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# A modern portfolio theory approach to asset management in the listed South African property market

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# A Modern Portfolio Theory Approach to Asset Management in the listed South African Property Market

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A research report submitted to the Faculty of Engineering and the Built Environment, University of the Witwatersrand, in fulfilment of the requirements of the degree of Master of Science in Building.

Johannesburg 2009

**DECLARATION**

I declare this research report is my own unaided work. It is being submitted for the Degree of Master of Science in Property Development and Management (Building) at the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination in any University.

_____.

(Signature of Candidate)

_____ day of _____ year _____.

**ACKNOWLEDGEMENTS**

I wish to acknowledge the assistance of my supervisor, Francois Viruly, in the preparation of this research.

## DEDICATIONS

I dedicate this Research Report to all my family and friends. Thank you for all your support and endless patience. I hope we can share the benefits of all this work together.

**ABSTRACT**

This report focuses on a Modern Portfolio Theory (MPT) approach to Asset Management in the Listed South African Property Market. The research was undertaken to fill the gap in property research on Modern Portfolio Theory in South Africa. The research set out to calculate the optimal portfolio weighting from historical data (1995 – 2006) from Investment Property Databank (IPD) by using a portfolio optimiser spreadsheet on Excel's solver application. Interviews with Asset Managers were carried out to find out how many of them use MPT as a strategic portfolio tool when managing a property portfolio. The research proved whether MPT is used by Asset Managers in South Africa, as well as, how MPT should be used as strategic diversification tool and why it should be used.

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## LIST OF SYMBOLS

| | |
|---|---|
| Θ | Standard deviation/risk |
| r | Returns |

## NOMENCLATURE

| | |
|---|---|
| MPT | Modern Portfolio Theory |
| IPD | Investment Property Databank |
| SAPI/IPD | South African Property Index International Property Databank |
| IRR | Internal rate of Return |
| AIRR | Aggregate Internal rate of Return |

# Chapter 1

# Introduction

## 1. Introduction

This research report will investigate whether portfolio managers use Modern Portfolio Theory (MPT) as a technique when planning a strategy for their particular listed fund. The report intends to demonstrate that portfolios have better risk sharing characteristics when constructed using MPT than portfolios using the traditional approach. In order to prove these benefits of using MPT, a broad understanding of macroeconomic fundamentals, property economics and principles of investment is necessary. Lewis (1990), states, for years models have been used to analyse individual properties – incorporating cash flows, lease structures, tax and leverage considerations – but now managers are putting total portfolio under scrutiny in an effort to have greater control over its risk and reward characteristics and to search for what equity "MPT'ers" call an "efficient frontier". While Hartigay and SU, (1993), state, that the traditional approach of strategic planning is well accepted in spite of all its idiosyncrasies and faults whilst the approach based on MPT is still treated with suspicion, mainly because of its heavy reliance on complex mathematics. This study is therefore undertaken, to investigate whether, MPT is or should be used within the listed property sector and how it should be utilised.

### 1.1 Development of the Problem

Preliminary readings on the listed property sector illustrated the different types of property cycles and how they were all reacting and acting based on different market fundamentals. The listed market is always debating the "pick of the day" share. Property shares would be favoured according to the sector in which the majority of its capital was invested in and where the markets position was on that particular property cycle. The current

Property Unit Trusts (PUT) and Property Loan Stocks (PLS) market place is distinctly broken up into specialised and diversified funds. The diversified funds offer investors a share that achieves the returns of retail, office, industrial and property markets while a specialised fund only provides returns from one specific sector.

PUT's and PLS's began consolidating in order to achieve a suitable market capitalisation value in order to compete with international REIT's. Along with consolidation, the listed property sector increased the level of acquisitions. This consolidation and acquisition strategy would therefore affect the weightings of these funds across the sectors. Diversified funds had different allocation across the sectors and it was therefore a question of how much of each sector should be held in a portfolio in order for the portfolio to achieve above market returns. This study therefore looks at the strategies of the PUT's and PLS's and will establish whether portfolio managers are applying MPT to their strategies, as well as establishing what the optimal weightings are for a diversified property portfolio. The remainder of the chapter describes and clarifies property economics and the principles of property investment.

## 1.2 Introduction to Investment

### 1.2.1 Risk vs Return

Risk is the major determinant of an investment return. In the listed property sector each underlying asset or property has its individual risk that will dictate the expected return of that particular property or asset. Asset Managers or portfolio managers will carry a risk analysis for each underlying asset. A risk analysis is the systematic analysis of the degree of risk attaching to capital projects, risk reflects the variability of expected return from a capital investment, and as such a statistical technique of

probability may be applied to assist a decision. In simple terms an investment is a trade off between risk and expected return because as the risk increases the expected return increases. Figure 1.1 in Appendix A shows the relationship between risk and return.

Waldy (1991), states, that the main argument for considering single asset risk to be equally as important in practice as that most investors are not able to diversify away the individual property element of risk adequately. Sources of risk in a property investment decision may arise from: tenant risk, sectoral risk; structural risk; legislation risk; taxation risk; planning risk; and legal risk (Baum and Crosby 1995). Morley (1998) suggests the following aspects are risks in property investment: rental value and rental growth yield on sale and timing of sale, age and obsolescence, lease structure; liquidity management costs; taxation and inflation. According to Financial management theory there are three general types of risk: business, financial and liquidity. Business risk is due to the uncertainty of future income flows, based on the nature of the firm's business and the market, which it operates in. Financial risk is risk arising from the particular method of financing of an investment. Liquidity risk is the uncertainty caused by the availability or access to the secondary market for an investment.

In 1952 Harry Markowitz developed the Modern Portfolio Theory (MPT), which was a model, which illustrated the power of diversification. The MPT simply explains the age-old adage "Don't put all your eggs in one basket". The theory adds to this concept of diversification by quantifying the benefit of diversification in terms of portfolio risk and return, in simple terms how many eggs to put in which basket. In broad terms, pairs or sets of assets that do not move together provide greater diversification benefit when they are combined in a portfolio. Ultimately, however, even with a large number of assets or properties, there is no way to avoid all risk. All

asset or properties are affected by common (risky) macroeconomic factors we cannot eliminate our exposure to general economic risk, no mater how different are the assets or properties we hold.

### 1.2.2 Nondiversifiable risk and Diversifiable risk

As discussed above we identified broad sources of risk being business risk, financial risk and liquidity risk. We will now identify which of these risks are nondiversifiable risk and diversifiable risk. The first risk is the risk that has to do with general economic conditions, such as business cycles, inflation rate, interest rates, exchange rates and so forth. None of these macroeconomic factors can be predicted with certainty and all affect the rate of return of an asset or property will eventually provide. Then one must add these macro factors, the firm-specific influences, or risks that are unique to that single asset or property, such as operating costs, location and so on. These asset-specific factors affect only that asset without noticeably affecting other firms.

Figure 1.2a and Figure 1.2b in Appendix A show two graphs representing the portfolio risk as a function of the number of stocks in the portfolio. When all risk is unique risk, as in figure 1.2a, diversification can reduce risk to low levels with all risk independent, and with investment spread across many securities, exposure to any particular source of risk is negligible. This is a simple application of the law of averages. The reduction of risk to very low levels because of independent risk sources is sometimes called the insurance policy.

When common sources of risk affect firms, however, even extensive diversification cannot eliminate all risks. Figure 1.2b in Appendix A illustrates that portfolio standard deviation fall as the number of securities increases, but is not reduced to zero. The risk that remains even after

diversification is called market risk; this is risk that is attributable to market wide risk sources. Risk that cannot be eliminated is also commonly referred to as systematic risk or nondiversifiable risk. The risk that can be eliminated by diversification is called unique risk, firm-specific risk, non-systematic risk or diversifiable risk.

### 1.2.3 The Risk and Expected Return on a Portfolio

An asset held as part of a portfolio is generally less risky than the same asset held in isolation (Brigham and Gapenski, 1994). The expected rate of return on the portfolio is a weighted average of the expected returns on the components securities, with the same portfolio properties as weights. For example, in the simplified case of two securities, the portfolio return can be calculated as follows: -

$$E(r_p) = WA\ E\ (r_A) + W\ B\ E\ (r_B)$$

Where
- $E(r_p)$ = Expected return of Portfolio P
- $E(r_A)$ = Expected return of security A
- $E(r_B)$ = Expected return of security B
- $W_A$ = Proportion of portfolio invested in security A
- $W_B$ = Proportion of portfolio invested in security B

(*Source*: Bode, et al, 2003)

Kinghorn (1990) suggested that if the same were true for portfolio risk, investors would have little, if any incentive to diversify their holdings. Any risk-spread benefits would be offset by a reduction in expected returns (Kinghorn, 1990). It is clear that under these conditions an investor would simply set their specific risk levels and choose the security or asset that offered the required returns. However, portfolio risk is a function of the

weighted average of the individual variances plus the weighted covariance's between the returns of pairs of shares. In the simplified case of two securities, with returns on the individual securities having a normal distribution, the portfolio standard deviation can be calculated as follows: -

$$\sigma_p = \sqrt{(W_A \sigma_B)^2 + (W_A \sigma_B)^2 + 2 (W_A \sigma_A)(W_A \sigma_B) \rho_{AB}}$$

Where
- $\sigma_p$ = portfolio variance (represents risk)
- $\sigma_A$ = standard deviation of security A
- $\sigma_B$ = standard deviation of security B
- $W_A$ = Proportion of portfolio invested in security A
- $W_B$ = Proportion of portfolio invested in security B
- $\rho_{AB}$ = Correlation coefficient between A and B

(*Source*: Bode, et al, 2003)

The variance of the portfolio is a sum of the contributions of the component security variances plus a term that involves the correlation coefficient between the returns on the component securities. The correlation coefficient between security A and B should between –1 and 1 for example -1< GAB <l. If the correlation between the component securities is small or negative, then there will be a greater tendency for the variability in the returns on the two assets to offset each other. This will reduce portfolio risk. The reduction in portfolio risk is represented by portfolio variance in the above equation, when the correlation coefficient is lower.

### 1.2.4 Property Investment Process

All property investment requires careful analysis of many contingencies on which the decision depends. There are five basic steps that will guide an investor to make an investment decision. The five steps are as follows.

*(i) Identify the goals, objectives and constraints of the various participants in the investment process which an investment must satisfy in order to be acceptable.*

*(ii) Analyse the overall investment environment-market, legal, financing and tax in which the investment decision must be made.*

*(iii) Forecast the expected future benefits and costs (cash flows) arising from the ownership of the investment. This analysis involves four types of decisions: operating, financing, and reversion decisions as well as tax planning.*

*(iv) Apply appropriate decision-making criteria to compare the benefits with the costs of the investment. An analysis must be carefully developed to be relatively certain of the investments ability to meet the constraints and objectives of all the participants in the investment process.*

*(v) Accept or reject the investment under the assumptions of the input variables.*

(Jaffe and Sirmans, 2001)

The investment process is used to discover whether a particular investment is feasible. A property investment is feasible when the investor determines that there is a reasonable likelihood of satisfying explicit investment objectives, which must be tested against a specific set of constraints (Graaskamp, 1980). The Investment process is simply a

structure in which the expected risks and expected returns can be analysed.

The first step in the investment process is to ascertain the investor's goals, objectives and constraints. There are four major participants in a property investment: The equity investor, the mortgage lender, and the user of real estate, and the government. Each of these participants play different roles in the property and therefore have different and usually conflicting objectives for entering into the investment. Each participant has an effect and possibly restrictions on the feasibility of the project. All of the participant's objectives and constraints must be carefully scrutinized and analysed when considering the property investment. Failing to do so will be disastrous and will result in economic loss.

The second step of the investment process involves an analysis on the overall environment affecting the investment. Four distinct areas of analysis govern this step: the market environment, legal environment, financing environment and the tax environment. In summary this step is concerned with examining the business risk of the particular investment. As one of the major categories of risk to which a real estate investor is exposed, business risk is defined as the variability of the expected net income from a real estate investment. (Jaffe and Sirmans, 2001) Any investment produces two potential forms of income: the annual flow from operations and the flow from selling the investment.

Market analysis is therefore carried out to identify the factors, and the probability of their occurrence, that influences net income. The essential and important factors are rent, vacancies, and bad debts, operating expenses and, of course, at the end of the investments holding period, the selling price.

The legal environment plays a major role in the investment analysis. Whereas market analysis is interested in the economic constraints of an investment, the legal environment investigates the legal constraints. One of the major legal decisions is the choice of business entity for engaging the investment. Each entity has advantages and disadvantages and factors such as liability, management, ease of transferability, and taxation greatly influence the decision. The other legal implication, is the quality and quantity of property rights associated with the ownership of the property. This is important because these rights have value in the property market, any limitation on these rights reduces the investments value (Jaffe and Sirmans, 2001).

The financing environment involves the use of money. There are mainly two sources of money: debt and equity. A property investor will usually use a combination of debt and equity but could also use all debt or all equity. An investment becomes feasible if it generates enough income to cover the cost of the debt and equity. The cost of borrowing or the debt is generally referred to as the interest rate and the cost of equity is the required rate of return on equity (Brueggeman and Fisher, 2005). Debt Finance is where the mortgage lender has traditionally accepted a fixed rate of interest and a sinking fund payback of the amount lent over the mortgage maturity. This form of debt financing is commonly known as fixed rate mortgage. In recent years, there have been numerous variations in mortgage lending practices, such as adjustable-rate loans and equity participation loans (Jaffe and Sirmans, 2001). On the equity portion, property investors use a variety of techniques to obtain the necessary equity funds. The equity position in property investments is presumed to have more risk exposure than the debt financiers because the equity claim is, in essence, the “residual” claim associated with the investment (Gelttner, Miller, Clayton and Ticholtz, 2007). The equity investor receives funds only if there are any resources remaining, after all

other claimants such as debt financiers have been paid. Both debt and equity capital tend to flow into those sources that have the highest expected return for a giver's level of risk.

Government dictates the tax environment. The governmental influences the investment decisions by taxation. The influence of taxes is important in making the investment decision, since taxes influence the amount of cash flow from an investment (Jaffe and Sirmans, 2001). The important cashflow for all property investors is the amount left after taxes have been paid.

The third step in the property investment process is to forecast the expected cash flow from an investment. The cash flow is forecast for the period of time during which the investment is expected to be held. The investment decision is based on reasonable future expectations because the cash flow from the investment are not known. The two major sources of cash inflows from a property investment is the annual cash flow rental collections and the cash flow from the sale of the investments. The most important cash flow figure is the amount left after all costs of operating and selling the investment has been paid. Normally costs would include operating expenses, payments for debt servicing and taxes. Once the investor has produced an expected cash flow from operation and cash flow from sale; the investor is now prepared to apply various criteria to examine the relationship between cash inflows and cash outflows.

This now brings the Investor to the fourth step in the investment process. The fourth step is to apply the decision-making criteria. The decision-making criteria falls into three broad categories: (i) rules- of- thumb techniques, (ii) traditional valuation techniques and (ii) discounted cashflow models. Each method has its own advantages and disadvantages.

(i) Rules-of-thumb techniques are simple calculations which investors can use for quick, easy decisions. However, these have limitations because of their simplicity. The most commenly used technique is the “capitalization rate”. The capitalization rate is the ratio of net operating income divided by the value of the investment. The disadvantage to this technique is that no consideration has been taken, on the cost of debt, depreciation of the asset and taxes.

(ii) Traditional Appraisal Methods are techniques for estimating value. A “direct sales comparison approach” is a traditional appraisal method which is used to value an investment by comparing it with similar properties which have recently been sold. The “cost approach” method is used to estimate the value of an investment on the cost to reproduce the property using the current construction costs and considering the location of the property. The “traditional income approach” is an appraisal method to estimate the present value of a building based on the expected income stream.

(ii) The third set of decision-making criteria for a property investment analysis is a discounted cash flow model. Basically a discounted cash flow is based on the concept that the value of a property investment is equal to the present worth of the future cash flows. When using the discounted cash flow model one will apply two basic criteria: net present value and Internal Rate of Return. If the Net Present Value is positive if indicated that the present value of the cash inflows exceeds the present value of the cash outflows and therefore an investor would accept such an investment. The Internal Rate of Return is calculated, it is compared with the “hurdle rate” or the weighted average cost of capital. If the internal rate of

return is greater than the “hurdle rate”. Then the investment is accepted.

The fifth and final step of the investment decision process is the “investment decision”. By this time an investor has analysed all the considerations. All the assumptions and estimates must be reviewed and checked for accuracy and all unfeasible investments must be discarded. The investor must now make the investment decision which best suites his risk-return profile.

## 1.3 Statement of the Research

There is uncertainty whether portfolio managers in the listed property sector apply MPT technique when planning their strategies. This study therefore aims to investigate whether portfolio managers have used or even consider the MPT. The study will also establish the efficient frontier according to the Investment Property Databank (IPD) index and compare the weighting of this optimal portfolio with funds weighting and will also include interviews, which will provide some insight into the advantages and disadvantages of using MPT.

## 1.4 Hypothesis/Proposition

Portfolio managers in the listed Property Market use Modern Portfolio Theory in planning a strategy on how much capital to allocate across the three commercial property sectors.

## 1.5 Research Objectives

- To attain the returns of the IPD index.

- To establish an efficient frontier using the return data from the IPD index.
- Generate the optimal portfolio and establish the weights across sectors and geographical locations.
- To compare the weightings of the IPD optimal portfolio to the weightings of each of the PUT and PLS.
- To establish the advantages and disadvantages of using MPT technique in planning a portfolio strategy.
- To establish whether portfolio managers in the South African listed property sector use MPT technique even planning a portfolio strategy.

## 1.6 Scope and Limitations

### 1.6.1 Scope of Study

Property within South Africa, excluding state owned properties.

### 1.6.2 Limitations

- Analysis is over a short term period
- Analysis is limited to 12 year period
- Access to data on property returns is only available from 1995
- Access to data on listed property funds
- Time (+- 1 year)
- Budget

## 1.7 Research Design and Methodology

### 1.7.1 Research Design

The research carried out involves the following steps:

Chapter 2 - will consist of the Literature review, with reference to the Literature pieces which have contributed to the knowledge of this topic.

Chapter 3 - will explain the Data and how the data will be analysed and provide results of this Data Analysis.

Chapter 4 - is the Methodology which justifies the methods used to gather information and classify the different types of information.

Chapter 5 - is to include the recommendations and conclusions of the topic - A Modern Portfolio Theory Approach to Asset Management in South Africa's listed Property Sector.

### 1.7.2 Methodology

Research method adopted and justification

- Literature review that gives an understanding of Modern Portfolio Theory diversification, risk and return.
- Discussing Property economic fundamentals that affect Property returns.
- Accessing property return data from the International Property Data bank. Carry out correlation calculations to establish the optimal property portfolio according to IPD data.
- Compare weightings of the Optimal Portfolio to the weightings of each of the listed funds.
- Carry out interviews with a portfolio manager from each fund and establish methodology.
- Finally concluding the study by linking the findings to the objectives and making recommendations.

