firms with high leverage tend to be more low risk. The ratio cash + interesting bearing securities to market capitalization is positive and significantly correlated to beta (risk). We also find a significant positive correlation with CREO and poor performance; we measure poor performance as dummy variable, firms which experience a ten percent level drop in market capitalization within the sample period investigated takes the value of 1. The inclusion of this variable increased our r-squared, in addition, firms that have lost market capitalization may be

disposing off their CREO in bad times, hence it is important we control for this to prevent misspecifications in our model.

The correlation coefficient for CREO in explaining risk of firms is negative however statistically insignificant, however we generally find that when we examine the correlation across industry classifications, quite a number of the industries have a positive and insignificant relationship with beta. We conclude that although we find a negative and insignificant relationship between beta and CREO, this correlation is inconsistent with Shariah compliant firms.

In table 5 we replicate the model in table 4; firm outperformance (alpha) is the dependent variable, in aggregate terms we find a flat or zero correlation between CREO and the idiosyncratic component of Shariah compliant firms. Our results on Shariah compliant firms differ from the significant negative relationship in general firms as seen in Brounen and Eicholtz (2005). These results may differ for several reasons including that the authors use an international data consisting of nine countries. We also include in the second model the dichotomous variable in which firms with CREO (CREO>50%) higher than the median take the unit value 1.

Our results in the US equities context can be compared to the study of Deng and Gyourko (2000) who study the role corporate real estate plays in the idiosyncratic component of a firm's return with US equities, the results in the study are similar to our observations here that there is an insignificant correlation with CREO and idiosyncratic component of return (alpha), however the study finds a significant negative correlation with alpha and firms with higher concentration of CREO (above sample median). We test the hypothesis that Shariah firms with higher concentration of real estate have a significant negative relationship with alpha; however we reject the hypothesis that this applies to Shariah compliant firms as we find no significant correlation.

In Table 6, we run two model specifications, first we interact CREO with high and low beta and in the second model we interact firms with high CREO with a dummy variable which specifies if the firm's beta is below or higher than 0.9, 0.9 represents the commercial real estate risk as seen in Deng and Gyourko (2000). We find a negative correlation between idiosyncratic return and CREO in all CREO and risk interactions including low risk firms. Similar to previous study we find that the correlation between alpha and high risk firms with low CREO is closer to zero, in contrast a return penalty is more evident in high risk firms and in high risk firms with

high CREO, although we find an insignificant correlation in Shariah compliant firms unlike previous results in general firms which find a significant correlation between alpha and high risk firms with high CREO (Deng and Gyourko, 2000).

Section 5 Robustness Tests

In this section we attempt to use other techniques to validate our results that unlike general firms, the restrictions in Shariah compliant firms may in fact have an effect in CREO, which may then have an effect in the significance of the return penalty often associated with CREO. In our initial analysis we find that Shariah restrictive variables specifically leverage and cash + interest bearing securities are significantly correlated with corporate real estate ownership (CREO). An important question we attempt to answer is if the restriction of these variables does in fact affect corporate real estate ownership. The importance of corporate real estate ownership in explaining the idiosyncratic component of returns has been explored in past literature.

In our initial methodology, we use equity betas; however the use of equity betas in our analysis could involve misspecifications due to the correlation between leverage and CREO and its influence on equity betas. Hence we check the robustness of our results by using asset betas as seen in Deng and Gyourko (2000) to proxy for systematic risk. In estimating asset betas we follow the estimation of asset beta by Gyourko & Nelling (1996)

$$\beta_A = \left(\frac{D}{SXP} \right) \beta_D + \left(1 - \frac{D}{SXP} \right) \beta_E \qquad (6)$$

In the formula above β_A is the asset beta to be estimated, D is total debt (long term debt + short term liabilities), S is common shares outstanding, P is the Share Price, β_D is the debt beta of each firm (we assume debt beta of 0.20) and β_E is the equity beta of each firm which we estimate from equation 3. Our result in table 7 shows the estimation of our models in which we used asset betas for high and low betas, the return penalty to increase slightly. However our findings show a statistical insignificance in the role corporate real estate ownership plays in explaining the idiosyncratic returns of Shariah compliant firms.

