

The Case for Real Estate Investment Trusts in Dubai

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ABSTRACT

With Real Estate Investment Trusts becoming an increasingly popular means to invest in the real estate market in the developed countries in recent years, it is of interest to this research whether recent legislation in Dubai will have the similar effects. Despite the growing demand for Islamic Finance products and services in the region coupled with a robust real estate market there have not been any significant studies to engage the concepts of REITs in Dubai and its adherence to *Shariah* principles.

This research examines the basis of Islamic Finance, the theory of capital structure as proposed by Miller and Modigliani (1958), and previous studies on the performance of Real Estate Investments Trust in other markets in order to gauge whether unleveraged REITs in Dubai will optimise a mixed asset portfolio whilst complying with the principles of Islam. Hypothetical Property Trusts have been created to act as proxy for the performance of REITs in Dubai which include one that is debt free and two that are incrementally leveraged.

With the local equity market and local corporate bond market representing the two other asset classes that are included in a mixed asset portfolio, it is that of the Real Estate Investment Trusts that have proven to be the dominant asset class. The inability of borrowing to enhance the performance of the Hypothetical Property Trusts gives credence to the ability of unleveraged REITs to optimise a mixed asset portfolio whilst complying with the principles of Islam and hence laying the foundation for the growth and popularity of REITs in Dubai.

CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

The spectacular growth experienced in the Middle East region is well represented by the success story of the Emirate of Dubai in the United Arab Emirates. This city which only several years ago was unknown to the average person, has made a mark for itself in the global landscape in a very short period of time. Dubai recognising the need to diversify their economy away from oil as their reserve is limited and prices are constantly fluctuating began to build an infrastructure that would allow them to enter into new industries and become less reliant on oil revenues. In order to create an infrastructure the construction industry would need to be focused upon which meant the import of western technologies, equipment, but most importantly people. With many skilled expatriates moving to the region in order to satisfy the massive employment demands, Dubai quickly began to recognize the vast shortage of housing and commercial property units which till recently have been in great demand.

The rapid growth of Dubai and surrounding regions including that of Saudi Arabia, Qatar, Bahrain, and Oman, has led to a substantial amount of people and businesses to become both wealthy and influential. The Arabic people in these regions have always imported the technologies and products of the Western world in order to satisfy the ever growing demands of their countries including that of banking and financial products. With the vast majority the Arabic people being followers of Islam the need for a form of banking and financial products that complies with the teachings of the Koran have led to what is now referred to as Islamic Finance. Although Islamic Financial institutions have

been established some years ago in has not been until the last several years that the actual demand has flourished as one might have expected it to.

Although Muslim scholars have recently introduced products to cater to the Islamic population, the recent legislation introduced by the Dubai International Financial Centre (DIFC) regarding Real Estate Investment Trusts (REITs) has not been extensively researched as to the benefits and advantages of having such an instrument in a mixed asset portfolio. I believe that Real Estate Investment Trusts (REITs) will become an ever increasing popular asset class for investors in the years to come as the ability of unleveraged REITs to optimize a mixed asset portfolio whilst conforming to the principles of Islam becomes evident.

1.2 DISSERTATION OUTLINE

The following research gathers insight into the studies and research of Real Estate Investment Trusts in other countries, notably in the United States where analysis from various aspects has been performed. The discussion incorporates the benefits and advantages of having REITs within a portfolio including diversification, inflation hedging, and healthy returns whilst always adhering to the principles of Islam. The ability to evidence that REITs would be an appropriate investment vehicle to allocate to a mixed asset portfolio of investors within the Middle East region should assist in laying the groundwork for further literature and research on this topic.

This paper is structured whereby Chapter 2 covers the literature that I have reviewed including the various aspects of REITs, capital structures, and Islamic Finance and Chapter 3 outlines the Data and Methodology that I have to used examine the performance of the Hypothetical Property Trusts as proxy for the REIT market. Chapter 4 discusses in detail the results of my analysis of the HPTs, how they compare to the current school of thought and previous studies, and whether REITs will become a financial instrument to be reckoned with in Dubai in the years to come. Chapter 5 concludes my research where a summary of my findings is provided, whether my hypothesis holds merit and where further research if necessary will be needed.

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

In order to better appreciate the performance of REITs and the advantages that they have provided mixed asset portfolios in past studies the following literature reviews have been examined. Studies regarding interest rates, the effects of leveraging, monetary policy, emerging markets, and Islamic Finance have also been reviewed so that an understanding of how REITs, capital structures, and Islamic Finance may be intertwined to form an unleveraged REIT that would be both compliant to the ideas of Islam whilst optimising a mixed asset portfolio. The journals below cover varying periods of time and theories of portfolio management give validity to the recommendations and conclusions presented in this research.

2.2 LEGISLATION AND REGULATION

The National Association for Real Estate Investment Trusts (NAREIT) has been the leading organisation and representative council for Real Estate Investment Trusts in the United States since legislation was passed in 1960 allowing for the creation of such entities. The US Congress' passing of such a bill allowed for investors to purchase units of a trust that invested in large scale commercial properties and other income producing properties that would have been previously available only to large institutions or wealthy individuals. (www.nareit.com) REITs were also originally seen as a simplified way to invest and expose oneself to the real estate market in a professional and efficient manner as the units are traded on a listed exchange just like other assets such as equities allowing for REITs to be viewed as a liquid instrument whilst participating in the risk and return attributes that people seek in real estate. NAREIT has not only been the largest promoter

of REITs in past years but they have also been the organisation that has encouraged professionalism, integrity, and transparency as one would expect from any leading exchange or regulatory body. Although the popularity of REITs have grown substantially in the United States in the recent past, Australia, Canada, Singapore, and Holland have also enjoyed the success of identical investment vehicles in their respective countries.

As the property market flourished in Dubai in recent years the Dubai International Financial Centre has enacted DIFC Law No.5 of 2006 and subsequently issued RM35/2006 Investment Trusts and REITS Rules Instrument 2006 that would permit for the establishment and operation of a Real Estate Investment Trust within the realm of the financial city and eventual listing on the DIFX which is the Dubai stock exchange. (www.arabianbusiness.com) The DIFC has been established as a 'Free Zone' in Dubai where international financial institutions can create a presence in the United Arab Emirates without relinquishing any ownership to local Emiratis that would otherwise be the case in Dubai. The DIFC was also created in order to promote a level of transparency, regulation, and security that is seen to compete with the likes of Bahrain which has been the leading financial jurisdiction in the Middle East.

With the DIFC enacting legislation for Real Estate investment Trusts there is now a self regulating body and platform whose promotion of transparency and international standards will assist in the growth of this investment vehicle to the region and beyond. With the recent turmoil in Dubai which has seen many executives of high profile

companies been arrested and charged with numerous criminal charges (www.zawya.com) the need for the level of transparency and corporate governance that the DIFC promotes is truly what is needed if REITs are to prevail. A prime example of such corruption is the recent arrest in October 2008 of Sami Al Hamshi, a former Vice President of Tatweer which is a subsidiary of the government owned Dubai Holding, has been charged with irregularities in a deal that he approved while he was working with the property development company. A slew of other high ranking executives from Dubai Islamic Bank, Tamweel, Deeyar, and Sama Dubai have also been arrested and charged with various crimes in recent months as the government has clamped down on corruption and abuse of powers.

The issue of transparency is closely examined in the work by Hartzell *et al.* (2004) where the authors examine the impact of Corporate Governance on the IPO valuation of REITs and the effect on long term performance. The sample used was quite substantial in that 107 REITs in the United States based during the 1991 to 1998 period were assessed and the results indicated that firms with higher corporate governance structures not only had higher IPO valuations, but that they also had better long term performance than their counterparts.

2.3 PORTFOLIO EFFICIENCY

Much of the research that has been performed on REITs in recent years has focused on the principles of modern portfolio theory attributed by the work of Markowitz (1952). The premise of Markowitz's principles has become the basis of portfolio management

and touch upon themes of diversification and efficiency. Markowitz in his paper describes the “expected return-variance of returns” (Markowitz, pg.77, 1952) rule where investors should seek to invest in a portfolio that “gives both maximum expected return and minimum variance”. (Markowitz, pg.79, 1952) This phrase which has been the basis of much discussion in many of the papers researched is commonly referred to as the ‘efficient frontier’ where the combinations of expected returns and the accompanying variances of different sets of portfolios are mapped out on a chart. With a series of potential portfolios and their corresponding variance and return scenarios displayed an investor can then assess their decision for investments based upon their preference of levels of risk and accompanying returns. Markowitz (1952) in his paper suggested that if investors needed to reduce risk and achieve more efficient portfolios then one would invest in companies that had a low covariance to each other.

As REITs have not had the popularity as equities have in past years the first comprehensive studies that have been published on the consideration of real estate investments as an asset class have been performed by Brueggman *et al.* (1984) and (1992) as an extension to their first paper. Brueggman *et al.* (1984) analyse the performance of U.S. Commingled Real Estate Funds (CREFs), which is a fund that is established with the objective of purchasing and managing a portfolio of income producing properties on behalf of pension funds and other large institutional investors. The authors used CREFs as the investment vehicle representing real estate and compared them against stocks in the Standard and Poor 500 stock index, corporate bonds reported by R.G. Ibbotson Associates, and T-Bills during the 1972 to 1983 period. The results

reveal that CREFs had superior returns than either stock or bonds, less variance, and a negative correlation with both stocks and bonds, which indicate that portfolios including real estate investment through CREFs would have been greatly diversified whilst optimising the portfolio's performance.

Brueggman *et al.* (1992) again assessed CREFs in the United States against stocks on the Standard and Poor 500, and corporate bonds and T-Bills from Ibbotson and Associates, for the 1972 to 1991 period. Although the performance of real estate against the other asset classes, with respect to annual returns, did not gauge well during the 1984 to 1989 period, it did decrease its risk element as measured by its standard deviation which decreased from 1.9% to 1%. During the entire timeframe examined it was revealed that investment in real estate via CREF would have reduced the element of risk as its standard deviation was a mere 6.77% versus stocks that exhibited 17.08% and bonds with 12.24%. In their final assessment of the entire period the authors found that investment in real estate provided excellent diversification benefits through low levels of variance and superior risk adjusted returns.

The benefits of real estate investments within a portfolio are again highlighted in Chandrashekar (1999) analysis of U.S. REITs, stocks represented by the S&P 500 Index, and bonds represented by the Shearson-Lehman Government/Corporate Bond Index for the 1975 to 1996 period. The author also highlights another measure of performance that is included in many of the articles researched which is that of the

Sharpe Ratio that characterises how well the return of an asset compensates for the risk taken. Assets with a high Sharpe Ratio provides more return for the same level of risk hence investors seek a higher Sharpe Ratio which is calculated as; $S = E(R - R_f) / \sigma$.

Chandrashekar (1999) finds that REITs performed well against the other asset classes as it exhibited monthly returns of 1.03 compared with 0.73 for stocks and 0.23 for bonds, and that the Sharpe Ratio was even more impressive with 0.21 for REITs, 0.17 for stocks, and 0.12 for bonds. The superior returns and Sharpe ratios of REITs during the sample period assessed indicate that the inclusion of REITs in a portfolio would optimise its performance.

Han and Liang (1995) examine the performance of REITs in the U.S. against that of the stock portfolio constructed by the Center for Research and on Security Prices (CRSP) from the 1970 to 1993 period using the Jensen Index which is based upon the CAPM model. Although the authors have examined both Equity REIT and Mortgage REITS only the results for the Equity REITs will be highlighted as only these are relevant to this research paper. With the CRSP stock portfolio having a higher monthly return of 1.22% compared to the Equity REIT of 0.99% but a standard deviation that was higher by nearly 1%, the Sharpe Ratio for the CRSP was still superior by a measure of 0.106 to 0.081 indicating a better risk adjusted return for the broad based stock portfolio of CRSP. The authors also tested the comparison by removing the CRSP as the market index in the CAPM formula and replaced it with the S&P 500 and interestingly found that the Jensen Index was higher by a margin of 0.163. This S&P 500 bias shows the Jensen Index at a positive 0.139 which indicates that the Equity REIT was superior versus the market

portfolio. With the Equity REIT performing well against the S&P 500 and not the CRSP, the authors have suggested that this may be due to the exclusion of small cap stocks from the S&P 500 index and that other research may overestimate performance of REITS by only using large cap stock indices.

With Australia having a well established REIT market and similar economic conditions and factors facing Singapore, Sing and Ling (2003) decided to study the performance of the Australian property market against Singapore stocks and bonds. Due to the fact that Singapore did not enact REIT legislation until 1999 and it was only in 2002 where the first REIT was launched Sing and Ling (2003) decided to take 22 Listed Property Trusts included in the Standard and Poor's (S&P) ASX 200 Property Trust Sector based in Australia, which are the Australian equivalent of REITs, and analysed them against the equities on the Stock Exchange of Singapore-All Equities Index (SES) and Singapore Government Long Term Bond- Price Index for the 1995 to 2002 period, in order to determine their ex-post return parameters and contribution to a mixed asset portfolio. The authors constructed four Hypothetical Property Trusts (HPTs) based upon the historical performance of the Australian LPTs and found that the mean annual returns of the HPTs were 4.354% versus that of the stocks on the SES that had a -0.436% return and 2.064% for the Long-Term Bonds. The volatility of the HPTs based on standard deviation of 0.018% was lower than the stocks that measured 0.032% but higher than the bonds which measured 0.004%, resulting in the HPTs having a risk adjusted return that was superior to the stocks but inferior to the bonds. The authors found that healthy performance of the HPTs and its low correlation to the stocks and bonds would have

optimised a mixed asset portfolio. Sing and Ling (2003) also made an interesting note in that they thought the HPTs acted like a hybrid instrument as they had characteristics of low volatility as evidenced by bonds and the high returns shown by stocks, as HPTs must payout a vast majority of their income to shareholders as per legislation.