# Chapter 2

# Literature Review

## 2.1 Introduction

There is an abundance of literature available from previous studies concerning the benefits of diversification with property portfolios. Most of this research was undertaken in the United States of America, Europe and the United Kingdom; however the principles of diversification are borderless. The focus on diversification emerged, approximately, 30 years ago among investors concerned with stock returns at a time of market difficulties throughout the word and especially in the United States of America, MPT seemed to offer a rational solution to the simultaneous objective of minimizing risk while maximizing portfolio performance when other approaches to the balancing of risk and return seemed to have failed.

King and Young (1994), stated, that previous resources devoted to the management of property portfolios may be better spent on the examination of asset specifics rather than in seemingly sophisticated portfolio construction techniques associated with MPT. Edward Schuck (1995) questioned the arguments by Donald King, Jr, and Michael Young. An examination was made of the development of MPT, risk and diversification, strategies for active and passive investors and the normality assumptions. Schuck (1995), specified, that strategy is the most important element in property decision making, and the decision-making tool must be dictated by the goal being sought, he therefore concluded that MPT is the most useful in conjunction with other methodologies and good old intuition.

Modern Portfolio Theory. Do we use it or don't we use it? In the academic literature, one factor retarding MPT's employment in the institutional real estate community is the quantity and quality of pertinent data (Viezer, 1999:1). From other literature undertaken the general point of view was

the reliability of the results dependent on the quality of data, which could have been affected by the following circumstances.

- The difference in Market Environments, for example geographical and spatial attributes
- The relative size of the property market
- The current position of the real estate market in terms of the market's particular property cycle
- The macroeconomic situation occurring in that time period

Regardless of the above issues regarding the data of property returns, Viezer (1999:1), states, although the inherent uncertainties in real estate return correlations are due to data limitations it will probably persist over the foreseeable future. There is still much to recommend a tool that takes in both risk and expected return over an alternative that focuses only the latter. The above clarifies the importance of the MPT in a portfolio strategy.

Portfolio Managers must be reminded that the MPT is a tool where one can minimize the level of risk while trying to achieve a specific expected return. Most investors want a return that is higher than the annual inflation rate as this causes the value of the investment to increase. If the after tax return on your investment is lower than inflation, the real value of your investment will decline. In order to achieve a total return that is greater than the inflation, landlords or property owners have an escalation clause in commercial contracts which would to some degree follow the inflation rate. The escalation in property rentals already includes the inflation rate however; the escalation could be below or above the inflation rate. The CPI is used by landlords as a platform for deciding the escalation rate (Technicon, SA). Escalation rates also take the state of the property market into account. However, the relationship between office property

prices and inflation becomes easier to understand – investors can predict the future property returns using the inflation rate (Barkham, and Ward, 1996). This chapter will discuss Capital Markets and the Financing Environment in further detail.

Property Cycles and the different types of diversification will also be discussed in this chapter. One form of diversification is by spreading the assets in a portfolio geographically, by nodes in separate and different locations. Different nodes have their own characteristics. This uniqueness could strengthen or weaken property returns of the node, depending on current economic trends or business cycles. This occurs because each node will experience its own property cycle. It can be difficult to determine where one is on the property cycle compared to the business cycle. The property market is linked closely to the business cycle, or the time it takes for the economy to move between one peak in annual growth rates to the next – on average seven years. (The Property Handbook, 2005).

The literature undertaken will also include a section of short versus long term in order to place a perspective on the time horizon involved in the property investment. A substantial amount of literature was completed on mixed-asset portfolios and the role which property ownership affects such portfolios. Therefore I have included a section on this topic as it is important for property owners or Asset Managers to be aware of other investments and their unique roles in a Mixed-asset portfolio.

The literature reviewed proved that Modern Portfolio Theory is an important tool for carrying out the tactical operations of a portfolio while implementing the strategy. The literature also suggested that specialised property funds are also to certain degree diversified within that sector. The

study undertaken below will prove that there are benefits in diversifying a property portfolio.

## 2.2 Portfolio Theory

### 2.2.1 Modern Portfolio Theory

Harry Markowitz published a paper on Modern Portfolio Theory in 1952. Markowitz proved that age-old adage “Don’t put all your eggs in one basket” is true. Before the paper was issued, people had an intuitive sense that they should not put too much of their total wealth in a single investment or type of asset. Markowitz was therefore the first person to prove mathematically, that it was a question of how many eggs to put into which basket. The key to modern portfolio theory is a mathematical model which will be described later in Chapters 3 and an example will be carried out in Chapter 4. All these mathematical calculations are a way to structure and discipline your thinking as a portfolio manager – a way to reduce risk and improve overall return (Hudson-Wilson, 1990). Hudson-Wilson (1990), states, that the more advanced our thinking can become about the characteristics of each real estate investment and how it resembles and differs from others, the better the return we will be able to achieve.

Portfolio Theory assumes an investor is both rational and risk averse and as such has a number of choices of investments to construct a portfolio. All investment opportunities involve risk and reward, an efficient frontier can be constructed where combinations of investments will have a given level of risk and return and at the efficient frontier will be the best possible risk reward combination. Markowitz (1952, 1959) showed that assets in a portfolio can be combined to provide an “efficient” portfolio that will give

the highest possible level of portfolio return for any level of portfolio risk as measured by the variance or standard deviation; these portfolios are thus connected to generate the "efficient frontier". Portfolios which have a combination below this efficient frontier will not be maximizing the efficient trade-off, according to the investors preferences. Having established an efficient frontier it is now necessary to decide where along the frontier the investor will choose a portfolio.

### 2.2.2 Investor Preferences

An Investor's preferences are always unique compared to the next investor. The investor's choice of where the portfolio's position along the efficient frontier will depend on their unique attitude towards risk and on whether the investor will wish to minimize risk at the expense of return or be prepared to higher risk to achieve maximum return. Institutional investors may tend to be risk-averse while private or specialist investors may be able to accept higher risk profiles (Isaac, 1998). Figures 1.3 a and b in Appendix A depicts risk and return on the horizontal and vertical axes of each graph, respectively. Each point along a line in the graph is a different combination of risk and return. The risk return trade-off is shown by the investor's utility function, which is an indifference curve.

Figure 1.3a in Appendix A illustrates a conservative investor, one who is less risk tolerant in his investment preferences. From the graph 1.3a it is clear that the investor's indifference curves are steeply curved to the North in the graph, investors generally prefer greater return and less risk. Thus the investor preference surface is rising toward the upper left section of the graph in other words the "North" and "West" quarter of the graph.

Figure 1.3b in Appendix B depicts a more aggressive investor; this investor is relatively more risk tolerant. Such an investor's indifference

curves are less steeply rising over the horizontal axis, indicating less need for additional expected return in more risky investments (Geltner, Miller, Clayton and Eichholtz, 2007). Aggressive investors also prefer to lie in the upper left, or, "North" and "West" quarter of the graph. MPT does not assist an investor to decide what their risk preference is. In order to decide where on the graph one would lie, an investor would have to quantify the investors risk preferences. One exercise, which is most commonly used, is a questionnaire given to the investor where once processed a "preference map" can be drawn up. However, in the real world most risk decisions are made non-quantitatively. By using indifference curves and an efficient frontier, an investor can depict his or her optimal choice.

### 2.2.3 The Efficient Frontier

The efficient frontier is a graph representing a set of portfolios that maximize expected return at each level of portfolio risk (Bode, 2003). Plotting the efficient frontier is very complex. To plot an efficient frontier, it is necessary to calculate the future expected returns and standard deviation, along with the correlation coefficients between each pair of assets. Byrne and Lee (1994) used a spreadsheet optimizer using matrix methods to compute the efficient frontier.

The efficient frontier describes the collection of portfolio's (i.e. asset mixes) that produces the highest expected return at various levels of risk (as measured by the standard deviation of portfolio returns) (Hudson-Wilson, 1995). Such portfolios can be seen as efficiently diversified. Figure 1.4 in Appendix A illustrates the graphical relationship of the individual assets and the efficient frontier. The expected return standard deviation (risk – return) combinations for any individual asset end up inside the efficient frontier, because single asset portfolios are inefficient, in other words, they are not efficiently diversified. When looking at Figure

1.4 in Appendix A an investor can immediately discard portfolios below the minimum variance portfolio. The minimum variance portfolio is dominated or favoured by portfolios on the upper half of the frontier because they yield a higher expected return with equal risk. Therefore, investors should only consider portfolios on the efficient frontier above the minimum – variance portfolio.

As discussed before, investor preferences and the efficient frontier can be used in order to assist an investor on choosing targeted range along the efficient frontier the optimal portfolio (Hudson-Wilson, 1995). Figure 1.5 in Appendix A shows the indifference curves superimposed on the efficient portfolio diagram. Point X on the diagram is where the indifference curve touches the efficient frontier, this is the point where the investors preferences match up with the optimal choice. Therefore an investor should consider portfolios on the efficient frontier, which lie above the investors indifference curve.

### 2.2.4 Capital Asset Pricing Model

The Capital Asset Pricing Model (CAPM) is an extension of Markowitz mean-variance theory. CAPM is developed from MPT but with three major additional concepts. The first concept is of a risk-free investment, secondly a notion of market portfolio is used and thirdly an efficient Market is assumed to exist. The CAPM was developed by Treynor, Sharpe, Lintner and Mossin in the early 1960's and was refined further for a few years. Generally the model predicts the relationship between the risk and equilibrium expected returns on assets. The CAPM also relates the required rate of return for a security to its risk as measured by beta (Bode, 2003). Beta measures the contribution of a single asset to the risk of a diversified portfolio. As discussed in Chapter 1 systematic risk is

nondiversifiable risk, therefore beta is effectively measuring the systematic risk of a specific asset. The CAPM's expected return – beta relationship is as follows:

$$E(r_A) = r_f + \beta_A [E(r_m)-r_f]$$

Where: $E(r_A)$ = Expected return of Asset A

$r_f$ = risk-free rate of return

$\beta_A$ = Contribution of Asset A to the risk of a portfolio

$E(r_m)$ = Expected return of the market

(*Source*: Bode, 2003)

The expected return – beta relationship also holds for any combinations of assets. The beta of a portfolio is simply the weighted average of the Betas of the Assets in the portfolio, using as weights the portfolio proportions (Bode, 2003).

Assets are combined into portfolios based on possible equilibrium prices in different situations (Findlay, Chapman, Hamilton, Stephen and Yormark, 1979). Generally, these are not applicable to real estate because of a lack of consistent market data and difficulties in applying optimization concepts (Findlay, *et al*, 1979)

## 2.3 Property Portfolio Strategy and Investment Performance

There is a great need to manage property effectively because of its nature as an investment. The larger funds have an obligation towards shareholders to ensure growth, thus proper management of the portfolio is needed in order to ensure shareholder confidence. For the smaller portfolios, there may not be as many shareholders but it is equally

important for the returns to beat the market. The objective of the portfolio manager may differ, for example, some property investment managers concentrate on opportunities which require management and active development, redevelopment or refurbishment; others are content to hold fully let prime investment properties on institutional leases and almost treat the investment as paper investment with little active management (Isaac, 1998). Dubben and Sayce (1991) summarized the main problems of property investment as the lotting problems (the size and indivisibility of lots for sale); illiquidity; the need of management and the complexity of financing development. Because of those problems and property portfolios require effective management. Lewis (1990) states that shareholders now want to be sure they are well diversified not only by city and property type but by leasing structures and maturities and even tenants. Portfolio Managers can pick up properties when the price seemed right, usually in cities hot at the time, and selling others when the offer was attractive, and that this deal-oriented approach creates random portfolios only vaguely diversified by geography and property type (Lewis, 1990). The investment decisions will have a direct relationship to the amount of property within the institutional portfolio. Figure 1.7 Appendix A, shows the investment process which is undertaken on an ongoing basis. The relationship between strategic decisions and performance measurement is illustrated in figure 1.7 Appendix A. The next section will discuss portfolio construction and size.

### 2.3.1 Portfolio construction

The issue of how many properties an investor should hold to diversify risks is obviously a key one. As discussed earlier nonsystematic risk is risk which can be diversified. Statman (1987) undertook a study to show how many stocks are needed in order to diversify all the nonsystematic risk and only be left with the market risk. Figure 1.6 in Appendix A shows

the average standard deviations of equally weighted portfolios by random selection as a function of the number of stocks. Statman (1987) proved that on average, portfolio risk does fall with diversification, but the power of diversification to reduce risk is limited by common risk or market risk.

Byrne and Lee (2000) explained that the average results by and large indicate that an increase in portfolio size is accompanied by a reduction in portfolio volatility, and the most of the reduction in risk occurs within the first 20-40 properties, after which any fall in risk is marginal. Byrne and Lee (2001) re-evaluated the potential risk reduction in the UK real-estate market across the whole spectrum of portfolio sizes and found that the actual number is more likely to around 400-500 properties. Therefore for a portfolio to be used as an index, 400-500 properties would be required because this provides a good proxy for market movements.

Nonsystematic components of risk affect the performance of individual properties and market affects make only a small contribution in explaining returns. Nonsystematic components of risk in the property are aspects such as location of the property, this factor operate to provide a low correlation coefficient between properties and thus reduces risk (Isaac, 1998). Investors can achieve similar levels of risk reduction by diversifying within a single sector. These issues will be discussed later on in more detail.

In considering the structure of the portfolio one should also consider the correlation of returns of the property with the returns of other relevant properties. If there is a low correlation between the two properties it shows that market responds more to specific factors than general market movements. Risk reduction in a portfolio can be expressed as a percentage of the change in standard deviation from the average standard

deviation of the portfolio to the systematic or market risk level(standard deviation of the market) (Isaac, 1998).

$$RR = \frac{\sigma_p - \sigma_m}{\sigma_p}$$

Where: RR = Risk Reduction (%)

$\sigma_p$ = Standard deviation of portfolio

$\sigma_m$ = Standard deviation of the market

(*Source*:Isaac, 1998)

There are namely two methods of diversification techniques: randomly or purposively. Random diversification takes place when investment vehicles are selected randomly without a just cause or reason. This may seem very impractical but it can work. Purposive diversification is the process of selecting investments which achieve a stated portfolio objective. Property and Investment Professionals usually use the purposive method as a portfolio construction strategy.

Joseph Ori (1995), recommended that investors follow a 7 step market and investment diversification approach to the structuring of real estate portfolios. Ori, (1995), stated, the following steps should be followed in sequence.

1. Determine the objectives of the real estate investment program
2. Allocate funds between the public and private markets
3. In each of these markets, allocate funds between debt and equity investment
4. Select the proportions of preferred property types for each of the investment categories considered
5. Allocate proportions to preferred property locations, markets, or

economic regions for each of the allocations above.

6. Determine investment structure of each allocation
7. Monitor performance continuously adjusting investment allocation and making exit and entry decisions as required.

(Ori, 1995)

Robert Rodino (1987), showed an analytical scheme that allows asset Managers to make decisions in an objective and systematic manner as described by Rodino, considered the time value of money, Internal Rate of Return as an index that can be used to compare the investment performances of diverse investments. This study illustrates how an asset Manager should analyse each property in order to achieve the portfolio's objective. Rodino (1987) stated the following variances need to be analysed:

1. Acquisition and resale Capitalisation Rates
2. Rent escalations
3. Vacancy rates
4. Expense increases

Rodino (1987), also stated that risk considerations must be entered into. The analysis and acquisition strategy analysis should consist of the following:

1. Economic forecasts
2. Expectations
3. Field data
4. Key investment variables
5. Cash flow forecasts
6. Internal rate of returns (IRR)
7. A matrix of aggregate internal rate of return (AIRR)

Rodino (1987) concluded that the future cash flow from each property is projected, and the best selling mix and schedule of properties can be determined from the above analytical scheme.

Once the portfolio has been constructed the investor must measure and evaluate its actual behaviour in relation to the expected performance. Such action usually involves selling certain investments and using the proceeds to acquire other investments for the portfolio. Portfolio Management therefore involves not only selecting a compatible group of investments that meet the investor's objectives, but also monitoring and restructuring the portfolio as dictated by the actual behaviour of the investments. Viezer (1999:1) used diversification hurdle rates as tools that make investment decision-making criteria consistent with performance evaluation and offers real estate managers a method to efficiently build their portfolios, one deal at a time. Viezer (1999:2) stated that combining outputs of several models can reduce the chance of a model that may be "wrong" but listening to the needs of decision makers and synthesizing and organizing available research and data will make the model useful.

### 2.3.2 Portfolio Strategy

Property Portfolios are held for a number of different objectives which are investor specific. In this research we have considered that maximization of shareholder's wealth by increasing the value of shares as the main objective of many organizations. Through an appropriate strategy of diversification portfolio managers can maximize return minimizing risk. There are namely two methods of diversification techniques: randomly or purposively. Random diversification takes place when investment

vehicles are selected randomly without a just cause or reason. This may seem very impractical but it can work. Purposive diversification is the process of selecting investments which achieve a stated portfolio objective. Investment professionals usually use the purposive method as a portfolio construction technique which goes hand-in-hand with the strategy.

There are two approaches to the planning of portfolio strategies. The traditional approach is one of the methods. This method looks at the investors objectives in terms of the need for income and capital appreciation and selects those securities which appear to be the most appropriate to meet these needs. The other approach is the Modern Portfolio Theory (MPT) approach. As discussed earlier this approach is aimed to create a strategy which will maximize the expected returns on a portfolio for a particular specified level of risk. The traditional portfolio strategies are directed towards either the production of current income or to the achievement of capital growth in the future. The income strategy emphasized the need for the maximization of current incomes. Properties selected for this kind of portfolio must be able to provide the income needs of the investor in current and real terms. The capital growth portfolio strategy is mainly concerned with the increase of the future value of the portfolio. The emphasis within the strategy is placed on capital gains rather than on income.

Portfolio strategy depends on forecasting ability. If investors possess perfect forecasting ability they will be able to predict with complete certainty those properties that will show superior performance. If an investor has no forecasting ability then this investor can construct a portfolio that tracks an index. This way the investor has the comfort of knowing that the portfolio's performance has been no better or worse than the market. Most investors and portfolio managers have some forecasting

ability. Recognising the differences in forecasting ability has led to a widely recognized approach to investment known as the active-passive strategy (Brown and Matysiak, 2000). This suggests that the investment process can be split in to two parts.

