The Relationship between Corporate Real Estate and Economic Cycle

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Studies on the relationship between corporate real estate (CRE) and economic cycles are very thin, especially from developing countries, such as South Africa. More, in practice, most firms hardly dedicate enough resources to CRE divisions. This leads to that management not fully maximises the wealth of shareholders. This study uses multi-linear regression to test how GDP, interest rate, and total corporate costs react to changes in CRE. The sample is made up of blue chip firms listed on the Johannesburg Stock Exchange (JSE). The results reveal mixed bag solutions-for certain firms; GDP, interest rate, and corporate costs are statistically significant and vice versa. More, this analysis can be replicated to other similar industries and indices around the world.

Keywords: corporate real estate, economic cycle, interest rate, GDP and total corporate costs

Introduction

Background to the Study

Business cycles affect the values of corporate real estate (CRE) in some nay ways. Among them, there is either to decrease and/or increase value. The factors that affect business cycle include interest rates, GDP, and interest rates (Neumeyer & Perri, 2005). Then, the question is how those parameters that affect CRE are managed in such a manner that the wealth of firms is maximized. The latter statement is central to this study. In order to understand how CRE can add value to the total wealth of companies, one needs to understand what CRE is.

According to Wurdemann (2012), corporate real estate (CRE) is the real estate property held by a non-real estate company to support core business operations. Although CRE may account for a certain amount of the firm's total assets, the significance it has been often neglected. Manning and Roulac (1999) commonly described CRE as industrial, office, or retail space, that is, a plot, building, improvement, etc. in use by companies, not only for selecting site, but also facility design and space utilisation decisions, unavoidably influences a company's corporate operations and future cash flow in various ways past any investment return gained from owning real property. Interpreting their definition CRE is a factor of production which provides space in order to manufacture and deliver goods and services, the research will be looking at the value CRE

adds to non-real estate companies; one problem that we have identified is most non-real estate companies that are not attentive to CRE and its performance because they believe that managing CRE can/will be likely be a cost to the company.

The other problem we have identified is that there are no skills for managing CRE efficiently in companies so that wealth is maximised for the shareholders. This research will be focused on the idea that if corporate real estate's performance increases, then it will ultimately increase the company's returns as well the shareholder's profits. Therefore, our aim is to find ways in which the shareholder can generate more income by focusing on corporate real estate and the type of impact it has on non-real estate companies. The reason why we chose to focus on non-real estate companies instead of real estate companies is that real estate companies tend to use their buildings operate their own company but also have other companies use their buildings, therefore they generate income from their own production as well as leasing, whereas non-real estate companies tend to use the building but not own it, so they generate profit from the company's revenue only.

For this research to be done, we looked at literature and data (which will be done in the next chapter of this research) to find corporate real estate's performance. In literature, we decided to look at the relationship of corporate real estate to a certain variable; the variables we are observing are GDP, interest rate, and the company's total cost.

The contribution of this article is to find out whether corporate real estate is either increasing or decreasing with each variable; the reason why we perform this study is that we want to find out if corporate real estate's value can increase by one or all factors thus increasing the company's revenue. Companies tend to not invest much in corporate real estate because it is viewed as costly to maintain or check its performance; therefore, if companies were to invest in corporate real estate, then these companies would be able to increase their profit by managing it effectively. In data collection, we will be extracting financial statements from various non-real estate firms to determine their current CRE value and we will also record South African interest rate and GDP dating from 2008; these will be used to develop a multiple linear regression model that explains the relationship between CRE and economic cycle variables.

The reason why companies lack skills of how they can use corporate real estate to increase their return is that corporate real estate is one of the industries which have inadequate information; there is not enough research which has been done on corporate real estate. We hope that after conducting our research, people will better understand what the industry entails and how its value can increase thus increasing the shareholder's profit and ultimately the country's GDP or state of the economy.

The balance of the article is follows: Section 2 is on literature review; Section 3 is methodology and data; Section 4 is on empirical analysis; and Section 5 concludes the study.

Literature Review

Introduction to the Literature Review

The purpose of this study is to find the relationship that CRE has with the business cycle in synthesis prior studies; the literature review section focuses on: (i) the relationship between CRE and interest rate; (ii) the relationship between GDP and CRE; and (iii) the relationship between the total corporation costs and CRE respectively.

Methodology of Literature Review

The literature review was done by using the following research structure and method: The literature review was done based on corporate real estate, the management of corporate real estate, GDP, interest rate, and the company's total cost with the aim to find the type of relationship that CRE has with each of the variables identified. The literature review assists in understanding what CRE is and how non-real estate companies treat CRE as an asset to the company. The articles will be selected based on the type of management non-real estate companies have on corporate real estate, because it has been found that the CRE industry has not matured enough because many firms do not manage properly due to the idea that it is time consuming and costly to the firm.

The articles will assess whether firms are receiving profit to its maximum without corporate real estate, or whether their profit could be maximised further if corporate real estate was included in their portfolio, thus increasing the economy's GDP. Various financial statements from non-real estate companies will be used for data collection of the proposed selected sample and population. The population will be focused on Johannesburg Stock Exchange (JSE) listed non-real estate companies. Multi-regression will be used to determine the relationship between corporate real estate and interest rate, and GPD and the company's total costs by selecting the value for corporate real estate in each company then adding each value against the business cycle to check whether CRE increases or decreases with business cycle phases. The data will be collected, analysed, and presented in a form of a graph for the next chapter of the project. In synthesis prior studies, the literature review section focuses on: (i) the relationship between CRE and interest rate; (ii) the relationship between GDP and CRE; and (iii) the relationship between the total corporation costs and CRE.

The Relationship Between CRE and Interest Rate

This section investigates the relationship between corporate real estate (CRE) and interest rate; the information will not be limited to the South African context, but it is an international context. CRE value is affected by different macro-economic indicators, such as GDP growth rate, interest rates, and government policies. For a corporation to see whether they are maximizing the return with the use of the CRE, they will need to measure the performance of the company's CRE. By providing the public with sufficient information about these factors that are affecting the CRE value, this shall enable the non-real estate corporations to maximize the wealth generated by their CRE (fixed asset).

Cerqueiro, Ongena, and Roszbach (2016), on an article entitled "collateralization, bank loan rates, and monitoring" gathered information that indicates the significant contribution of collateral to the supply of credit, the formation of the debt contracts, and the inducement that are used by the lenders to monitor borrowers. The authors computed the value of claimant priority and also gave a broad explanation why banks are considered to be senior creditors. The authors carried out their research by collecting large data from a large Sweden financial institution that has assessments data about collateral values (Cerqueiro et al., 2016). After analysing the data gathered from the large bank, the authors discovered that the bank tightened the credits limits, decreased the strength of its monitoring of borrowers, and increased the interest rate that consequently decreased collateral. These were caused by the bank's respond to the changes in the legal system and these respond to the change also caused the increase in the number of borrowers that miss the tax payment.

This research was carried out by using a method called difference-in-differences approach; it was specific used to analyse the effects of the changes in the legal system to two groups which are the group that is

indirectly affected by the legal change and the group that is directly affected by the change in the law (Cerqueiro et al., 2016). The main aim objective of using difference-in-differences method in this article is to enable the authors to compare the effects of change in law for both two groups that are affected by the changes in law (Cerqueiro et al., 2016). The issues with this article are that its data are based more on the changes of Sweden law and Sweden's banks respond to the changes in the Sweden legal system, and also the lack of accurate data on collateral values can be used by the researchers to address the research problem.