Lee and Stevenson (2005) in their study of REITs and their contribution to a mixed asset portfolio analyses the efficient frontier over varying time periods such as 5, 10, 15, and 20 years. The authors have analysed US REITs representing real estate, the S&P 500 Composite Index to represent large cap stocks, the Wilshire indices to represent mid, small and micro cap sectors, DataStream indices for the U.S. Government bond sector, Treasury Bills for cash, and the MSCI indices for Asian and European equity markets for the 1980 to 1992 time period. The comparative analysis shows that REITs provided higher returns than bonds but lower returns than the equity markets, lower standard deviation to that of stocks and higher standard deviation to that of bonds, resulting in the authors finding that REITs would benefit a mixed asset portfolio by increasing return on a risk adjusted basis. The authors result that is very interesting and particular to their work is found in their assessment of optimal allocation towards REITs over the different time spans mentioned. Where it is found that the allocation to REITs in the 5 year time period to be that of consistent yet minimal, it is with the increase in time spans such as that tested over the 20 year period where the percentage allocation to REITs increases dramatically and more frequently suggesting that the REITs' contribution to diversification increases with time. Lee and Stevenson (2005) have also noted that REITs

provide return enhancement to bonds and risk reduction to stocks much to the argument of Sing and Ling (2003) where REITs are seen as a hybrid instrument.

The research of Mueller and Mueller (2003) focused on whether REITs behave more like traditional real estate investments by assessing the inclusion of private and public real estate in a mixed asset portfolio and observing their the mean-variance attributes in the efficient frontier model for the 1978 to 2002 period.. Their study includes private real estate investment through the inclusion of the NCREIF Index (National Council of Real Estate Investment Fiduciaries), public real estate through the NAREIT Equity Index (National Association of Real Estate Investment Trusts), common stock through the S&P 500 Index, and the risk free rate using the Ibbotson LT government bond index. The significant findings made by the authors include the fact that over the 25 year period Equity REITs exhibited the highest annual return with 14.5%, NCREIF had the lowest volatility of all comparables with a standard deviation of 6.56%, and that the public and private real estate actually had a very low correlation of 0.05. With the public real estate (NCREIF) providing a decreased level of volatility in the efficient portfolio and public real estate (NAREIT) providing a strong risk adjusted return, Mueller and Mueller (2003) believe that the inclusion of both public and private real estate in a mixed asset portfolio would provide a more efficient frontier than rather having only one component.

With much research above indicating that REITs are an asset class that should be allocated to portfolios, it is the work of Chan *et al.* (1990) that firmly opposes such a view. The authors assessed the monthly returns of 30 U.S. REITs from 1973 to 1987

against major stock indices using the CAPM framework and the multifactor Arbitrage Pricing Model using specific macroeconomic variables such as that of inflation. The empirical results find that REITs provided significant excess returns over the T-Bill rate using the CAPM framework, however when assessed using the Arbitrage Pricing Model, these excess returns seem to disappear. Equity REITs were first observed as less risky than stocks, but it is the fluctuating returns of REITs, especially in the 1970s that eroded the superior risk adjusted returns. Chen *et al.* (1990) also observed that despite the traditional academic beliefs that real estate was a strong hedge against inflation, their results had proved otherwise. The empirical results that indicate the poor hedging benefits of equity REITs against inflation and the lack of superior risk adjusted returns counters the argument for REITs as an asset class within an optimal mixed asset portfolio but also detrimental to the argument for investing in real estate to hedge inflation which essentially erodes ones earnings and wealth.

2.4 PROPERTY TYPE AND PROPERTY DIVERSIFICATION

Benfield *et al.* (2008) compare the performance of property diversified REITs against those that are specialised in one particular property type to ascertain whether the theory of corporate finance, where diversified firms trade at discount to specialised firms, holds true in the case of publically traded REITs over the 1995 to 2006 period. The authors use 75 equity REITs extracted from NCREIF (National Council of Real Estate Investment Fiduciaries) and test them against the S&P 500, and the small cap firms found in the NYSE, NASDAQ, and AMEX indices using the Sharpe Ratio, Jensen's Alpha, and

Treynor index. Through the various methods of testing, including parametric, nonparametric, single market factors, and multi factor market models, the authors conclude through their results that the performance of property diversified REITs was superior to specialised property REITs over all periods contravenes the traditional school of thought that diversified firms trade at a discount to specialised ones.

Capozza and Seguin (1999) have examined the cash flow and firm value of diversified and industry focused REITs in order to determine which exhibit superior performance. The authors have used 75 equity REITs taken from NAREIT (National Association of Real Estate Investment Trusts) for the 1985 to 1992 period and have closely analysed the income statements to derive the performance of the property trusts. Initial findings show that diversified REITs had a yield of 9.43% versus property specific REITs that had a yield of 8.14%, a significant difference of 130 basis points. As per the authors' expectations, property specific REITs had a general administrative expense ratio of only 0.5% where that of diversified REITs had 0.96%, reflecting the increased managerial costs undertaken by diversified REITs that need to hire additional staff that specialise in different segments of the property market. Findings also include that diversified REITs have an increased cost of borrowing by 47 basis points and that investors allocate a lower discount rate to property focus REITs when assessing cash flows due to their transparency and liquidity, thus resulting in a higher firm value for property specific REITs. While diversified REITs exhibit a higher gross yield due to their opportunistic approach towards investing in real estate, it is their higher expenses and increased

discount rate that allow Capozza and Seguin (1999) to find that property specific REITs to provide more firm value.

Gyourko and Nelling (1996) examined the relationship between property type and geographic location of equity REITs and the relative measures of systematic risk and diversification against stock market data. The authors have used in their research publicly traded REITs listed on NARIET extracted from the NYSE or AMEX over the 1988 to 1992 period and divided them into groups according to property type such as industrial or retail, and then also grouped them according to geographic location and economic regions. The returns of the REITs are then regressed against the S&P 500, the index representing the stock market data, in order to gauge the benefits of diversifying across property types. The results show that diversification by way of property type had a mean R^2 of .71 with the market versus the R^2 of the groups based upon geographic location and economic region that had a mean of .51 and .53 respectively, indicating that diversifying by means of property type is less effective. The retail property category had exhibited an R^2 that was .30 higher than that of Industrial or Warehouse when property types were regressed against the REIT equity beta. The greater systematic risk exhibited by retail property can be explained by the nature of retail leases that include a percentage of the tenant's revenue as part of the contract, making it highly susceptible to downturns in consumer spending. The authors conclude that investors should be cautious in that the higher returns provided by retail property is accompanied by higher levels of systematic risk, and that there are no substantial findings that indicate diversifying through property type provides diversification benefits.

2.5 INTEREST RATE SENSITIVITY

Chen and Tzang (1988) have focused their research on whether REITs were sensitive to changes in short term and long term interest rates. The authors have analysed 32 equity REITs and 22 mortgage REITs in the U.S. market over the 1973 to 1985 period by using Merton's (1973) intertemporal capital asset pricing model (ICAPM). The data set was then subdivided into periods of 1973 to 1979 and 1980 to 1985 as the Federal Reserve changed their mandate from interest rate targeting to money supply targeting. The returns of the REITs were then regressed against 20 year U.S. government bonds and 3 month, 6 month, and 1 year Treasury Bills. The empirical results show that both equity and mortgage REITs were sensitive to interest rate changes for the 1980 to 1985 period, but providing a poor hedge against unfavourable short and long term rate movements whereas the results for the 1973 to 1979 period show that REITs were affected only by unfavourable long term interest rate movements. The shorter term contracts offered by equity REITs allows the trust to renegotiate terms that reflect current market conditions including interest rates, thus allowing for value of equity REITs to be less sensitive as they are able to change rent prices in order to maintain value.

Mueller and Pauley (1995) have studied the effects of interest rate movements on the value of REITs in the U.S. over the 1972 to 1993 period by comparing monthly price changes of the 3 month U.S. Treasury bill, 10 year, and long term government bonds against the S&P 500 Index, the S&P 40 Utilities Index, the NAREIT Price Index (REIT index) and the Wilshire Real Estate Index. The results show that the Wilshire and NAREIT Indices had a low negative correlation to the movements in short, medium and

long term bonds ranging from -0.22 to -0.33 for the Wilshire and -0.201 to -0.299 for the NAREIT. Although the negative correlation shows that equity REITs prices are inversely effected my movements in interest rates, the degree of such movements is not considered significant. The authors then analysed the change of equity REIT prices to the change in rising and declining interest rate changes during the same time period and found that during times of rising interest rates the NAREIT index had a negative .153 correlation whereas that of the Wilshire had a negative .34 correlation. In declining interest rate movements the findings are more significant with the NAREIT exhibiting an average - 0.25 correlation and the Wilshire -0.46. The rationale for the differing levels of correlation for the NAREIT and Wilshire indices to interest rates is that the Wilshire Real Estate Index had a higher degree of leverage than that of the NAREIT, thus making it more sensitive to interest rate movements.

McCue and Kling (1994) examine the relationship between the macro economy and real estate returns over the 1972 to 1991 period. The authors have used U.S. REITs to gauge real estate prices, the S&P 500 for stock prices, the CPI for prices, the 3 month U.S. Treasury bill for short term nominal rates, the Federal Reserve Industrial Production Index for output and the McGraw Hill Construction Contract Index for investment. The results using the vector autoregressive model (VAR) suggest that macro economic variables have a significant influence on real estate prices, contributing nearly 60% to the variation in real estate returns with nominal interest rates accounting for nearly 36% of the variation. With the other variables accounting for the remaining 24% in real estate return variation, McCue and Kling (1994) feel that nominal interest rates are the largest

contributor to the variation in real estate prices and that this may be explained by the interest rate effect which influences capitalisation and discounting rates used for property valuations.

2.6 MONETARY POLICY

The issues of inflation and GDP and their effect on the property market is a highlight of the article by Ewing and Payne (2003). Ewing and Payne focus their work towards understanding the relationship that macroeconomic shocks have on the value of equity REITs for the January 1980 to September 2000 period by using the generalised impulse response analysis in assessing U.S. REITS found in the NAREIT Index, the federal funds rate, the consumer price index, corporate bond default risk premiums, and real output which have all been extracted from the Federal Reserve Bank of St. Louis Economic Database (FRED). Their findings state that during a period of expansionary monetary policy which is represented by the lowering of interest rates and increase in economic output, returns of REITs will increase, as is the case of lowered returns for REITs during periods of monetary tightening whereby interest rates are increased to keep inflation within acceptable parameters.

Bredin *et al.* (2006) have studied the influence of unanticipated changes in monetary policy and their effects on Equity REITs as it has long been the role of policymakers and central bank chiefs to use the change in interest rates as a means of spearheading their monetary policies to stabilise inflation and control economic growth. Their analysis consists of daily U.S. data from January 31, 1996 through till March 1, 2005 which

includes that of The Dow Jones-Wilshire Equity REIT Index, the S&P 500 Index, and the Federal Funds Futures contract from the Chicago Board of Trade (CBOT). The results show that a change in the Federal Funds Future contract has an effect on the mean and volatility of the Equity REITs, and to an extent greater than the effect on the S&P 500. The reason for the greater influence on Equity REITs than the S&P 500 is viewed as being caused by fact that the capitalisation rates used to calculate property value are immediately changed and by the assumption that there will be an impact on the occupational demand for property.

Thorbecke (1997) analyses the change in monetary policy via the federal fund rate, non borrowed reserves, and Federal Reserve policy changes and how it affects the price of stocks in the United States for the January 1967 to December 1990 period using the VAR methodology. The author's results show how a one standard deviation positive innovation in the federal funds rate decreased stock returns by an average of 0.80% per month, while a one standard deviation positive innovation in the non borrowed reserves increased stock returns by 1.790% per month, reaffirming the theory that a change in interest rates or money supply has an immediate effect on the value of stocks. The cause for the change in value is similar to that found in Bredin *et al.* (2006) as a move in interest rates changes future cash flows of a firm or similarly increases or decreases the discount factors at which the cash flows are capitalised both increasing or decreasing the value of the firm or portfolio.

The study of Rogalski and Vinso (1977) examine the change of the money supply in the U.S. and its affect on stock prices of the S&P 500, the Dow Jones Industrial Average, the Fisher's Link Relative Index, and the New York Stock Exchange for the 1963 to 1974 period. The money supply figures are cross correlated with that of each index by using direct comparison and that of lagged dates to assess not only the relationship of money supply but the extent to which there is a delayed or anticipated response. The results show that the money supply had a somewhat relevant degree of relationship in the 1 month lag period that may be due to the fact that the Federal Reserve does not publish money supply figures for 1 month after collecting all the relevant data. The authors conclude that their results confirm the theory that information regarding money supply affects stock prices and that causality does not necessarily go only from money supply to stock prices but also from stock prices to money supply. Rogalski and Vinso (1977) have also stated that;

“these results have implications for monetary policy in that changes in the money supply as affected by the Federal Reserve policies will have a direct impact on returns from common stocks. While monetary policy should not be guided by the impact on the stock market, such influences should not be ignored due to the influence of the stock market on economic activity”

(1977: 1029)

2.7 INFLATION HEDGING

The report by Colliers International (2008) highlights the issue of inflation that has been plaguing Dubai and other developing regions in the Middle East in the last several years with cost of all goods and services increasing across the board. The annual inflation rate of the United Arab Emirates in the fourth quarter of 2008 has been recorded at 11.5%, that of Saudi Arabia 10.5%, Qatar 13.5%, and Oman at a much lower 5.9% which is still considered quite high in comparison to developed nations.(Colliers International, pg. 6, 2008) This rapid rate of inflation causes many difficulties for investors as their aim to protect and conserve their wealth is of prime concern irrespective of the benefits arising from the economies growing at paces such as annual rates of 17.5% for the U.A.E. and 12.9% for Qatar. The important role of monetary policy and how it is used to control the economic growth of individual firms or economies so as to control the levels of inflation to within acceptable levels is only made that much more complicated for the central banks of the Middle East with their currencies being pegged to the US Dollar. The pegging of their currencies to the US Dollar forces these central banks to follow the interest rate policy of the United States so as to not cause discrepancies in interest rates and opportunities for arbitrageurs to strike.