Section 6 Conclusion

Prior studies have shown a negative relationship between corporate real estate holdings and firm performance (risk-adjusted returns). We look into these assertions in Shariah compliant firms and find an insignificant negative relationship and a flat relationship (coefficients close to zero) between CREO and the idiosyncratic component of returns.

Shariah compliant firms are different from general firms in several ways including limitations in business activities and more importantly they are restricted in financial ratios which must not exceed 33%, these financial ratios include leverage, cash + interesting bearing securities and account receivables. Shariah compliant restrictive variables including leverage and cash are significantly correlated with corporate real estate ownership. Leverage has a positive and significantly correlation with CREO. We suspect that these restrictions in leverage may reduce CREO in Shariah compliant firms, and significantly reduce the role CREO has on the returns of Shariah compliant firms.

In ten major industries investigated we find a positive correlation with CREO and alpha (outperformance) and in two industries are flat correlation, we find a negative correlation in only three industries.

Our results show that corporate real estate holding of Shariah compliant firms do not have any effect on the outperformance of firms' returns, although we find that CREO generally decrease the risk of Shariah compliant firms. Our explanation for this is that the combination of the activities of these firms (industry classification) and the Shariah financial restrictions has an implication in the significance of high corporate real estate ownership relating to lower returns.

We find that the general rule of thumb that corporate real estate ownership decreases return of the firm may not apply in some cases, specifically in Shariah compliant firms. We echo the assertions of Brounen and Eicholtz (2005) that the sector in which a firm is active can skew the results in the negative relationship between CREO and firms' returns, as this is evident in Shariah compliant firms.

Furthermore, an investigation into Shariah compliant firms in an international context is required; this would validate the results that corporate real estate ownership plays no role in explaining firm performance as seen in our investigation is the U.S context.

Appendix

Table 1. Corporate real estate ownership and Shariah compliant restrictions by industry and year, 1996-2009.

	N	CREO	Leverage	Cash + Interest bearing	Account Receivables
All Sectors					
1996	320	0.32	0.25	0.06	0.10
1999	458	0.34	0.23	0.04	0.08
2002	549	0.29	0.28	0.14	0.12
2005	622	0.30	0.21	0.07	0.09
2009	550	0.31	0.24	0.11	0.10
1996-2009	2499	0.31	0.24	0.09	0.10
Mining/Oil & Gas Extraction					
1996	18	0.74	0.30	0.03	0.08
1999	27	0.90	0.59	0.03	0.08
2002	22	0.68	0.62	0.05	0.12
2005	51	0.70	0.35	0.05	0.07
2009	52	0.82	0.50	0.06	0.07
1996-2009	171	0.79	0.46	0.05	0.08
Building and Heavy Construction					
1996	3	0.21	0.62	0.05	0.01
1999	4	0.25	0.34	0.26	0.05
2002	5	0.26	0.42	0.12	0.20
2005	7	0.09	0.22	0.18	0.24
2009	6	0.22	0.42	0.08	0.22
1996-2009	25	0.20	0.37	0.14	0.17
Textiles and Apparels					
1996	5	0.28	0.43	0.02	0.21
1999	5	0.27	0.29	0.04	0.23
2002	5	0.32	0.34	0.08	0.18
2005	5	0.25	0.39	0.04	0.17
2009	7	0.20	0.11	0.15	0.09
1996-2009	27	0.26	0.29	0.07	0.18
Lumber, wood and furniture products					
1996	6	0.50	0.15	0.06	0.12
1999	8	0.47	0.23	0.03	0.16
2002	15	0.39	0.39	0.06	0.14
2005	16	0.44	0.34	0.03	0.12