Alberico (2018) explained the effect of interest rate on CRE. The author started by listing and explaining factors that cause fluctuation of the interest rate; these are inflation rate, Central bank, and supply and demand of credit. Variables that influence the change in the interest rate are not limited to the one in Alberico (2018); but since this literature review is focused more on the relationship between CRE and the interest rate, there is no need to go deeper in details explaining the other factors that affect interests that are not listed on the Article. CRE is a real estate property that is used by the corporation for the corporation's operational activities, such as office space, company's branding, etc., when CRE value gets affected by the economic factors and such impacts consequently impact the corporation operational activities. Since the main objective of this literature review is to analyse the correlation between the CRE and interest, it is wise to start by discussing the variables that causes the interest rate to fluctuate on different stages of a business cycle.

According to Alberico (2018), the influencers that cause change to the interest rate on different stages of the business cycle are supply and demand of credit, inflation, and reserve bank. The curve representing the supply of credit curve is upward sloping and the curve representing the demand for credit it is downward sloping. It is important to know how the change in the interest rate impacts the supply and demand of credits; interest rate is the cost of borrowing. The relationship between the supply of credit and interest rate is a negative relationship; this means that the increase in the supply of credit will result in a decrease in interest rate, demand for credit have a positive correlation with the interest rate, and a decrease in demand for credit will results in credit suppliers, reducing the cost of borrowing which is the interest rate. Alberico (2018) stated that inflation also plays a role in the fluctuation of the interest rate; the interest rate in a long-term tends to increase due to the early increase in an inflation, which is due to the fact that lenders will charge high rate in order to protect their capital purchasing power when pay back in future, therefore the correlation between inflation and interest rate is an inversely proportional relationship; an increase in one of the two will cause a decrease in the other one.

The Central Bank can influence the interest rate in two different ways: changing the repo rate and repurchasing rate is the cost that the central bank is charging the commercial banks in a country. This is basically the commercial banks cost of borrowing from the central bank. The Repo rate has a negative relationship with the interest rate; the increase in a repo rate will result in a decrease in an interest rate (Alberico, 2018). The study is about the effect of interest rate on CRE; the other method that Central banks use to change the interest rate is by indirectly changing the discount rate direction. Alberico (2018) concluded by stating that there is a relationship between interest rate and CRE, and CRE value might decrease when the interest rate increases but this will depend on what caused the increase in interest rate. The increase in the inflation rate might cause an increase in CRE value, which due to the fact that corporate real estate is a hard asset that inherent value since it has limited supply. The land where the CRE is built on is limited; it cannot be reproduced that as inflation increase, the CRE might increase, provided that the increase in the CRE caused by the inflation is greater than the decrease caused by the increase in interest rate.

Chervachidze (2017) in an article titled "Higher interest rates a risk for CRE values, recession or not" answered the following question about the interest rate and CRE, "With the possibility of an increase in the interest rate during the mid-term of the U.S. economy, how will the CRE be affected as a whole and the CRE used two different scenarios which are "baseline scenario (which indicates a moderate growth in 2017 and a recession in 2019); and alternative scenario (this scenario indicates high economic progress, then a slowdown with high interest rates and inflation)"

For both scenarios, the author found out that the increase of interest rate indicates a risk for CRE irrespective of the next recession timing and Chervachidze (2017) also find out that an increase in the interest rate caused a decline in the CRE values for both scenarios but the magnitude that CRE values decreased with were not the same. Therefore, Chervachidze (2017) concluded that the CRE values in each scenario will decrease with an increase in interest rate that might be influenced by the inflation rate, and economic and policy uncertainty over the next five years. The CRE values drop in baseline scenario; it will be greater than the drop in the CRE values in the alternative scenario; and for baseline scenario, the decrease will be prolonged and the risk increases with the increase in the interest rate (Mohan 2018).

Akinsomi, Mkhabela, and Taderera's (2017) article examined the influence of the macro-economic indicators in trying to explain the real estate returns in the context of South Africa. Authors of this article did a literature review with an aim of finding and testing factors that influence the commercial real returns; these factors were tested on the emerging market by the study. When conducting this study, authors used financial information published by Investment Property Data Bank (IPD) that date from 1995 to 2014 of South African commercial real estate returns, rental growth, total returns, and capital growth. The factors found to be the most dominant and significant in explaining returns of all types of real estate in South Africa were interest rate, gross domestic product, unemployment rates; these factors are also macro-economic factors (Akinsomi et al., 2017). The other objective of this study was to identify the key differences between the variables that determine the change in capital values and total returns; these variables are also different from the ones that determine the rental growth. This article targets the government regulatory agencies as well as asset managers; this is because the authors believe that the findings in this article will help them to make best decisions that are influenced by relevant sufficient information.

The methodology that was used by authors of this article is a quantitative since there was a collection of data from the investment property databank (IDP), then the data was summarised and the descriptive statistical analyses was applied. The results were as follows: The rental growth was found to have a strong correlation with total returns in South Africa but the rental growth was found to have to be negatively correlated to capital growth and the capital growth determinants were found are similar to the determinants of total returns. The authors also concluded that the total returns and capital growths are positively related to the interest rate, which means that the increase in the interest rate will result in an increase in the total returns and capital growths. The operating expenses, unemployment rates, and GDP have a negative relationship with the total returns and capital growths; the decrease in the capital growths and total returns will result in an increase in the related operating expenses, unemployment rates, and the gross domestic product of the South Africa.

Peng and Thibodeau (2016) explored the impact of the fluctuation of the interest rate on irreversible investment in commercial properties. The authors used an historical data of quarterly capital improvements on 1,416 income producing properties between 1978 and 2009. The authors discovered that there is a strong non-monotonic effect of interest rate on office space, retail, and apartment, but on the industrial, they found that

there is no monotonic effect; they also reveal that a decline in the treasury yield will dramatically escalate capital improvements only if those properties values are high, but if the properties values are low, the effects of the treasury yield might be negative or weak (Peng & Thibodeau, 2016). According to the authors, these findings have significant implications for fiscal and monetary policies; the conclusion drawn from the data collected is that a decline in interest rate does not necessarily attract investment.

MacGregor, Nanthakumaran, and Orr (2012) measured the responsiveness of the asset values to the fluctuation of interest rate called duration and convexity was only applied to the management of bond portfolio and we do not have an accepted known concept, such as this one; that is used to measure the sensitivity of equity and real estate value in order to enable the asset manager to have control over the interest rate risk. The study was carried in 2012. The concept of duration and convexity makes it possible for asset managers to control the exposure of assets to the interest rate risk (MacGregor et al., 2012). One of these article objectives is to improve the area of interest rate risk management; this is done by evaluating the correctness of the results produced by the concept duration and convexity when used on commercial property values in measuring the sensitivity of the asset value to interest rate changes (MacGregor et al., 2012).

The simulation done during the examination of the duration and convexity; it confirmed that the real estate duration and convexity is similar to the bond. The authors of this article demonstrated that the duration is not good enough when used to mitigate the interest rate risk on a real estate's portfolio, but the authors also stated that the other part which is convexity; it is important in producing an effective interest rate immunisation plan. Further, they argue that asset managers started feeling the pressure of improving the interest rate risk management after the bubble bust. The asset managers started paying more attention to the long-dated bonds by prolonging the period of the property assets in reacting to the shift in the period of their obligations and the chances of rises in interest rates in the future. The duration and convexity were designed for measuring the duration for repayment of the bonds principal with the finite and fixed cash flow, but on real estate market and equity, it is currently restricted by the mix-up with regards to the application of these methods to assets that its stream of income is not constant and with no fixed terminal value (MacGregor et al., 2012). This article used Fabozzi's interpretation of the concept of the duration and convexity, making sure that it becomes easier when trying to justify the reason why the duration convexity is used on a real estate asset as an interest rate sensitivity measure. The Fabozzi's interpretation also helps in encouraging the asset managers of property assets to apply asset allocation and immunisation strategies based on liability or asset matching framework.