Real estate has always been viewed as an effective means of hedging inflation and one of the earlier studies on such topics has been performed by Hartzell *et al.* (1987). The authors conducted a study of quarterly returns of a U.S. CREF (Commingled Real Estate Fund) comprising of 300 properties from 1974 to 1983 to assess the asset's ability to hedge against both expected and unexpected inflation. The 3-month T-Bill is used to for

the default-free interest rate, the CPI (Consumer Price Index) as the inflation rate, the expected inflation rate is the difference between the nominal interest rate and the forecasted real rate, and unexpected inflation is the difference between actual inflation and expected inflation. The results indicate that by using the regression methodologies of (Fama-Schwert) that real estate as measured by the returns of the CREF provided a complete hedge against expected inflation over all sample periods,, where the hedging ability of the CREF against unexpected inflation were partly effective. Hartzell's testing of inflation hedging of different property types indicated that industrial property was the strongest hedge with a coefficient of 3.57 for expected inflation and 3.07 against unexpected inflation whereas that of retail had a coefficient of only 0.54 for expected and 0.75 for unexpected inflation, making it only a partial hedge against inflation.

The research by Rubens *et al.* (1989) tested the hedging effectiveness of residential, farmland, and business real estate against actual, expected, and unexpected inflation during the 1960 to 1986 period, along with the ability for mixed asset portfolios to provide comparable hedges. The authors used the Treasury bills as measures for expected inflation, the CPI index as actual inflation, First National Bank of Chicago CREF for business real estate returns, the residential component of CPI for residential real estate process, prices for farmland from the U.S. Department of Agricultural, S&P 500 Index for stock prices, and Ibbotson and Associates for government and corporate bonds. The authors tested the hedging effectiveness by using the Cochran-Orcutt method of regression to control for autoregressive disturbances, and found that only residential real estate proved a complete hedge against actual inflation, business real estate was a

complete hedge against expected inflation, and residential and farmland real estate proved a complete hedge against unexpected inflation. When the real estate was then added into 4 different mixed asset portfolios including stock and bonds, neither one of them proved to be a hedge against unexpected inflation, where the portfolio including business real estate was a complete hedge against expected inflation, and the portfolios consisting of farmland or residential real estate only served as partial hedges against actual and expected inflation.

Sing and Low (2000) analyse the hedging effectiveness of the Singapore real estate market, along with stocks on the Stock Exchange of Singapore (SES) All Share Index for the 1978 to 1998 period. Their results of the Singapore market reveal that real estate provided a better inflation hedge than financial stocks in regards to actual, expected and unexpected inflation. When property was analysed according to type, industrial property was most effective against actual and unexpected inflation with retail property being superior versus expected inflation. Sing and Low (2000) also analysed the real estate hedging effectiveness in low and high inflation regimes and found that residential property to be a strong hedge in a low inflation regime while industrial property was stronger in a high inflation environment.

Yobaccio *et al* (1995) studied the inflation hedging effectiveness of U.S. REITs for expected and unexpected inflation from February 1972 to December 1992. Although the authors examined mortgage REITs, equity REITs, and hybrid REITs, it is the results of the equity REITs that are relevant to the research at hand. In order to make conclusive and

comprehensive results the authors used several types of data to gauge inflation estimates including that of U.S Treasury bills, Livingston Data, and the CPI (Consumer Price Index) and analysed these data references over varying time periods. The results indicate that equity REITs only at best partially hedged expected inflation and actually performed quite poorly against unexpected inflation in all periods of the study.

2.8 CAPITAL STRUCTURES

The inclusion of debt within capital structures has long been studied, including that by Maris and Elayan (1989) when they assessed the cost of capital to untaxed firms, namely REITs. They chose REITs for the main fact that REITs are generally tax exempt at the corporate level as a vast majority of its income must be passed to shareholders. The authors collected data on 61 U.S. REITs for the 1981 to 1987 period and grouped them according to their degree of leverage, that being of high debt REITs and low debt REITs. The authors found that there was a negative impact in the leveraging of REITs as viewed by the negative correlation to the growth rate and that leverage only increased the cost of capital.

These above results reflect the well known studies of Miller and Modigliani (1958) that is today known as the M&M theory. Modigliani and Miller (1958) assessed the capital structure of firms and the benefits of debt financing and concluded in their Proposition I, consisting of perfect capital markets and no personal or corporate tax, that leveraging had no effect on the value of a firm or its cost of capital. However, once corporate taxation was brought into discussion, the authors found that a firm benefited from leveraging to the extent of the tax rate on corporate earnings multiplied by the market value of the debt

issued, which has been become known as the tax shield. While Modigliani and Miller (1958) provide the potential benefits of leveraging, they do also state that increased return is accompanied by increased variance of outcomes and that lenders demand higher borrowing rates as debt to equity ratios increase.

The value of the tax shield is apparent in the work by Kemsley and Nissam (2002). The authors used cross sectional regressions to ascertain the value of the debt tax shield for 2,964 firms that were either listed on the NYSE or the AMEX over a 31 year time frame from 1963 to 1993. The results show that the value of the debt tax shield was 40% of the firms' debt balances in comparison to the average corporate tax rate of 45%, indicating that the firms captured a vast majority of the benefits of debt as per the hypothesis of the M&M Theory. It was also found that the advantage of the tax shield as being an increasing function of the tax rate and adding nearly 10% to the value of the firms.

Earlier papers such as that of Hamada (1969) provides an in depth analysis of the studies of Modigliani and Miller (1958) and Markowitz (1952) and attempts to link the two fields of finance. Hamada (1969) takes into account the financing and investment decisions that are available to corporations and investors alike and uses the framework of the market equilibrium capital asset pricing model to assess the MM Propositions using the mean variance portfolio model. Among the findings of Hamada (1969) of interest to this research is where he alludes to the capitalisation rate for a firm's equity, or rate of return required by investors, that increases linearly with the firms degree of leveraging which

reaffirms the M&M theory, where expected yields are increased as leverage increases reflecting the premium included to account for greater volatility and variability risk.

2.9 EFFECTS OF LEVERAGING

Capozza and Seguin (1999) in their examination of U.S. Apartment REITs versus Non-Apartment REITs during the 1985 to 1992 period recognise that the risks associated with increased debt financing eludes to the higher probability that a firm will experience financial distress. This perceived level of increased risk caused by leveraging is countered by their findings where apartment REITs are leveraged to 54.2% of assets compared to 47.6% for Non Apartments. The cause for the increased use of debt by Apartment REITs is explained by the fact that they use more long term fixed rate debt that is less costly than other non Apartment REITs as banks and financial institutions are more comfortable lending against residential properties as they are easy to value and faster to liquidate in the event of default. Capozza and Seguin (1999) have also found that the addition of debt to capital structure increases management time that is needed to handle the financing, accounting, and reporting that is involved with leveraging to the extent that debt is approximately 35 basis points costlier than the cost of capital. Adding to the disadvantages to leveraging is their assessment of agency costs on REITs where managers are paid a percentage of assets under management and not that of equity. This method of compensation causes REIT managers to rapidly grow the assets under management through the means of leveraging even at the expense of the shareholder's return on investment and increased risk.

As to whether untaxed entities such as those in Dubai would benefit by leveraging are highlighted by the work of Boyd *et al.* (1998) The authors analyse the effect on portfolio performance of including real estate into a mixed asset portfolio by those investors that are not taxed. A bootstrap estimate using the Markowitz mean-variance analysis is used to create efficient frontiers for a series of portfolios including varying levels of stocks, bonds, and real estate. The data consists of common stocks and bonds retrieved from Ibbotson and Associates and the real estate was gathered from Evaluation Associates for the 1970 to 1995 period within the U.S. market. The initial result of interest is that real estate was both negatively correlated with common stocks and corporate bonds, and only slightly correlated with Treasury Bills indicating that real estate within a portfolio would have provided diversification benefits to investors through reduced levels of risk.

The result for non taxed investors of adding leverage to the real estate investment caused mean returns to decline from 8.25% for no debt to 2.31% for 75% leverage, and standard deviation to increase from 10.35 for no debt to 40.56 for 75% debt. Where debt free real estate was seen as optimising portfolio efficiency through lowered risk for all investors, the addition of leveraged real estate caused a decline of the mixed asset portfolio frontier for untaxed entities.

The research of Chaudry *et al.* (2004) focuses on the various causes of idiosyncratic risks for undiversified REITs in the U.S. market for the 1994 to 2000 period. The effects of size, financial leverage, performance, liquidity, capital, and earnings variability were analysed against the firm specific risk factors for REITs. With regards to leveraging, it was mentioned that the higher levels of borrowing may increase earnings but only at the

expense of higher probability of default, coinciding with the argument that the greater the equity position of a REIT, ideally one that is debt free, the lower is its risk as more capital is available to the firm to lessen the burden of a downturn market if and when real estate prices begin to decline. The results obtained from the two-stage regression model found that though the variables of leverage and capital did not affect the idiosyncratic risk of REITs in the earlier years, they did exhibit a significant rising trend, indicating in their conclusion that investors should closely isolate the leverage and capital ratios when analysing the potential for adding REITs in a mixed asset portfolio.

Brown (2000) in his research of U.S. mortgage and equity REITs during the 1988 to 1991 period examines the effects of a downturn real estate market on highly leveraged versus well capitalised REITs. Where a mortgage REIT is a portfolio of real estate loans and an equity REIT is a portfolio real estate equity positions, it is assumed that the return of a mortgage REIT should be less affected than that of an equity REIT as it holds senior claim on the properties within the trusts. The sample data consists of 92 REITs taken from NAREIT, and shows that mortgage REITs had provided loans on commercial property in the range of 70 to 100% of its value where equity REITs had a debt level of only 35%. It is found that in downturn markets where highly leveraged REITs are in dire need to sell their properties they begin to sell them at levels below those of distressed sale rates. The evidence provided in the research by Brown (2000) shows that the growth rate of mortgage REITs were -8.48% while that of equity REITs were 14.93% over the sample period. The author actually found that in the downturn market of the U.S. in the 1998 to 1991 period equity REITs took advantage of their superior capital position and

extremely low market property prices to increase their size from US \$6.3 billion to \$7.3 billion. Brown (2000) remarks that that during the U.S. property market downturn in the early 1990s highly leveraged properties were liquidated which in turn created an opportunity for REITs that were well capitalised to increase their holdings.

2.10 EMERGING MARKETS

Schnabl and Hoffman (2007) thoroughly discuss the potential causes for economic ‘booms and busts’ of both developed and emerging markets. The authors provide ample evidence that high levels of liquidity due to a low interest rate regime from the US, Japan, and the Euro zone have been invested in new or emerging markets in order to take advantage of higher yielding investments that could not be realised in their respective countries. The investment flows mostly to those emerging markets that have their currency pegged to either the Euro or the US dollar, leading to vast amounts of foreign reserves, money supply, and an ever increasing buoyant credit growth. These emerging markets then experience fast growing economies, increased demand for their products, and increase in wages and consumption that leads to an optimistic atmosphere and feeling about their economies that in turn increases the value and cost of assets, including real estate. This euphoric feeling causes for a speculative element to enter the market pushing asset prices higher as people believe that even a downturn would be limited, creating a market that is essentially a ‘self-fulfilled prophecy’. When these emerging markets experience an economic shock, or bust, the foreign funds that have flowed to these markets though international financial markets and hedge funds are then repatriated to more secure markets. This outflow of funds makes the downturn much more severe and

longer lasting than would normally be witnessed in developed economies as the source and cause of their economic booms, money supply, have now exited their nations.

Lu and Mei (1993) have examined the quarterly returns of property and equity markets for emerging markets for the 1994 to 1998 period and compared them to the US equity and REIT market. The emerging markets chosen were that of Argentina, China, Hong Kong, Indonesia, Malaysia, Peru, the Philippines, Singapore, Thailand, and Turkey. The authors find that the returns of the property markets in the emerging markets tend to outperform that of the equity markets in several instances, but the overall consensus is that property markets and equity markets exhibit similar returns. When these emerging markets are compared to that of the US market, they all resulted in higher volatility and that only 3 property markets outperformed that of the US with respect to returns. The authors have also found that there were greater diversification benefits for US residents to invest in the emerging property markets than that of the US equity market (S&P 500) due to lower correlation figures, however due to the asymmetrical nature of the results the benefits of diversification are minimised.

2.11 REAL ESTATE INDICES

Hoag (1980) discusses the creation of a real estate index in the U.S. so that investment managers and institutions have a means by which to assess the risk and return attributes of investing in real estate. Where stocks and bonds are tracked on a daily basis and have indices measuring their performance as these assets are sold frequently and publicly, the sale of real estate is minimal in comparison and is generally not available to the public,

highlighting the need to create a real estate index. The author suggests that an index be created whereby valuation characteristics such as cash flows, sale prices, location, property type, size, and age be tracked and documented along with economic variables such as levels of inventories, construction costs, and population.

Hoag (1980) uses an example of how industrial property is assessed by appraisers and draws similar comparisons to analysts and their valuation process for stocks. The author then creates a valuation model where he assesses the risk and return attributes of 800 U.S. industrial properties that he gathered from the University of California, Berkley and compares them against stock, bonds, and treasury bills obtained from Ibbotson and Sinquefeld (1979). The results indicate that industrial property returns were higher compared to the other assets, along with a marginally higher level of volatility, and low correlation, providing evidence for diversification benefits. Hoag (1980) concludes that the creation of a real estate index would allow portfolio managers to objectively calculate the value of real estate along with its risk and return characteristics.

2.12 ISLAMIC FINANCE

The means by which to protect one's investment portfolio from inflation may be limited to the individuals and institutions of Dubai not only because real estate prices have increased sharply in recent years but also due to the issue of limited availability of Islamic accepted financial products. With the growth of Islamic finance growing at over 10% per year (www.forbes.com April 24, 2008) the challenge for the creation of new financial instruments that is acceptable to Muslim scholars has been daunting. The main

obstacles facing Islamic Finance in establishing new financial instruments that are acceptable to the beliefs of Islam derives from the principles of Shariah that governs the aspects of the lives of Muslims.

Jobst (2007) examines the fundamental legal principles of Islamic finance and how it affects the ability to create securitisation transactions including asset backed securitisation. The main obstacle the author notices is that Islamic finance is governed by *Shariah* law which bans interest and states that income must be derived from entrepreneurial investment and shared business risk as opposed to guaranteed return that is the basis of conventional banking. Jobst (2007) also recognises that investment activities are also limited to activities that are deemed lawful (*halal*) and not those that are sinful (*haram*), including the association to gambling, alcohol products, pork products, firearms, tobacco or adult entertainment. The term *gharar*, meaning preventable uncertainty, is also prohibited under the principles of *shariah*, therefore limiting investors to participate in forward contracts and financial derivative instruments as they are considered risky. In his comparison of Islamic and conventional financial instruments, Jobst (2007) finds that although there may be different legal structures the lenders or counterparty receive the same yield for their participation in a financial transaction.