- The first part is to create a portfolio that tracks an index. All the specific risk is eliminated through diversification so that the returns move in line with an index. The penalty for doing this, is that it is not possible to outperform the index.
- The second part reserves a proportion of funds that can be used to back your beliefs concerning forecasts of performance for individual assets. If you are able to capitalize on this part successfully, then over time the performance of your portfolio should be better than a managed portfolio carrying the same level of market risk. If, of course, your forecasts were not so good, then your performance will be below that of a managed portfolio.

(Brown and Matysiak, 2000)

The active-passive strategy tries to identify those assets that have an intrinsic value that is different from their current value. This requires some knowledge of the volatility or risks associated with the property in order to determine whether it is underpriced or overpriced.

### 2.3.3 Performance Measurement

Performance measurement is important because it provides the basis for evaluating the decisions that investors make as part of developing their investment strategy. There are three main reasons for undertaking performance measurement: communication, accountability and research (Brown and Maysiak, 2000). Communication is required to convey results to trustees or shareholders. Trustees and shareholders require

accountability as professional advisers are called upon to justify their advice. The third reason for undertaking performance measurement is to provide information that can be used in future decisions and forecasting.

There are two main objectives that performance measurement tries to fulfill: external and internal. The external objective covers the measurement of performance against pre-set targets for example another fund, market index or another asset class. The International Property Databank (IPD) releases its annual digest which reflects the market performance by type of return sector and geographical location. N South Africa the IPD digest Index is the best measurement of the market and is therefore the most commonly used. The internal objective is concerned with the comparison of returns of individual properties and illustrates why one property has outperformed other properties within the portfolio. This objective also leads directly to the rebalancing of the portfolio in response to those sectors that are performing weakly. Adjusting the portfolio weights is one way of trying to maximize the performance of the portfolio in the long term and is part of the continuing evolution of the investment strategy. (Brown and Matysiak, 2000). To maintain the risk of the portfolio at the desired level then the beta should equal one (Brown, 1991)

A good performance measurement system will, therefore, try to answer a number of important questions, such as:

- What returns have been achieved?
- How do these returns compare with other portfolios and assets?
- Has the timing of purchases been good?
- Has selection ability been good?
- Can good performance be achieved consistently from period to period?
- What is the risk profile of the portfolio?

- How well diversified is the portfolio?
- Where are the returns coming from i.e. is it skill or is it chance?

(Brown and Matysiak, 2000)

From the above summary three topics stand out: Selection, diversification and Timing. The next three sections of literature will go through each of these topics in more detail. Selection is concerned with whether under valued properties have been purchased, in order to know whether a property is undervalued. One needs to know what drives that market and the volatility of the market. Diversification within the Property market will also be discussed. This research has identified seven types of diversification. Timing is concerned with whether properties have been acquired according to the rise or fall of the market in the future. An entire section on property cycles will discuss this matter in depth.

## 2.4 Property Volatility

Commercial property values are derived by the income producing potential of the building. However, other market forces are always present to dictate the quality of property returns. Returns are driven by rental income and capital growth. Depending on the environment, rental income can be kept constant by competitive or tight market forces. Capital growth is affected by the outcome or performance of the macro-economy. Macro-economic factors such as inflation have a direct influence in the Capital Markets and affect property returns exogenously. The Capital market will be discussed later in this chapter; this section will examine the endogenous market forces that contribute to property.

Each property has its own endogenous factors which drive that type of property causing very different cyclic properties (Wheaton, 1999). The

literature will focus on the market drivers in Office property, Industrial property and retail property. Regard less of the type of development being examined. Every market study addresses three basic questions:-

- Will there be users to rent or buy the proposed project?
- How quickly, and at what rent or price, will the proposed project be absorbed in the market?
- How might the project be planned or marketed to make it more competitive in its market.

Property market analysis is, in fact, the identification and study of demand and supply, usually for a particular product. The demand side consists of the user of property for example, owners or renters. The supply is made of existing properties and properties that are expected to enter the market. Property Market or Investment analysis is actually risk analysis (Jaffe, et al, 2001). Risk analysis is the synthesis of supply and demand analyses as they relate to the decision making process. The endogenous market forces of each property will demonstrate what risks occur in the different markets.

### 2.4.1 Office Property

Demand for commercial space is a derived demand relating to economic activity and output. This means that both the amount and type of space demanded vary as patterns of economic activity change in a city or region. Historically, industrialization and manufacturing employment had a positive correlation to the growth of cities. However, during the 50 years or so developed economies have seen a move away from manufacturing employment and towards service employment. This trend has been most pronounced in larger cities which have lost much of their manufacturing employment as a result of mechanization, suburbanisation of industry and the global shift of production to the developing economies (Dicken, 1992).

Office space is used by business, financial and professional services sector. Larger cities have the highest concentration of office space due to this global shift of industrialization to services.

Office space can be categorized according to various factors, but the more important factors are:

- Grade
- Location
- Size and space flexibility
- Use and Ownership
- Features and Amenities

The office market is sub divided by the following type of grade:

- P or premier grade office space is top quality, modern, new generation space with premium rentals, ample parking, prestigious finishes and an attractive environment. Premier grade buildings set standards for rentals in the market place
- A-grade offices are not usually older than 15 years, or recently refurbished with quality and contemporary finishes, air conditioning and sufficient onsite parking. Rentals are comparatively high for the node or city.
- B-grade offices are older buildings that have been regularly renovated so facilities are close to modern standards. B grade buildings are air-conditioned and usually have on site parking.
- C-grade office buildings have older style finishes, services and systems. They may or may not have air conditioning and parking.

(*Source*: Financial Mail – The Property Handbook 2005)

Central business districts (CBD's) are usually prime locations that are charactirised by a higher density of office space and higher rents. All organizations are affected by urbanization economies. Reasons for these economies might include greater variety and quality of business services. The opportunities available for firms to specialize, improvements in the general infrastructure, cultural facilities and the existence of a larger pool of suppliers, buyers and skilled labour – including managerial and professional staff (Ball, et al, 1998). However, congestion to CBD's causes deurbanisation and forces organizations to locate outside of CBD but still have the benefits of the general economic strength of city or metropolitan area. These are known as decentralized office nodes and are usually centered around hospitals, universities, schools or other businesses. Decentralised nodes and CBD's have their advantages and disadvantages and therefore create a different value for different users.

Size and flexibility of office space is becoming increasingly important as more tenants opt for open floor layouts and more efficient use of space. The footprint size of the building is important for users who require large continuous blocks of space. Smaller office units are used by smaller businesses such as professional practices, for examples, Lawyers, Doctors, Accountants, Quantity Surveyors, Engineers and Architects.

Buildings that are leased to one tenant are referred to as single-tenant buildings, while a buildings leased too many tenants are referred to as a multi-tenant building. A single-tenant building may be owned by the tenant, in which case it is referred to as an owner-occupied building. Offices can also be built for designated purpose or user and these developments are called "built-to-suit". Speculative developments are built for unknown users or tenants with the expectation of the building being leased in the near future.

Office space users are also concerned about the features of the buildings and the proximity of certain amenities. One of the most important characteristics is the proximity to transport nodes or routes and availability and cost of parking. The type of user or occupier defines the importance of some of a building's features. Some modern larger organizations would require all the extras such as canteen, retail and on-site gyms. The most common feature, which affects most buildings, is the ability to reticulate data cabling and electrical supply for each work-station, as a large majority of employees function with desktop and laptop computers.

The characteristics of office space are important to understand because these factors include utilities, future expansion capability and upgrading abilities in order to supply the demand. As discussed before the volatility of property is derived by the demand-supply economics of the property type.

#### 2.4.1.1 Demand and Supply Analysis for Office

Increase in demand for office space originates primarily from growth in office-using employment. Market analysts often multiply the expected growth in office jobs by the estimated average of square meters of office space required for an employee to calculate the future demand for office space in a market area. South African employment statistics can be attained by Statistics South Africa (STATSA), however, the data is not nodal specific and will only provide national and regional data. Regional demand is less important than the demand for the market area in which the project will compete. A risk analysis should create a complete understanding of the market area in terms of employment trends, space requirements and other demand factors for that particular area.

Leasing activity and absorption of space helps create a current trend in the demand of space. The absorption rate is also often referred to as the change in vacancy rate of a period of time. Leasing activity provides crucial information of current rental rates, escalation rates, operating expenses and the term of the lease. All of the above factors affect the value of a property. Ultimately the risk-return profile of a building. Leasing activity will also allow investors to see what type of tenants are dominating the office space market. Tenant types vary by industry classification, for example, Information, Finance and Insurance, legal, social etc.

### 2.4.2 Industrial Property

Industrial space is used by Manufacturers, Distributors, Research and Development, and specialized services. Nowadays, hybrid space mixes characteristics of office and industrial and sometimes does not fall neatly into one category of use. Most new industrial buildings are located in business parks, most of which are dominated by warehousing and distribution activities rather than production. In more developed countries where there exist high levels of technology, these types of activities generally are characterized by relatively low ratios of employment.

Industrial space is classified in three broad categories, namely, Manufacturing, Research and Development and warehouse/distribution. Most new industrial buildings are designed and built to user specifications and are owner-occupier. Research and development laboratories and incubator space is “built-to-suit” and can be a single-tenant or multi-tenant building. Large retail store chains tend to operate their own warehouse, multi-tenant bulk warehousing run by third-party logistic companies are also common. Organisations that handle perishable goods usually have

fewer but larger warehouses and the distance to the markets and suppliers is leading factor in the location decision.

Built-to-suit facilities pose problems for investor-owners and owner-occupiers. If the tenant or owner moves out the investor will have to incur extra costs in fitting out the warehouse for the next tenant, while the owner may have difficulty selling the building and then also opt for fitting out the warehouses to suit the purchasers' requirements. These scenarios not only cost money when retrofitting but leasing the building as is can take longer than usual take up rates. Investors and owners will have to weigh-up the costs involved in holding the building and retrofitting the warehousing.

#### 2.4.2.1 Demand and Supply Analysis for Industrial Space.

Like the demand for office space, the demand for industrial space is often projected by estimating future employment in appropriate sectors. However, the connection between employment and the demand for manufacturing and warehousing is not as simple office space. Industrial space is more closely linked with the method of production or the product itself rather than people. Distribution warehouses are driven by the location of secondary markets, for example, stores or manufacturing warehouses. The amount of space is also decreasing due to automated tracking functions and new methods of inventory control are developed with space decreasing capabilities in mind.

Supply analysis focuses on the type and configuration of the building. Factors such as ceiling heights, office space, column spacing, building depth and other functional components will define the industrial sub-market which the property falls in. Leasing activity and absorption rates will also provide the critical information such as rents, escalation rates,

term and vacancy rates. Investors should also examine competing industrial properties in the area. Access to transportation corridors, quality of industrial space in the area, general appearance, activity levels and other spatial considerations will influence the rent of the building, ultimately the risk of the building.

### 2.4.3 Retail Property

The risks in retail property lie in the type of property as well as the retailing business and its customers. Retail property includes both shopping centers and freestanding stores. In the property industry retail properties are classified by size and are referred to by the gross lettable area (GLA).

The South African Council of Shopping centers (SACSC) describe four main types of shopping centers. Each center consists of “anchor tenants” – larger stores that draw in shoppers – and line shops – smaller tenants, usually a mix of national, regional and local businesses and services.

Neighbourhood centers sell convenience goods (food, medicine, cards, and household sundries) and provide personal services (dry cleaning, hair and nail care, travel agent and video rental) that meet the day-to-day living needs of the immediate area. Takeout food and small sit-down restaurants are also common in neighbourhood centers, as well as liquor stores. They tend to be in the region of 10,000m² to 30,000m², usually anchored by a supermarket and roughly serve a 5km radius of land.

Community centers also provide for daily necessities, but add more clothing and speciality stores. The key tenants are usually a supermarket and a discount department store. Furniture home-ware, banks and larger restaurants are also common in community centers. A typical community

center may range from 30,000m² to 60,000m² and serve an area of about 10 km radius.

Regional centers focus on general merchandise, clothing, furniture and home furnishings. They usually have two or three anchors with one of the anchors being the main anchor. Regional centers will have movie theaters, a food court and restaurants. The typical size of a regional shopping center is between 60,000m² and 100,000m² and serves a radius of 15km.

Super-regional malls have a GLA in excess of 100,000m². They usually have three or four anchors and a range of entertainment offerings. Super-regional malls are so successful because they offer every type of product, but they are few. They serve an area of about 20km to 30km radius and in some cases even more land than 30km.

Another risk factor included in retail property is higher parking ratios required by town planning restrictions. The parking ratio for retail is higher than any other type of property therefore; larger pieces of land are required to achieve the bulk necessary for a reasonable size shopping center. When carrying additions to shopping centers, owners need to plan to accommodate the extra parking requirement, which can be the deal breaker for the potential expansion. The next section will take a closer look at the risks associated with retail developments by analyzing the demand-supply factors.

#### 2.4.3.1 Demand and Supply Analysis for Retail Space

Demand for Retail Properties is derived by the disposable Income of the households within the catchment area. The level of disposable income is critical to the success of a shopping center because the higher the

disposable income the more spending takes place in the catchment area. Disposable income data can be obtained from STATSA, disposable income is calculated by applying a factor of consumer expenditure to household income. The percentage of income spent on retail purchases varies by income level. Specialist consultant firms carry a market analysis which profiles the catchment areas population by age, lifestyle and trends and this helps reduce the risk when making a decision and planning a strategy. For example, if a center is located too far on the leading edge of growth or is too aggressive in its projections of purchasing power the potential risk increases. National economic trends and cycles can slow or stop growth for years, thus affecting the center's profitability. In an increasingly competitive market, investors or owners must beat the competition to the market and this often requires riskier earlier decisions.

One important way to reduce risks in Retail properties is ensuring the correct anchor tenants and key tenants are leased. Anchor tenants are essentially, the customers in retail development. Leasing agents are familiar with the expansion plans of national and regional chains and understand what they look for in the catchment areas demographics. Anchor tenants and key tenants are characterized by national corporate brands, which are well known and well advertised. These tenants are important because their brand power draws people to the center thus providing more shoppers for the other line stores and smaller tenants. Anchor tenants and key tenants are usually informed about the spending power of a region and will usually dictate how much space they require and where they want to be positioned in the shopping center. The location of these tenants is arranged in such a way that shoppers end up walking along destination, paths between anchor/key tenants and walking past the smaller stores.

The location of the retail center is also important. A retail development will be successful by virtue of its trade area characteristics. The income level of the households in the area, competition, highway access and visual exposure are all important fundamentals which should exist in order to reduce the risk profile of the retail centre. The distance between shopping centers cannot be precisely established as it is not merely actual distance, but population density, customer convenience, accessibility and the selection of products. Patrons may choose to shop at a neighbourhood center which falls within a catchment area of a regional or super-regional shopping center. The distance of shopping centers of the same sub-market is a more critical factor. Catchment areas are actually divided into two market, the primary market and the secondary market. The primary market consists 80% of the center's total sales and the other 20% of the total sales comes from the secondary market. In some cases, catchment areas overlap and this causes "leakage" from one area to another. A comparison of total potential retail sales and the total actual sales in existing retail areas shows whether excess purchasing is available that either is not being spent or is being spent in surrounding trade areas (Guy, 1994).

### 2.4.4 Measuring Volatility

The above sections discussed the risks associated with the different types of property. These endogenous risks can affect the return of a property by directly affecting the income generated by the property. The measurement of risk rests on the concept of volatility rather than the layman's concept of the probability of a potential loss (Baum, 2004). Volatility is expressed as the fluctuations of return around an average return. For example (Baum, 2004), if property A produced a 20% return each year for five years, over the five-year period it would have shown 0% volatility as the actual return in each year was the same as the average. If

another property, B, produced a positive return of 20% for the first two years followed by a negative return of 40% in year three and two further years of a positive return of 25%, property B would have produced the same average return of 10% per annum. However, the volatility in returns has a standard deviation of 28.06 and thus makes property B more volatile.

## 2.5 Diversification Within the Property Asset Class

Property varies by size, property type, geographical/economic region and proximity to an urbanized area (edge city versus business district). Therefore diversification within the real estate sector should require the purchase of many more or different properties (Young and Graff, 1995). The following seven subsections describe the ways in which the property Asset class has been found to behave differently.

### 2.5.1 The effect of property type and total property returns

Private property owners specialize in one or two property types, but most institutional investors own or manage several property classes because they recognize the benefits of intra-asset diversification. Webb (1984) found approximately 61 percent of institutional investors diversify by property type, while a more recent study by Louagrand (1992) found that 89 percent diversity by property type. It is clear that, over time, this recognition of diversification by type has increased. The idea behind within – asset diversification is to recognize as many distinct groups of sub-asset classifications as possible and to maximize within group homogeneity, while maximizing the heterogeneity between groups (Seiler, Webb and Myer, 1999). By carrying out the above diversification, portfolio managers will lower the correlations between the groups, which in turn will

increase the diversification abilities of the portfolio. Thus, the greater the intra-asset diversification, the greater the reduction in overall unsystematic risk, and the more likely the portfolio will reach a better optimum.

A variety helps guard against the impact of building cycles and changes in political, economic and social conditions which may influence employment or buying patterns (MacMahan, 1990). Diversity helps insulate a portfolio from unpredictability of the future. Property types are limited to office, industrial, retail, office and residential. These types of property can be broken down into categories or sub-types. Industrial Properties consist of sub-types such as distribution centers, light industrial and specialized industrial warehousing. The Grade of an office space is measured by evaluating the age of the building, location, quality of finishes, building system, amenities, lease rates and tenant profile. A detailed breakdown of the different grade levels of Offices space in South Africa was discussed earlier in this chapter, these different grades can be regarded as sub-types within the Office market. Retail properties can be divided into the following sub-types: regional malls, neighbourhood centers, community, centers and high street shopping areas. It is important to understand that each sub-type of property has its own characteristics as well as risks and returns. Therefore within a property portfolio it may be necessary to not only include different types of property but also different sub-types of property.

### 2.5.2 Geographic, and economic diversification possibilities

Geographic diversification was defined in regional terms for example, provinces or states. In recent terms investors have realized geographical diversity refers to a number of cities within metropolitan areas which are not linked by economic factors likely to be negatively influenced at the same time.

Miles and McCue (1984) undertook a study comparing the diversification benefits that could be achieved by geographic regions versus property types, and divided the country in four regions. Miles and McCue (1982), concluded that diversification by property type was more effective from a risk – return perspective than was geographic diversification. Heston and Rouwenhorst (1994) showed that property type factors are more important than regional factors in explaining real estate returns within a portfolio. From these studies it is clear that diversification by property type is the more important factor when composing a portfolio.