MacGregor et al. (2012) provided information to the readers that can be used in improving the consideration and understanding of real estate in liability-asset framework; it also simplifies the use of the property interest rate sensitivity metrics when applied in the allocation of fund for assets in a portfolio. This article succeeded in coming up with a methodology and a formula that makes asset-liability matching strategies a more useful selection for real estate fund managers. The authors managed to achieve their main objectives which were to improve the accuracy of the estimated capital value sensitivity, encourage the fund managers to use duration and convexity for bettering the estimate of the asset sensitivity to the fluctuation of discount rate, and give an improved protection against the interest rate risk. The duration and convexity also help real estate asset fund managers since it is a better estimate in low in an environment with low income growth, but this will require derivatives with duration and convexity for bettering the correctness of the estimate of capital value sensitivity. The general principle that these articles derived were tested using the UK example but they can be used by other countries they will be successful. The authors suggest that more researches should be done on

this topic by applying the same principle to other countries so that the difference in the duration can be analysed and convexity with non-constant cash stream.

Chaney and Hoesli (2010) investigated how pension fund and insurance corporations to have an improved and accurate interest rate risk management. The aim of this article is to provide a better understanding of the interest rate risk sensitivity of a real estate to fund managers. The authors managed to achieve this by applying Monte Carlo simulations that included the uncertainty of the underlying stochastic processes. According to Chaney and Hoesli (2010), after modelling office investment property, they obtained the following results: The sensitivity of interest rate for a usual office property is 13.15% and it standard deviation obtained was 7.8%. In this article, the determinants of interest rate sensitivity are found to be the risk premium, the degree of rotation of the curve of the interest rate, the state of the macroeconomic environment, and the property's remaining economic life.

The stochastic method this article used to calculate the interest rate sensitivity of real estate is set up on discounted cash flow method and Monte Carlo simulation; by using this method in this manner, it expands the understanding of the interest rate sensitivity in three ways (Chaney & Hoesli, 2010). One of the ways that this method improves the understanding of the sensitivity of interest rate is by using discounted cash flow valuation method that incorporate at least 15 correlated determinants. The second one is that, according to Chaney and Hoesli (2010), the article's approach permits performing full sensitivity analyses of the property duration, which indicates the main factors of the interest rate sensitivity. The articles that were reviewed above all indicate that there is a relationship between the interest rate and the CRE. The important question is what kind of a relationship exists between CRE and the Interest rate. Based on the research and the literature review of articles, the relationship between CRE and interest rate is a negative relationship; the increase in the cost of borrowing will cause a decrease in the CRE value, but there is an exemption when the increase in an interest rate is cause by the inflation; this might increase the CRE value which is due to the fact that the supply of land is limited; land cannot be reproduced therefore an increase in an inflation will increase the CRE value if that increase in inflation is greater than the increase in the interest rate.

The relationship between GDP and CRE. The purpose of this research is to determine the relationship between GDP and corporate real estate. According to Wurdemann (2012), corporate real estate (CRE) is the real estate property held by a non-real estate company to support core business operations. Although CRE may account for a certain amount of the firm's total assets, the significance has been often neglected. Manning and Roulac (1999) commonly described CRE as industrial, office, and/or retail space (i.e., land, buildings, improvement, etc.) in use by businesses, where not only site selection, but also facility design and space utilisation decisions, inevitably impacts a company's business operations and future cash flow in numerous ways beyond any investment return received from the ownership of the real property. Interpreting their definition CRE is a factor of production which provides space to manufacture and deliver goods and services, Manning and Roulac (2001) outlined that by CRE including all the space involved in supporting a company's business, corporate real estate management (CREM) makes the managerial and administrative functions in relation to the space it uses. Managing corporate real estate may comprise of broad aspects, for instance, facility management, workplace design, outfit management, and portfolio management of real estate.

Customarily, CRE has been viewed as a cost factor and the choices relating to corporate real estate have been motivated by cost considerations only. A lot of current studies have focused on recognizing how corporate real estate adds to the overall business performance. By the end of the 1980 and the start of the 1990s, the first

researchers began presenting research on how CREM can increase its contribution to the business thus increasing the business' profit and ultimately the country's GDP besides focusing on cost-control. Pittman and Parker (1989), in their survey, showed that corporate real estate executives reflect that communication and good relationship with operating division and management to CRE division are important for top-performing real estate division. Additionally, the outcome showed that senior reporting level and centralized CRE are significant determinant of how well the company's CRE is doing.

Nourse and Roulac (1993) concluded that companies should think about the CRE strategies the company has from a wider viewpoint than only minimising cost. To effactully support a variety of corporate objectives, numerous real estate strategies will be needed. Nourse and Roulac (1993) listed eight kinds of real estate strategies which include how an entity's CRE decisions can be made.

To find the exact value of real estate that is added, Krumm (1999) defined seven elements of added value; these elements changes CRE from the being just a cost of doing business to it being an important entity's asset. His list is different to that of Nourse and Roulac (1993) by enabling and reformulating processes to escalate production and recognizing rising of value as part of their strategy, emphasizing the continuous changes in culture by incorporating work environment modernizations and categorizing a variety of CRE decisions under the idea of controlling risk. In addition, the study indicated that CRE is on average about 15% of the total firms' assets. This is considerably different from the ideas of previous research, which proposes that CRE is about 30% of the total firms' assets. Starting from 2000, problems with the workspace became an important component of CREM. The physical working environment is considered to be the third most significant factor that comes after benefits and compensation, when an employee is making a decision of whether to stay or leave a job; Lindholm (2008) stated that 41% of firms who were part of a survey done in the U.S. believed that physical work place would influence their decision to take a job or a position. Lindholm (2008) stated that excluding the problems at the workplace, location matters are highlighted, too. Retailers, hotels, and industrial firms have identified for a very long time that site selection is a crucial component for financial success. Lindolm (2008) also stated that service providers can also get financial gain by choosing an appropriate site to proper site selection. Companies that occupy offices can increase the added value by using their real estate to create or strengthen the corporate image, using them as symbols to mirror their values and culture this is called CRE marketing real estate strategy.

Joroff et al. (1993) reported CRE is part of other resources, such as capital, human capital, information, and technology. He presented the growth of CRE from the taskmaster to the controller, dealmaker, entrepreneur, and business strategist, which spoke on the overall competitiveness of the corporation. Singer Bossink and Vande Putte (2007) explored how companies use the strategies of corporate real estate to upkeep their company's competitive strategy. Singer et al.'s (2007) research also demonstrates that most of the companies (7/10), using a standardisation CRE strategy. The companies which are using CRE strategies usually have a clear idea and understanding of the corporate image they would like to make using their corporate real estate; these companies also knows how to make their buildings to perform proficiently.