2009	10	0.42	037	0.05	0.13
1996-2009	55	0.44	0.32	0.05	0.13
Chemical & Allied Products					
1996	50	0.26	0.38	0.06	0.10
1999	50	0.29	0.15	0.07	0.04
2002	72	0.24	0.16	0.09	0.05
2005	86	0.26	0.21	0.09	0.03
2009	75	0.25	0.19	0.06	0.10
1996-2009	343	0.26	0.21	0.07	0.06
Rubber and Leather Products					
1996	2	0.18	0.06	0.09	0.13
1999	6	0.43	0.39	0.11	0.17
2002	9	0.32	0.30	0.14	0.17
2005	8	0.27	0.24	0.09	0.07
2009	11	0.29	0.21	0.13	0.15
1996-2009	36	0.31	0.26	0.11	0.14
Materials Industry					
1996	46	0.28	0.14	0.10	0.14
1999	58	0.31	0.18	0.09	0.16
2002	59	0.27	0.32	0.08	0.12
2005	67	0.26	0.20	0.12	0.13
2009	70	0.28	0.30	0.15	0.11
1996-2009	300	0.28	0.24	0.11	0.13
Electronic and Electrical equipment					
1996	50	0.33	0.16	0.06	0.11
1999	68	0.30	0.12	0.16	0.12
2002	82	0.27	0.28	0.15	0.12
2005	77	0.24	0.17	0.08	0.04
2009	69	0.20	0.18	0.09	0.08
1996-2009	346	0.27	0.19	0.11	0.10
Transport, Transport Equipment and Manufacturing					
1996	7	0.62	0.26	0.06	0.15
1999	17	0.61	0.30	0.11	0.09
2002	29	0.39	0.30	0.07	0.09
2005	27	0.42	0.21	0.06	0.09
2009	36	0.38	0.23	0.08	0.16
1996-2009	122	0.43	0.26	0.07	0.16
Communications					
1996	5	0.63	0.86	0.01	0.06
1999	9	0.62	0.39	0.10	0.07
2002	7	0.55	0.66	0.06	0.08

2005	5	0.44	0.40	0.10	0.07
2009	6	0.40	0.50	0.09	0.05
1996-2009	32	0.54	0.54	0.08	0.07
Electric, Gas					
1996	2	0.78	0.87	0.03	0.14
1999	2	0.64	0.39	0.00	0.09
2002	1	0.26	0.30	0.01	0.05
2005	5	0.59	0.25	0.01	0.05
2009	6	0.73	0.50	0.07	0.08
1996-2009	16	0.68	0.43	0.03	0.08
Durable & Non-Durable Goods					
1996	8	0.22	0.66	0.06	0.11
1999	11	0.27	0.49	0.07	0.11
2002	16	0.23	0.51	0.06	0.26
2005	15	0.16	0.11	0.08	0.24
2009	12	0.20	0.24	0.07	0.23
1996-2009	62	0.21	0.37	0.06	0.20
Apparel & Accessory Stores					
1996	6	0.31	0.19	0.11	0.07
1999	11	0.38	0.22	0.06	0.09
2002	15	0.40	0.25	0.07	0.05
2005	18	0.36	0.08	0.1	0.02
2009	17	0.35	0.07	0.08	0.08
1996-2009	67	0.37	0.15	0.08	0.06
Eating and Drinking Retail					
1996	3	0.45	0.31	0.02	0.01
1999	7	0.45	0.29	0.05	0.09
2002	10	0.41	0.31	0.03	0.08
2005	15	0.40	0.25	0.07	0.07
2009	6	0.28	0.14	0.05	0.07
1996-2009	41	0.40	0.26	0.05	0.07
Business Services					
1996	40	0.17	0.12	0.04	0.09
1999	75	0.15	0.09	0.08	0.09
2002	79	0.13	0.16	0.13	0.05
2005	77	0.11	0.09	0.30	0.11
2009	76	0.12	0.09	0.10	0.12
1996-2009	347	0.14	0.11	0.14	0.09
Health Services					
1996	3	0.48	0.13	0.19	0.11
1999	4	0.54	0.57	0.04	0.13
2002	13	0.32	0.70	0.02	0.16
2005	13	0.35	0.52	0.04	0.10