Geographic diversification however can be regional or city focused. Natural geographic differences can also contribute to a regions performance. Garreau(1981) fostered the concept that instead of geographic differences being important, it is economic regions that matter. Real estate returns are different in various geographic regions in the country; the reason is because of the fundamentally different economies of the region as opposed to arbitrarily drawn dotted lines on a map (Grissom, Hartzell and Liu, 1987). Mueller and Ziering (1992) carried on with the study by removing not only arbitrary geographic segmentation but also economically defined regions. They examined several specific economic factors that were suspected to drive real estate returns. The conclusion of the study was that while the geographic region is certainly an indicator, it is local economic conditions that truly impact real estate returns. Mueller and Ziering's (1992) hypothesis was confirmed by the finding that local economic factors were able to yield a more diversified portfolio that would be achieved through a simple geographic diversification strategy.

A new twist on geographic classification is global diversification, offsetting economic conditions in one country with those in another (MacMahan,

1990). Global diversification also helps protect a portfolio from unfavourable local or state laws regulating land use, attitude toward land use, tenant right and other issues affecting property value. Therefore, a mix of property locations will probably reduce the impact of restrictive state or country laws.

### 2.5.3 The effect of Property size on Portfolio Returns

The size of a building can be expressed by either physical size (square meters) or in currency value (Rand) because the two are highly correlated. It is not surprising then that the size of property has been found to be positively related to returns.

Roulac (1976) explained that the market for large properties is one in which only a few participants exist. The fewer participants there are in a market the more illiquid the asset will be. This is customary with property investment, therefore illiquidity is even greater in the market of large properties. Investors who hold large properties are rewarded or compensated for investing in lower levels of liquidity by receiving higher returns. Some of the excess return is due to a thinner market but further ad that economies of scale are reached with the holding of larger properties. The risk – return characteristics of large buildings can also be dominated by the number of tenants occupying that one building. The Impact of losing a single tenant is more serious for a small property than it is for a large one.

### 2.5.4 Diversification by decentralized nodes and CBD

Garreau (1991) introduced the concept of areas just outside the Metropolitan area. He referred to these nodes as edge cities and spoke about the additional criteria on which to further divide real estate assets.

This may seem similar to geographic or economic diversification but is in fact very different. "Edge cities" experience the same economy as the metropolitan area because of its physical proximity but can still have other advantages of less crime, congestion, and subjectively, a better quality of life. This concept was further substantiated by Pagliari, *et al*, (1995), where they also suggest the potential to further divide real estate holdings by urban versus suburban regions.

### 2.5.5 Diversification by Tenant Industry

Another important area to consider in balancing a property portfolio is diversification by tenant industry. Real Estate is really a physical conduit for cash flows between business operators and investors (MacMahan, 1990). If business operations, carried out by the tenant, does not thrive, the property's success is threatened.

If one industry dominates the tenant mix of a portfolio, a downturn in any single industry will not greatly affect tenant solvency and growth. Therefore, tenant diversity may be achieved by not acquiring properties that greatly increase concentrations an a particular industry. On the other hand where buildings are already owned, the landlord can reduce his exposure by leasing vacant space to tenants that offer diversity. This type of diversification is governed by the business cycles experienced by the particular business sector.

### 2.5.6 Lease Diversification

A sixth subject of diversification focuses the importance of balancing a portfolio by the term of lease. If most of the expiration dates occur on the same year, the portfolio runs the risk of high vacancies and excessive leasing costs. Re-leasing is a process that could take a few months,

leaving the landlord or owner with no income for that period of releasing. Having these leases expire at the same time will make the building seem empty making the re-leasing of the building more difficult and could cause negative perceptions among existing tenants. MacMahan (1990) advised that lease diversification should also encompass a mix of credit and terms in order to protect the portfolio from recessionary or inflationary fluctuations. Therefore, a portfolio with long term leases (a recession hedge) and some short term leases (to provide more frequent rent increases during inflation) is a desirable goal (MacMahan, 1990).

### 2.5.7 Diversification by Investment vehicle

The final area of diversification is by investment vehicle. An ideally diversified portfolio should be balanced between investments in mortgages, equity and hybrid debt. These three vehicles all have different characteristics and therefore perform differently; hence the yields may serve to counterbalance each other.

### 2.5.8 Diversification and Property Portfolio Size

As discussed earlier nonsystematic risk is risk which can be diversifiable. Figure 1.6 in Appendix A show the average standard deviations of equally weighted portfolios by random selection as a function of the number of stocks. Statman (1987) proved that on average, portfolio risk does fall with diversification, but the power of diversification to reduce risk is limited by common risk or market risk. An increase in the size of a property portfolio is accompanied by a reduction in portfolio volatility, and as stated earlier most of the reduction in risk occurs within the first 400-500 properties, after which any fall in risk is marginal.

## 2.6 Property Cycles

Property cycles have been a significant underlying reason for the financial successes and failures of real estate investments, throughout history, because of their pervasive and dynamic investment values (Phyrr, Roulac and Born, 1999). Based on this recognition, investors and portfolio managers are placing increased emphasis on the identification, analysis and decision-making implications on property cycles. The property market is linked closely to the business cycles because income generated from rentals is the physical conduit between business turnover and the value of the property. Business cycles are often referred to as economic cycles of a country or region. In South Africa, the time it takes for the economy to move between one peak in annual growth rates to the next is an average seven years (The Property Handbook, 2005). In order to understand the nature of business cycles a definition is provided below:

*A business cycle is fluctuations in the level of business activity in an economy brought about by changes in demand conditions, particularly increases and decreases in investment spending. The business cycle is characterized by a very low level of demand relative to supply capacity, accompanied by low levels of output, unsold stock and high unemployment. As demand picks up in the recovery stage, stock levels fall and output and employment increases. Boom conditions are characterized by full capacity levels of output and employment, but with a tendency for the economy to 'overheat', producing inflationary pressures. The ending of a boom is followed by a period of recession, with falling demand, leading to modest falls in output and employment at first but then accelerating into depression as demand continues to fall.*

(Pass, *et al*, 2002)

It is important to understand dynamics of a business cycle because during an upswing in the business cycle, growth rates increase due to an increase in output. This growth requires more resources to be used, and one of the resources used by every business is space. Hence, a demand for space increases when output increases. In an upswing in economic activity generally causes demand for occupation of property and, as user demand increases, rents rise and vacancy rates fall (Key, MacGregor, Nan Thakumaroon and Zarkesh, 1994). Developers use these market signals and begin to develop, and lenders and investors are willing to fund the developments or to purchase the completed developments.

The pattern of an ideal property cycle is very similar to the business cycle. Much of the literature undertaken described and discussed different stages of the property cycle. A summary of a property cycle is provided below.

*Business upturn and development* - An upturn in the business cycle typically at a time of low real interest rates and high capital availability, generates a rise in economic activity and strong user demand. This occurs at a time of low levels of development, so available space is absorbed quickly. Vacancy rates fall, as a result of lower interest rates, lower expected risk and higher expected rental growth. Capital values rise. This may be after a delay as valuations take time to adjust to new information. The expected profitability of new development improves, new development begins and land value increase. As the boom continues, lending may be extended to more speculative development projects. Although a development boom has begun, there is a lag between construction starts and completed development. This means that limited new supply has reached the market, so rents and capital values continue to increase.

*Business downturn and overbuilding* – Deal interest rates rise in response to the boom and the business cycle turns downwards. Demand and absorption of new space level off and then fall. New development has reached the market vacancy rates begin to rise and rental growth begins to decrease. Capitalisation rates rise with real interest rates and in anticipation of poorer growth prospects and greater perceived risk and capital values fall. As in the first stage, may be delayed because valuations are slow to respond. There is a fall in new project starts but much continues in part because it is already under way and there are substantial sunk costs.

*Adjustment* - The fall in the demand for new space coincides with the peak in supply vacancy rates rise above their equilibrium level and rents fall, although the adjustment may be gradual. Developers are unable to generate income to cover the interest payments on their completed developments and lower capital values mean refinancing is not possible. There are bankruptcies and the poor returns lead to disinvestments from the property market.

*Slump* - Demand and development are low and vacancy rates are above their equilibrium levels. Open market rents have fallen below equilibrium levels.

*The next cycle* - The effects may extend to the next upturn if the oversupply in the boom was so great that, when the next business upturn occurs, there is substantial vacant space left over from the previous upturn and so limited need for new development.

(Ball, *et al*, 1998)

From the above explanation of the property cycle one can see that the investment cycle of property is a part of the general business cycle. As discussed earlier the demand for space is a function of output. This relationship proves that occupier demand is an exogenous mechanism driving investment in property. The availability of finance is also an exogenous factor which affects property investment. The capital markets and the financing environment will be discussed later in the chapter.

As discussed earlier, unique demand side pressures affect the different sectors. These sector unique factors are the endogenous factors which affect the sector cycle. Wheaton (1999), demonstrated that differed types of real estate can have very different cyclic property. The study proved that the only common component among real estate property types is a high degree of asset durability, elasticity's varied significantly and so did the development lag. This shows that property is not a uniform sector within the economy and that market behaviour and investment performance can be fundamentally different across property types.

Although it may not be possible to accurately predict real estate's physical market cycles far into the future, however monitoring each property type's market movement may help to better analyse and price risks on their property investments. Some investors will try to "time the market" by buying at or near the perceived bottom and then selling near the perceived top, while other long term investors may decide to manage some properties through a down cycle and experience the next upside wave. Because real estate financial market cycles are even less predictable than its physical market cycles, one can only hope to monitor capital flows and their sources, and be prepared with a strategy for the alternatives that may arise (Mueller, 1995). The next section will discuss the Capital markets and the finance environment.

## 2.7 Capital Markets and the Financing Environment

Within the Capital Market and the Financing Environment property is regarded as an investment class. As an investment class Property has many different and particular characteristics therefore property is completely different from other investment classes. Treasury bond, Commercial Mortgages, Corporate bonds and common stocks are the main competing investments when comparing the expected returns of property (Brueggeman and Fisher, 2005). The inherent characteristics of property as an asset are listed below:

- Commercial properties are of large individual value. Commercial Property ownership tends to be concentrated in the hands of large investing institutions and companies, though some rich private individuals participate.
- Property is not a standardized investment. No two properties can be identical in terms of location, structure, tenant and lease.
- Property is not a pre-packaged investment. Owners have to pay to manage their properties or do it themselves.
- Property is an investment that can often be improved by active management
- Property is an investment you can create for yourself
- Expertise is needed in managing property.
- There is no single market for commercial property. It may be traded at auction or sales.
- Information on the property market is often imperfect.
- Most commercial property is bought in the hope that it will produce an increasing stream of income and that its capital value will rise to match the rising rents.

(Brett, 1990)

All of these characteristics along with the property cycle and the Capital Market make property sensitive to macroeconomic changes. All investment classes react differently depending on the state of the economy. In Canada during periods of low inflation Amoako – Adu and Athanasskos (1999) found bonds and stocks provided the highest real return while gold and commodities, the lowest rates of return. However in periods of low inflation gold and bonds provided the highest real return. In addition, during periods of recession in Canada, treasury bills and bonds were found to perform the best and real estate and commodities were found to perform worst during recessions (Amoako-Adu and Athanassakos, 1999).

The inflation cycle affects the competitive advantages of all investment classes. For example the value of a bond will increase if the interest rate decreases and vice-versa (Bode, 2003). The hedge against inflation is the historic advantage of property (Maurer and Sebastian,2002). The preservation of growth of funds during periods of high inflation in the past led institutional investors to the property sector (Ganesan and Chiang, 1998). This was also experienced in South Africa and led to the over exposure to property causing losses during market slumps.

As mentioned earlier property is illiquid. Sources and suppliers of financing are aware of the intricacy of property as an investment class. These sources of finance therefore need to analyse the potential investment by means of an appraisal. Appraisal valuations in South Africa will usually be presented by the users or investors by the sources or suppliers will carry out their own analyses before granting finance Appraisal Values are used as a basis for lending and investing (Brueggeman and Fisher, 2005). Both the sources and users of financing will examine the geographical position and other Property Market or

Physical Market issues. The Property Market environment or Physical Market will be dealt with in more detail in Chapter 4.

The decision of the sources of finance will take the inflation cycle into perspective. The link between property sector and other investment class becomes important. Firstly investors will consider the value of the property. There are a number of ways to determine the value of income properties. In income property appraisals, at least two of three approaches are normally used: The sales comparison approach, the income capitalization approach and the cost approach (Brueggeman and Fisher, 2005). The sales comparison approach is based on data received from recent sales of properties very similar to the property being appraised. The income approach is based on the principle that the value of a property is related to its ability to produce cashflow. In a well functioning market we can take market value as representing true value (Brown and Matysiak, 2000).

The second factor that the sources of financing will consider will be the required Internal Rate of Return from the investment in property. Here investors and suppliers of financing will compare the risk and return trade-off by type of investment class. Conceptually, the discount rate should be thought of as a required return for a real estate investment based on its risk when compared with returns earned on competing investments and other capital market benchmarks (Brueggeman and Fisher, 2005). For example, if the period of analysis is 10 years for the prospective real estate investment, the discount rate selected should be greater than (1) the interest rate on a 10 year Treasury Bond, (2) the interest rate on a 10 year commercial mortgage loan, and (2) the weighted average of corporate bond rates, or the borrowing rates for tenants in the property being evaluated (Brueggeman and Fisher, 2005). The risks related to operation and reversion, as well as a risk premium for property ownership

should also be included to arrive at a reasonable required internal rate of return.

The decision to invest in a project is separate from the decision to finance the project – projects should be evaluated without reference to the way they are financed (Brown and Matysiak, 2000). Investors and suppliers of finance to property are aware of its unique characteristics and its illiquid nature. In the past both have learned that over exposure to direct or indirect property investments is detrimental during market slumps. This has led investors and institutions to protect capital investments through diversification. Diversification means that many assets are held in the portfolio so that the exposure to any particular asset is limited (Bodie et al, 2003).

## 2.8 Mixed-Asset Portfolio Investments

An investor's portfolio is simply his collection of investment assets. Concentrating all your investments in one investment class can lead to over-exposure to the cycles and forces that operate the investment class. In 1952, Harry Markowitz came up with a formal model explaining how to make the most of diversification. On average, portfolio risk does fall with diversification, but the power of diversification to reduce risk is limited by common sources of risk (Bode et al, 2003). The rule of thumb with diversification is to get an efficient balance within your portfolio by spreading your capital among a number of different asset classes. The main asset classes through which an investor can diversify your investments are:

- Money-market instruments
- Bonds
- Shares

- Property
- Gold coins

An investor could even diversify within property alone by investing both directly and indirectly in the sector. The key point to building a portfolio of diverse financial assets is to achieve a balance of risk giving the investor assured returns, within a framework of assets with uncorrelated performances.

A direct investment is one that an investor directly owns a claim or a security or property. For example, when a person purchases land or a stock in order to preserve value or earn income, that investor has made a direct investment in property and the particular organization respectively. An indirect investment is an investment made in a portfolio or group of securities or properties. For example, by buying an interest in a property unit trust that deals in property, the investor is indirectly investing in property. Direct investments in property usually need large amounts of capital and highly illiquid. Indirect investments in property can be made by with rather smaller amounts of money and can easily be turned into cash. Depending on the property market and forces one could be more favourable than the other. Both direct and indirect investments in property have their advantages and disadvantages. Zagaretos (2002), explains that investors are likely only to capture a small portion of direct property returns by investing in South African Property Unit Trusts.

Portfolios of various financial assets have become the modern investment vehicles. Investors like to spread their risk by allocating sections of their capital to each investment asset. Bonds have the lowest risk, stocks have the highest risk and somewhere between them is property. Property has the advantage of having a low correlation with equities and government

bonds within a mixed portfolio (Fraser, Leishman and Tarbert, 2002). Portfolio risk depends on the correlation between the returns of the assets in the portfolio.

As mentioned earlier property has a low correlation with equities and government bonds. Equities and government bonds have a high correlation – simply because they appear on opposite ends of the efficient frontier. Property situates itself between bonds and equities in respect of risk. Therefore adding property to a portfolio of bonds and equities is in respect of risk of the overall portfolio. Therefore adding property to a portfolio of bond and equities offers diversification benefits. The advantage of this is that the low correlation between the performance of property and other assets during high inflation periods provides a stable overall return (Kaggwa, 2003). Real Estate Investment Trusts (REIT's) are the American version of a South African Property Unit Trusts (PUT's). Different asset classes have their own market cycles and major forces. This states the time factor is very important when trying to correlate the returns from the different asset classes. Lee and Stevenson (2005) found that REIT's diversification qualities span the entire efficient frontier, providing return enhancement properties at the low end of the frontier, switching to risk reduction qualities at the top end of the frontier. They also show that REIT's attractiveness as a diversification asset increases as the holding period increases.

The introduction of Property Unit Trusts (PUT's), Property Loan Stocks (PLS's) and other vehicles allowed investors to trade property assets on a daily basis. This trading occurred because property had become liquid and mobile. Indirect investment in property has diversification, liquidity and mobility advantages. Other advantages attained from the characteristics of property are:

- Historically and generally, property is considered as an inflation hedge unlike bonds and equities
- Property is an average a smoother performing investment class. Property cycles exist, but the stock market is more volatile.
- Property is made up of land and buildings that do not easily lose value or change drastically in price. Isaac (1998), explained that building depreciate at a known rate while land normally appreciates.

Generally the legal nature of property transactions and the possibility of long term leases have a stabilizing effect that does not allow for extreme fluctuations in income (Fraser et al, 2002). Therefore property is viewed as an investment class that provides relatively reliable and stable income that is preserved against inflation. However, due to forces in the Property market environment some urban areas may loose value quickly due to urban decay or the land may loose value due to its location.

A successful direct investment in property will depend on the design, geographic position and management of the building. A market analysis is the first step to reducing risk associated with property investments (Jaffe and Sirmans, 2001). A market study involves the consideration of numerous factors such as delineation of the market area, demographic analysis, the economy of the market and other data. Office property rentals reflect the data that is found in the market analysis. The characteristics of Commercial leases allow rentals to be a stabilizing factor in the Property Investment. However, the growth in capital value is affected by the property market cycle and macroeconomic forces. The investor should be concerned about the total return: The combination of capital appreciation and rental income (Brown and Matysiak, 2000). Therefore total returns need to be used when comparing investment assets.

With the main objective of investors being wealth maximization, it is understandable that investors compare property with other financial assets. Maurer and Sebastien (2002) investigated the hedging capabilities of real estate securities (mutual funds) against inflation and Olesen (2000) studied stock market equities as an inflation hedge in the long-term. A comparison between both property and financial assets was carried out by Ganesan and Chiang (1998). In a recent study carried out by Coleman and Mansour (2005), they investigated asset allocation models that are used by commercial real estate investors. Real Estate did not conform well with the models. Coleman and Mansour (2005) proved that there were two 'real world' factors that the models did not account for. (i) returns were not normally distributed (ii) observed behaviour of investors. This shows the complex nature of property when comparing it with other asset classes.