The corporate real estate's value can be increased by performing the following steps: increasing the assets value, one of the plans of increasing the assets value by overseeing the portfolio of real estate real and also start viewing CRE as a capital asset which is capable of being managed to maximise the company's returns. The purpose of the CRE strategies is to minimize cost and to increase the real estate portfolio value and also make sure that the lowest cost substitute is chosen; these alternative may be owning versus leasing or outsourcing

versus insourcing. The important thing to note is that managing properly the corporation's portfolio has to begin by doing a valuation of inventory and of current facilities, from there start managing using a real estate information system. The second step is marketing and sales; CRE can enhance the sales and marketing strategies by selecting a location and the physical structure of CRE that supports the marketing of the firm's product. Visibility and ease of access are central when creating ways to attract customers and grow revenue. Physical design of the CRE can be used in enhancing the company's image among its employees, customers, investors, and suppliers, which indirectly adds value to the organisation. Thirdly, enhancing innovations is a new thing in real estate strategies that have just been introduced recently and most corporations are not aware of this strategy. Most companies are in competitive environments, in order for them to grow and survive their need to promote innovation in the workplace. Therefore, this can be achieved by providing employees with a health workplace, which motivates and supports innovative thinking and working. This in turn can make companies to achieve higher returns through modernization.

Fourthly, growing employee satisfaction by growing the employee's contentment in relation to their work place is dependent on CRE and facilities management choices relating to the selecting of a site, workplace design, and amenities to incorporate in the CRE. Companies that make smart decision about workplace to improve employee's satisfaction will increase revenues which other companies' experience in the different types of industries they work in. The fifth step is increasing productivity thus leading to increased returns. Decisions on real estate in relation to choosing the site, interior design, and CRE infrastructure directly influence the performance of the building and functionality; this will increase employee's performance by allowing them to do their job efficiently in a health environment. Facilities and CRE decisions have an impact on numerous personnel and system aspects, thus influencing productivity in a firm of the individual employees and productivity level of teams; this in turn affects the company's returns.

Increasing flexibility strategy is a way of growing flexibility which includes physical workspace and financial terms (Lindholm, 2008). A lot of companies form and reform work teams within their offices from time to time (Lindholm, 2008). They experiment with flexing time and shared jobs which make it possible for the staff to share the space. Others can enter or exit markets when the conditions change. In comparison, a lot of space contracts are long-term, and workspaces are fixed, forcing the company to remunerate for space that is not ideal for its operations. If workspace is one of the key drivers of flexibility for the firm, then a real estate strategy that puts emphases to provide flexible space matching the period of corporate satisfaction will back the company's core strategy thus adding value to the company (Lindholm, 2008). Some operation choices that usually fall under flexible real estate strategy include selecting spaces that can be altered to be for many users and labours which creates a flexible workspace within the structures, and discussing short-term leases which includes opportunities to expand and contract as well as lease than buying properties that are not important to the main business (Lindholm, 2008).

Lastly, reducing costs is the most recognised strategy to cause returns to rise (Lindholm, 2008). Reducing cost in any space has a direct and instant influence on how the finances perform within the company (Lindholm, 2008). Real estate operating decision which is mentioned the most to decrease cost includes outsourcing some real estate services and using the corporate real estate's workforce to run the real estate transactions of an operating unit (Lindholm, 2008). Other engagements the company can deliberate when pursuing this strategy is including co-locating business units, adapting green buildings, and selecting locations based on governmental incentives (Lindholm, 2008). It is possible to decrease costs by negotiating lower rates for real estate related

services and utilities and adding quality and timing of facilities maintenance to avoid costly repairs and capital expenditures (Lindholm, 2008).

The effect of business decisions is primarily shown by the following three value drivers: (i) sales growth; (ii) operating profit margin; and (iii) period of competitive advantage. Business judgments, for instance, the variety of products and services, pricing policy, promotion, distribution, and customer service have a certain influence on the "sales growth" and "operating profit margin" value drivers. The effect of investments decisions is primarily shown by the following two value drivers: working capital investment and fixed capital investment.

Investment seems to be driving value under working capital-high inventory levels or the expansion of capacity, for example. The effect of financing decisions is primarily shown by the following three value drivers: tax rate, capital structure, and dividend policy.

The IMF has revised GDP growth downward for much of the globe in 2016-2017, as economic uncertainties continue and intensify. Currency issues, declining exports, and soft energy prices add to volatility. Political issues and conflict undermine stability as well. There is potential for global economic deceleration. Weakened exports could lead to slower or smaller port and infrastructure investment and broader softening of investment in real estate and other asset classes. The U.S. remains attractive to global capital and the inflows are still strong, although they may be under pressure at their origin (China, Middle East, and Europe).

In this part of the literature, we will discuss the U.S. gross domestic product from quarter one to quarter four; according to McCarthy (2016), GDP grew at an annualized rate of 2.3% in quarter one—slower than the 2.9% registered in quarter four but above the 2.1% consensus estimate. Slower growth compared to the prior three quarters was due to weaker contributions from personal consumption expenditure, non-residential fixed investment, exports, and government spending. Despite a build-up in inventories, import growth which slowed slightly subtracted a little from overall GDP growth.

The bottom real estate space is the amount that CRE has contributed to the company and GDP. In retail sector, consumption slowed in quarter one; the rise in personal disposable incomes and a strong labour market augurs well for consumers and retailers in quarters ahead. Retail sales continued to show steady growth in quarter one thus increasing GDP. On the office sector, with the economy operating at or near capacity, employers will find it difficult to fill skilled positions from the current workforce. While a rise in participation would help, growth of the labour force will be limited due to the aging population. Likewise, the tax cuts might boost the job market, but gains will likely be modest given that the timing of the stimulus coincides with the economy operating almost at full capacity. And for the industrial sector, while a slowdown in imports is good for the economy's trade balance, it is not a net positive for the industrial sector since imports use three times the space that exports do. However, with rising personal disposable incomes, consumers may spend more on imports in the months ahead.

The next observation is how GDP accelerated in growth for the second quarter according to Havsy (2017) gross domestic product (GDP) for quarter two in 2017 grew by 2.6% at an annualized rate, in line with consensus expectations. This was the best quarter since quarter three in 2016 when growth was 2.8%. By comparison, growth in the second quarter last year was 2.2% and quarter two in 2015 was 2.7%. The following are the types of changes with occurred in the respective real estate space regarding the changes or corporate real estate. Retail sales remain strong and this GDP report had a lot of positive news. Combined with the extermination of the boarder adjustment tax, retail has been performing well. There are still challenges the

industry face, but strong consumption patterns and rising wages should help retail as it adjusts to the new market paradigm. In the office sector, job growth has maintained a hiring pace like 2016 in the first half of the year, but that is likely to slow in the second half. Despite the healthy pace of hiring, firms are still taking longer to make leasing decisions. The rise in exports is good for the economy but does not assist the industrial market as much as imports in the industrial space. Imports use three times the space exports do and import growth has slowed. There are other tailwinds keeping the industrial market strong, but a continued rise of exports and slowing of imports is something that could hurt the industrial market.

According to Havsy (2017), gross domestic product (GDP) grew at an annualized rate of 3.0% in quarter three in 2017, surpassing the 2.5% consensus estimate. This was the best third quarter since quarter three in 2014—when growth was 5.2%—and it was only the third time that growth has reached 3% or higher in the past 12 quarters. That retail sales remain strong the tight labour market finally leads to increased wage growth, which will help retailers. Nonetheless, ecommerce continues to grab a greater share of those retail sales. Retail centres that are well-located have strong tenants that understand the new paradigm and continue to evolve will do well. The removal of older, weaker centres will only enhance those that remain. Job growth continues to slow; however, September's job number was impacted by recent natural disasters within the office sector.