2009	8	0.11	0.28	0.01	0.09
1996-2009	41	0.37	0.51	0.04	0.09
Lab, Medical and Opth Instruments					
1996	28	0.26	0.10	0.09	0.08
1999	37	0.23	0.12	0.11	0.09
2002	46	0.23	0.19	0.07	0.09
2005	49	0.18	0.12	0.06	0.09
2009	35	0.15	0.13	0.06	0.08
1996-2009	195	0.21	0.14	0.08	0.09
Retail Stores					
1996	4	0.32	0.03	0.00	0.05
1999	4	0.32	0.02	0.05	0.01
2002	7	0.36	0.05	0.04	0.00
2005	9	0.40	0.08	0.05	0.00
2009	8	0.43	0.20	0.13	0.02
1996-2009	31	0.38	0.09	0.05	0.01
Table 1 shows the CREO and Shariah financial ratios of Shariah compliant firms from 1996 to 2009. Corporate real estate ownership is measured by the ratio property, plant and equipment to total asset. Leverage is measured by the ratio of total debt plus debt in current liability) divided by common shares outstanding multiplied by share price. Cash + interest bearing securities is measured by the ratio cash + interest bearing securities by market capitalization and account receivables is calculated by account receivables by market capitalization.					

Table 2. Industrial beta and return statistics, 1996-2009

	N	Avg. Ret	Alpha	Avg. Beta	Size
All Sectors					
1996	327	2.48%	0.01	1.41	6.68
1999	466	4.28%	0.03	1.20	14.19
2002	557	-0.97%	0.02	1.47	7.68
2005	630	1.00%	0.01	1.53	10.97
2009	547	4.74%	0.01	1.10	11.41
1996-2009	2538	2.23%	0.02	1.35	10.38
Mining/Oil & Gas Extraction					
1996	18	2.48%	0.02	1.30	9.22
1999	27	4.30%	0.02	1.45	7.82
2002	22	-0.97%	0.02	1.33	9.22
2005	51	1.26%	0.03	1.23	5.97
2009	52	4.75%	0.02	1.28	9.03
1996-2009	171	2.24%	0.02	1.30	7.95
Building and Heavy Construction					

1996	3	3.42%	0.04	0.52	0.51
1999	4	0.06%	0.01	1.69	2.53
2002	5	-1.69%	0.02	1.07	3.56
2005	7	2.24%	0.01	1.51	4.16
2009	6	2.60%	-0.03	1.90	0.89
1996-2009	25	1.37%	0.01	1.43	2.56
Textiles and Apparels					
1996	5	3.98%	0.01	0.82	2.32
1999	5	2.16%	-0.02	0.95	1.24
2002	5	0.54%	0.03	0.57	3.29
2005	5	3.17%	0.00	0.89	2.17
2009	7	5.06%	0.01	1.73	4.62
1996-2009	27	3.10%	0.00	1.10	2.85
Lumber, wood and furniture products					
1996	6	1.93%	0.02	1.08	3.49
1999	8	0.98%	-0.01	0.70	2.46
2002	15	-0.32%	0.02	1.24	2.81
2005	16	-0.51%	-0.01	1.22	10.79
2009	10	5.96%	-0.00	1.21	3.86
1996-2009	55	1.61%	0.00	1.14	5.46
Chemical & Allied Products					
1996	50	2.22%	0.00	1.08	14.77
1999	50	4.36%	0.02	0.94	26.25
2002	72	-1.86%	0.00	0.77	24.20
2005	86	0.62%	0.00	1.16	7.32
2009	75	3.69%	0.01	0.81	15.73
1996-2009	343	1.69%	0.01	0.94	17
Rubber and Leather Products					
1996	2	2.87%	0.01	0.16	15.34
1999	6	0.78%	0.02	0.61	6.08
2002	9	0.98%	0.01	0.95	4.45
2005	8	0.44%	0.00	1.86	4.30
2009	11	6.95%	0.01	0.97	0.84
1996-2009	36	2.02%	0.01	1.05	4.10
Materials Industry					
1996	46	2.96%	0.01	2.03	4.75
1999	58	4.08%	0.02	1.38	4.76
2002	59	-0.74%	0.02	2.31	6.58
2005	67	1.23%	0.01	1.38	15.83
2009	70	5.71%	0.02	1.99	16.32
1996-2009	300	2.68%	0.02	1.80	10.40
Electronic and Electrical					