This competitiveness between the investment classes highlights the importance to research property performance. The need for this research is further driven to make sure that information and ideals are up to date and current with today's property sector. The methodology used in previous literature informs the research on the best approach to use in order to analyse Mixed-Asset Portfolios which theoretically is the same as a Mixed-Property portfolio, however technically the analysis of the two portfolios is very different due to the nature of the assets.

## 2.9 Short-term versus long-term periods

In the short-term one of the inputs remain constant (Begg, 2003). In the case of office property the constant input in the short-term is rental income. Due to the nature of commercial property leases the escalation

rate clause only adjusts the rental value annually. Short-term is usually seen as any occurrences within a month-to-month or quarter-to-quarter periods. The expected average annual inflation rate is used to escalate the rentals at a percentage per annum rate (Kaggwa, 2003). Other factors are also included when deciding an escalation rate for the lease rental are operating costs and demand for the property, a higher demand will achieve a higher escalation rate.

Unexpected inflation or inflation shocks can occur in the short-term. These shocks can cause investors who receive constant income to make gains or losses in nominal returns. This is due to the inelastic nature of rentals. It's essential that short-term property performance is measured against short-term inflation changes. Maurer and Sebastien (2002) used month-to-month and quarterly data to analyse short-term returns and annul dates to analyse long-term returns.

In the long-term the flattening out of the fluctuations occurring in the short-term can be balanced out, high and low figures counteract each other. The ideas that if you measure returns over long periods all intermediate changes in value will be irrelevant and you will be left with an average return that is more in line with expectations (Brown and Matysiak, 2000). The total return from investing in property provides investors with significant long-term buffer against inflation (Financial Mail – Property Handbook. 2005).

Investing directly in property is usually considered long-term due to the Term of financing from Banks or Institutions. These investors would be concerned about the value of their investments due to the expected annual change in inflation Economists and analysts can predict the changes in inflation based on an hypothesis known as Rational Expectation. With rational expectations, people guess the future correctly

on average (Beggs, 2003). Any high or low forecast are quickly defected and corrected. By these forecasts, investors can plan for the future. Indirect investors can also make use of these forecasts. Although indirect investors can invest in property for the short-term unlike direct investors, they can also invest for the long-term. Short-term fluctuations can cause the most harm for indirect investors. Slow adjustments for inflation changes in the short-term affect expected real returns in the long run. Captial Markets are more sensitive to inflation fluctuations than the physical property market. This is because the physical property market is driven by long-term investments.

Lee and Stevenson (2005) found that linkages between Real Estate Investment Trusts (REIT's) and the private real estate market increase with the use of longer horizons. They also said long-term investments in REIT's showed the diversification qualities of the direct market, further enhancing REIT's diversification qualities. In South Africa information is only available annually due to the nature of commercial property leases. The short-term period is modified to accept annual Property valuation information. Due to accounting policies and legislation institutions have been forced to provide information on their investments and thus improving the frequency of valuation in the Capital Market. Competition between institutions, fund managers and direct investors cause a shortage of information in the short-term. In order to be competitive in the Capital Market, investors need to be knowledgeable in both the physical market and the financing environment.

## 2.10 Methodology used in Literature

The aim of this research is to investigate whether South African Asset Managers make use of the Modern Portfolio Theory approach when

planning the funds strategy. The Literature review was undertaken to provide knowledge of the topic and related issues. The methodology used the literature was aimed at providing an understanding of Portfolio Theory. Portfolio Management, property Volatility, Diversification, Property cycles, Capital markets, Property Economics and the Financing Environment.

Firstly, Portfolio Theory was discussed in order to provide some history on Modern Portfolio Theory (MPT). This section also explained in detail how and why Modern Portfolio Theory is beneficial for Portfolio Managers. MPT also leads to other empirical developments such as the Capital Asset Pricing Model (CAPM). However, the importance of the Efficient Frontier is the critical in choosing the optimal portfolio.

The section on Portfolio Strategy and Management demonstrates how portfolio managers make decisions on acquisitions and reversions during the management of the portfolio. The literature also discussed the different strategies used by portfolio managers and that MPT was an approach technique used in determining a strategy. The performance measurement of a portfolio was also briefly discussed because of its importance in providing transparency to shareholders as well as reviewing the portfolio manager's strategy.

The literature review also clearly stated that portfolio returns were directly linked to selection, diversification and timing. The selection of properties is concerned whether the portfolio consists of strong performing properties. A properties performance is affected exogenous and endogenous factors. The section of property volatility focuses on the endogenous factors which contribute to property return, while the section on Capital markets and the financing environment discuss the exogenous factors such as macroeconomics and fiscal policy. The different types of diversification are also discussed and literature shows the direct

relationship between property volatility and the different markets within property. The section under diversification also looks into the affects Tenants and leases have on portfolio performance. Timing of property strategies are also discussed in further detail within Property Cycles. Portfolio managers can use historical property cycle to technically forecast property returns and help time good decisions.

The methodology used in the literature was basically to show the relationship between property economics and portfolio theory. An understanding of these two topics is crucial improving if Modern Portfolio Theory is used as an approach technique when planning a portfolio strategy, and if it is not used why it should be used.

## 2.11 Conclusion

From the literature, the most important issues related to the diversified property portfolios are:

- All these mathematical calculations are a way to structure and discipline your thinking as a portfolio manager – a way to reduce risk and improve overall return. The more advanced our thinking can become about the characteristics of each real estate investment and how it resembles and differs from others, the better the return we will be able to achieve (Hudson-Wilson, 1990).
- Portfolio managers are painfully aware that even slight changes in the risk/return levels attributed to specific investments – or change correlation coefficients – may have a dramatic impact on the mix of assets in optimal portfolios. This is an uncomfortable situation for decision-makers give the level of uncertainty associated with any

forecast of investment performance (Hudson-Wilson and Guenther, 1995).

- If the correlation between a market segment and an investors portfolio changes in a predictable way, that information can be useful in determining the optimal allocation of assets (Lee, 2003)
- Real Estate Portfolios of a large size tend, on average, to have lower risks than small sized portfolios, but portfolios with relatively few properties can still have very high or very low risk (Byrne and Lee, 2001).
- A diversified portfolio strategy may result in a lower yield but there is more protection on the downside (MacMahan, 1990).
- Real Estate investment is not a uniform sector within the economy and that market behaviour and investment performance can be fundamentally different across property types (Wheaton, 1999.)
- Investment managers with regional investment strategies offer the simultaneous benefits of both diversification by sector and geographical specialization (Robert, 1989).
- Monitoring cycle movements should be useful in acquisition, asset management and disposition decisions (Mueller, 1995).
- The traditional approach of strategic planning is well respected in spite all its idiosyncrasies and faults whilst the approach based on MPT is still treated with suspicion, mainly because of its heavy reliance on complex mathematics (Hargitay and Yu, 1993).

By diversifying a portfolio fund managers are attempting to eliminate the diversifiable risks and thus have the appetite for the market risk only. This works well for a long-term conservative approach to property investment. Fund managers concentrating on deal-at-a-time approach are literally trying to time the markets whilst other specialist funds are not interested in diversifying their portfolios because they would rather focus on their specialties and reduce the unique (diversifiable) risk of their properties.

Diversification across the different types of properties protects the portfolios performance against downward cycles but it does not necessarily mean that a diversified fund would perform better than a non-diversified fund. The “funds of funds” have the best opportunity to create the optimal portfolio as they can buy and sell shares of diversified funds as well as specialist funds and achieving a overall weighting equal to that of the optimal portfolio. Diversification is not every fund managers cup-of-tea, but for those who are diversified MPT could be a useful tool in the strategic planning of the fund.

From the literature review undertaken it is clear that, internationally, there has been a debate on whether MPT is used in practice as well as in the theoretical and academic studies. There is little academic work undertaken on this subject in South Africa. However, Property economic fundamentals and portfolio theory are important to understand when analysing property portfolios which is a component of the qualitative section in Chapter 4. The following Chapter will discuss the methodology that will be applied on the quantitative and qualitative approach of this research.

# Chapter 3

# Methodology

## 3.1 Introduction

This chapter is to set out the methodology which has been adopted in order to reveal or test the hypothesis and interpret the findings with a need to realizing the research objectives. The research design applied Modern Portfolio Theory to calculate the optimal weightings of a fund across the three different property sectors. One can also apply Modern Portfolio Theory to calculate the optimal weightings for geographical spread or even across the different types of sub-sectors within a sector. For example in the retail sector there exists different types of retail assets such as neighbourhood, regional and super regional centers. A qualitative approach of interviewing the asset managers of the listed property funds will achieve the main objective of research.

From the literature undertaken it was found that Modern Portfolio Theory makes sense from an institutional management perspective for implementing strategic investment policy, however there are a couple of problems in trying to apply MPT in this way. Firstly, there is a low correlation between the sectors, this was also seen in the empirical analysis, and therefore in terms of neutralizing the risk of a portfolio and overall wealth, these institutional investors would include large allocations to stocks and bonds. A second problem is practical in nature. It is difficult to come up with the data of highly refined yet reliable risk and return expectations by property sector that are necessary for the rigorous application of MPT, within the real estate portfolio. Historical periodic returns data in the property market are just not good enough nor is our knowledge of the determinants of future property returns, to permit very useful analysis at this level.

When discussing this problem with the various interviewees of the South African listed property funds, the most important argument against diversification in portfolio strategy is the need for specialization in a sector. However, the diversified funds would have less emphasis on specialization. Like institutional

investors the fund managers of diversified funds would include large allocations to retail or the sector which performs the best. This strategy is common because these fund managers want to extract the overall wealth of the market while holding smaller portions of the remaining sectors to neutralize risk. These fund managers were more concerned of the property cycles of each sector as well as the supply and demand fundamentals of each. The changes within the cycles would urge the fund managers of diversified funds to readjust their capital allocations accordingly the performance of the different sectors, for example they would want to increase their positions in a sector which is performing better than the others, thus decreasing their positions in the sectors with inferior performance or returns. Capital contributions to one sector may affect the capital value of other sectors because the demand for the weaker performing sector decreases.

The relationship between the user (physical) market and Capital Markets are the core to understanding property performance. An investor's perception of whether property is an attractive investment is directly influenced by market fundamentals. Changes in the macro-economy like inflation and interest rates affect the availability of investment capital, financial obligations and property performance. The macro-economy is discussed further in this chapter. Government's reaction to inflation shocks and global factors will also be discussed. Short-term changes in market and macroeconomic fundamentals are considered to be critical in decision making within the property sector. The discussion will begin with an explanation on portfolio analysis, which is required in order to interpret the answers from the interviews and fully comprehend why the fund makes such decisions.

## 3.2 Portfolio Theory & Analysis

A qualitative measurement of the listed funds in South Africa's was required in order to understand what each fund based their strategic decisions on. These

interviews provided useful information required to analyse the funds' portfolios. Most importantly it guided the objectives of the research by discovering the strategic planning and operational management of the portfolio, ultimately, allowing me discover whether the fund manager's use or do not use Modern Portfolio Theory in determining the optimal weightings across the three sectors.

The questions were chosen specifically to understand some of the decisions which will have to be made by the portfolio manager, for example:

(i) The required balance between capital and income return; and which is more important.
(ii) The acceptable level of risk
(iii) The allocation of funds to the different sectors.
(iv) The market capitalization and future growth.
(v) The outlook of the market
(vi) The outlook of the South African economy
(vii) The selection of individual properties

The questions were set in a simple logical sequence which allows a proper assessment of each fund. The following topics are dealt with by appropriate questions answered in the interview.

### 3.2.1 Fund size and patterns of investment

Firstly, the Market capitalization or size of fund provides a measurement to compare the size of the different funds in monetary value. Secondly, a brief description of the Funds History, for example the date of establishment and the size of the fund at establishment, through major acquisitions that have got the Fund to where it is today, allows one to analyse the timing and allocation of

investment. This also provides insight on whether the fund has a passive or proactive management policy.

### 3.2.2 Fund Structure and Property Type

Here the most important is the sector weighting in the different sectors and this was compared to the optimal IPD portfolio which was calculated in Chapter 3. It was also asked whether the managers were interested in changing their positions (weightings) in the different sectors, this shows whether the market is changing and the fund managers want to react accordingly. The sectoral spread five years ago provides some insight of the timing and allocation of investments with changes in the market.

It was also important to establish whether the Funds placed more emphasis on Sectoral or Geographical Diversification, as this provides further information of diversification strategy. The other important fact was to ask whether the funds considered effective diversification as a case of quantity or quality Funds which emphasise on quantity had a lower grade of properties in their portfolios and were more focused on wealth maximization than eliminating risk. The funds which agreed that quality was more important than quality were more risk averse, however were still focused on the funds growth. It was also asked whether the fund would invest in international markets, because this would show that funds are thinking hedging on changes in the South African economy and macroeconomic fundamentals such as the Rand-Dollar exchange rate and interest rates. These two macroeconomic fundamentals could be held in higher regard than sectoral diversification.

### 3.2.3 Volatility of Returns

The fund managers were asked to list some of the problems facing the market in order to provide a picture of the market risks. In other words, the systematic

risks associated with the volatility of the market needed to be understood. This allowed analysing the fund's current position (weightings) in each sector and whether these weightings could change in the future.

### 3.2.4 Management Structure

In order to investigate whether Asset Managers used Modern Portfolio Theory in making capital allocation decisions among the three different sectors, it is essential that we understand who makes such decisions and why. From the interviews there were namely, two different management structures. Firstly, there was an executive committee where most of the executive committee members are employed by the fund and are involved in the day-to-day management. Secondly, the fund would only employ one Chief Executive Officer who would be involved in the day-to-day operations but would report to participating interest holders who would together make high level decisions.

## 3.3 Market Fundamentals

The Physical Market environment determines the price or rental to be charged on various types of real estate in different locations. The market environment is also involved in analyzing the demand for property and the way the value of an investment is determined. Macroeconomic fundamentals create risks that must be considered in the decision making process. This section examines the physical market environment and describes how the investors use this information to make investment decisions.

There are two major users of property, namely the tenant and the equity investors. The demand for property investment is based on the flow of services that it produces. The tenant is paying for a set of services, not merely a physical unit. The payment for these services is called the rent, although we price the

rent per physical unit. So investors must be certain that the property provides the degree of services that is demanded. In other words the equity investor is aware that the market environment links the supply and demand for property. The Equity investor will carry out a market analysis to identify supply and demand factors from both the tenant's and his own perspective. A market analysis is also the first step to reducing market risk facing the equity investor and helps consider market conditions. Changes in factors that influence the number of tenants and the rentals tenants are willing to pay will also have an impact on the expected income from an investment. At the same time these factors may influence the equity investor's behaviour in the market. These perceptions would be reflected in the valuations of the investment. Direct investors in property would consider the flowing factors when analyzing the market:

- Income - rental should keep up with acceptable or equilibrium market rates. A rental increase can improve monthly cashflow and generate stronger yields.
- Demographic factors – population characteristics are one of the major determinants of the long-term direction of real estate markets. Migration trends or patterns also have an effect on the property market.
- Supply factors – the existing supply of property includes buildings that have been constructed over a long period of time. The characteristics of new and existing supply such as condition, location, age and services should be compared with the investment under consideration.
- Economic trends – investors monitor the important indicators of economic activity that forecasts recessions or growth.
- Location – whether there is a need or advantage in a particular location.
- Physical characteristics – physical attributes of land and improvements play a crucial role in the overall feasibility of the investment. These attributes are:

1. Size and shape of the site
2. Topography
3. Storm-water drainage
4. Servitudes
5. Water table, springs, or other water factor
6. Soil and subsoil characteristics
7. Utilities
8. Functional layout of improvements
9. Personal response factors, such as security
10. Transportation access
11. Physical conditions of improvements

- Building costs versus Replacement or Improvement costs
- Grade Value – whether a higher grade property costs more to build than redeveloping an existing lower grade building
- Sociopolitical Environment – this will help investors identify the degree of business risk for an investment
- Rental and Vacancy forecasts
- Capitalization rate
- Net Operating Income (NOI)
- Income ratios including income return, and capital growth as well as the internal Rate of Return (IRR)

Indirect Investment Fundamentals are different from the direct investment fundamentals. This is due to the different characteristics discussed in Chapter 2. Indirect investment fundamentals are:

- Growth of returns
- Sectoral diversification of the property company
- Geographical diversification of the property company
- Strength of returns in relation to Market averages and investment options.

- Price/Earnings (PE) ratios of the property company.
- Scale and size of the property company.

Perceptions of the property market depend on the current trends indicated by the above mentioned fundamentals. Currently in Johannesburg CBD there is almost a 25% vacancy rate. Many businesses moved out of the CBD due to crime, grime and decay. Urban decay lead to decentralization patters and Johannesburg CBD quickly lost investor confidence. Sandton CBD quickly gained the reputation of being the financial center of Johannesburg. Sandton was experiencing the highest rentals in South Africa while other decentralized nodes also grew. Pretoria CBD on the other hand continues to survive and was not affected by urban decay. It should be noted that Johannesburg CBD is the largest office node in the country with 1 662 937m² of lettable office space. Tenants' demands for services also began to change. Some tenants preferred low rise buildings in decentralized nodes which were less congested than the CDB's and were also closer to residential areas. These decentralized nodes were positively affected by the rise in residential property prices in and around the nodes. However, property market trends are not easily predictable. Differences may occur depending on the particular location influence of cycles and the grade of office property being considered.

It is therefore important to understand the systemic nature of the relationship between the Physical Property Market and the Capital Markets.

## 3.4 The Relationship between the Physical and Capital Markets

There is a systemic relationship between the availability of capital funds and property investment opportunities. The capital market is the main source of funds in the form of Debt and Equity, which can be invested in the property market. The bringing together of sources and uses of capital is the core to the

finance function (Jaffe and Sirmans, 2001). The ability to purchase an ownership interest with only a fraction of the equity capital required shows that there will always be a demand for debt financing in property:

However, funds are not just handed over to investors. Suppliers of capital will assess the risk involved. This risk assessment of commercial property is a major activity, involving thousands of individuals around the world. The type of risk referred to above is known as default risk. Default risk measures the probability that the borrower or user of the capital will not or cannot complete the terms and payments of the mortgage. Other risks as inflation risk, interest rate risk, exchange rate risk, market risk, legislative risk, market timing risk, liquidity risks and others. All of the above mentioned risks as well as macroeconomic conditions will affect the availability of capital funds.

Property finance is an activity that reacts directly with the economic conditions in the real estate market. This is by nature due to the fact that the production of debt or equity claims can always be reversible. The capital-structure also known as the debt-equity mix for an investment should always be under review. Any change in economic conditions can be met by a change in capital structure or debt-equity mix and to reduce risk. This is needed as during economic recessions the financial health of borrowers weakens. The Capital market is also evolving as recent trends have shown a need for new and creative financing instruments. Financing instruments are usually depicted by the tax climate or legal environment.