Hamoudi (2007) in his research examines the revolutionary ideas of social, cultural, and economic elements of modern Islamic finance. With interest payments being at the heart of debt like instruments that are used in purchasing property and other assets alike, the elimination of interest makes for a challenge to Muslim scholars to create products that

avoid interest. Hamoudi (2007) reviews the principles of *Shariah* that emphasises the profit and loss sharing concept where one party may not be disproportionately disadvantaged by a financial contract. The belief in social harmony is at the heart of the profit and loss sharing principle whereby the ability of one party to benefit from a commercial transaction and the other to suffer a loss would create a society filled with hatred and enmity. (Kuran, T. pg. 171, 1989)

Aggarwal and Yousef (2000) in their paper researched the financial instruments used by Islamic Banks to finance projects in countries where Islamic law prohibits the use of interest. One such financial product that has been developed by Islamic Banks that was observed was that of *Ijara* whereby people can purchase assets like that of real estate. The concept of *Ijara*, much like that of leases or lease to buy, is when a bank purchases a property on behalf of an individual or investor and allows them to enjoy the benefits of the asset in return for a fixed charge. When payments have been made over the predetermined timeframe stated in the contract, ownership is then transferred to the investor much like a lease contract. Aggarwal and Yousef (2000) conclude that most of the financing of Islamic banks is based on the mark up principle, including *Ijara*, which is very much like conventional debt instruments, and the fact that most lending is secured violates the prohibition of collateral like that of *Ijara* where properties are held as collateral.

2.13 CONCLUSION

The above literature has examined REITs, Islamic Finance, macroeconomic variables, and capital structures that give insight to this research where the potential for unleveraged

REITs in Dubai to become a popular financial instrument due to its ability to optimise a mixed asset portfolio whilst complying with Islamic principles is explored. While the studies of interest rates, monetary policy, and portfolio efficiency have been focused on evidence from the US and Singapore markets, the underlining principles and economic theories are plausible in the free market environment of Dubai. The following chapters will employ several of the empirical methods included in the above literature and assess whether the results coincide with those of other studies and research.

CHAPTER 3
DATA & METHODOLOGY

3.1 INTRODUCTION

With the Dubai property market becoming world renowned in the last several years with respect to its grandeur and attractive investment yields it is only through a proper analysis and comparison against local assets classes can one make an accurate assessment of its viability as an investment. The historical prices of the Dubai property market are compared to that of other local investment asset classes including that of the local equity market, the Dubai Financial Market (DFM), and that of the Emirates Bank Bond (EBB) as a proxy for the local bond market. The quarterly asset prices from the 4th quarter of 2004 to the 3rd quarter of 2008 are analysed which provides for an extensive data set given the relative youth of the property, equity, and bond markets of Dubai.

3.2 DATA

With the real estate market in Dubai in its infancy as the freehold property market was only enacted in 2002 the data available is therefore minimal in comparison to larger property markets such as those of the United States and Europe. With reputable institutions such as that of Colliers International and local real estate brokerage Landmark Properties whom have collected and compiled extensive historical square footage prices of the Dubai property market in the last several years, it has been possible to make an in depth comparison of the varying local asset classes. The data used in this research is based upon their data compilation over the years and includes quarterly sales prices from the 4th quarter of 2004 to the 3rd quarter of 2008. The reputation of Colliers and Landmark and the comprehensive assessment they have made through their own internal sales and data compilation of external sources provides for a reliable and accurate

information source. The prices for the DFM and EBB from the 4th quarter of 2004 to the 3rd quarter of 2008 have been extracted from Bloomberg.

In order to gain deeper insight into the factors that may be influencing the local property, equity, and bond market, macroeconomic factors including that of inflation, interest rates, money supply, and oil prices are included in the correlation analysis. The money supply and inflation figures have been sourced from The United Arab Emirates Central Bank, whereas interest rates and oil prices have been extracted from Bloomberg. As a considerable amount of the investment in the property market has come from foreign investors in Russia, the U.K., Iran, and India, the corresponding stock market data has also been extracted from Bloomberg in order to test whether these markets have in some way contributed to the growth of the Dubai real estate market. With Emaar and Arabtec being the most prominent and influential property developer and contractor respectively, their equity prices have also been extracted from Bloomberg and correlated against the macroeconomic factors and asset classes mentioned in order to gauge their influence and relationship with the market.

3.3 LIMITATIONS

While the reliability of the data in this research is quite dependable, it is the lack of particular information that was initially sought that could not be attained that provides for some limitations. Firstly, considering that most bonds have been issued in the past 12 to 18 months which does not provide an adequate time frame to be reliant, it is only the Emirates Bank Bond that has been used in this study to reflect the performance of the

corporate bond market. The second limitation is that of the lack of data for the EIBOR (Emirates Inter Bank Offer Rate) which could not be sourced. However due to the UAE currency (dirham) being pegged to the US dollar the EIBOR must follow the direction of the US monetary policy and its Fed Fund Rate so that arbitrage opportunities in the market are not created, making the Fed Fund rate a benchmark for local interest rates a fair and reasonable estimation. Lastly, because the legislation regarding REITs is quite recent, there have not been any trusts that could be examined and analysed which leads to the creation of Hypothetical Property Trusts that are to be used as a proxy for the REIT market.

3.4 METHODOLOGY

3.4.1 Hypothetical Property Trusts

Due to REIT legislation being relatively new and lack of actual publicly traded property trusts or funds till date, the way in which the property data is assessed in order to reflect the attributes of a Real Estate Investment Trust is the creation of ‘Hypothetical Property Trusts’(HPTs). The HPTs created were to have been initiated in the 4th quarter of 2004 with an initial investment capital of AED 1,000,000 that was used to purchase both property specific portfolios with 100% residential, and 100% commercial components, and then mixed portfolios of residential and commercial reflecting a diversified portfolio of properties types. Property location has also been tested by creating HPTs that focus strictly on particular neighbourhoods of Dubai including that of Dubai Marina, Business Bay, and Dubai International Financial Centre (DIFC). HPTs reflecting property specific and diversified portfolios were created so that a comparison to the findings of Benefield

et al. (2008) whom conclude that property diversified trusts are superior to property specific trusts where the conclusion of Capozza and Seguin (1999) is that the overall performance of property specific trusts are superior can be analysed.

In order to gauge the effects of increased risk and probability of default due to leveraging real estate as found in Chaudry *et al.* (2002), two HPTs were created with levels of borrowing representing portfolios that were 35% (HPT,4) and 75%(HPT,5) leveraged. The portfolio that was leveraged is that of HPT 1 that consists of villas and apartments, which provides for an observation to be made on HPT,1 that is initially debt free and then having it leveraged incrementally. The interest rate used to determine the borrowing cost was that of 6.25% per annum and the calculation for the mortgage repayments was based on a 15 year amortisation schedule.

As the office properties found in the data set were sold several years ago and are still not completed it is not possible to ascertain actual rental incomes and hence the first set of HPTs are assessed solely on capital appreciation. The portfolios are as follows;

Table 1- Hypothetical Property Trusts

	Capital Appreciation
HPT,1	100% residential, villas and apartments (unleveraged)
HPT,2	100% office (unleveraged)
HPT,3	50% residential, 50% office (unleveraged)
HPT,4	Residential, + 35% leverage
HPT,5	Residential, +75% leverage
HPT,6	Marina Apartments (residential)
HPT,7	Dubai Apartments (residential)
HPT,8	DIFC offices (office)
HPT,9	Business Bay (office)

However for testing purposes that is of interest going forward the office and residential properties were placed into a second set of HPTs where average yields of office and residential properties in Dubai, that was provided by Colliers International, is used for rental income purposes. As the legislation for REITs dictate that 90% of net income must be paid out to shareholders these HPTs have reinvested the remaining 10% of the net income into the property market at prevailing prices of the particular quarter. The 90% of net income paid out to shareholders is still included in the mean return to reflect the total return on investment. These portfolios based on income reinvestment are as follows;

Table 2- Rental Income and Reinvestment

	Type
HPT A	100% residential (unleveraged)
HPT B	100% office (unleveraged)
HPT C	50% residential, 50% office (unleveraged)
HPT D	Residential, + 35% leverage
HPT E	Residential, +75% leverage
HPT F	Marina Apartments (residential)
HPT G	Dubai Apartments (residential)
HPT H	DIFC offices (office)
HPT I	Business Bay (office)

3.4.2 Asset Performance Measurements

In order to ascertain the risk and return benefits of property investment in Dubai and its potential benefits of optimising a mixed asset portfolio the above HPTs, the Dubai Financial Markets (DFM), and the Emirates Bank Bond (EBB) were assessed based upon their returns, standard deviation, and Sharpe Ratio of quarterly excess returns (returns

over the risk-free rate). As found in Chandrashekar (1999) the Sharpe Ratio is calculated as;

$$\frac{E(R - R_f)}{\sigma} \quad (1.1)$$

where:

R = return of asset

R_f = risk free rate as measured by the 90 day Treasury Bill

σ = standard deviation of excess returns

**the US 90 day Treasury Bill has been used as the risk-free rate as it is viewed as the most liquid and most secure of assets that an investor can hold.*

The Sharpe Ratio has been used in this study as it accurately reflects the risk-adjusted return of assets as evident by its use in Sing and Ling (2003) and Chandrashekar (1999). The higher the resulting Sharpe Index Ratio, the superior is its risk adjusted return attributes, which is a characteristic that investors seek and prefer than opposed to only observing the performance based upon mean and volatility separately.

The returns for the HPTs have been calculated using the formulas found in Boyd *et al.* (1998) where the return for an unleveraged real estate investment is;

$$Ru = \frac{V2 + I - V1}{V1} \quad (1.2)$$

where:

V1 = price of HPT at the beginning of the period;

V2 = price of HPT at the end of the period;

I = income for the period.

The return for a leveraged real estate investment is;

$$RL = \frac{Ru - iL}{(1 - L)} \quad (1.3)$$

where:

Ru= return from unleveraged investment

L= degree of leverage expressed as a percentage of original value

i= the interest rate paid for leveraged funds

3.4.3 Non-taxed investor vs. Taxed investors

The analysis of the MM theory developed by Miller and Modigliani (1958) is of particular interest to this research as there is no form of personal or corporate taxation in the emirate of Dubai or for the entire UAE for that matter. The MM theory refers to the lack of benefit from leveraging in an environment that is absent of taxation, however when taxation is introduced only then is there an advantage to adding leveraging. The value created by borrowing in a taxed environment has become known as the tax shield and is approximately the extent of the tax rate on corporate earnings multiplied by the market value of the debt.

The research of Boyd *et al.* (1998) whom concluded that there was a negative effect from adding leverage to a real estate portfolio when non taxed investors were considered and that a positive result from adding leverage to a real estate investment only occurred where investors were subject to taxation is the basis for this section of research where leveraging real estate in a non taxed environment is investigated and whether it is deemed appropriate or providing value. The formula found in Boyd *et al.* (1998) is used to

calculate the return for leveraged real estate where a tax shield is available to taxed investors is;

$$R_{lt} = \frac{R_u - iL(1 - T)}{(1 - L)} \quad (1.4)$$

where:

R_u = return from unleveraged investment

L = degree of leverage expressed as a percentage of original value

i = the interest rate paid for leveraged funds

T = investor's marginal tax rate

3.4.4 Correlation of Varying Asset Classes

In order to assess the relative degree of relationship between the several asset classes being used in this study that may be given partial allocation in a mixed asset portfolio, the correlation of excess returns for the HPTs, the DFM and Emirates Bank Bond have been analysed using the formula;

$$\frac{\text{cov}(X, Y)}{\sigma_X \sigma_Y} \quad (1.5)$$

A correlation coefficient of 0.5 to 1.0 or -1.0 to -.5 indicates a large and significant relationship between the two asset classes, where a figure of 0.3 to 0.5 or -.5 to -.3 provides a moderate level, and 0.1 to 0.3 or -0.3 to -0.1 a weak and insignificant relationship.

The results from the empirical testing not only implies the relative degree of dependence of the different asset classes to one another, but it also reveals the level of diversification benefits that are present if the corresponding asset classes are placed into the same portfolio. With the work of Markowitz (1952) becoming the basis for Modern Portfolio Theory, several studies including that of Brueggman *et al.*(1992), Chandrashekar (1999), and Sing and Ling (2003) have found that the low, moderate, and sometimes negative correlation exhibited by REITs, equity, and bond markets provided for diversifications benefits that optimised a mixed asset portfolio by reducing overall risk.

3.4.5 Correlation of Macroeconomic Variables

The correlation exercise performed on the varying asset classes has also been used to test the relative degree of dependence of several macro economic data including money supply, oil prices, and the US Fed Rate as the UAE interbank lending rate, EIBOR, does not provide sufficient data points yet is closely tied to the US interest rates, as the UAE currency is pegged to the US Dollar and hence must follow the movements of their US counterparts. Money supply is a key macroeconomic variable that has been researched by Thorbecke (1997) and Rogalski and Vinso (1977). Both studies have found that an increase in the money supply positively affects the value of stocks to the extent that a one positive standard deviation increased stock returns by 1.79% per month in the research of Thorbecke (1997).

The studies of McCue and Kling (1994), Bredin *et al.* (2007), Ewing and Payne (2003), Chen and Tzang (1988), and Mueller and Pauley (1995) have focused their research on

the sensitivity of REITs to the movements of interest rates and have all concluded that an inverse relationship exists, where an increase in interest rates decreases the value of REITs and where a decrease in interest rates increases their value. The cause for the inverse relationship as explained by Bredin *et al.* (2007) is that the movement in interest rates immediately causes the capitalisation rate, a measurement used to calculate property value, to change accordingly thus creating an instant readjustment in value.