There has not been much change from the stats received of the industrial sector in the previous year for the industrial sector. GDP rose by 206% in quarter four; and according to Mohan (2018), gross domestic product (GDP) grew at an annualized rate of 2.6% in quarter four—slower than the 3.2% registered in quarter three and below the 3.0% consensus estimate. The weaker than expected pace of growth reflected a drag from net exports and inventories that somewhat offset the strength in consumer spending. Government spending rose by 3%, amid post-hurricane rebuilding efforts. For the year, GDP grew by 2.3% in 2017, up from 1.5% in 2016. While the performance of quarter four did not change much from quarter three, for the office sector, the economy operating at or near capacity, employers will find it difficult to fill skilled positions from the current workforce. While a rise in participation would help, growth of the labour force will be limited due to the aging population. Likewise, the tax cuts might boost the job market, but gains will likely be modest given that the timing of the stimulus coincides with the economy operating almost at full capacity.

While the increase in exports is good for the economy, the sharp acceleration in imported goods augurs well for the industrial sector since imports use three times the space that exports do in the industrial sector. A huge explanation for the slowing down in GDP growth was less about accumulating inventory and a broader trade deficit. If these aspects are detached, then we would get what economists call final sales to domestic purchasers. Final sales enlarged at 1.8% annual rate, almost three times as fast as GDP. In 2015, final revenues rose by 2.8%, which is the strongest growth since 2005. Final sales have been stronger than GDP in each of the last two years. When the inventory runoff finishes, as it probably will in the first half of 2016, GDP growth will speed up. Consumer spending is healthy. In quarter four, it grew at a 2.2% annual rate; and for the year, it increased by 3.1%. If consumers carry on increasing their spending at this speed, inventories will need to be reloaded resulting in a rebound in manufacturing and more hiring.

The major concern in the GDP statement was the decrease in business investment. In quarter four, non-residential fixed investment, the widest measure of business spending decreased at a 1.8% annual rate. In 2015, the whole investment spending rose at the slowest speed since 2010. Although part of this is clearly being motivated by the merging in the oil and gas industries, there was also a decline in spending on IT and transportation equipment. The concern is that this decline mirrors a decrease in business confidence. The

decrease in global equity markets since the commencement of the year will not recover that confidence. If industries are less confident, they will be more careful in binding to lease space and increase employment. Another significant optimism for the economic outlook is the robust growth in after-tax income. In quarter four, inflation altered after tax income rose at a 3.2% annual rate, capping a year which saw the quickest income growth in almost 10 years (since 2006). The income growth is the result of a mixture of robust job growth and steady growth in wages. In 2016, we anticipated that employment growth, even though it is slowing, will still be healthy and well above the long-term average. In adding to this, wage growth will possibly speed up as labor markets continue to tighten. Therefore, we assume income growth will remain strong. This should continue to push customer spending growth to be at a firm pace. The result that may occur is that increasing demand for retail and industrial space as consumers purchase goods and services through numerous stations.

Overall, the GDP report is a lot more positive than expected or assumed to be. The rate of GDP thus far supports the vision that the economy will grow stronger in 2016 than it did in the previous year. A rebound in inventories motivated by robust growth in consumer spending can possibly boost GDP. Therefore, demand for corporate real estate (CRE) is expected to remain reasonably good and vacancy will continue to be tighter in most markets. If market volatility causes this to flag, growth may not be as strong as it is anticipated. CRE choices need to be deliberated as strategic decisions because it is non-recurring, lasts for a long period, involves special characteristics, and needs specialized expertise. In addition, it fails to provide a clear connection (and a foundation for that connection) between the performance measures and the corporate system. It can inform supervisors with lot interesting things about corporate real estate, but it does not provide a score for its involvement to the company's performance, when comparing it to other supporting business units.

The general opinion is that CRE, because of its magnitude of investment, affects the capital structure. The analysis showed no proof of this general opinion. Related to this opinion—owning CRE affects the tax being paid. Also, for this opinion, the analysis shows no proof. Furthermore, owning CRE was expected to have a strong relationship with the amount of total capital investment. Also, here the analysis showed no proof. Furthermore, it can be remarked that the bonus score card approach (as developed by Kaplan and Norton) is the dominant approach for measuring added value of CRE. What these models fail to provide is a clear linkage (and a rationale for that linkage) between the performance measures and the corporate system of rewards and punishments. They do not provide a scorecard in the traditional sense of the word. It can tell managers many interesting things about CRE, but it does not give a score for the contribution compared to other supporting business units to organisation's performance. In conclusion, assumptions concerning this are very limited because it does not give an overview of all the literature on corporate real estate management. It only indicates where the general focus of literature concerning the added value of CRE is: from a business point of view.

The relationship between the total corporation costs and CRE. This section examined the relationship between the corporation's operating cost and the corporate real estate. The operating cost plays a vital role in a corporation; it is important for the corporations to know all the variables that are affecting their operating cost value and need to know whether that variable have a positive or negative relationship with their operating cost. Since corporate real estate is a core part in this research, we need to research how the operating cost reacts on a corporate real estate. According to Varcoe (2000), a CRE can be seen in three perspectives: (i) as a factor of production; (ii) as a property market asset; and (iii) as financial asset of a company. From these perceptions, we can infer that CRE is a use of real estate for the corporation's operational purposes. For corporation to be able to maximize their employees' productivity, they need to provide their employees with a quality work

environment that can stimulate productivity among employees (Musa & Baharum, 2012). Similar findings are in Hiang and Ooi (2004).

According to Musa and Baharum (2012), the quality of corporate real estate plays the most important role in institutions of higher learning since it has an impact to the sharing behaviour of knowledge among lectures and students. The learning atmosphere should be designed in such a manner that it can accommodate the needs of the institution of higher education's stakeholders (Musa & Baharum, 2012). A quality CRE for institution of higher education is a building with good heating system, good functional structure, and good acoustic system; these components enhance the learning and sharing of knowledge.

The article titled "Corporate Real Estate (CRE): Public Institution of Higher Learning in Malaysia" published by Musa and Baharum, collected and presented information with an aim of showing the importance of a quality functional building to the institutes of high learning. High institutes of learning need CRE so that it can be able to carry research and teaching programs, but it has been found that the cost of using and owning real estate is the uppermost outlays for the institutes of high learning (Musa & Baharum, 2012). Musa and Baharum (2012) were trying to solve the challenge of providing learners with encouraging learning environment and the task of making sure that institutions are producing high quality graduates. According to Musa and Baharum (2012), when measuring the net wealth of assets in an institution, approximately 80% of it is represented by real property regardless of its use, it can be research, teaching program, or office space, gaining recurring capital and substantial costs. The role of a corporate real estate management for an institution is a vital influencer for an effective application of disposing it at the disposal stage, this is because when a real estate property productivity is maximized, it value will consequently increase (Musa & Baharum, 2012).

An excellent property management for a university is the management that is capable of aligning business planning with the property operating cost and service delivery, enables the property to support the institute's business needs, and optimizes the property's utilization (Musa & Baharum, 2012). The article by Musa and Baharum has shown that CRE is very important to any organisation and shown that corporate real estate is not only significant to organisations that aim to make profit. These authors also identified the components of CRE that increase value of institutes; these are the minimization of cost, promotion and marketing sales, and improving flexibility.