Since property is a fixed asset, it is used as securitisation or debt financing in the formal banking sector. For listed property companies physical property adds value to the share price and also plays the role of a stabilizing fixed asset. As property becomes increasingly integrated into capital markets, there will be continuing opportunities for innovations and money making within the Capital Market.

## 3.5 Short-Term Market and Macroeconomic changes

Since rentals are fixed for a period of one year the short-termed period is considered one year. Short-term macroeconomic changes influence future expectations on the strength of rental income and property capitalization rates. Increasing interest rates increase the debt service, unless the mortgage is a fixed rate. Higher cap rates are also reflected when higher interest rates are present. When using the income capitalization valuation model, the higher the cap rate the greater the depression of property value. At a constant Net Operating Income (NOI) and a higher capitalisation rate, lower capitalized values will be realized. Likewise, increasing inflation rates increase the demand for money, forcing the South African Reserve Bank (SARB) to increase rates to try keep the supply of money low. Declining inflation will prompt the SARB to decrease inflation rates in order to try increase the demand for money. This however is the theory and other factors to contribute to the changes in interest rates. Investors are attracted by reductions in the interest rate but more speculators see a change for easy money. Investors anticipate stronger cashflows when interest rates are low therefore increasing the present value of investments.

From the above it is visible that short-term changes do affect investor's perception. However, investors take long-term considerations when analyzing the different cycles. The property cycle and business cycle are different and the past trends associated with these cycles may not occur in present trends. Another long-term downfall is that all post studies have unique characteristics caused by unique economic conditions. Past studies can be used as indicators to try make reasonable assumptions.

The short-term changes affect most markets such as the stock exchange, clothing and others. Short-term changes provide influential signs of expectation

and not necessarily the future. However, an understanding of the long-term is required.

## 3.6 Conclusion

It is important to understand why macro-economic fundamentals impact on the property market because in the long-term sustainability of property lies in the relationship between expectations and economic growth. The macro-economy reflects changes in GDP growth, inflation and interest rates. These changes affect the demand for property in their own respective forms. The reason for diversification across sectors in property is a hedging strategy to take advantage of any hypothetical changes and to cope with illiquidity.

In conclusion, the methodology will continue with the theoretical framework to set the foundation in property portfolio diversification. The data which will be sourced is the South African Index International Property Databank (SAPI/IPD); the listed property sector makes up 80% of the data sample for this index and therefore is a near perfect fit for the exercise which we are carrying out. From the data an analysis will be carried out using a portfolio optimizer spreadsheet. This optimizer spreadsheet provides data to graph the “Efficient Frontier”. This empirical exercise will provide us with the optimal portfolio for the South African property sector.

Interviews were undertaken with the Asset Manager’s from 18 of the South African listed property funds. The questions were be set out in a manner which can be collated to achieve the objectives of the research. The interviews will allow us to comprehend why the fund makes such decisions and whether MPT would be useful for the different funds. What is also interesting is the comparison of the weightings across their various funds with the optimal portfolio, some managers were within the weightings without using MPT.

The following chapter will undertake data gathering, statistical calculations, calculate the optimal portfolio weightings derived from IPD data and aggregate information from the interviews as discussed above.

# Chapter 4

# Empirical Analysis and Interviews

## 4.1 Introduction

This Chapter will carry out the calculations in order to establish the optimal portfolio weightings by using the IPD data. This process will also illustrate how to use the mean-variance method of MPT in order to arrive at optimal portfolio weightings, as well as, construct an efficient frontier. Further to this all information gained form executing interviews will be aggregated and processed in order to achieve the research objectives.

This involves the data analysis needed to find the optimal portfolio weightings between retail, office and industrial property. Table 4.1 in Appendix B illustrates the historical data from 1995 to 2006. This allows us to develop an optimal portfolio. By studying the historical data, our calculations should provide useful predictions for the near future, perhaps the next year or two years. The important steps in optimizing a property portfolio are:

1. Calculate the average returns each sector over the period of 1995 – 2006.
2. Calculate the volatility (standard deviation) for each sector over the period of 1995-2006.
3. Calculate the correlation between each sector and develop a correlation matrix.
4. Calculate the covariance between each sector and develop a covariance matrix.
5. Develop a weighted pairwise covariance matrix.
6. Carry out a Mean-variance Analysis
7. Plot the efficient frontier
8. Select the optimal (target) portfolio

The theoretical framework provided by the literature will be discussed next. Followed by the descriptions of the variables and their definitions. The portfolio optimizer will be explained and then employed.

## 4.2 Theoretical Framework

Markowitz, 1952, set the foundation in portfolio diversification when testing the relationship of different stock and effect the combination of the stocks had on the volatility of the portfolio. I have chosen to follow the empirical work undertaken by Markowitz, 1952, as an entry-level study for portfolio management in the South African listed property market.

The theory behind this is what kind of relationship occurs between two variables. If two variables are measured on the same unit that may not be independent but instead correlated (Glarke and Cook, 1998). For the purpose of this work we will look at six different combinations made up of three different variables, retail, office and industrial returns. Thus developing a correlation matrix as illustrated in Table 4.4 in Appendix B.

Once we have developed the correlation matrix, a table of each covariance between each possible pair of assets is required. This is done by using the volatility of each sector and the correlation coefficient. Each cell is a covariance of each possible pair as shown in Table 4.5 in Appendix B.

A combination of weightings is to establish for a range of portfolio returns. These weightings are then used in a weighted pairwise covariance matrix as illustrated in Table 4.7 in Appendix B. The sum of each cell in this matrix equals the portfolio variance. The square root of the portfolio standard deviation or volatility.

The portfolio optimizer then provides a set of expected returns and volatilities for each portfolio. Using this data a graph representing the investment opportunity set for retail, office and industrial properties. This graph is called the efficient frontier and is shown in Graph 4.5 in Appendix B.

## 4.3 Data Sources

The South African Property Index International Property Databank (SAPI/IPD) provided total property returns. Total returns of three different commercial sectors were used retail, office and industrial. The total return of each sector is made up of income return and capital appreciation of properties for one year. The total return is of the actual asset and 80% of the sample data are properties which are owned by listed funds. The IPD database consists of properties with a total market valuation of R 120 billion.

## 4.4 Descriptive Statistics

Statistical methods use graphs and charts to describe the data and show general trends over time. The following terms and their definitions are needed to understand the statistical method.

Mean or average – of a set of observations divided by the number of observations.

Standard deviation – the average amount by which observations deviate on either side of the mean. A small standard deviation tells us that the observations cluster closely around their mean, while a large standard deviation says that the observations are much more scattered.

Average return and volatility (standard deviation) of each sector are given in percentages in order to make a comparison between their relative size differences.

Correlation – is an analysis measuring the strength of a linear association between two variables.

Graph 4.1 in Appendix B "Total Retail Returns" is provided to show a general trend. The annual returns of South African Retail property show a general trend of rising returns over the period of 1995-2006. The highest return was achieved in 2005 at 33% and lowest total return occurred in 1998 in at 9%. The average total return is 18% over the last twelve years. The standard deviation of South African Retail returns over the same period is 7%.

Graph 4.2 in Appendix B "Total Office Returns 1995-2006" is provided to show a general trend of the office space market. The annual returns of South African office property show a general trend of rising returns over the period of 1995 to 2006. The highest total return was in 2005 at 26% and the lowest total return occurred in 1998 at 1%. The average total rate of return is 12% over the twelve-year period. The standard deviation of South African office returns over the same period was 7%.

Graph 4.3 in Appendix B "Total Industrial Returns 1995-2006" is provided to show the general trend of the industrial property market. The annual returns of South African Industrial property show a general trend of rising returns over the period of 1995 to 2006. The highest total return was in 2005 at 33% and the lowest total return occurred in 1998 at 2%. The average total rate of return is 16% over the last twelve years. The standard deviation of South African Industrial returns over the same period is 10%. This standard deviation clearly shows that Industrial property is the most volatile out of the three sectors.

Graph 4.4 in Appendix B “Total Return performance 1995-2006” shows the general comparison trend over the twelve years. From the graph one can analyse the three graphs in comparison and begin to see a relationship between the three sectors. However, this method of comparison is not conclusive. A portfolio optimizer spread sheet will therefore be used to establish the relationship between the three sectors.

## 4.5 Data Analysis

The data analysis was carried out using a portfolio optimizer spreadsheet. The portfolio optimizer investigates the optimal portfolio by establishing the optimal weightings of each sector and provides data to graph the “Efficient Frontier”.

## 4.6 Efficient Frontier

Using the Microsoft Excel program for windows a mean-variance analysis was completed on the data. Table 4.6 in Appendix B shows the Mean-Variance Analysis. In order to calculate the standard deviation of each portfolio and the Sharpe-ratio the weightings need to be entered into the weighted pairwise covariance matrix shown in Table 4.7 in Appendix B. This needs to be done irretatively until the Mean-variance analysis complete.

Using the expected returns of each portfolio and its respective standard deviation. The efficient frontier was graphed. Graph 4.5 in Appendix B represents the efficient frontier or the investment opportunity set for retail, office and industrial property. Investors desire portfolios that lie to the “northwest” of Graph 4.5 in Appendix B therefore the optimal portfolio would achieve a 15% expected return while experiencing 6.6% in volatility.

The weightings of the optimal portfolio are as follows:

| | | |
|---|---|---|
| Retail | = | 73% |
| Office | = | 16% |
| Industrial | = | 11% |

The results show that the majority of portfolios' weight is held in Retail, followed by Office and then Industrial. One must remember that this analysis was carried out using historical data and therefore not provide actual predictions for the near future. The relevance and implications of the result will be discussed in the following chapter.

## 4.7 Interviews

Interviews were undertaken with Asset Managers from 18 of South Africa's listed property funds, each interviewee was on the Board of Directors of their respective fund. The interviews assisted in answering the research problem and achieve the research objectives. Appendix C shows the questions asked to the 18 fund managers. It was important to get as much background information of each fund as possible in order to analyse the funds' objective and the fund managers' mandate. The background information which was asked allowed identifying which funds were specialised and which diversified and what the current market positions are.

When asked what diversification technique they used all 18 fund managers answered the Traditional method only, with exception of 2 fund managers. The 2 fund managers said they would use the traditional method as a tool to value the specific property and they would use MPT to maintain the overall portfolio specific requirements. King and Young (1994) argued that precious resources devoted to the management of property portfolios may be better spent on the

examination of asset specifics rather than seemingly sophisticated portfolio construction techniques associated with MPT. From the response of the interviews it was clear that the majority of the fund managers did not consider MPT but rather focused the supply available in the market; the demand for the product; inflation and capital market conditions. Those that used MPT were more concerned with the benchmarking of portfolios weightings.

Following the finding that all the fund managers used the Traditional method, it was asked whether they placed more emphasis on Income returns or Capital growth. 18 fund managers said both were important but stated that income was the most important factor as this would eventually lead to a higher Capital growth. Based on the traditional method of valuation for a specific property proves that if the income is not sufficient to overcome the operation expenses and produce an adequate return than the capital value or disposal value at the end of the term will be of high value in comparison with properties with higher incomes and the same operating expenses.

Sector diversification was more important than geographical diversification for 17 of the fund managers. The 1 fund manager that stated geographical diversification was more important was representing a specialised fund which was only invested in a single sector. Lee (2001) implied that the property type composition of the real estate fund should be the first level of analysis in constructing and managing a real estate portfolio for three reasons. Firstly, property type effects account for most of the variation in property returns with property type factors explaining almost three times the variability in real estate returns than to regional factors. Second, titling the property type weights of real estate portfolio from those of the benchmark portfolio leads to greater tracking errors than regional tilts. Finally, Lee's (2001) results indicate that two properties in the same property type are closer substitutes than two properties in the same region. As a consequence, the potential for portfolio risk reduction is greater by diversifying across property types within a region than across regions within a

property type. It was agreed with the interviewees, that funds pay closer attention to the property type allocation of their portfolios than to the regional spread.

All fund managers agreed that macroeconomic fundamentals such as growth rate, inflation and interest rate were important and affected the property market cycles. However, 14 of the 18 fund managers ranked growth rate as the most important macroeconomic factor to consider. The remaining 4 fund managers ranked interest rate as the most important factor to consider, and these fund managers were representing funds which were heavily invested in retail properties. Interest rate increases diminishes a populations disposable income and ultimately demand for retail space decreases.

They also agreed that property market fundamentals such as rentals, operating costs, vacancy rates and escalation rates are all to be considered carefully. However all 18 managers agreed that rental was the most important property fundamental to consider.

Lack of good quality properties, high building costs, electricity supply shortages, lack of skill in the construction industry, lack of skills in property management industry, interest rates and high asking prices caused by an overheated property market were the most common problems encountered in the current market. 11 of the 18 fund managers would like to change the portfolio weightings in order to adjust accordingly to property market cycles. The same list of problems above was again the main obstacles for property funds in achieving the optimal weightings the desired.

Out of the 18 fund managers interviewed 14 stated that the optimal portfolio weightings calculated above were heavily weighted in retail. These 14 fund managers agreed that this portfolio was representative of markets history from 1995 and did not show what the market would be doing in the future, almost as we were driving a car in a forward direction by looking at the rearview mirror. The

other 4 were representing funds which invested the majority of it capital in to retail properties and were not willing to change their current positions on sectoral diversification as they had gained the required skills and knowledge of the specialised retail sector.

# Chapter 5

# Conclusions and Recommendations

## 5.1 Introduction

The research undertaken assists to explain if MPT is used by portfolio managers when formulating investment policy and strategies. The research also establishes what other techniques are used for portfolio strategy in the listed sector and points out the advantages and disadvantages of Modern Portfolio Theory. All the objectives that were initially proposed in Chapter 1 have been met. The literature facilitates the theory of commercial property markets; the financial and capital markets as well as portfolio and diversification theory. The empirical methodology began with establishing an optimal portfolio by using IPD data and then comparing each fund's sectoral weightings with this IPD optimal portfolio. To further substantiate the research interviews were carried out with the portfolio managers in order to identify which technique was used when strategizing for the construction of their respective portfolios. Additional questions in the interviews were designed in order to analyse the fund and understand why they chose that specific strategy technique.

The reason for diversification across sectors in property is a hedging strategy, to take advantage of any hypothetical changes and to cope with liquidity. Linear regression analysis across the three sectors showed there was a positive correlation between the all three sectors during the period of 1995-2006. Graphs 4.7, 4.8 & 4.9 in Appendix B show a general trend of the two variables. For the purpose of understanding the repercussions of the results the wider context of the risks associated with each sector was discussed in Chapter 2.

South Africa's general property cycle (graph 4.4 in Appendix B) displays that in recent years, from 2003 to 2006, was characterized by a period of relatively high returns in all sectors. This same period was experiencing a period of low inflation and resulted in lower interest rates and a high Gross

Domestic Product (GDP) growth rate. The availability of capital and investment decisions are governed by the changes in the interest rate and the capital market in general. Inflationary pressures lead to the adjustment of interest rates thereby influencing the property market through required yields. A discussion of the macro-economy and property fundamentals was therefore necessary to shed light on how capital and investment are attracted to the property sector. The connection between capital and physical markets emphasize the influence of short-term macro-economic changes. In order to make recommendations and conclusions for the research, the main findings need to be discussed.

## 5.2 Main Findings

The time series data was attained from IPD index for total returns over the period of 1995 to 2006.

The average return for each sector over the period of 1995 to 2006 was:

- Retail = 18%
- Office = 12%
- Industrial = 16%

The volatility (per time increment of data) from year-to-year for each sector over the period of 1995 to 2006

- Retail = 0.07
- Offices = 0.07
- Industrial = 0.10

Using the above data the correlation coefficient between the three sectors were calculated and the results were as follows

- Retail and Offices had correlation of 0.88
- Retail and Industrial had a correlation of 0.94
- Office and Industrial had a correlation of 0.89

A graphical representation of the above relationships is shown in graphs 4.7; 4.8 and 4.9 in Appendix B. The graphs are scatter-plots of annual total returns of each sector and the trend lines illustrate the positive correlation of the three combinations.

The correlation coefficient between Retail and Offices is 0.88 which lies between 0 and 1. This is a direct relationship and a positive linear correlation exists, in other words an increase in Retail returns results in an increase in Office returns. The correlation coefficient between Retail and Industrial is 0.94 which also lies between 0 and 1; a positive linear correlation also exists between these two sectors. The correlation coefficient between offices and Industrial is 0.89 which again also lies between 0 and 1 and thus also has a positive linear correlation between the last pair of sectors.

The covariances between each possible pair of sectors were calculated. This was done using average annual returns, volatility or standard deviation and the correlation coefficients, as indicated in Table 4.4 in Appendix B.

Following the calculation of the covariances and the mean variance analysis was carried out. We start by identifying individual points on the frontier by setting the highest and lowest return that the portfolio can achieve, in this case if we held a full portfolio in retail we would achieve our highest return of 18% and if we held a full portfolio of offices we would achieve our lowest return of 12%. We then need to generate the whole efficient frontier by finding the efficient points between the highest and the

lowest returns. The problem is to find the split across the assets that achieve a target return whilst minimizing this variance of return. This is a standard optimization problem answerable by Microsoft Excel's Solver application, which contains iterative search methods for optimization. This method of portfolio optimization is summarized in Table 4.6 Appendix B. Each row of the mean-variance analysis represents an efficient point on the efficient frontier. The efficient frontier has been graphed in Graph 4.5 in Appendix B.

The next step is to calculate the standard deviation or risk of the portfolio which is referred to as the portfolio variance. The portfolio variance is calculated by multiplying each of the covariance by the product of the "weights", or proportional shares of the total portfolio value. This is summarized in table 4.7 of Appendix B. The final step in computing the volatility of the portfolio is to simply sum up all of the weighted covariances and take the square root of that sum.

Modern Portfolio Theory says that the optimal portfolio which is also known as the Target portfolio should be the point on the efficient frontier which is closest to the north-east corner of the graph. In this study the target portfolio has the following weights 73 % in retail 16 % in office and 11 % in industrial. These results show us that retail is the sector where the largest allocation of capital would exist. With a perspective of overall wealth maximization it is understandable that larger allocations to retail would be included in a portfolio whilst industrial and property would be less appealing.

The main objective of the qualitative study was to determine whether South African Asset managers used MPT as a tool when constructing or managing their respective funds. Through the interviews it was found that only 2 of 18 interviewees used MPT as strategic tool when making

decision on the sectoral composition of the fund. One fund manager stated that MPT was not as useful as in property market as in the equity market because of illiquidity of the property while others stated they did have the know-how to apply the mathematical calculations and therefore had not used MPT before. The two had used MPT had used for benchmarking purposes for allocation across the different sectors.