3.4.6 Mixed Asset Portfolios

In order to gauge the optimisation of a mixed asset portfolio with the addition or investment in real estate via REITs, a series of portfolios are created by including varying proportions of investment in the DFM, Emirates Bank Bond (EBB), and the HPTs. The purpose of this exercise is to determine whether the inclusion of REITs within a portfolio lowers the overall risk, evidenced by a decrease in volatility, or possibly enhances the returns at the same time. Whether REITs provided for a decreased level of risk or increased returns, a strong case for the inclusion of REITs within a mixed asset portfolio is examined. Only HPT 1, that of the residential portfolio including apartments and villas, was used in the mixed asset analysis as it has nearly the lowest risk-return ratio (Sharpe Ratio) of all the property trusts which creates an objective result in the ability of REITs to optimise an investment portfolio in Dubai. The following table provides the series of portfolios that analysed and charted;

Table 3- Mixed Asset Portfolios

Portfolio A	75% DFM, 25% EBB
Portfolio B	50% DFM, 50% EBB
Portfolio C	25% DFM, 75% EBB
Portfolio D	50% DFM, 30% EBB, 20% HPTs
Portfolio E	30% DFM, 30% EBB, 40% HPTs
Portfolio F	20% DFM, 20% EBB, 60% HPTs
Portfolio G	10% DFM, 10% EBB, 80% HPTs
Portfolio H	75% DFM, 25% HPTs
Portfolio I	50% DFM, 50% HPTs
Portfolio J	25% DFM, 75% HPTs
Portfolio K	25% EBB, 75% HPTs
Portfolio L	50% EBB, 50% HPTs
Portfolio M	75% EBB, 25% HPTs

In order to calculate the expected return of a portfolio there is only the need to arrive at the weighted average return of the assets, whereas the process to calculate the standard deviation of a portfolio involves several steps. The formula for a two asset portfolio is as follows;

$$\sigma_p = \sqrt{(X_1^2 \sigma_1^2) + 2X_1 X_2 \sigma_{1,2} + (X_2^2 \sigma_2^2)}$$

Where:

X= weighting of asset

σ^2 = variance of asset

σ = covariance of assets

The formula for a three asset portfolio is an extension to the above;

$$\sigma_p = \sqrt{(X_1^2 \sigma_1^2) + (X_2^2 \sigma_2^2) + (X_3^2 \sigma_3^2) + 2X_1 X_2 \sigma_{1,2} + 2X_1 X_3 \sigma_{1,3} + 2X_2 X_3 \sigma_{2,3}}$$

3.4.7 Inflation Hedging

The ability of real estate to hedge against inflation has long been an academic discussion as evidenced in Chan *et al.* (1990), Hartzell *et al.* (1987), Rubens *et al.* (1989), Sing and Low (2000), and Yobaccio *et al.* (1995). With the above authors finding varying levels of hedging abilities of REITs and inflation being a main issue in Dubai and the U.A.E. in the past several years, it is only appropriate to analyse the inflation hedging abilities of the Dubai real estate market. The methodology for assessing whether REITs are a hedge against actual inflation simply involves deducting the actual inflation rates from the returns of the HPTs. A negative figure indicates that property investment via REITs have been a poor and negative hedge whereas a positive result indicates a complete and positive hedge against inflation. As there is limited data and lack of short term government bonds in Dubai that are regularly traded on an exchange, the ability of REITs in Dubai to be measured against expected and unexpected inflation is not possible, however the importance to test against actual inflation and the pending results are still crucial to the ability of REITs to be viewed as an asset class to be provided allocation in a mixed asset portfolio.

3.4.8 Efficient Frontier

In addition to the assessment of the above mentioned mixed asset portfolios, a further analysis is performed by creating numerous portfolios in order to create the efficient frontier. The efficient frontier, also known as the Markowitz efficient frontier, is a chart that maps out the various risk and return combinations that are generated from adding and

removing particular asset classes from a portfolio. Where it is assumed that a rational investor would seek to minimise his or her risk within a portfolio if they were risk adverse, and that they would only be willing to accept more risk if compensated with higher returns, the investor can easily view this risk-reward relationship of varying portfolios on the efficient frontier chart. The assets included in the portfolios assessed include that of the DFM, Emirates Bank Bond, and that of HPT 1. The reason for only including HPT 1 is the same as was explained in the Mixed Asset Portfolio section where HPT 1 had nearly the lowest risk-return ration (Sharpe Ratio) which provides for an objective analysis in assessing optimal portfolios. The software used to perform the analysis is that of Portfolio Optimizer Pro (version 1) which has been created by Hoadley Trading and Investment Tools.

3.4.9 Sensitivity Testing

As the freehold property market in Dubai is relatively new and a downturn in prices has not yet been realised, it is only prudent to create a sensitivity test where property prices decline for four consecutive quarters in order to realise its true potential for asset allocation in a mixed asset portfolio. With many recent articles written including that of the Financial Times where HSBC has stated that property prices have already fallen 4-5% in the UAE in October alone and Merrill Lynch earlier predicting a fall of 10% in the property market up to the end of 2009, there is sufficient cause and reason to perform sensitivity testing.

Two sensitivity tests are created where the first test, Scenario A, involves adding 4 quarterly data points to the HPT data sets representing a 2.5% decline in every quarter versus a 5% quarterly decline in Scenario B. The mean returns and standard deviation for the stock market and the corporate bond market remain stable with no change in mean return or standard deviation so that a fair and rigid testing of the HPT allocation to a mixed asset portfolio is performed. The resulting figures from Scenario A and B are then assessed against the DFM and EBB in terms of creating an efficient frontier where the optimal and minimum risk portfolios are generated.

3.5 CONCLUSION

The asset classes analysed through the several modes described above including, returns, standard deviation, the Sharpe Ratio, and cross correlation are assessed in order to quantify the ability of the real estate market in Dubai via REIT instruments to optimise a mixed asset portfolio. Despite the several limitations discussed there is substantial data points that have been provided by reliable sources that makes this research both noteworthy and valuable to portfolio managers and investors alike.

CHAPTER 4

RESULTS

4.1 INTRODUCTION

The ability of REITs, as a proxy for investment in the Dubai real estate market, to optimise a mixed asset portfolio is indicated by the results of the various analyses on the HPTs versus the DFM and the EBB over the 3rd quarter of 2004 to the 4th quarter of 2008 period. The many studies that have been performed on the subject of a REITs' ability to optimise a portfolio including that of mean, standard deviation, correlation, inflation hedging, and the efficient frontier are provided below and give a clear indication as to the need of allocating a portion of a portfolio to REITs.

4.2 ASSET PERFORMANCE

4.2.1 Returns

The excess returns (returns over risk free rate) in Figure 1 indicate that the DFM was superior to the HPTs and the EBB with a quarterly mean of 7.94%, where the mean for the various HPTs ranged between 4.25% and 8.8%, and the EBB exhibiting a very low 0.32% mean. The inferior mean of the EBB to the other assets corresponds with various findings including that of Brueggman *et al.* (1992) and Chandrashekar (1999) where both equity and property markets were superior to the corporate bond market. The higher mean of the DFM to that of the HPTs is in agreement with Brueggman *et al.* (1992) that found equities to have a mean annual mean of 13.26% versus 10.46% for the CREF (Commingled Real Estate Fund), however it differs from that of Chandrashekar (1999) who reveals that REITs had an annual mean of 12.36% where the equity market had a mean of 8.75%.

Figure 1- Mean, Standard Deviation, and Sharpe Ratio

	Mean	S.D.	Sharpe
DFM	7.94	31.14	0.25
EBB	0.33	0.19	1.76
HPT 1	5.17	7.00	0.74
HPT 2	7.22	4.95	1.46
HPT 3	6.4	5.11	1.25
HPT 4	4.9	8.9	0.55
HPT 5	3.3	15.5	0.21
HPT 6	6.97	3.36	2.07
HPT 7	4.26	10.07	0.42
HPT 8	6.24	4.33	1.44
HPT 9	8.87	8.61	1.03

**NB- results for HPT 4 and 5 are not accurate as rental income has not been included yet borrowing costs have been.*

4.2.2 Standard Deviation

The volatility and risk attributes of the asset classes as measured by the standard deviation of excess quarterly returns reveal that while the DFM had the highest returns it has also provided the highest standard deviation of 31.3% which can be viewed as extremely volatile by any measure. The EBB as a proxy for the corporate bond market had the lowest standard deviation of 0.187% where those of the HPTs exhibited a range of 5.1% to 10.06%, indicating that an allocation to EBB provided the least risk, followed by the HPTs and then the DFM. The superior standard deviation of the EBB corresponds with the findings of Chandrashekar (1999) and Sing and Ling (2003) however it contradicts Brueggman *et al.* (1992) where REITs had exhibited the lowest standard deviation.

4.2.3 Sharpe Ratio

The risk adjusted return, as measured by the Sharpe Ratio, reflects the risk and reward relationship of investing in assets by measuring the mean and its accompanying standard deviation. Figure 4 reveals that although HPT 6, which is invested only in one particular area of Dubai, had the highest Sharpe Ratio of 2.07 it is that of EBB which exhibits the superior result of all three asset classes. The EBB had a Sharpe Ratio of 1.76 where the HPTs invested in specific property types, such as HPT 1 in residential and HPT 2 in office, ranged from 0.73 to 1.459, and the DFM exhibited a dismal 0.254. These results show that while the DFM initially had the highest mean of the three asset classes it is the volatile nature of its returns that provide for a poor risk adjusted return. While the EBB had the lowest mean yet the least volatile returns it exhibits the superior result from a risk and reward perspective. The results of the HPTs whose mean was less than the DFM and higher than the EBB, yet whose standard deviation was higher than the EBB and less than the DFM corresponds to the findings of Lee and Stevenson (2005) who view REITs as a hybrid instrument in that it provides return enhancement to bonds and risk reduction to equities.

4.2.4 Reinvestment of Rental Income

Figure 2 reveals the mean, standard deviation, and Sharpe Ratio for the HPTs when rental income and reinvestment is taken into account. The main difference between the results based upon rental income and reinvestment (figure 2) and capital appreciation (figure 1) is that the mean returns are increased significantly as is the case for HPT1 whose mean is increased 37% and that of HPT2 27%. With the volatility of these HPTs remaining

relatively the same, as only 10% of net income is reinvested, whilst having higher returns, the risk adjusted returns (Sharpe ratio) are increased, highlighting the effectiveness of allocating REITs to a mixed asset portfolio. Even though the rental income is based on rough estimates, the increased risk adjusted returns of the HPTs would still exist regardless of the historical rental yields.

Figure 2- Reinvestment of Rental Income

	Mean	S.D.	Sharpe
HPT A	7.09	7.0	1.01
HPT B	9.16	4.95	1.85
HPT C	8.12	5.10	1.59
HPT D	7.86	10.16	0.77
HPT E	7.38	14.64	0.5
HPT F	9.03	3.42	2.64
HPT G	6.18	10.07	0.61
HPT H	8.26	4.13	2.0
HPT I	10.89	8.21	1.33

4.2.5 Leveraging

The effects of leveraging real estate which is presented in Chaudry *et al.* (2002) can be seen by observing the results of HPT A (debt free), HPT D (35% leveraged), and HPT E (75% leveraged) in Figure 2 that more accurately reflect the attributes of REITs in where rental income is received from tenants and mortgage payments are made from these proceeds. The results show that the increase of leverage did result in increased returns, but only at the expense of a higher standard deviation. These results confirm the theory presented in Chaudry *et al.* (2002) where higher levels of leverage may increase returns but only at the expense of increased risk and probability of default. The incremental decrease of the Sharpe Ratio from the debt free portfolio (HPT A) to the leveraged HPTs

portfolios confirms the increased risk that is associated with increased levels of borrowing.

Where increased levels of borrowing increase the levels of risk as observed by the above results, Capozza and Seguin (1999) have also recognised the increased cost associated with adding leverage to a portfolio. They have noted that that the addition of debt to capital structures increases management time that is needed to handle the financing and reporting, to an extent that debt is 35 basis points (.35%) costlier than capital. The increased levels of risk and management costs that are associated with adding leverage to a portfolio does prove the negative effects of borrowing and this should be brought to the attention of investors who are lured by increased returns.

4.2.6 Property Diversification versus Property Specific

The varying HPTs created have demonstrated different levels of mean, standard deviation, and risk adjusted returns. The most notable difference lies between HPT 6 that is focused only Dubai Marina apartments and HPT 7 which holds apartments throughout Dubai. The superior mean of 6.97% for HPT 6 against that of HPT 7 of 4.26% and the lower standard deviation of 3.36% and 10.07% respectively provides HPT 6 a risk adjusted return that is over 400% greater than that of HPT 7.

The superior performance of the property specific portfolio (HPT 6) against that of the diversified portfolio (HPT 7) does not even take into account the additional managerial cost and borrowing costs experienced by diversified trusts that Capozza and Seguin

(1999) have outlined, due to the limitation of this research where hypothetical property trusts have been examined. Where this finding contravenes that of Benefield *et al.* (2008) who have concluded in their analysis of REITs over the 1995 to 2006 period in the US that diversified REITs have outperformed that of specialised ones it does coincide with the conclusions of Capozza and Seguin (1999) where although diversified REITs had a slightly higher return of 8.07% to that of 7.41% for focused REITs, it is the issue of diversified firms being less liquid and having to be discounted at higher rates that erodes firm value below that of property specific firms.

The higher Sharpe Ratio exhibited by HTP 8 that is focused on the DIFC neighbourhood of Dubai than that of HTP 9 that is focused on the Business Bay area is of interest as both portfolios are office property types. Where the mean of HTP 9 is slightly higher than HTP 8 it is the standard deviation of HTP 8 that is half that of HTP 9 that results in a risk adjusted return that is 40% higher for the portfolio invested in the DIFC. While both portfolios consist of office space that is being demanded by the service sector it may be that the DIFC whose tenants are to consist of internationally renowned financial institutions and law firms that are considered more stable and secure than those small to medium size businesses that will be occupying the Business Bay area to exhibit a higher risk adjusted return.

4.3 NON-TAXED vs. TAXED INVESTORS

The effects of leveraging for taxed and non taxed investors being investigated in this section takes into account that the marginal tax rate for an investor is 30%, the cost of

interest is 6.25%, and the amortization of the mortgage loan is 15 years. The results in Figure 3 reveal that in an untaxed environment the unleveraged portfolio A whilst has a lower mean than the leveraged portfolios D and E, is not volatile as its counterparts giving it a much superior risk adjusted return that is 24% higher than D and 50% higher than E.