Gibler and Lindholm, (2012) explored how many firms do not pay enough attention to real estate operating costs; these authors also highlighted that there is enough evidence found by researchers that support that CRE can increase the value of a non-real estate corporation. This research is about a strategic management theory that Gibler and Lindholm (2012) developed from a model that Lindholm, Gibler, and Leväinen (2006) came up with in their article titled "modelling the value-adding attributes of real estate to the wealth maximization of the firm"; this model demonstrate in what way can CRE increase corporation's value. The method that Gibler and Lindholm used in their research is the collection of data from questionnaire directed to corporate real estate managers. With this article, authors want to make sure that there is enough information about corporate real estate management that can be used by managers of real estate to add value to the corporations during economic downturn.

One of the objectives of this article is to show the relative significance of other real estate strategies during the recession that will give managers a better understanding of the complementary CRE approaches on the academic level; the article achieves this by modifying and updating the ideal of how CRE contributes to the value of the corporation. The model that Lindholm et al. (2006) came up with revealed how the CRE operating

choices and strategies adds value to firms, but this ideal needed to be adjusted as times goes by to incorporate the technology changes and changes in firm's priorities. The article discovered that most corporate real estate managers use real estate tactics that support the corporation's main business which either be profitability growth or income growth and it also reveals that managers of real estate most of them have succeeded in transforming their real property strategies into operating choices (Gibler & Lindholm, 2012). Gibler and Lindholm (2012) succeeded in providing clarity about the Lindholm et al.'s (2006) model and they also added a new environmental sustainability strategy into the model.

A corporation with a perfect CRE strategy maximises it productivity; Roulac (2001) supported this on a journal entitled "corporate property strategy is integral to corporate business strategy"; the making and retaining of clients and the improving of investor's wealth can be done by superior CRE strategies since it gives the corporation a competitive advantage. The study by Ali, McGreal, Adair, Webb, and Roulac (2008) examined the correlation between the financial performance of big corporations and corporate real estate strategies between 1998 and 2003; the data of companies that authors used are the UK Company's data. From the sample of companies that were examined in UK, 75% of them used CRE strategies that increased the corporation value and some of them used strategies that are like the one that Nourse and Roulac (1993) came up with on their article. The authors did this study by selecting 100 major companies in UK, after that they interpreted the statements obtained from these companies and then finally the authors mapped the results of the interpretation to the Roulac and Nourse's (1993) framework. The author reveals that in 1998 and 2003, the strategy that was mostly used is "facilitate production, operation and services delivery" followed by "promote sales and selling process" (Ali et al., 2008).

With regards to Musa and Baharum (2012), more research still needs to be done since there is limited implementation of CRE to universities and with regards to the Ali et al. (2008); these strategies still need to be tested on other countries other than Canada and under different environmental and economic conditions. The findings in the article published by Ali et al. (2008) are as follows: The companies are starting to give real property attention as other business sectors, such as HR and they started changing the strategy that is focusing on minimising real estate costs orientation to strategies that contribute to the business operations. On the data collected between the two periods 1993-2003, due to vary of the CRE strategy, the fluctuation of the economy and the changes in the location (UK) did not have a significant effect on the company's financial performance. When relating this article to the research topic, it does indicate that there is a relationship between operating cost and the corporate real estate even though these authors was focusing more on the company's performance and CRE strategies. From our research and from the article reviewed, we were able to draw that the CRE and the operating cost of an organisations have a relationship; the relationship is negative due to the three components identified by Musa and Baharum (2012). One of those components is that CRE minimises cost and increases productivity; this shows that an increase in the CRE will results in a decrease in the operating cost of firms.

Webtser (1995) stated that businesses are always finding new ways to increase their bottom line profit, and CRE is the major cost in any business even though CRE is a cost with the correct management a business can save from the large portion of cost. On the other hand, Holod (1993) stated those business entities in Canada and America prefer to outsource corporate real estate, to increase the level of expertise in managing CRE. This resulted from the companies wanting to find ways to cut company cost and downsizing the business. While Teoh (1993) created a model centred around the positive corporate view that non-real estate entities have on

managing CRE assets, JLW (1992) stated that many companies neglect CRE in Austria, which leads to companies operational rather than strategic imperatives when it comes to deciding how the process will be implemented. Webster (1995) was backing this claim; according to him, 10% of respondents surveyed were unable to identify the highest and best for their property which leads to an increase in the total cost of the company. Therefore, using the external economies of scale was the best alternative to cut down and control operating cost.

Production is viewed as a corporate cost which can be a prime concern to the company; however, there are some companies which view cost as less important provided the company's return on the extra cost spends to promote the manufacturing. The other reason why companies decide to outsource is that they may be planning to reduce salaries, company benefits, and office space and occupancy costs. Since managing CRE asset is seen as a non-core activity for many businesses, therefore outsourcing is seen as the best option to push costs out of a business. Wong (1995) stated that sometimes outsourcing can cost more than insourcing if the work is done in the same way as it was done previously. Developed countries prefer outsourcing because it gives the local entities better opportunities at having access to skills and technology, at the same time, building a core business-focused organisation. Ciandrella (1996) claimed that companies now have different reasons to outsourcing it has moved from price to quality. However, McDough and Haywood (2000) researched reasons for outsourcing and they found that it was for compressing time, re-inventing, competition and competitive advantages, business process re-engineering, value chain analysis, cost control, and lastly technology.

According to CoreNet (2005), 80% of CFO's were implementing a cost reduction program, 52% continued to do nothing or either did not know what to do with regards to the property portfolios. More than 50% claimed that the companies did not have real estate strategy and 23% applied no performance to their real estate. A lot of companies do not regularly or consistently check the property's performance and trade it as an overhead cost, even if the property has a huge number of unique characteristics. Englert (2001) outlined that property is not taken seriously; companies take it for granted and under-managed corporate real estate. Since there are corporations that do not focus on corporate real estate enough, it becomes hard when it is time to measure its value that it is contributing to the business and this is due to companies not having certain objectives and goals set out with regards to corporate real estate thus it being a cost.

There was experiment done in New Zealand to all the business entities there, to see if corporate real estate is implemented to its highest level. What was found is that there were many corporations that had a high number of employees and yet the size of the firm was small. Many of the companies either owned or outright owned its own portfolio, and it looked like most of the firms were focused on the operation rather than the strategic side of real estate because the business' needs and maintenance are what drives the decisions taken by management. Only 10.2% of the respondents who participated in the experiment admitted to spending on managing CRE, the reason few firms in CRE is because managers in these firms believe they are not in the property business therefore do not need to focus on CRE. Most firms take properly merely as a place to house a function, 29.8% do not have a property plan and lastly 20.6% this was outlined by McDonagh and Frampton (2002). Although the above statistics are not good, there are companies that are invested in CRE, and more companies are beginning to see the need for strategic planning and beginning to apply it to the business' core. While other firms are beginning to apply strategic planning to the firm's portfolio, other firms have a separate plan for property.

However, according to Nichols and Roulac (1993), the use of and relevance of a property plan met with a more mixed response, with approximately 30% of respondents stating that a plan is not used or has no relevance or a poor alignment. The whole idea of CRE is to increase the company's value, meaning the shareholder's profit needs to maximise if CRE is implemented fully, therefore the opportunity cost should be less. The profit is derived once the cost has been subtracted, if the company's economic added value (EVA) is positive or increasing then that means the operating profit is enough to cover the company's total cost. Through the perspective of CRE, real estate can affect the shareholder's in two ways which are occupancy costs and cost of capital. The fixed costs fundamentally affect the firm's value. A business needs to commit their real estate assets to the highest and best use (HBU) to decrease costs and maximise profit; this is very crucial in strategic CRE asset management. If real estate ownership is less important than, the divestment of non-core real estate assets may turn into a feasible way to increase share prices and the shareholders' income. CRE managers will be under pressure to implement CRE efficiently for it to add value to the company instead of being a cost to the firm because shareholder would want a higher return.