equipment					
1996	50	2.40%	0.00	1.33	5.65
1999	68	9.90%	0.07	2.08	4.98
2002	82	-2.55%	0.02	2.24	9.44
2005	77	0.14%	0.05	3.06	8.93
2009	69	6.11%	0.02	1.24	7.37
1996-2009	346	2.92%	0.04	2.07	7.48
Transport, Transport Equipment and Manufacturing					
1996	7	2.00%	0.00	1.60	2.64
1999	17	3.53%	0.02	0.94	4.85
2002	29	-0.70%	0.03	1.03	5.20
2005	27	0.74%	0.00	1.62	7.47
2009	36	3.63%	0.01	1.29	8.55
1996-2009	122	1.79%	0.01	1.29	6.17
Communications					
1996	5	1.18%	-0.01	1.05	10.97
1999	9	5.03%	0.04	1.53	26.70
2002	7	0.66%	0.00	2.04	26.46
2005	5	1.65%	0.00	0.98	26.87
2009	6	5.42%	0.01	0.86	32.55
1996-2009	32	2.82%	0.01	1.30	25.28
Electric, Gas					
1996	2	1.68%	-0.01	0.21	1.62
1999	2	1.99%			
2002	1	2.11%	0.03	1.03	1.22
2005	5	1.86%	0.04	1.32	6.19
2009	6	2.30%	0.02	0.65	11.55
1996-2009	16	1.99%	0.02	0.91	7.23
Durable & Non-Durable Goods					
1996	8	1.77%	-0.01	1.24	3.89
1999	11	1.59%	-0.01	0.69	5.52
2002	16	-0.56%	0.01	0.92	4.40
2005	15	1.79%	0.00	1.12	4.76
2009	12	5.10%	0.01	0.82	3.91
1996-2009	62	2.04%	0.00	1.00	4.34
Apparel & Accessory Stores					
1996	6	5.20%	0.02	1.28	2.27
1999	11	3.02%	0.00	0.41	5.10
2002	15	0.06%	0.03	1.31	2.71
2005	18	2.08%	0.01	1.52	3.95
2009	17	7.24%	0.04	1.01	4.03
1996-2009	67	3.29%	0.02	1.15	3.73