When the portfolios are subject to taxation the value provided by the tax shield to leveraged entities becomes apparent as the returns increase by 5.73% for D and 14.4% for E. The leveraged portfolios having similar volatility increased their risk adjusted returns by 6.5% for D and 18% for E, while the unleveraged portfolio A has actually experienced a lower return, and more importantly a risk adjusted return that decreased by 7%. The value provided by the tax shield provides for an argument that the increased risk that accompanies leverage is only beneficial to investors who are subject to taxation.

Figure 3- Taxed vs Non Taxed Investors (actuals)

NON TAXED	Mean	SD	Sharpe Ratio
A	7.09	7	1.01
D	7.86	10.16	0.77
E	7.38	14.64	0.5

TAXED	Mean	SD	Sharpe Ratio
A	6.58	7	0.94
D	8.31	10.17	0.82
E	8.45	14.28	0.59

With sensitivity testing being examined in a later section it is only appropriate to assess the effects of leveraging on taxed and untaxed investors when a downturn market has occurred, unlike that of Dubai where property prices have only increased since the freehold market began and reflected in the results of Figure 3. Four consecutive quarters of a negative 5% movement in prices have been added to portfolios A, D and E and the results are provided in Figure 4.

Figure 4- Taxed vs Non Taxed Investors (sensitivity)

NON TAXED	Mean	SD	Sharpe Ratio
A	4.92	7.51	0.66
D	4.77	10.83	0.44
E	4.35	14.26	0.31

TAXED	Mean	SD	Sharpe Ratio
A	4.4	7.51	0.59
D	5.26	10.8	0.49
E	5.34	14.04	0.38

With the results of Figure 4 providing a more accurate representation of a property market that is subject to downturns, the effect of leveraging in a taxed and non taxed environment becomes more pronounced. Unlike the results in Figure 3, the returns of the leveraged portfolios are less than that of the unleveraged portfolio and while having very similar volatilities, the risk adjusted returns decrease substantially. The lower returns of portfolios D and E to that of the unleveraged portfolio A show that leverage may be appropriate in a market when prices are rising but not in the long term where borrowing without the advantage of a tax shield only diminishes returns.

The advantage to leveraging in a taxed environment is also revealed by the returns of D and E that have increased by 10.3% and 23% respectively, and their risk adjusted returns that have increased by 11% and 25%, when they have subject to taxation and value of the tax shield is provided. Where the returns of D and E were decreasing incrementally to that of A in a non tax situation, the opposite occurs when taxation is taken into account as the returns of D and E increase incrementally from that of A. The results and descriptions above only support the theories of Miller and Modigliani (1958) where the advantage to leveraging is available to taxed entities where in the absence of such taxation leveraging provides no value.

4.4 CORRELATION

4.4.1 Asset Correlation

Figure 5- Asset Correlation

	HPT1	HPT2	HPT3	HPT4	HPT5	HPT6	HPT7	HPT8	HPT9	EBB	DFM
HPT1	1	0.47	0.91	0.99	0.9	0.16	0.85	0.72	0.15	0.37	0.04
HPT2		1	0.79	0.43	0.35	0.35	0.42	0.85	0.9	0.61	0.13
HPT3			1	0.89	0.84	0.37	0.77	0.89	0.52	0.55	0.12
HPT4				1	0.94	0.09	0.84	0.69	0.11	0.29	0.09
HPT5					1	-0.16	0.78	0.62	0.04	0.11	0.27
HPT6						1	0.16	0.54	0.11	0.45	-0.21
HPT7							1	0.61	0.15	0.43	0.005
HPT8								1	0.52	0.58	0.2
HPT9									1	0.48	0.35
EBB										1	-0.27
DFM											1

The results of the correlation analysis results in Figure 5 provides the potential benefits of diversification of assets when placed into mixed asset portfolios of varying proportions.

The most notable result is that of the consistently low correlation between the all HPTs and the DFM which leads one to believe that there is an insignificant relationship

between the price movements of the two assets. The positive attribute of this low correlation that ranges form -0.21 to 0.27 is the potential diversification benefits that occur when the DFM and the HPTs are placed in the same portfolio. The weak

relationship of these two assets resembles the findings of Brueggman *et al.* (1992) that have compared CREFs to the S&P 500 Index in the US over the 1972 to 1991 period

where the correlation coefficient exhibited that of -0.17. The high correlation of 0.67

between the Singapore equity market and the diversified HPTs that Sing and Ling (2003) created counters the above results, however their study does reveal that office properties

such as those of the HPT 2, 8, and 9 found in the Dubai market had a very weak

correlation of 0.053 versus the equity market.

The negative 0.27 correlation between the DFM and the EBB shows that the relationship is not only weak but that there is, albeit insignificant, an inverse movement of prices to one another where one is increasing the other is decreasing. This weak correlation which proves for a minimal degree of diversification and risk reduction benefits when placed in the same portfolio is relatively similar with the findings of Chandrashekar (1999) and Sing and Ling (2003) where the property trusts examined had a correlation of 0.37 and 0.118 respectively to the bond market. The results provided by Brueggman *et al.* (1992) where the correlation was that of 0.432 does show a moderate degree of relationship between the assets however it still provides for a level of diversification and risk minimisation.

The average correlation of 0.43 that exists between the EBB and the HPT does provide for a moderate degree of relationship of the asset returns yet there is still the ability of risk reduction to occur when the EBB and HPT are mixed in the same portfolio. This result which does not accurately reflect the findings of Chandrashekar (1999), Sing and Ling (2003), and Brueggman *et al.* (1992) whom have all found a weak correlation between the bond market and property trusts, with results ranging from 0.3 to -0.287, does not entirely eliminate the potential benefits of diversification.

Upon closer examination of Figure 3 there are some interesting findings that include the moderate level of 0.47 correlation between HPT 1 (residential property) and HPT 2 (office property). This finding may indicate that there are potential benefits of

diversification in the allocation of different property types within a portfolio and not only diversifying within asset classes. The other finding to note is that of the degree of relationship that varies between the EBB and different property types where that of the EBB and HPT 1 (residential) exhibited a correlation of only 0.37 and that between the EBB and HPT 2 (office) had a higher and more significant result of 0.61. It is evident that the residential portfolio placed together with the EBB provides greater risk reduction benefits.

4.4.2 Correlation of Macroeconomic Variables

Figure 6 shows the results of the correlation analysis for all the three main asset classes and that of macro economic data including money supply (M3), interest rates, and equity markets of other countries whose citizens are significant investors in the local property market. Only HPT 1, 2 and 3 have been cross correlated with the above variables as they represent the most comprehensive types and categories of property in Dubai.

The two most significant results in Figure 6 are those found in the money supply (M3) and interest rate (US Fed) categories. The correlation between money supply and that of the HPTs that ranges from 0.41 to 0.46 and the DFM which is 0.47 indicates a moderate and significant degree of relationship that exists between the returns of the two asset classes and the growth of the money supply. This finding confirms and strengthens the findings of Thorbecke (1997) and Rogalski and Vinso (1977) and the general theory that an increase in the money supply has an upward pressure on the price of equities and assets alike. With the movement of prices as exhibited in the HPTs and the DFM

corresponding to the movement in the money supply of the UAE, investors and fund managers should be mindful of this significant and positive relationship and pay close attention to further changes in the money supply in order to determine the relative degree of future price movements.

Figure 6- Correlation of Macroeconomic Variables

	HTP 1	HTP 2	HTP 3	Oil	*Money Supply	FTSE	BSE	MICEX	Tehran	US Fed Rate	EBB	DFM	Emaar	Arabtec
HTP 1	1	0.47	0.91	-0.24	0.43	-0.22	0.02	-0.15	0	0.53	0.37	0.04	0.21	0.001
HTP 2		1	0.8	0.32	0.41	-0.67	-0.57	-0.43	0.26	0.61	0.61	0.13	-0.04	0.28
HTP 3			1	0.07	0.46	-0.5	-0.27	-0.26	-0.05	0.63	0.55	0.12	0.06	0.17
Oil				1	-0.02	0.29	-0.18	0.43	-0.03	0.3	-0.41	0.38	0.15	0.43
*Money Supply					1	0.15	0.15	-0.17	-0.16	0.34	0.163	0.47	0.36	0.6
FTSE						1	0.7	0.76	-0.5	0.65	-0.81	0.43	0.3	0.13
BSE							1	0.48	-0.32	0.2	-0.27	0.34	0.24	0.14
MICEX								1	-0.38	0.49	-0.68	0.13	-0.05	0.19
Tehran									1	0.48	0.41	-0.27	0	0.06
US Fed Rate										1	0.67	-0.68	0.14	-0.15
EBB											1	-0.27	-0.2	-0.07
DFM												1	0.86	0.44
Emaar													1	0.22
Arabtec														1

The strong negative correlations of the HPTs (-0.53 to -.063) and the DFM (-0.68) to interest rates (the US Fed Rate) reinforce the findings of many studies including that of Bredin *et al.*(2007), McCue and Kling (1994) and Thorbecke (1997) whereby REITs and equities have an inverse relationship to the movement of interest rates. The explanation for the inverse relationship is that when interest rates decrease (increase) the value of the assets increase (decrease) due to the change of the capitalisation rate for calculating property value and that of the discount rate in valuing equity prices. Both measures of calculating value have an immediate effect on prices as a decrease in the capitalisation or

discount rate changes the net present values of both rental income for properties and dividends for equities. The significant relationship in the change of interest rates to the change in the prices of the HPTs and equities should again provide fund managers and investors alike another indicator to observe in estimating and evaluating current and future price movements.

The results within Figure 6 that may be considered both unexpected and perplexing is the lack of a positive correlation between the HPTs and the equities markets of Russia, the UK, India, and Iran and the stock prices of Emaar and Arabtec. With Emaar exhibiting a 0.21 and Arabtec 0.001 correlation to the HPTs, is it of interest to view an insignificant relationship between the price movements considering that three assets reflect the property market industry in Dubai in one respect or another. The varying levels of insignificant results of correlation ranging from 0.26 to -0.67 between the HPTs and the above foreign equity markets has also been unexpected as investors from these countries have been quite active in the Dubai property market in past years. The these two unexpected results deserve further attention in future research as they do not correspond to what many would anticipate.

4.5 MIXED ASSET PORTFOLIOS

The results of the correlation analysis performed and examined in the previous section are directly related to the results that are seen in Figure 7 where the three asset classes HPT 1, as a proxy for REITs, DFM, as proxy for Dubai equity market, and the EBB as benchmark for corporate bond market are combined into various portfolios and assessed

based on their mean, standard deviation, and Sharpe Ratio. The correlation figures found in Figure 5 influence the level at which the risk of the portfolios A to J are reduced.

Figure 7- Mixed Asset Portfolios

	Portfolio	Mean	SD	Sharpe Ratio
A	75% DFM, 25% EBB	6.037301435	23.34778801	0.258581303
B	50% DFM, 50% EBB	4.134756671	15.55114507	0.265881172
C	25% DFM, 75% EBB	2.232211906	7.755215932	0.287833624
D	50% DFM, 30% EBB, 20% HPT	5.103453988	15.68325874	0.325407753
E	30% DFM, 30% EBB, 40% HPT	4.550115494	9.860484988	0.461449462
F	20% DFM, 20% EBB, 60% HPT	4.757794906	7.658593871	0.621236089
G	10% DFM, 10% EBB, 80% HPT	4.965474318	6.524201312	0.761085393
H	75% DFM, 25% HPT	7.248173083	23.49779102	0.308461892
I	50% DFM, 50% HPT	6.556499965	16.10472033	0.407116661
J	25% DFM, 75% HPT	5.864826848	9.572572977	0.61266985
K	25% EBB, 75% HPT	3.962282083	5.265082896	0.752558347
L	50% EBB, 50% HPT	2.751410436	3.533553348	0.778652581
M	75% EBB, 25% HPT	1.540538788	1.804798137	0.853579554

The first 3 portfolios A, B, and C are a series of combinations representing increasing and decreasing weightings only of the DFM and EBB. It is of interest in combining these two assets because, as seen in Figure 1, the DFM has the highest return and highest standard deviation where the EBB had the lowest return and lowest volatility. The results for Portfolios A, B, and C reflect these attributes where in A the portfolio is heavily weighted toward the DFM and only slightly to that of the EBB resulting in a mean and standard deviation that is still relatively high along with a poor risk adjusted return of 0.258. When the weighting of the EBB is increased in portfolios B and C the standard deviation decreases by 33% and 100% respectively and the mean also decreases by nearly the same degree creating a series of portfolios whose risk adjusted returns remain relatively the same. The slight increase of 10% in the risk adjusted return of the portfolios A to C do

not reflect the benefits of diversification that was expected in combining these two assets although the advantage of the higher Sharpe Ratio is still quite beneficial.

Portfolios H, I, and J demonstrate the effects of combining varying weightings of the DFM and the HPT. The benefits of combining the two assets do not immediately become apparent in portfolio H where the DFM is allocated a 75% weighting and the HPT 25% as the standard deviation is still quite high at 23.49% and the mean 7.24%. With the incremental increase of the HPT in portfolios I and J the standard deviation decreases by 59% while the mean only decreases 19%. The benefits of diversification are apparent in this series of portfolios where the risk adjusted return of portfolio J is 98% higher than that of H.

The next combinations of assets observed is that of the HPT and the EBB found in portfolios L, M, and N. Portfolio L that is weighted heavily towards the HPT is initially found to have a mean of 3.9% and a standard deviation of 5.26% that seems relatively conservative in contrast to the other portfolios previously observed. This conservative combination of assets is only increased when the EBB is allocated a higher weighting in portfolios M and N where the standard deviation decreases by 65.7% and the mean by 81.75% resulting in a risk adjusted return that is 13.42% higher. This increase in the risk adjusted return may be only 3% higher than found by increasing the weighting of EBB to the DFM portfolios in A, B, and C however the Sharpe Ratio in portfolio N is over 300% higher to that found in portfolio C.

The portfolios E, F, G, and H include all three assets, the HPT, the DFM, and the EBB in various weightings that resembles a proper mixed asset portfolio than only combining two assets. While the mean of the portfolios remain relatively stable and within the 4.55% to 5.1% range regardless of allocation this represents a mean that does not deviate by more than 12% from the low and high of the range whereas the standard deviation ranges from 6.52% to 15.68%, representing a 140% difference. This combination of a slight deviation in means and an extensive difference in the standard deviations causes the Sharpe Ratio to exhibit a range of 0.325 to 0.761 which equates to a difference and or deviation of 133%.

