

REAL ESTATE PORTFOLIO MANAGEMENT: ONE APPROACH
FOR DIVERSIFICATION OF SPECIFIC RISK

by

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Real Estate Portfolio Management: One Approach for
Diversification of Specific Risk

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William Joseph Kloppenburg

Submitted to the Department of Architecture on July 31,
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ABSTRACT

This thesis examines the risk management strategies currently in use by institutional real estate investors. The argument is made that given the current data constraints, and the evolving theory, one strategy for investors with limited portfolios is to explicitly address its management of specific risk in a portfolio context. This method is supplemented with a traditional diversification strategy for market and product-type selections. To support this argument, the thesis presents the portfolio management strategy being used at Perini Investment Properties, a real estate investment firm with a portfolio of properties currently valued in excess of \$300 million. Perini's decision history with this matrix will be reviewed, in an attempt to determine its strengths and weaknesses as a tool for diversification of real estate portfolios.

Thesis Supervisor: Marc Andrew Louargand
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DEDICATION

To my wife Lauriann C. Kloppenburg
for her support and understanding.

ACKNOWLEDGEMENTS

I want to thank Marc Louargand, my thesis adviser, for his guidance and insight without which this "thesis experience" might easily have become a "thesis nightmare."

In addition, I would like to express my appreciation to Tom Steele and Perini Investment Properties for allowing me to use the company as a case study site. Without Tom Steele's inspiration to develop the matrix, and PIP's history with it, exploring the specific risk management issues would have been more difficult and less productive. I am also grateful to Larry Mulhern, Bart Perini, and Phil Ordway, also with PIP, for their time and candor. The overview they provided was helpful in establishing a framework for my research.

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CHAPTER ONE: INTRODUCTION

Institutional involvement in real estate has changed the rules of the investment game. These investors have stimulated a great deal of interest in the area of risk management. To date, most of the research has focused on strategies that look to diversify risk, in a portfolio context, across property-type and location. While this approach can be quite effective, its sophistication makes it most appropriate for very large portfolios. Investors with limited portfolios need a simplified approach that can be used to balance a portfolio's risk across types of specific risk. The asset management functions performed by real estate investors offer an opportunity for simplified specific risk management. This thesis attempts to provide investors with a tool to exploit this opportunity.

Overview:

Institutional investment in real estate has been on the upswing over the last two decades. Spurred on by The Employment Retirement Income Security Act (ERISA) in 1974, pension fund investors have helped to lead the way. One estimate puts pension funds' real estate investment at \$113.4 billion, which would represent a 5% allocation of total pension reserves to real estate.[16] Prior to the

recent real estate market downturn, the prevailing view was that pension fund investors would increase their asset allocation in real estate to 10%, which would mean another \$100 billion of domestic equity capital introduced into the national real estate market over the next five years. The current market conditions make this scenario unlikely. However, as total reserves continue to grow, pension funds are likely to add to their current real estate investments, in order to maintain the existing 5% allocation.

Initially real estate investors viewed the market fundamentals in real estate to be quite different from the stock and bond markets. The investment focus was on individual transactions: a deal-oriented approach. Early attempts at diversification within real estate portfolios resulted in acquisitions in various geographic regions. This naive strategy was challenged with the onset of the troubled times in the oil industry. According to James DeLisle, research director at Equitable Real Estate Investment Management, "Most funds were diversified across regions that turned out to have the same economic base. They ended up with a bias in their portfolios toward energy. They also got over-concentrated in office buildings." [12] As real estate portfolio returns dropped into single digits, investors began to recognize the need for a more deliberate approach to building real estate portfolios.

To date, attention has focused mostly on improving the quantitative foundation for methods of diversification by region and by product type. Large scale investors who have been able to use their internal historical return data to perform statistical analysis have generated some sophisticated strategies for diversification, primarily across product type and geographic location. Smaller scale investors, however, often lack the internal resources to implement this approach successfully. In light of the limited data available for statistical analysis, reliance solely on region and product diversification techniques may not be appropriate for many investors.