Eating and Drinking Retail					
1996	3	2.19%	-0.03	3.11	3.05
1999	7	0.30%	-0.02	0.84	10.09
2002	10	1.31%	0.02	0.93	7.07
2005	15	0.65%	0.00	1.5	9.98
2009	6	5.73%	0.02	0.78	18.42
1996-2009	41	1.90%	0.00	1.21	10.02
Business Services					
1996	40	2.11%	0.02	1.6	6.23
1999	75	8.37%	0.05	2.00	22.33
2002	79	-1.70%	0.02	2.14	7.18
2005	77	4.65%	0.00	1.75	12.63
2009	76	4.35%	0.02	0.87	13.25
1996-2009	347	2.44%	0.02	1.67	12.87
Health Services					
1996	3	2.98%	0.02	0.77	1.77
1999	4	-2.67%	-0.04	1.60	1.83
2002	13	-1.02%	0.00	-0.04	2.64
2005	13	1.55%	0.01	0.44	4.25
2009	8	4.21%	0.01	0.82	3.86
1996-2009	41	0.94%	0.00	0.51	
Lab, Medical and Opth Instruments					
1996	28	2.17%	0.00	1.78	1.94
1999	37	5.40%	0.03	0.99	3.89
2002	46	-1.59%	0.03	1.23	4.24
2005	49	0.84%	0.00	1.50	6.96
2009	35	3.90%	0.01	1.02	9.15
1996-2009	195	2.07%	0.02	1.29	5.42
Retail Stores					
1996	4	4.21%	0.03	1.61	1.84
1999	4	1.37%	0.00	0.29	5.91
2002	7	-1.14%	0.01	0.76	4.97
2005	9	-1.03%	-0.01	1.47	5.55
2009	8	5.99%	0.03	3.91	2.39
1996-2009	31	1.92%	0.01	0.94	10.12
Table 2 depicts the average monthly returns of firms, alpha is the idiosyncratic component of return of each firm which is derived from equation 3, beta is the systematic risk of each firm derived from equation 3 and size is the average year end market capitalization measured in billions of dollars.					

Table 3 Correlation coefficients between CREO, Return, Risk and Shariah Var.

Standard Industrial Classification	n	Return Correl CREO, α	Risk Correl CREO, βe	SC Variables Correl CREO, DR	Correl CREO, CR	Correl CREO, AR
Mining/Oil & Gas Extraction	171	-0.22***	0.06	0.76***	-0.16**	-0.11
Building and Heavy Construction	25	-0.09	-0.18	0.35*	-0.08	0.57***
Textiles and Apparels	27	0.09	-0.13	0.37*	-0.21	-0.20
Lumber, wood and furniture products	55	-0.14	0.06	0.70***	-0.25*	-0.17
Chemical & Allied Products	75	-0.03	-0.01	0.23***	0.00	0.34***
Rubber and Leather Products	343	-0.20	0.03	0.85***	-0.28*	-0.04
Materials Industry	300	0.02	0.05	0.57***	-0.18***	0.07
Electronic and Electrical equipment	346	-0.04	0.12***	0.53***	-0.03	-0.04
Transport, Transport Equipment and Manufacturing	122	-0.08	-0.05	0.50***	-0.06	0.18***
Communications	122	0.18	-0.16	0.67***	-0.56***	0.18
Electric, Gas	16	0.23	0.21	0.51***	0.02	-0.03
Durable & Non-Durable Goods	62	-0.01	0.15	0.81***	-0.12	-0.05
Apparel & Accessory Stores	67	-0.03	0.08	0.67***	-0.27***	0.39***
Eating and Drinking Retail	41	-0.28*	-0.20	0.56***	-0.24	-0.16
Business Services	347	0.03	-0.04	0.18***	-0.02	0.09
Health Services	41	-0.44***	-0.08	0.66***	-0.31**	0.46***
Lab, Medical and Opth Instruments	195	-0.01	-0.00	0.58***	-0.06	0.24***
Retail Stores	31	-0.49***	0.01	0.74***	-0.13	0.43**
All Sectors	2538	-0.029	-0.04**	0.48***	-0.06***	0.02

Table 4 depicts correlation coefficients between corporate real estate ownership and the Jensen Alpha (α), Beta (β), Debt Ratio (DR), Cash Ratio (CR) and Accounts Receivables (AR) of Shariah compliant firms. Correlation coefficients marked with ***, **,* are statistically significant at the 1%, 5% and 10% respectively.