The most significant result occurs within the more equally weighted portfolios of E and F where the relative decrease of the DFM from E to F is allocated to the HPT in portfolio F, and where the EBB weighting remains the same. The mean of portfolio F, with the slightly higher HPT weighting, decreases by only 10.7% where the standard deviation decreases by over 37% which increases the risk adjusted return of portfolio F by 41.8%. This extensive improvement of the risk adjusted return by slightly altering the weighting of varying assets highlights the benefits of diversification and more importantly the ability of the HPTs to optimise a mixed asset portfolio.

4.6 INFLATION HEDGING

With many studies being focused on the ability of real estate to hedge against inflation and such an issue being relevant to Dubai, it is only appropriate to perform such an analysis in this research. The EBB and DFM are also measured against inflation as they

are the other two potential assets being allocated a portion of a mixed asset portfolio. A negative figure results in a poor and perverse hedge against actual inflation where that of a positive figure provides a complete and successful hedge.

The positive results of HPT 1, a proxy of the property market in Dubai, in Figure 8 is a clear indication that HPT 1 is a complete hedge against actual inflation. While in few instances through out the data set the HPT 1 does not hedge against actual inflation, the overall result is very positive and encouraging. The positive result of HPT 1 is similar to the results of Hartzell *et al.* (1987) that found commercial real estate to be positive hedge against inflation and Rubens *et al.* (1989) that found residential REITs to be a positive hedge. In contrast Sing and Low (2000) have concluded that most of the REITs analysed did not hedge against inflation and only in the instances where industrial and retail properties portfolios were examined was there evidence of a positive hedge.

Figure 8- Inflation Hedging

	EBB	DFM	HPT 1
Q3 2008	-1.851005	-27.19371	11.302932
Q2 2008	-2.414689	-1.533036	-0.77988
Q1 2008	-2.307512	-12.89857	2.8766216
Q4 2007	-2.076717	36.76173	18.045897
Q3 2007	-2.064061	-7.497923	-5.119531
Q2 2007	-2.286305	14.521988	-7.820828
Q1 2007	-2.344744	-13.50198	2.2474949
Q4 2006	-1.737208	-17.55727	12.061272
Q3 2006	-1.700736	9.5100641	-1.974895
Q2 2006	-1.704697	-34.81355	1.5653795
Q1 2006	-1.729921	-18.90324	2.5954178
Q4 2005	-1.155904	-6.977272	7.0139623
Q3 2005	-1.141231	14.320121	0.2422619
Q2 2005	-1.17164	88.956581	8.7085891
Q1 2005	-1.18393	36.703212	-5.292388
Average	-1.791353	3.9931434	3.0448204

While the DFM also proves to be a positive hedge against actual inflation is that of the perverse hedge demonstrated by the EBB that causes some concern. Although the EBB has provided a very low standard deviation that has lowered the overall risk in the mixed asset portfolios in section 4.5 it comes at the expense of minimal returns that results in a negative real return when inflation is taken into consideration. The effect of negative real returns is an undesirable scenario where the value of an asset or portfolio is diminished through the lower purchasing power of an individual or entity from one period to another.

4.7 EFFICIENT FRONTIER

Where in section 4.5, Mixed Asset Portfolios, several portfolios were created consisting of two and three assets in order to view the potential diversification benefits, this section seeks to determine the optimal portfolio all three asset classes using the efficient frontier program Portfolio Optimizer Pro. The basis of an optimal portfolio is founded on the research of Markowitz (1952) where he states that in regards to maximum expected return and minimum variance of return rule he titles the ‘E-V rule’ that;

“It assumes that there is a portfolio which gives both maximum expected return and minimum variance, and it commends this portfolio to the investor.”
(Markowitz, pg.79, 1952)

The results in Figure 9 reflect the numerous weighting limitations and or bands that have been created in order to assess the optimal and minimum risk portfolios for HPT 1, the DFM, and the EBB in various circumstances. The first scenario where a minimum of 10% must be allocated to every asset and maximum allocation of 80% to any one asset

reflects the more liberal strategy where one would have a high degree of freedom in asset allocation to a mixed asset portfolio. The sequence of portfolios then become more constrained with regards to the minimum and maximum allocations till the minimum of 30% and maximum of 40% is reached, reflecting an equally weighted portfolio with very limited opportunity for weighting selection.

Figure 9- Efficient Frontier (Optimal and Minimum Risk Portfolios)

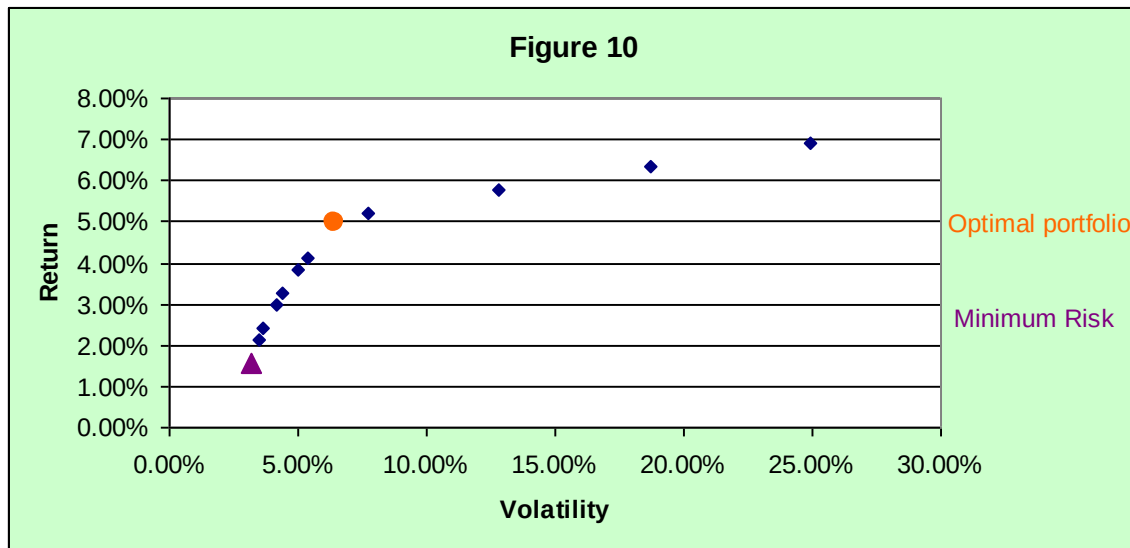
Minimum 10% Maximum 80%	Return	S.D.	Sharpe Ratio	HPT 1	DFM	EBB
Optimal Portfolio	4.97%	6.41%	0.78	80%	10%	10%
Minimum Risk Portfolio	1.58%	3.20%	0.49	10%	10%	80%
Minimum 10% Maximum 70%	Return	S.D.	Sharpe Ratio	HPT 1	DFM	EBB
Optimal Portfolio	4.48%	5.80%	0.77	70%	10%	20%
Minimum Risk Portfolio	2.06%	3.42%	0.6	20%	10%	70%
Minimum 10% Maximum 50%	Return	S.D.	Sharpe Ratio	HPT 1	DFM	EBB
Optimal Portfolio	3.51%	4.68%	0.75	50%	10%	40%
Minimum Risk Portfolio	3.03%	4.19%	0.72	40%	10%	50%
Minimum 15% Maximum 70%	Return	S.D.	Sharpe Ratio	HPT 1	DFM	EBB
Optimal Portfolio	4.86%	6.77%	0.72	70%	15%	15%
Minimum Risk Portfolio	2.20%	4.79%	0.46	15%	15%	70%
Minimum 20% Maximum 60%	Return	S.D.	Sharpe Ratio	HPT 1	DFM	EBB
Optimal Portfolio	4.76%	7.51%	0.63	60%	20%	20%
Minimum Risk Portfolio	2.82%	6.39%	0.44	20%	20%	60%
Minimum 25% Maximum 50%	Return	S.D.	Sharpe Ratio	HPT 1	DFM	EBB
Optimal Portfolio	4.65%	8.54%	0.55	50%	25%	25%
Minimum Risk Portfolio	3.44%	7.98%	0.43	25%	25%	50%
Minimum 30% Maximum 40%	Return	S.D.	Sharpe Ratio	HPT 1	DFM	EBB
Optimal Portfolio	4.55%	9.75%	0.47	40%	30%	30%
Minimum Risk Portfolio	4.07%	9.58%	0.42	30%	30%	40%

The results in Figure 9 reveal several trends the most noticeable and significant to this research being that HPT 1 consistently dominates the optimal portfolios in every circumstance to the extent that it is allocated the maximum possible weighting each and

every time. The second trend, which is actually disturbing, is where the DFM is consistently allocated the minimum possible weighting in the optimal portfolios and even in the minimum risk portfolios indicating that it does not assist a portfolio in either maximising returns or minimising risk. The third trend is that the EBB whilst being allocated a minimal allocation in the optimal portfolios is being allocated the maximum weighting possible with respect to the minimum risk portfolio that may be more suited the more risk adverse and conservative investor.

The first portfolio (minimum 10%, maximum 80%) where the highest degree of freedom for asset allocation is afforded reveals that the HPT 1 dominates the portfolio with the highest possible allocation allowed resulting in a return of 4.97%, a standard deviation of 6.41%, and a risk adjusted return of 0.78. In comparison to the result of HPT 1 by itself in Figure 1, the small allocation of the EBB and the DFM allow the for the HPT dominated portfolio to result in a return that decreases only by 3.9% where the standard deviation falls by 8.4%. The resulting risk adjusted return of 0.78 is actually higher than that of 0.739 when the HPT 1 was assessed by itself revealing the benefits of diversification in a mixed asset portfolio strategy. With the minimum risk portfolio having a return of 1.58% which is lower than the average inflation rate of 2.05%, a negative real return is provided which may not be suitable even for the more risk adverse investors who still seek to grow their wealth.

Figure 10 maps out the efficient frontier of the minimum 10% and maximum 80% portfolio.



4.8 SENSITIVITY TESTING

With the Dubai property market yet to experience a downturn which would exhibit a full cycle, a sensitivity test has been performed where in the first scenario, Scenario A, four consecutive quarters of a 2.5% decline in prices of HPT 1 have been included, and in Scenario B, a 5% decline, where the DFM and the EBB have remained stable. The testing is similar to that of section 4.7 where various weightings have been set to determine the optimal and minimum risk portfolios of the efficient frontier.

The results for Scenario A are provided in Figure 11. Despite the quarterly declines of 2.5% to the HPT 1 portfolio it still dominates the efficient frontier in all the cases presented in Figure 8 as it has been provided the largest allocation in all the optimal portfolios. The DFM still proves to provide lacklustre results with a consistently minimal allocation possible and the EBB proves once again to be the dominant asset in the minimum risk portfolio.

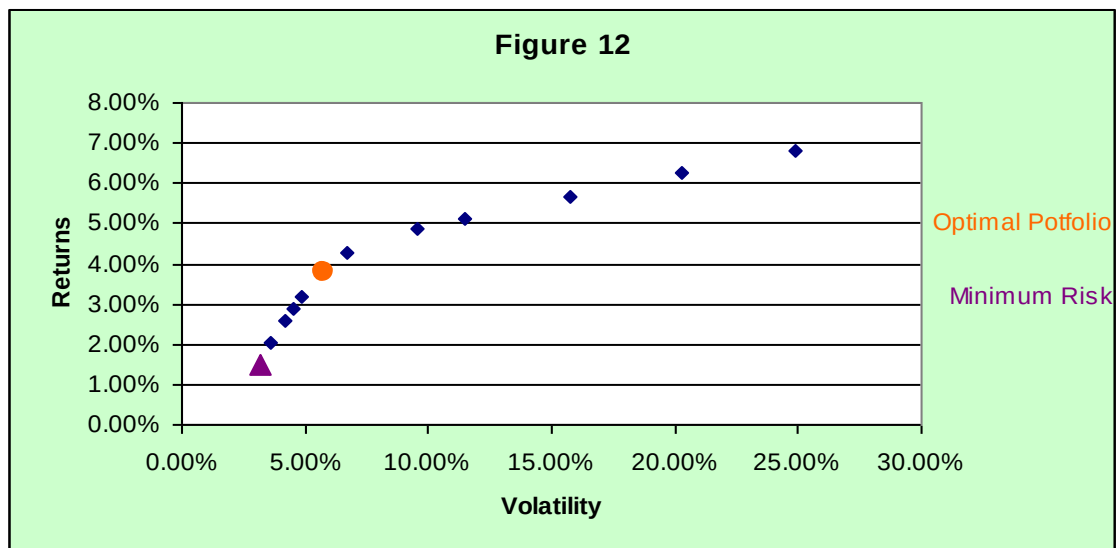
Figure 11 – Sensitivity Testing (Scenario A)

Minimum 10% Maximum 80%	Return	S.D.	Sharpe Ratio	HPT 1	DFM	EBB
Optimal Portfolio	3.77%	5.79%	0.65	69%	10%	21%
Minimum Risk Portfolio	1.48%	3.20%	0.46	10%	10%	80%
Minimum 10% Maximum 70%	Return	S.D.	Sharpe Ratio	HPT 1	DFM	EBB
Optimal Portfolio	3.77%	5.79%	0.65	69%	10%	21%
Minimum Risk Portfolio	1.87%	3.43%	0.55	20%	10%	70%
Minimum 10% Maximum 50%	Return	S.D.	Sharpe Ratio	HPT 1	DFM	EBB
Optimal Portfolio	3.04%	4.73%	0.64	50%	10%	40%
Minimum Risk Portfolio	2.65%	4.22%	0.63	40%	10%	50%
Minimum 15% Maximum 70%	Return	S.D.	Sharpe Ratio	HPT 1	DFM	EBB
Optimal Portfolio	4.21%	6.83%	0.62	70%	15%	15%
Minimum Risk Portfolio	2.06%	4.79%	0.43	15%	15%	70%
Minimum 20% Maximum 60%	Return	S.D.	Sharpe Ratio	HPT 1	DFM	EBB
Optimal Portfolio	4.20%	7.55%	0.56	60%	20%	20%
Minimum Risk Portfolio	2.63%	6.39%	0.41	20%	20%	60%
Minimum 25% Maximum 50%	Return	S.D.	Sharpe Ratio	HPT 1	DFM	EBB
Optimal Portfolio	4.19%	8.56%	0.49	50%	25%	25%
Minimum Risk Portfolio	3.21%	7.99%	0.4	25%	25%	50%
Minimum 30% Maximum 40%	Return	S.D.	Sharpe Ratio	HPT 1	DFM	EBB
Optimal Portfolio	4.18%	9.77%	0.43	40%	30%	30%
Minimum Risk Portfolio	3.79%	9.58%	0.39	30%	30%	40%

The first portfolio (minimum 10%, maximum 80%) where the highest degree of freedom for asset allocation is afforded reveals that HPT 1 dominates the portfolio as it did in section 4.4. Despite the dominance of HPT 1 there has been a slight decline in its weighting in comparison to section 4.4, where it was initially allocated 80% of the portfolio and now has been allocated 69%, with the difference of 11% being allocated to the EBB. The new results show that this portfolio in Scenario A has a return of 3.77% that is 25% less than previously stated and a standard deviation of 5.79% which is only

9.7% less, resulting in a risk adjusted return that has decreased 16%. In regards to the minimal risk portfolio, the EBB is still allocated the maximum possible, however like in section 4.4 it provides a negative real return.