According to Hiangand Ooi (2004), CRE has an adverse impact on shareholder wealth during the years 1997-2001 should not make CRE be viewed as a negative impact on non-real estate corporations for other time periods outside the time range. In Asia, there was a financial crisis and it was observed that holding real estate assets as part of an investment portfolio can be costly to the company because it could lead to lower returns and higher risks. According to Wylie (2013), in Australia, there are pressure which are put on corporate real estate due to costs; the expectation awaited is that CRE is meant to not only contribute to but to also take more of a leadership role in transforming the work environment. Non-real estate firms typically produce good profits from CRE and owning CRE on shareholder which could be a positive one, therefore in conclusion even though corporate real estate affects the shareholders' value through its impact on net operating income (NOI) and cost the value of CRE is usually hidden thus not reflecting fully in the share price. CRE can reduce shareholders profit; however, this would be caused by EVA and market value added (MVA) and exits in non-real estate businesses from different industries.

Methodology and Data

Methodology

The study uses multi-regression methodology whereby we will run a regression to determine the type of impact each economic variable has on CRE value. Since we will be analysing different companies' financial statements, this means that the results found may differ accordingly. The problem that we have found in the literature review is that many companies neglect corporate real estate because they believe that since the company is a no-real estate company then they do not need to focus on it, and because it may end up being a cost and take time from core business activities. This research will focus on non-real estate companies; the problem with non-real estate firms is that most of them do not have a CRE department, and there is a lack of qualified managers who will attend to the company's corporate real estate.

This is because the data that we will be using are a quantifiable and observable data. The other reason is that our research questions are about the relationship between quantifiable variables, such as the interest rate, GDP, and operating cost. The model is:

$$CRE\ value = c_0 + \beta_1 ir + \beta_2 GDP + \beta_3 TCC + \varepsilon$$

where *ir* is the interest rate, *GDP* is the gross domestic product, *TCC* is total costs of the company, and ε is error term. Methodology is a designed approach that converts principles of epistemological and ontological into guidelines that illustrate how the research will be conducted (Sarantakos, 2005).

Data

The population of our data is non-real estate corporations that are listed on the Johannesburg Stock Exchange (JSE); these are companies that do not specialise in properties they only use real properties as a factor of production. The type of sampling that we will be using is a non-probability; this is because we will choose randomly non-real estate firms from the JSE list and get their financial statement that we will be using so that we can be able to gather information about their operating cost, CRE value, etc. The study tests the following hypotheses: (i) the relationship between CRE and the interest rate; (ii) the relationship between GDP and CRE; and (iii) the relationship between total costs' companies and CRE.

The JSE top 40 was the chosen population from the population six no-real estate companies to different indices was randomly sampled. Data collected were annual interest rate, annual GDP (which forms part of the business cycle), total company cost, and each company's CRE value. The data collected dated from 2008 to 2018, because we wanted to have a large sample size which ultimately increases reliability and accuracy of the study. The other reason is because we wanted to see the change in the value of CRE in different stages of the business cycle.

We used Durbin-Watson, Akaike, Schwartz, and Hanna-Quinn tests to ensure validity. We also used data screening to ensure the data are clean before conducting statistical analysis even further; the data are screened to make sure that it is usable, reliable, and valid to test our hypothesis. Data verification process was used to ensure accuracy and consistency once the data were migrated from company's financial statements and the wits database system to the regression model.

For the six companies analysed, we found that the relationship between South African GDP and each company's CRE value is negative. The relationship between CRE value and interest rate for Company A, D, and E is positive. The relationship between CRE value and interest for Company B, C, and F is negative; the possible reason for this might be due to the increase in interest rate which means the cost of borrowing also increases, consequently the demand for goods decreases, and this decrease drives the price down ultimately decreasing value. The relationship between the value of CRE for each company and total company cost is positive; this may be due to the company investing in equipment and machinery which increases costs but also increases value.

Validity and Reliability

To ensure that the data that we collected are valid, we used reliable sources which are JSE, statistics South Africa report, and SAPOA reports. For validation of data, we will use a data screening and data verification method, this will be done manual to make sure that the information obtained from the financial statement was not altered/changed. To ensure that the data used is reliable: the study uses reliable reports from reliable sources these are SAPOA report, Statistics South Africa; and for financial statements, we will obtained them from the company's websites.

Table 1

Regressions of Independent Variables Against Dependent Variable

Panel A: Company A				
Equation	1	2	3	4
Constant	-1.316 (0.624)	8.247 (0.000)***	8.059 (0.000)	-2.102 (0.437)
Total corporate costs	1.019 (0.007)***			1.100 (0.006)***
GDP		-2.020 (0.544)		-2.267 (0.322)
Interest rate			0.567 (0.835)	3.151 (0.119)
Adjusted R^2	0.577	-0.071	-0.119	0.64
Durbin-Watson	0.793	0.803	0.615	1.175
F-Statistic	13.295 (0.006)***	0.402 (0.545)	0.046 (0.835)	6.338 (0.027)***
Akaike	-1.620	-0.690	-0.647	-1.669
Schwartz	-1.160	-0.629	-0.586	-1.548
Hannan-Quinn	-1.686	-0.756	-0.713	-1.801
Panel B: Company B				
Equation	5	6	7	8
Constant	8.250 (0.318)	11.816 (0.000)***	11.879 (0.000)***	12.085 (0.131)
Total corporate costs	0.283 (0.7103)			-0.008 (0.990)
GDP		-7.722 (0.238)		-2.315 (0.732)
Interest rate			-10.172 (0.035)***	-9.299 (0.134)
Adjusted R^2	-0.105	0.605	0.376	0.186
Durbin-Watson	0.229	0.638	0.668	0.824
F-Statistic	0.148 (0.710)	1.627 (0.238)	6.431 (0.035)***	1.687 (0.268)
Akaike	0.761	0.594	0.668	0.568
Schwartz	0.822	0.655	0.25	0.689
Hannan-Quinn	0.229	0.528	0.123	0.435
Panel C: Company C				
Equation	9	10	11	12
Constant	9.396 (0.107)	10.554 (0.000)***	10.447 (0.000)***	-9.472 (0.667)
Total corporate costs	0.165 (0.684)			1.386 (0.375)
GDP		-2.684 (0.885)		9.050 (0.728)
Interest rate			-1.513 (0.916)	4.309 (0.412)
Adjusted R^2	-0.100	-0.122	-0.123	-0.297
Durbin-Watson	0.888	0.827	0.755	0.906
F-Statistic	0.179 (0.683)	0.023 (0.884)	0.011 (0.919)	0.313 (0.815)
Akaike	2.743	2.762	2.764	3.019
Schwartz	2.803	2.823	2.824	3.141
Hannan-Quinn	2.677	2.696	2.697	2.887

Notes. The model is multi-regression, and ***, ** and * denote alphas at 1%, 5% and 10% respectively. *p*-values are in the brackets.