## 5.3 Discussion on Historical data

The time series data provided but the IPD has to be considered and the quality of the historical data could be skewed. The sample population used by the IPD, currently, consists of Institutional Investors, Private companies and listed funds. Listed funds make up 80% of the population however this was not always the case. Historically, in 1995, the Institutional Investors such as pension funds and life assurance companies held the largest portion asset available on the property market and therefore made up the majority of the sample population. These institutional companies could have charged excessive rentals to their operating companies and thus inflating the returns as well as the value of the asset.

From between 2000 – 2003 listed Property funds entered the market by purchasing properties from some of these institutional organisations. This became the trend with some listed funds were being supported by the institutional organisation as majority shareholders. The institutional organisations

Had realized the benefits of outsourcing of asset management and property management part of the business and retaining a shareholding where they had their roots. Literature has been read showing that these institutions prefer to hold property assets to the value of between 8 – 10%

of their market capitalization. Any additional asset which would exceed this quota would be sold to the listed funds.

## 5.4 Empirical evidence

The optimal portfolio weighting using IPD data was as follows:

- Retail 73%
- Offices 16%
- Industrial 11%

The qualitative section of the research found that only 2 out of 18 South African Asset managers used MPT as a strategic tool when considering the sectoral weighting of the fund. The importance of these results is discussed below.

## 5.5 Importance of the research and its findings

The reason for diversification across sectors in property is a hedging strategy, to take advantage of any hypothetical changes and to cope with illiquidity. The research illustrated how MPT should be used to construct an efficient frontier and an optimal portfolio. When such hypothetical changes occur one can move along the efficient frontier and position themselves accordingly.

From carrying out the interviews it was a common agreement among all the interviewees that because of the nature of property it was difficult to adjust your portfolio effectively. Property is illiquid in nature and therefore transaction periods are lengthy and by the time a building sold, developed or bought the market conditions could have changed. Frequency of property fund reviews and property valuations only occur bi-annually which also makes it difficult for practitioners to make sound investment

decisions with outdated information. Trading properties is capital extensive and therefore made less often because capital raising process takes longer.

MPT, through its mathematical calculations is way to structure and discipline the thinking as a portfolio manager. It is a form of reducing risk and improves overall return. Reducing risk through thoughtful portfolio diversification is a key to the success of a portfolio management strategy. The linkages and inequalities among real estate investments are more complexed than most asset managers realize. Rather than building only one “master” model of the real world through MPT. It should be seen as a process of several smaller models, each with its own set of data and results. The interviewees were actually using such smaller models such as acquisition and resale capitalization rates; rent escalations; vacancy rates; expense increase etc. From these smaller models the cashflow of each property is projected and then the fund managers calculate a form of aggregate internal rate of return (AIRR). AIRR is effectively the target return of the portfolio, the fund managers simply need to complete the last step of the empirical analysis which is to establish the efficient frontier and carry out the solver to establish the optimal portfolio weightings.

Overall, the interviewees agreed MPT can be used to provide general overview for diversified funds and that it could be useful to estimate what funds should be apportioned to each sector when carrying capital allocation exercises.

## 5.6 Gaps, Anomalies and further work

The empirical analysis consisted of a qualitative and quantitative study which provided a good debate on whether the MPT should be used in property sector. Out of the 18 interviewees, 16 did not use MPT and felt

that it was insignificant and asset managers should focus more on the deal orientated side of asset management.

Further work can be carried out to establish whether Property Assets can be valued using CAPM and how the Traditional Income derived value differs form the CAPM value. Additionally, forecast modeling can be carried out to add on to IPD data to determine what the optimal portfolio could be in the future.

## 5.7 Recommendations

Asset Managers should not use the optimal portfolio calculated by MPT as measuring yard stick, but rather as a tool that provides some insight on market conditions and current risks. The optimal portfolio calculated in this research represented the market in the last 11 years and basically showed us what the sectoral spread of a portfolio should have been in order to match or equal average market returns over the same period. This historical study allows practitioners to identify where the market as come from and allows one to predict where it is going in the future.

I would also recommend that practitioners consider forecasting returns for 3 to 5 years and then calculating the optimal portfolio weighting which should then be more representative of how the market will react in the future. Further to this should a fund wish to invest in other sectors which they do not currently hold, then it would also be possible to use MPT in order to calculate how much capital to allocate to a new sector.

MPT and all the mathematical calculations are a way to structure and discipline ones thinking as an asset manager and is also a mechanism to reduce risk and improve overall return. Reducing risk through thoughtful asset management is key to the success of a portfolio strategy.

# Appendix A

**APPENDIX A**

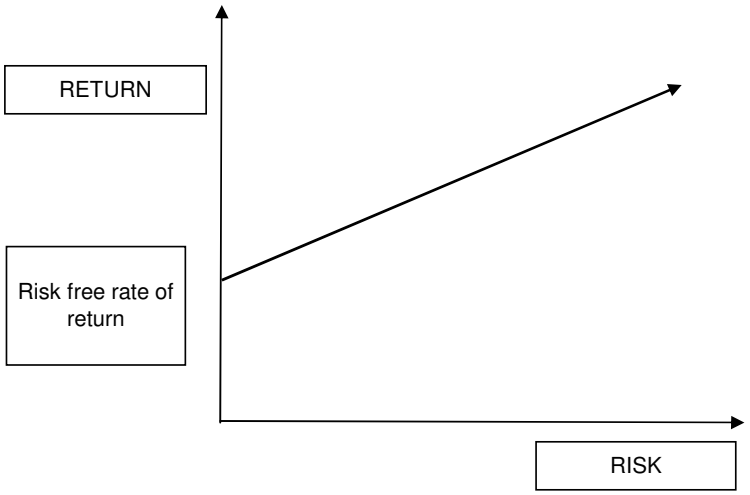



Figure 1.1 - Risk free rate of return

*(Source: Bode, Kane and Marcus, 2003)*

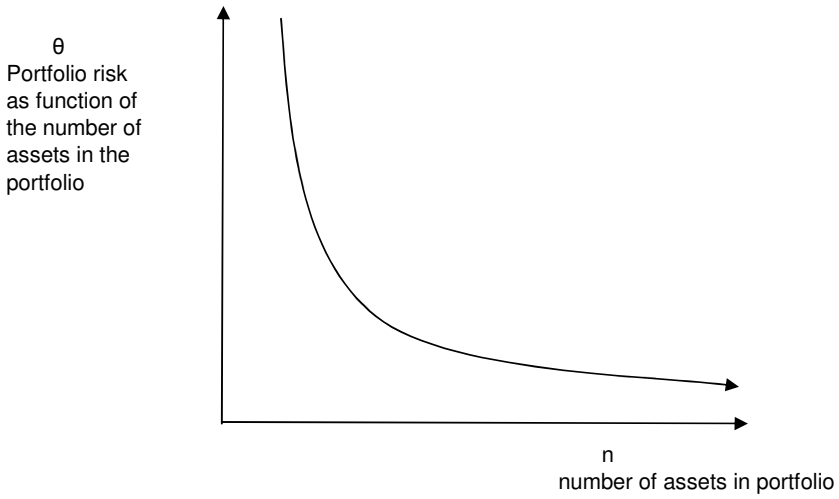



Figure 1.2 A - Unique risk only

*(Source: Bode, Kane and Marcus, 2003)*

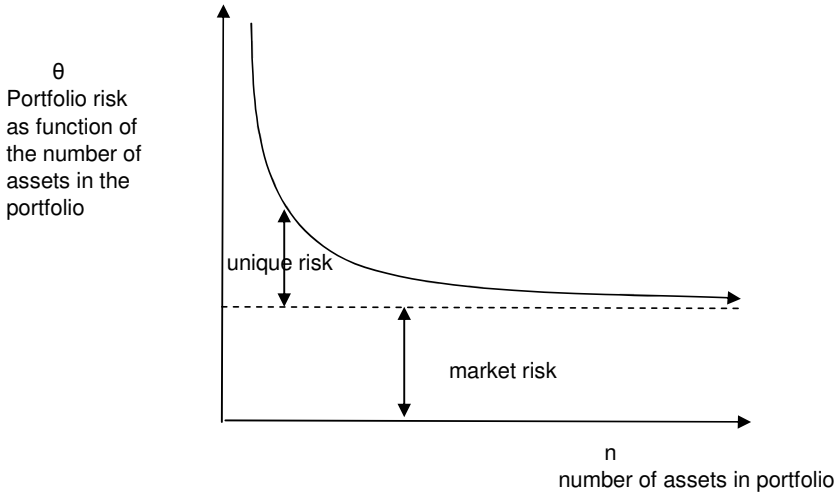
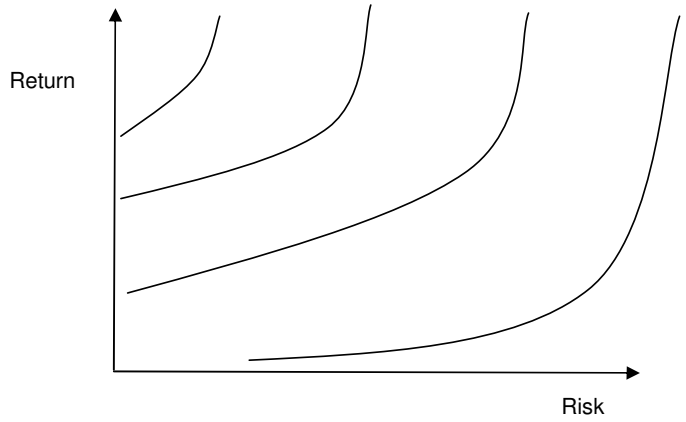



Figure 1.2 B - Market & Unique risk

*(Source: Bode, Kane and Marcus, 2003)*




*(Source: Geltner, Miller, Clayton and Eichholtz, 2007)*

Figure 1.3 A - Conservative Investor

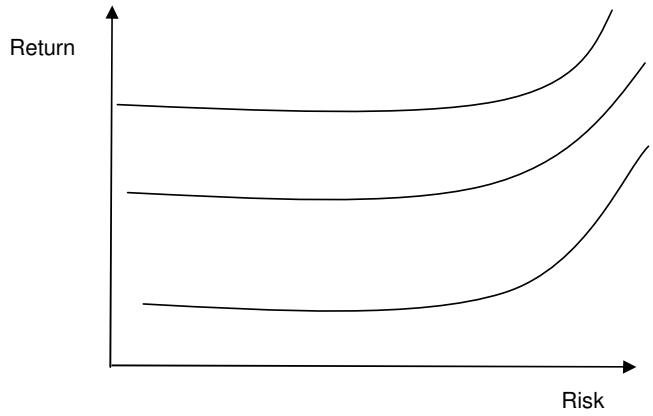
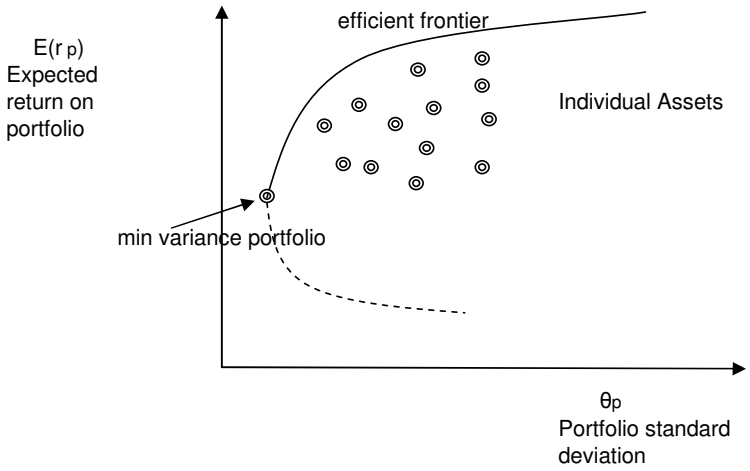



Figure 1.3 B - Aggressive Investor

*(Source: Geltner, Miller, Clayton and Eichholtz, 2007)*




*(Source: Bode, Kane and Marcus, 2003)*

Figure 1.4 - The efficient frontier of different assets

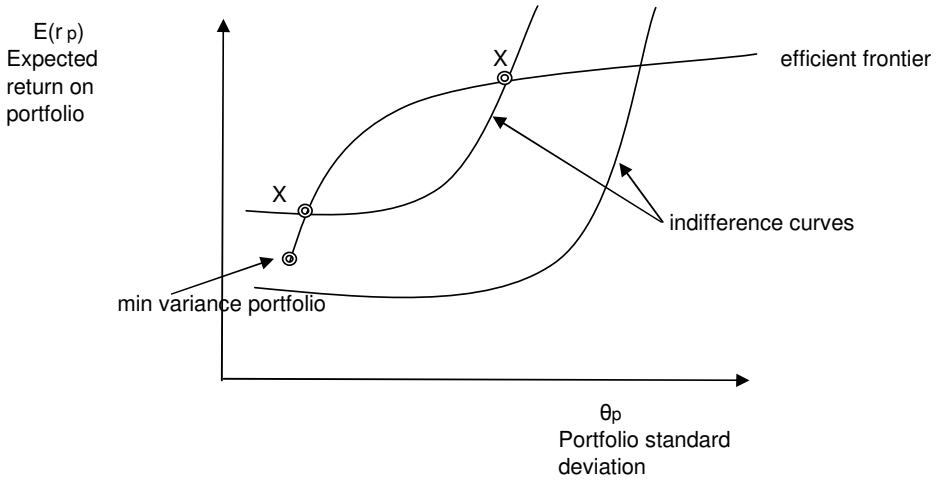



Figure 1.5 - Indifference curves and the efficient frontier

*(Source: Geltner, Miller, Clayton and Eichholtz, 2007)*

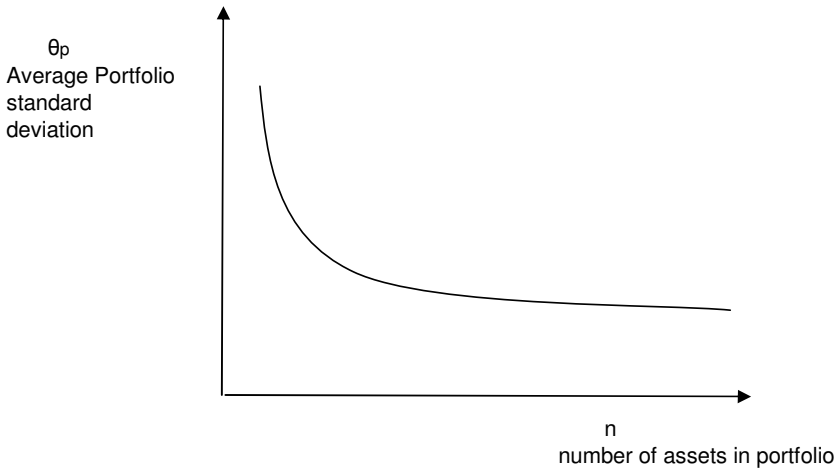



Figure 1.6 - Portfolio risk decreases as diversification increases

*(Source: Bode, Kane and Marcus, 2003)*

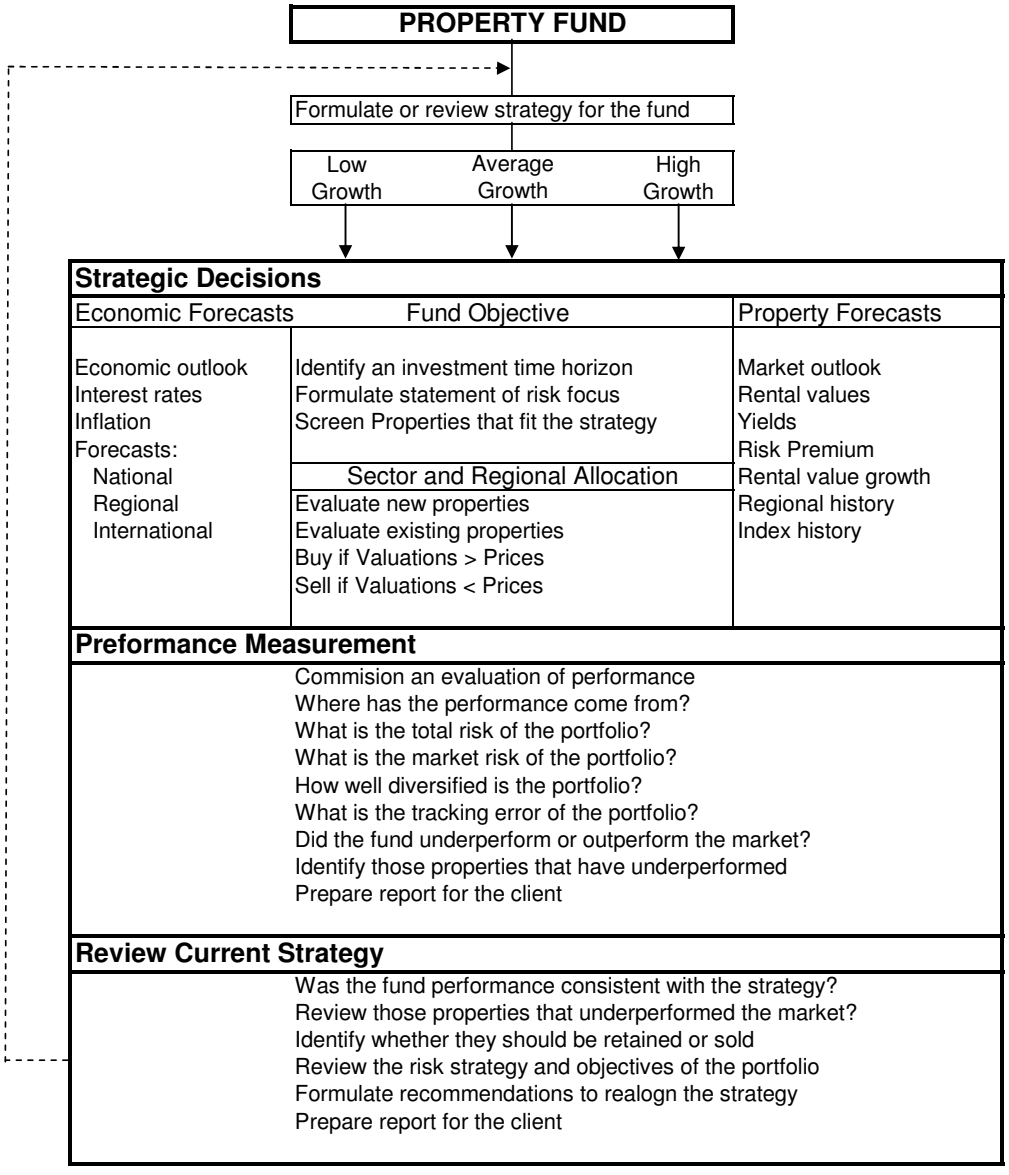



Figure 1.7 - The investment process

*(Source: Brown and Matysiak, 1990)*

# Appendix B

**APPENDIX B**

TABLE 4.1 HISTORICAL DATA

| | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Total Return: SAPOA / IPD Standing Investments (% pa)** | | | | | | | | | | | | |
| Retails | 0.17 | 0.17 | 0.23 | 0.09 | 0.18 | 0.10 | 0.13 | 0.11 | 0.17 | 0.26 | 0.33 | 0.27 |
| Offices | 0.15 | 0.10 | 0.13 | 0.01 | 0.09 | 0.13 | 0.08 | 0.05 | 0.09 | 0.17 | 0.26 | 0.25 |
| Industrials | 0.13 | 0.18 | 0.17 | 0.02 | 0.08 | 0.07 | 0.07 | 0.09 | 0.18 | 0.24 | 0.33 | 0.31 |
| Other | 0.15 | 0.17 | 0.18 | 0.05 | 0.24 | 0.16 | 0.10 | 0.22 | 0.24 | 0.27 | 0.25 | 0.22 |
| All Property | 0.15 | 0.14 | 0.17 | 0.05 | 0.14 | 0.11 | 0.10 | 0.10 | 0.15 | 0.23 | 0.30 | 0.27 |