Figure 12 maps out the efficient frontier of the minimum 10% and maximum 80% portfolio of Scenario A.



In the sensitivity testing of Scenario B, HPT 1 has been subjected to four consecutive quarters of a 5% decline in returns with the corresponding results presented in Figure 13. The results indicate that despite the more rigorous sensitivity testing of the performance of HPT 1 in Scenario B, HPT 1 still dominates the optimal portfolios in the various efficient frontiers. The DFM has not improved its allocation and seems to be continuously allocated the minimal weighting allowed while the EBB again dominates the minimal risk portfolios.

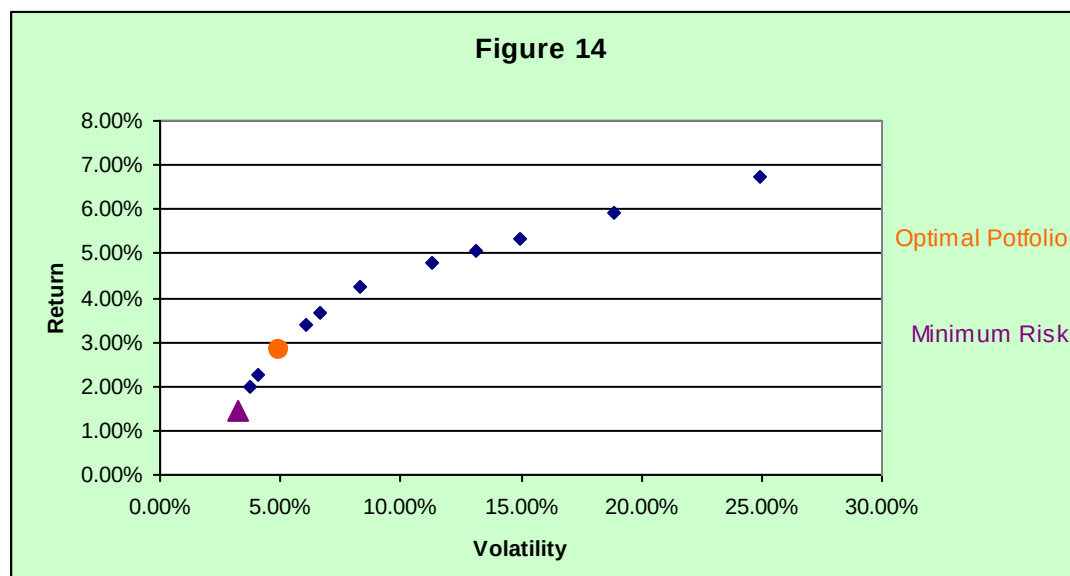
Figure 13- Sensitivity Testing (Scenario B)

Minimum 10% Maximum 80%	Return	S.D.	Sharpe Ratio	HPT 1	DFM	EBB
Optimal Portfolio	2.82%	5.01%	0.56	51%	10%	39%
Minimum Risk Portfolio	1.43%	3.21%	0.44	10%	10%	80%
Minimum 10% Maximum 70%	Return	S.D.	Sharpe Ratio	HPT 1	DFM	EBB
Optimal Portfolio	2.82%	5.01%	0.56	51%	10%	39%
Minimum Risk Portfolio	1.77%	3.48%	0.51	20%	10%	70%
Minimum 10% Maximum 50%	Return	S.D.	Sharpe Ratio	HPT 1	DFM	EBB
Optimal Portfolio	2.78%	4.95%	0.56	50%	10%	40%
Minimum Risk Portfolio	2.44%	4.38%	0.56	40%	10%	50%
Minimum 15% Maximum 70%	Return	S.D.	Sharpe Ratio	HPT 1	DFM	EBB
Optimal Portfolio	3.84%	7.12%	0.54	70%	15%	15%
Minimum Risk Portfolio	1.98%	4.81%	0.41	15%	15%	70%
Minimum 20% Maximum 60%	Return	S.D.	Sharpe Ratio	HPT 1	DFM	EBB
Optimal Portfolio	3.88%	7.75%	0.5	60%	20%	20%
Minimum Risk Portfolio	2.53%	6.24%	0.39	20%	20%	60%
Minimum 25% Maximum 50%	Return	S.D.	Sharpe Ratio	HPT 1	DFM	EBB
Optimal Portfolio	3.92%	8.68%	0.45	50%	25%	25%
Minimum Risk Portfolio	3.08%	8.02%	0.38	25%	25%	50%
Minimum 30% Maximum 40%	Return	S.D.	Sharpe Ratio	HPT 1	DFM	EBB
Optimal Portfolio	3.97%	9.84%	0.4	40%	30%	30%
Minimum Risk Portfolio	3.63%	9.62%	0.38	30%	30%	40%

The first portfolio (minimum 10%, maximum 80%) where the highest degree of freedom for asset allocation is afforded reveals that HPT 1 still dominates the portfolio, however to a lesser extent. The allocation to HPT 1 has been lowered to 51% from 80% in comparison to section 4.4 where the difference of the 28% allocation has shifted to the EBB which now is weighted at 39%. Where the allocation tends to shift from HPT 1 to the EBB in both Scenario A and B, the DFM has proved, despite rigorous testing, to lack the ability to either enhance returns or reduce risk.

The return of this portfolio in Scenario B is that of 2.82% and the standard deviation 5.01%, with a risk adjusted return of 0.56. This represents a decrease of 43% for the returns of the portfolio, a 22% decrease in volatility, and a decrease of risk adjusted return of 28% when compared to the results presented in section 4.4 which represent actual historical prices of the Dubai property market, the DFM, and the EBB. Although the dominance of HPT 1 obviously diminishes as the testing becomes more rigorous, it proves to be resilient in its ability to optimise a mixed asset portfolio.

Figure 14 maps out the efficient frontier of the minimum 10% and maximum 80% portfolio of Scenario B.



4.9 CONCLUSION

The superior performance of the HPTs when compared to the DFM and EBB over the 3rd quarter of 2004 to the 4th quarter of 2008 indicates the ability of HPTs, as a proxy for

REITs, to optimise a mixed asset portfolio. The results found in this study where the HPTs provided positive inflation hedging abilities, high risk adjusted returns, diversification benefits, and a dominant weighting in the optimal portfolio found in the efficient frontiers corresponds to many other studies performed on REITs found in other markets. Even when the HPTs were subjected to sensitivity testing it still provided credence to its ability to optimise a portfolio from an enhanced return and risk reduction perspective.

CHAPTER 5

CONCLUSION

5.1 DISCUSSION OF MAJOR FINDINGS

This research has examined the ability of unleveraged Real Estate Investment Trusts to optimise a mixed asset portfolio for investors in Dubai whilst adhering to the principles of Islam. With Chapter Two providing insight into the many variables that give credence to the performance of Real Estate Investment Trusts, the effects of leveraging on capital structures and the basis of Islamic Finance, several methodologies to assess the viability of REITs in Dubai have been provided and used in this research.

The robust performance of the Hypothetical Property Trusts, as a proxy for REITs, has proven to be an exceptional asset class as it has in previous research based in the US and Singapore. The consistently high returns and moderate levels of volatility of the HPTs when measured against the Dubai Financial Market and the Emirates Bank Bond has provided for superior risk adjusted returns, with the DFM proven to be lacklustre and that of the EBB providing negative real returns when inflation has been taken into account. When rental income has been included in the returns to reflect the true attributes of a REIT, the risk adjusted returns increased substantially which in some instances were even superior to the EBB.

The moderate to low correlation between the HPTs, the DFM, and the EBB provided for diversification benefits when the assets were placed into mixed asset portfolios. The HPT minimised the volatility when placed with the DFM and enhanced the returns when placed with the EBB, which resembled a 'hybrid' instrument as described by Sing and Ling (2003). The domination of the HPT 1 in the efficient frontier exercise was exhibited

by its consistently high allocation in the optimal portfolios of virtually every scenario, even as the HPT was subjected to declining returns as per the sensitivity testing. This dominance of the HPT in the efficient frontier provides evidence to support the claim for adding REITs to an investor's portfolio.

The moderate positive correlation between the money supply and significantly negative correlation of interest rates to the HPT and DFM confirms the theories provided by the traditional school of thought and literature reviewed in Chapter Two, where an increase in the money supply and or decrease of interest rates provides an upward pressure on both real estate and equity prices. While these findings give fund managers and investors alike indicators to track in estimating future price movements of the real estate and equity markets, it is noteworthy to mention that the research of Schnabl and Hoffman (2007) has found that the potential causes for rapid growth in emerging markets, such as that of Dubai, are that of low interest rate regimes and abundant money supply of developed countries. With sufficient evidence in their research to make such a conclusion, it may also be suggested that following these same indicators in the US, Europe, and Japan may give a more accurate insight to forthcoming trends in the marketplace.

While the leveraged HPT portfolios provided for higher returns than the debt free portfolio it also brought with it disproportionately higher volatility which incrementally decreased the risk adjusted returns, validating the theory that borrowing increases risk and probability of default. The sensitivity analysis performed to account for the lack of a downturn market in the Dubai property market only highlighted the risks associated with

borrowing as the returns of the leveraged portfolio were lower than the debt free portfolio whilst still providing higher levels of volatility.

Dubai being a tax free jurisdiction it was only appropriate to assess the ability of leveraging in enhancing returns to a non taxed investor. The results of adding leverage to a debt free HPT did cause for returns to increase but only at the expense of higher volatility and a diminishing risk adjusted return. When these same portfolios were assessed based on a an investor who is subject to taxation, the value of the tax shield become apparent as the risk adjusted returns of the leveraged portfolios increased where that of the debt free portfolio decreased. When the debt free and leveraged portfolios were subjected to hypothetical decreased returns to reflect a market that has experienced a downturn, the leveraging of a debt free portfolio only decreased returns and increased volatility, causing for the risk adjusted return to diminish rapidly. The value of leveraging was again only apparent when the portfolios were again analysed on the assumption of an investor who is subject to taxation, confirming the MM theory of Miller and Modigliani (1958) where leveraging only provided value to investors or firms that were subject to taxation.

The issue of borrowing as by conventional methods is of great concern to those that follow the teachings of Islam where *Riba* (interest) is strictly prohibited by the principles of *Shariah* that governs the daily lives of Muslims. The principles of *Shariah* also prohibits assuming *gharar* (preventable uncertainty or risky) as shown by the effects of

leveraging in a non taxed jurisdiction and the acceptance of collateral as is the case where mortgage charges are placed against properties. With the rapid demand for Islamic Finance in recent years due to the growth of the Middle Eastern economies and individuals present, Muslim scholars have created new financial instruments that are deemed acceptable under the principles of *Shariah*.

With *Ijara* being one of these *Shariah* compliant financial instruments that has become popular in recent years as a means to purchase property it is the conclusion of Aggarwal and Yousef (2000) that has debated the acceptance of such a product. The authors feel that the ‘mark up’ portion of the payment for an *Ijara* that provides profit for the financial institution leads to a ‘backdoor’ to the charging of interest. The inability to utilise financial instruments that charge interest or exhibit risk, along with the debate against the acceptance of *Ijara* as a Sharia compliant product leads to the notion that leveraging property would not benefit investors in Dubai and surrounding regions on the basis of religious beliefs and unnecessary risk.

5.2 GENERAL CONCLUSIONS

The above literature reviews coupled with the major findings of this research gives credence to the hypothesis that the growth and popularity of unleveraged Real Estate Investment Trusts in Dubai will become apparent as per the ability of the Hypothetical Property Trusts to optimise a mixed asset portfolio whilst complying with the principles of Islam and *Shariah*. The empirical results in this research provided sufficient evidence as to how the results of one of the inferior performing HPTs, that of HPT 1, hedged

against inflation, provided diversification benefits to mixed asset portfolios and dominated the efficient frontier, even under the sensitivity testing. The suggested capital structure of one that is absent of any borrowing has been given credibility as leveraging in a non taxed environment was proven to be counterproductive and that it does not comply with the principles of Islam.

5.3 AREAS FOR FURTHER RESEARCH

This research whilst providing evidence that REITs will be provided a significant allocation to investment portfolios for people and firms in Dubai going forward; there must be a continuous and periodic update to the empirical work performed. As the property market is relatively young in comparison to that of the US and Europe it is also imperative that a real estate index be established as per the study of Hoag (1980) where investment managers and institutions will have a reliable means by which to assess the risk and return attributes of real estate investment. The index should provide for comprehensive sale prices, rental yields, location, type, age and levels of inventories so that an accurate assessment of the market will be facilitated.

The lack of a significant and positive correlation between the equity markets of the UK, Russia, India, and Iran also provides for areas of further research and investigation as the residents of these countries have been active investors in the Dubai real estate market. Where the equity markets were not conclusive in providing evidence to their influence on the local property market it may be the money supply or interest rates figures of these countries that may produce more credible results. The conclusion of the research of

Schnabl and Hoffman (2007) where the low interest rate regime and abundant money supply levels of developed countries causes rapid growth of emerging markets may also be combined with the further investigation of the influence of the UK, Russian, Indian, and Iranian markets on the Dubai property market.

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