Empirical Analysis

In Model one, we illustrate the impact of the total company cost on CRE; in Model two, we illustrate the impact of the GDP on CRE; in Model three, we illustrate the impact of the interest rate on CRE. Model one illustrates that a one-unit increase in total company cost increases CRE by 1.019, one possible reason for this is because CRE is a capital-intensive investment which implies that in CRE; there is a significant portion of cost is associated with it. In Models two and three, independent variables are statistically insignificant; in Model four, we rolled over all independent variable for Company A. The total company cost in model four is still

positive and statically significant; the two variables keep the same signs and are still statistically significant. The total company cost for Company A has a causal effect, indicating that one event is the result of the occurrence of the other event (Abs.gov.au, 2018).

Models one to four show the adjusted R^2 has improved, meaning the model is very good. Durbin-Watson was used to test for autocorrelation and the value is 1.175, which means auto correlation exist because the value it is not around 1.3. F-statistics is used to test for structural break and it shows that Models one and four have structural breaks because we used a short time series. Akaike and Schwartz test for relative improvement in model; and based on the results, there is an indication that the model has improved.

For Company B, the variables are statistically insignificant only in Models five, six, and eight, and Model seven illustrates that when interest rate increase by one-unit, CRE decreases by 10 units and it also has structural break because we used short time series. The adjusted R^2 in Akaike, Schwartz, and Hannan-Quinn showed that the model has improved. For Companies C and D, all the models show that there are no statistical significant variables. The reason Company C's variable is statistically insignificant is that it is more focused on mining rather than real estate.

Table 2

Regressions of Independent Variables Against Dependent Variable (Continues)

Panel D: Company D				
Equation	13	14	15	16
Constant	4.719 (0.003)***	10.389 (0.000)***	10.020 (0.000)***	2.848 (0.173)
Total corporate costs	0.499 (0.002)***			0.647 (0.006)***
GDP		-7.129 (0.129)		1.589 (0.666)
Interest rate			-2.713 (0.502)	3.544 (0.195)
Adjusted R^2	0.694	0.171	-0.059	0.714
Durbin-Watson	1.185	1.199	0.502	1.517
F-Statistic	21.393 (0.002)***	2.862 (0.129)	0.493 (0.503)	8.503 (0.014)***
Akaike	-1.125	-0.129	0.116	-1.082
Schwartz	-1.065	-0.069	0.177	-0.961
Hannan-Quinn	-1.192	-0.196	0.049	-1.215
Panel E: Company E				
Equation	17	18	19	20
Constant	-2.179 (0.007)***	7.180 (0.001)***	9.684 (0.000)**	-01.653 (0.102)
Total corporate costs	1.086 (0.000)***			1.017 (0.000)***
GDP		1.744 (0.365)		5.249 (0.287)
Interest rate			1.850 (0.226)	-3.791 (0.359)
Adjusted R^2	0.971	-0.009	0.073	0.969
Durbin-Watson	2.189	1.056	0.910	1.811
F-Statistic	306.979 (0.000)***	0.921 (0.365)	1.714 (0.226)	95.681 (0.000)***
Akaike	-0.770	2.794	2.709	-0.585
Schwartz	-0.709	2.854	2.769	-0.464
Hannan-Quinn	-0.837	2.727	2.642	-0.718

(table 2 continued)

Panel F: Company F				
Equation	21	22	23	24
Constant	2.688 (0.182)	8.417 (0.000)***	7.808 (0.000)***	4.265 (0.052)**
Total corporate costs	0.524 (0.034)***			0.444 (0.051)**
GDP		-1.344 (0.059)**		-9.558 (0.150)
Interest rate			-6.423 (0.306)	-2.018 (0.676)
Adjusted R^2	0.383	0.297	0.021	0.534
Durbin-Watson	0.849	0.873	0.208	1.261
F-Statistic	6.576 (0.033)***	4.805 (0.059)**	1.196 (0.306)	4.439 (0.057)**
Akaike	0.492	0.622	0.952	0.322
Schwartz	0.553	0.682	1.013	0.444
Hannan-Quinn	0.428	0.555	0.886	0.19

Notes. The model is multi-regression, and ***, ** and * denote alphas at 1%, 5% and 10% respectively. *p*-values are in the brackets.

Given that companies analysed in this study have significant exposure to mining, we tested whether the mining variable has explanatory power on the total value of property. For that, we created a dummy, one for companies who main business is in min and zero otherwise. The results show that the mining dummy has a coefficient of 2.392 and *p*-value of 0.000. This illustrates that mining drives corporate real estate. The rationale for that might be that when mining companies expand so do their properties because they need properties for their operations including storing minerals that they have mined. For Company D, Model 13 illustrate that when the total company cost increase by one-unit the CRE value increases by 0.499, because part of the total RE goes to building their plants for breweries. In Model 16, the company total cost still remains positive and is statistically significant, which means it has a causal effect. The GDP and interest rate are hedge variables, which mean they have no causal effect but assist in balancing variables. Models 13 and 16 have structural breaks.

In Model 17 for Company E, when the total company cost increase by one-unit CRE value increase by 1.086, the interest rate is a hedge variable and Models 17 and 20 have structural break. For Company F, in Model 21, when the total company cost increases by one-unit the CRE value increases by 0.524. In Model 22, when GDP increases by one-unit, CRE value decrease by 1.344. Models 21, 22, and 24 have structural breaks; the interest rate loses its statistical significance due to heteroscedasticity.

Conclusions

The problem is that most non-real estate firms do not use CRE to its fullest potential; it is possibly due to the lack of skills in the industry and that these firms view CRE as an "enemy" since it is a cost intensive asset. The aim of this research is to broaden the study about CRE in non-real estate firms and come up with a model that explains relationship that CRE has with different economic indicators which are interest rate and GDP. From the literature review, we were able to find that most companies do not have a real unit especially in South Africa because it is viewed as a cost. There is a lack of CRE skilled labour in the industry, this might be the reason why the value of CRE does not add much value or maximizes shareholder returns. Most of the companies that have a real estate unit are a financial sector; other sectors, such as a mineral sector do not have a CRE department (Lalloo, 2013).

In this study, we used a quantitative methodology to derive the following regression model; we were able to deduce that GDP and non-real estate CRE value are positive for some companies, while negative for other companies; this can be due to the different strategies that are implemented within each company because they are from different indices which means the selected variables have a different impact for different companies. With regards to the interest rate for most of the companies act as a hedge variable, it indicates that there is possibly no relationship between CRE value and interest rate because it has no effect but assists in balancing the model. Most of the companies have a positive relationship between its CRE value and the total company cost; the possible reason for this is that corporate real estate is a cost intensive asset.

Previous studies did not indicate a clear relationship between GDP and CRE value of companies. Through our analysis, we were able to show that CRE value and GDP have a negative relationship for a majority of non-real estate companies. This study went in depth to determine and explain the impact that the components of the economic cycle have on the value of the CRE.

In conclusion, based on the analysis, GDP and CRE have a negative relationship for most companies. Interest rate and CRE have no relationship which means interest rate has little or no effect on CRE, because interest rate acts as a hedge variable. However, in the literature reviews, it was found that the relationship between CRE and interest rate does exist, provided that the increase of CRE is caused by inflation which is greater than the decrease caused by the increase in interest rate. The increase in the inflation rate might cause an increase in CRE value; this is because corporate real estate is a hard asset that inherent value since it has limited supply. Therefore, the analysis shows that the selected companies are not all affected in the same way by the economic cycle variables, this is because, these companies are from different indices, have different core business activities, and they do not use the same strategies to achieve their business objectives and to overcome business challenges. Companies with skilled CRE labour can ensure that the shareholders wealth is maximized by coming up with CRE strategies that are aligned with the core business strategies and capable of overcoming the negative impact that economic variable might have on the organisation's productivity.

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