Table 4 Second Stage least squares regression output

Variables	Constant	CREO	Size	Debt	Cash	Poor Performance	Adj R^2
A. Beta Overall	2.04***	-0.13	-0.22***	-0.08	1.25***		0.05

	Constant	CREO	Size	Debt	Cash	Poor Performance	R^2
A. Beta Overall	1.85***	-0.16	-0.15***	0.00	1.96***	0.23***	0.07
CREO>50%	2.00***	-0.01	-0.22***	-0.12*	1.31***		0.05
CREO>50%	1.81***	-0.03	-0.15***	-0.04	2.02***	0.23***	0.07
Mining/Oil & Gas Extraction	1.21**	0.00	0.00	0.09	1.09		-0.01
Rubber and Leather Products	0.90	1.29	-0.05	-0.84	1.17		-0.10
Materials Industry	2.00***	0.40	-0.15	0.01	1.77**		0.03
Electronic and Electrical equipment	2.48***	0.50	-0.22*	0.22	1.24		0.04
Transport,	2.00***	-0.12	-0.26**	-0.06	2.45**		0.04
Communications	1.26	-0.54	-0.05	0.59	2.49		-0.06
Durable & Non-Durable Goods	2.51***	0.02	-0.47*	0.17	-0.10		0.02
Apparel & Accessory Stores	0.11	1.63	0.09	-0.71	2.30		0.00
Business Services	3.01***	-0.58	-.033**	-0.38	-0.86		0.00
Lab, Medical and Opth Instruments	1.88***	-0.05	-0.29	-0.15	5.21***		0.07

Table 4 depicts the model in which beta from the first stage regression is the dependent variable, the independent variables include CREO which is the corporate real estate ownership ratio measured by property, plant and equipment to total assets, Size is the log of the end of year market capitalization, debt is the ratio of total debt to common share outstanding multiplied by share price, Cash is measured by the ratio cash + interest bearing securities by market capitalization. Poor performance is a dummy variable in which unit value 1 is given to any firm which drops10% in market capitalization within the period investigated.

Table 5 Second Stage regression output

	Variables							
	Constant	CREO	Size	Debt	Cash	D.Beta	Poor Performance	R^2
B. Alpha Overall	0.01	-0.0044	0.00	-0.01	-0.03	0.00		0.02
B. Alpha Overall	0.03	-0.0083	0.00	-.01	-0.03	-0.01	-0.00	0.02
CREO >50%	0.01	0.00	0.00	-0.01**	-0.03	-0.004		0.02
CREO >50%	0.02	0.00	0.00	-0.01	-0.03	-0.01	-0.00	0.02
Mining/Oil & Gas Extraction	0.02	0.00	0.00	0.00	0.01			0.04
Rubber and Leather	0.04	-0.01	-0.01	-0.01	-0.03			-0.05

Products								
Materials Industry	0.01	0.01	0.00	-0.01	-0.06**			0.04
Electronic and Electrical equipment	0.03	-0.05	0.01	0.01	-0.10			0.00
Transport,	0.02	-0.02	0.00	0.00	-0.02			0.00
Communications	-0.05	0.03	0.01	-0.02	0.07			-0.05
Durable & Non-Durable Goods	-0.02	-0.03	0.01	0.01	0.05			-0.04
Apparel & Accessory Stores	0.00	0.01	0.00	-0.01	0.11**			0.00
Business Services	0.00	0.02	0.01*	-0.02	-0.09**			0.04
Lab, Medical and Opth Instruments	0.05	0.02	-0.01	-0.06	-0.06			-0.01

Table 5 depicts the model in which alpha from the first stage regression is the dependent variable, the independent variables include CREO which is the corporate real estate ownership ratio measured by property, plant and equipment to total assets, Size is the log of the end of year market capitalization, debt is the ratio of total debt to common share outstanding multiplied by share price, Cash is measured by the ratio cash + interest bearing securities by market capitalization. Poor performance is a dummy variable in which unit value 1 is given to any firm which drops10% in market capitalization within the period investigated.