TABLE 4.2 AVERAGE RETURN (1995-1006)

| Retails | Offices | Industrials |
|---|---|---|
| 0.18 | 0.12 | 0.16 |

TABLE 4.3 VOLATILITY(per time increment of data)

| Retails | Offices | Industrials |
|---|---|---|
| 0.07 | 0.07 | 0.10 |

TABLE 4.4 CORRELATION MATRIX

| | | | |
|---|---|---|---|
| **Retail** | 1.00 | 0.88 | 0.94 |
| **Office** | | 1.00 | 0.89 |
| **Industrial** | | | 1.00 |

TABLE 4.5 COVARIANCE MATRIX

| StD | 0.07 | 0.07 | 0.10 |
|---|---|---|---|
| 7% | 0.005 | 0.005 | 0.007 |
| 7% | - | 0.005 | 0.006 |
| 10% | - | - | 0.010 |

TABLE 4.6 PORTFOLIO OPTIMIZER

**MEAN-VARIANCE ANALYSIS**

Rf = 8.00%

| E[*r*] | StD | SHARPE | Retails | Offices | Industrials |
|---|---|---|---|---|---|
| 12% | 7.19% | 0.62 | 0% | 100% | 0% |
| 13% | 6.59% | 0.83 | 72% | 17% | 11% |
| 14% | 6.58% | 0.98 | 72% | 17% | 11% |
| **15%** | **6.60%** | **1.13** | **73%** | **16%** | **11%** |
| 16% | 6.73% | 1.26 | 78% | 13% | 9% |
| 17% | 6.95% | 1.36 | 86% | 8% | 5% |
| 18% | 7.40% | 1.41 | 100% | 0% | 0% |

**RETURNS**

| Retails | Offices | Industrials |
|---|---|---|
| 0.18 | 0.12 | 0.16 |

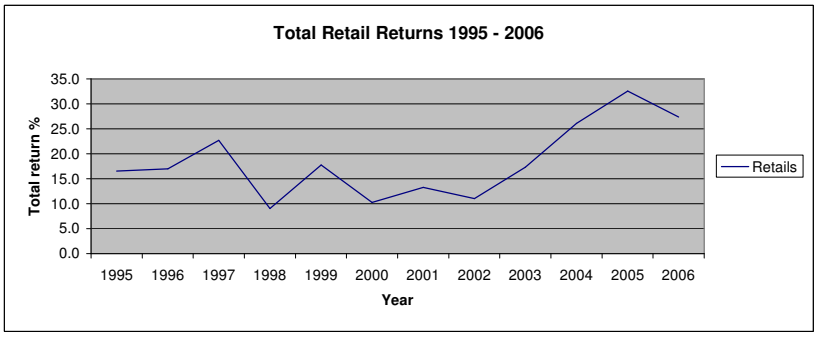
**VOLATILITY(per time increment of data)**

| Retails | Offices | Industrials |
|---|---|---|
| 0.074 | 0.072 | 0.10 |

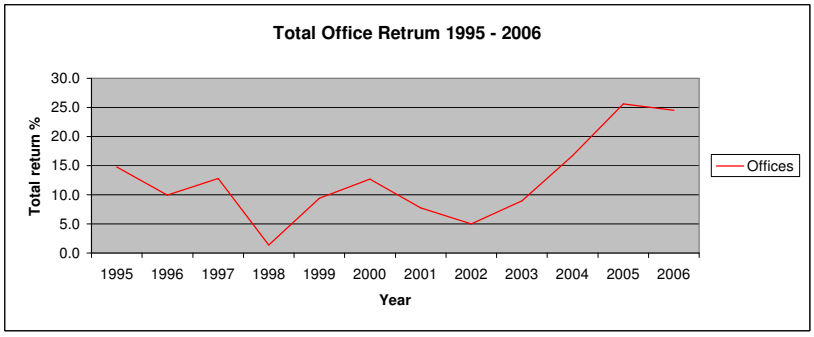
TABLE 4.7 WEIGHTED PAIRWISE COVARIANCE MATRIX

| PORTFOLIO | 73% | 16% | 11% |
|---|---|---|---|
| **73%** | 0.002905770 | 0.000558 | 0.000535826 |
| **16%** | 0 | 0.000138 | 0.000111212 |
| **11%** | 0 | 0 | 0.000112092 |

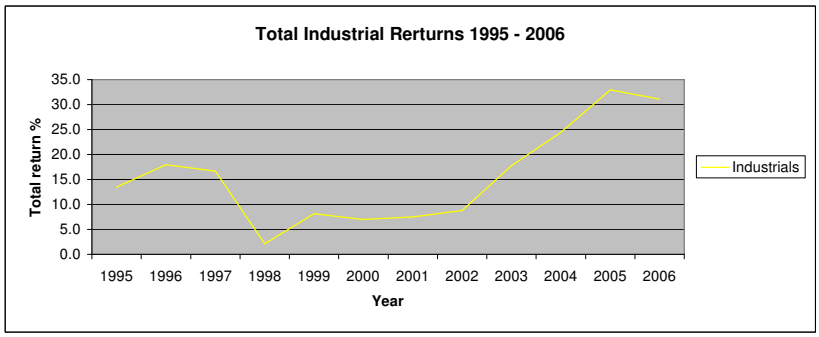
| | |
|---|---|
| **TARGET RETURN** | 16% |
| **PORTFOLIO VARIANCE** | 0.004361453 |
| **PORTFOLIO STD** | 0.0660413 |




Graph 4.1 Total Retail Returns 1995 - 2006



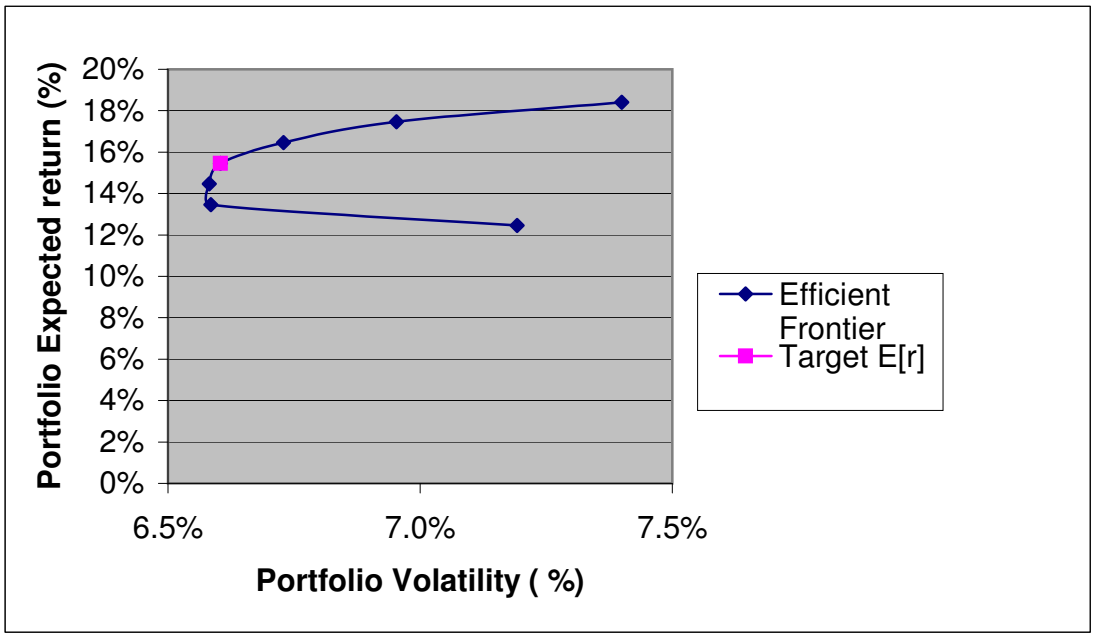

Graph 4.2 Total Office Returns 1995 - 2006



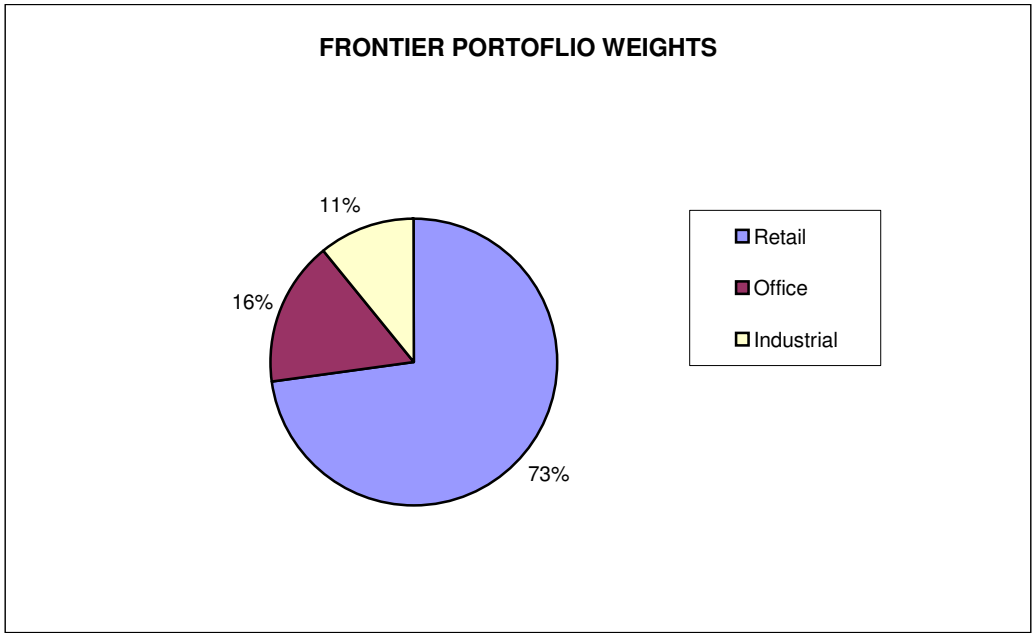

Graph 4.3 Total Industrial Returns 1995 - 2006



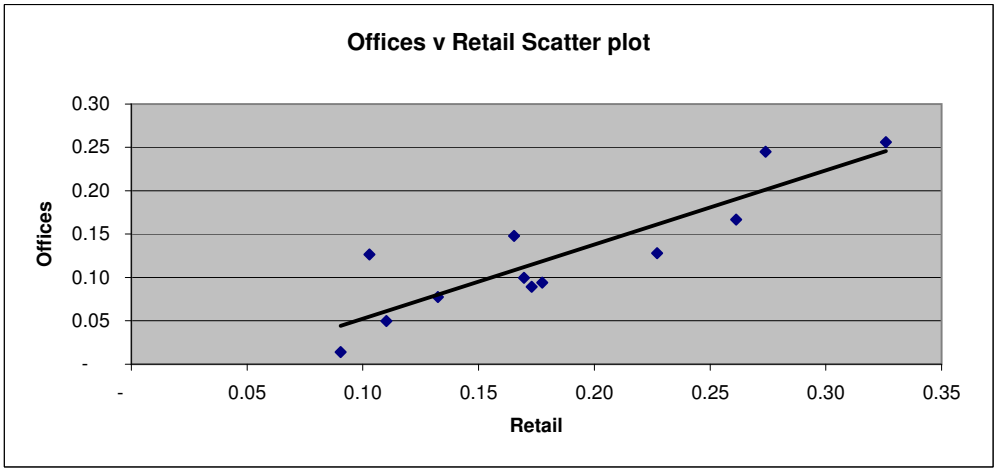

Graph 4.4 Total All property Returns 1995 - 2006



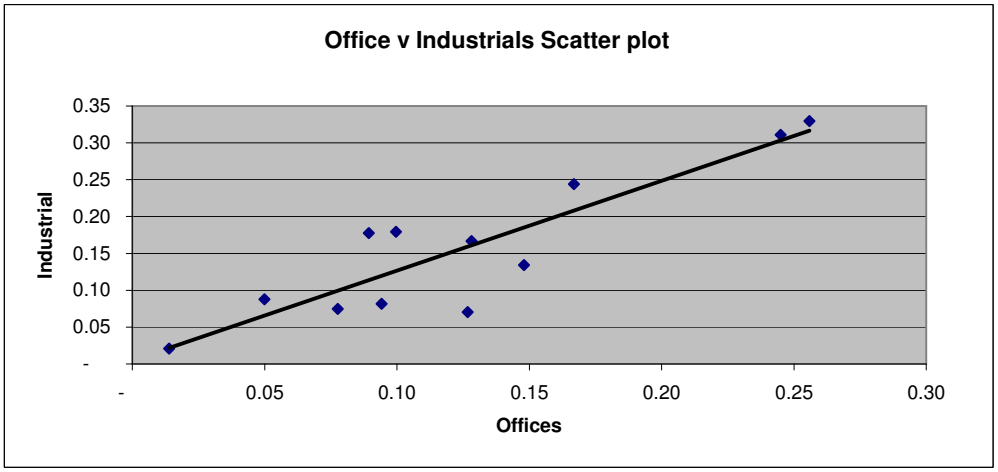

Graph 4.5 Efficient Frontier and Optimal Portfolio



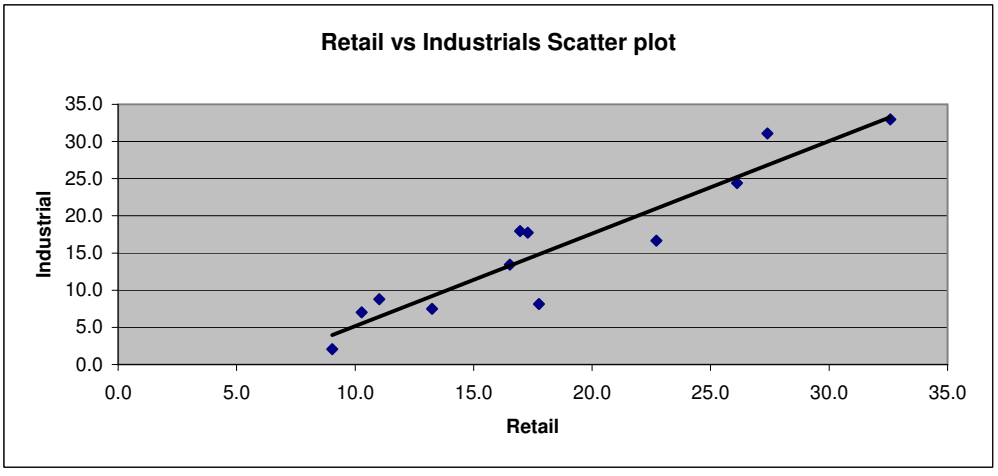

Graph 4.6 Optimal Portfolio Weights




Graph 4.7 Office v Retail Scatter Plots and trend lines




Graph 4.8 Office v Industrial Scatter Plots and trend lines




Graph 4.9 Retail v Industrial Scatter Plots and trend lines

# Appendix C

**APPENDIX C**

Pro-forma copy of Questionaire

**A MODERN PORTFOLIO THEORY APPROACH TO ASSET MANAGEMENT IN THE LISTED SOUTH AFRICAN PROPERTY MARKET**

Fund Name:
Interviewee:

| | |
|---|---|
| 1 | What is your Market Capitalisation? |
| 2 | What are the dominant properties of the Fund? |
| 3 | Is the Fund a PUT or PLS? |
| 4 | Can you briefly describe the History of the Fund? (i.e. establishment date and size; major acquisitions that have got the Fund to where it is today) |
| 5 | There are namely 3 Techniques of Diversifying, Randomly, Traditionally and Modern Portfolio Theory. |
| 5.1 | Are you aware of any of these funds? Are there any other techniques? |
| 5.2 | Which do you use? If the Traditional Method is used which does the fund emphasize on Income returns or Capital Growth? |
| 5.3 | Which technique do you consider the most importance? |

| | |
|---|---|
| 6 | Does the Fund place more emphasis on Sector on Geographical Diversification? |
| 7 | Which do you (the interviewee) consider more important, Sector or Geographical Diversification? |
| 8 | Would your fund consider investing in any other Sector? |
| 9 | What do you (the interviewee) consider most effective for diversification: Quantity or quality? |
| 10 | Would you consider International Diversification? |
| 11 | How is the Fund Structured in terms of Management? Is there an exco involved in the day-to-day operation of the Fund or is the Asset Management outsourced or is it a combination of the two? |
| 11.1 | Who makes the decision on the day-to-day operations of the fund? Outsourced Asset Management Co or Exco? |
| 11.2 | If the Fund is operated by a combination of the methods, what is the percentage split between the two? |
| 11.3 | How often is the fund reviewed? |
| 11.4 | If Asset Management is undertaken in-house what factors are considered: Macro-economic or Demand- Supply factors or a combination of both? |
| 11.5 | If Macro-economic which are most used? (i.e. growth rate, interest rate, inflation etc.) And which is the most the critical factor that is monitored? |
| 11.5.1 | Which macroeconomic factor do you consider most important? |
| 11.6 | If Demand- Supply which issues are considered more important? (i.e. rental rate, vacancy rate, operating cots etc) And which is the most critical that is monitored? |

| | |
|---|---|
| 11.6.1 | Which Demand-Supply factor do you consider most important? |
| 12 | What is your investment mandate? |
| 13 | What are some the problems currently facing Asset Management in your fund? |
| 14 | What does your sectoral and geographical spread look like? |
| 15 | Do you know what the sectoral spread of the fund was 5 years ago? |
| 16 | What would your optimal portfolio look like? Why? |
| 17 | What are your constraints from getting to the optimal portfolio? |
| 18 | What do you think of my optimal portfolio? |

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