Table 6 Second stage regression output

Variable	Model 5	Model 6
CREO Ratio * H Beta	-0.0131	
CREO Ratio * L Beta	-0.0010	
RC>50% * H Beta		-0.0001
RC>50% * L Beta		0.0034
Log Size	-0.0002	-0.0004
Poor Performance	-0.0027	-0.0025
Leverage	-0.0096	-0.0118**
Cash	-0.0294	-0.0237
Constant	0.0247	0.0233
R^2	0.02	0.02

The dependent variable is the idiosyncratic component of return. The pooled sample contained 1070 Shariah compliant firms, industry specific fixed effects were estimated for all models. CREO Ratio * H Beta is the CREO variable interacted by a high beta dummy which indicates 1 if beta is higher than 0.9 which is the average level in commercial real estate industry, CREO Ratio * L Beta is the CREO beta interacted by low beta dummy variable which indicates 1 if beta is lower than 0.9. RC>50% * H Beta is the CREO dummy variable above median interacted by high beta dummy which indicates 1 if beta is higher than 0.9. RC>50% * L Beta is the CREO dummy variable below median interacted by low beta dummy variable which indicates 1 if beta is lower than 0.9

Table 7 Second stage least squares regression output (Robustness)

Variable	Model 5	Model 6
CREO Ratio * H Beta	-0.0246	
CREO Ratio * L Beta	-0.0044	
RC>50% * H Beta		-0.0043
RC>50% * L Beta		0.0029
Log Size	-0.000	-0.0001
Poor Performance	-0.0027	-0.0028
Leverage	-0.0098*	-0.0110
Cash	-0.0274	-0.0218
Constant	0.0144	0.0095
R^2	0.02	0.02

The dependent variable is the idiosyncratic component of return. The pooled sample contained 1070 Shariah compliant firms, industry specific fixed effects were estimated for all models. Beta estimation in this table is the asset beta as seen in Gyourko & Nelling (1996). CREO Ratio * H Beta is the CREO variable interacted by a high beta dummy which indicates 1 if beta is higher than 0.9 which is the average level in commercial real estate industry, CREO Ratio * L Beta is the CREO beta interacted by low beta dummy variable which indicates 1 if beta is lower than 0.9. RC>50% * H Beta is the CREO dummy variable above median interacted by high beta dummy which indicates 1 if beta is higher than 0.9. RC>50% * L Beta is the CREO dummy variable below median interacted by low beta dummy variable which indicates 1 if beta is lower than 0.9

Reference

Brounen, D., and P. M. A. Eichholtz. "Corporate Real Estate Ownership Implications: International Performance Evidence.". *Journal of Real Estate Finance and Economics* 30, no. 4 (Jun 2005): 429-45.

Cheong, K., and C.S. Kim. "Corporate Real Estate Holdings and the Value of the Firm in Korea." *Journal of Real Estate Research* 13, no. 3 (1997): 273-95.

Deng, Y., and J. Gyourko. "Real Estate Ownership by Non-Real Estate Firms: An Estimate of the Impact on Firm Returns." *Unpublished Working Paper, Wharton School* (1999).

Gyourko, J., and E. Nelling. "Systematic Risk and Diversification in the Equity Reit Market." *Real Estate Economics* 24, no. 4 (1996): 493-515.

Ibrahim, M.F., S.E. Ong, and K. Akinsomi. "Shariah Compliant Real Estate Development Financing and Investment in the Gulf Cooperation Council." *Journal of Property Investment & Finance* 30, no. 2 (2012): 5-5.

Linneman, P. *Corporate Real Estate Strategies*. Real Estate Center, Wharton School of the University of Pennsylvania, 1998.

Liow, K.H. "Corporate Real Estate and Stock Market Performance." *The Journal of Real Estate Finance and Economics* 29, no. 1 (2004): 119-40.

Machlica, D., and NB Borunch. "Managing Corporate Assets from a Long Term Perspective." *Commercial Investment Real Estate Journal* (1989): 44-46.

Michael, S.J., C. Arjun, and W.R. James. "Real Asset Ownership and the Risk and Return to Stockholders." *Journal of Real Estate Research* 22, no. 1 (2001): 199-212.

Tuzel, S. "Corporate Real Estate Holdings and the Cross-Section of Stock Returns.". *Review of Financial Studies* 23, no. 6 (Jun 2010): 2268-302.