Adding to the need for alternative diversification tools are two issues relating to the theoretical foundation underpinning the statistical methods mentioned above. First, it is not clear that real estate investment occurs in an efficient market, where information and transaction costs are negligible, and the market fully exploits all information. Second, even if an efficient markets assumption is made, it is a questionable practice to use statistical relationships derived from historical data to predict future market behavior. A further complication arises when one realizes that unlike stocks and bonds, an investor who purchases a basket of real estate properties

must then provide asset management for those properties (Figure 1.1). Unlike security investors, the real estate investor must provide for the management of the forces of specific risk; a service provided to the security investor by corporate management.

FIGURE 1.1 - Asset Specific Management Structures

| <u>Investor</u> | <u>Real Estate</u> | <u>Stocks</u> |
|-----------------|---|---|
| Inputs: | <ul style="list-style-type: none"> o Basket of Properties o Asset Management | <ul style="list-style-type: none"> o Basket of Stocks |
| Result: | <ul style="list-style-type: none"> o Specific Risk Diversification o Systematic Risk Exposure | <ul style="list-style-type: none"> o Specific Risk Diversification o Systematic Risk Exposure |

The aim of this thesis is to provide investors with another tool for risk management, to supplement individual deal analysis and product and regional diversification. This tool is a matrix for ranking risk levels by property across specific risk variables (capital exposure, operating risk, leasing risk, market risk, and appreciation risk). The matrix may be the most appropriate risk management strategy for all but the largest investors, until such time as the data availability and market efficiency issues are addressed. Attending to these risk factors in a portfolio context, the matrix allows an investor to balance risk across variables so as to minimize portfolio exposure to a particular event or structural change that might effect

investment returns independent of location or product type.

Organization:

This thesis is divided into five parts. The first part provides an overview of the real estate investment industry and real estate portfolio management. The next section reviews the history of Modern Portfolio Theory. It traces the history of MPT from the securities markets to its current application to real estate investment. Risk and return variables in real estate investment are identified and discussed. The third section examines real estate product and regional diversification in more detail. The fourth section introduces a method for managing risk by dealing with its components explicitly, the specific risk matrix. An overall investment strategy is developed using individual deal analysis, product-type and regional diversification, and specific risk diversification. The strategy suggested is to use product-type and regional diversification to target acquisitions and sales, and to use specific risk diversification to confirm the targets and to inform the deal structures (i.e. leases, debt, etc.). This strategy is not much different than that currently in use by Perini Investment Properties. Perini's specific risk matrix decision history is reviewed to assess the effectiveness of the matrix in practice. The final section presents a summary statement of the argument developed in the thesis:

that an integrated risk management strategy represents an improvement over many of the techniques currently in use, for all but the largest real estate investors.

**CHAPTER TWO:
MODERN PORTFOLIO THEORY AND REAL ESTATE**

Chapter Summary: Modern Portfolio Theory grew up in the securities markets, and its application to real estate is a recent occurrence. Real estate's risk and return characteristics and measurement complicate transfer of the theory to the new market.

As pension fund investors entered the real estate market in the early 1970's, they brought with them an investment strategy based upon Modern Portfolio Theory. It was this theory that was driving the decision to enter the real estate market, in order to better diversify investments in the stock and bond markets. Early attempts to apply MPT to real estate met with difficulty in two ways. First, the pre-existing base of real estate investors was set in its own way of doing things - opportunistic investment on a deal by deal basis. Second, real estate did not trade in an auction market as did stocks and bonds. The consequence of this was that transaction data was hard to come by. Even when it could be obtained, the heterogeneous nature of real estate assets made it unclear how the data could be applied. Assume we knew that two office buildings in Boston sold six months apart, the first for \$200/sf and the second for \$350/sf. It is not clear whether this price differential resulted from office property appreciation or from differences in the leaseholds between the two properties.

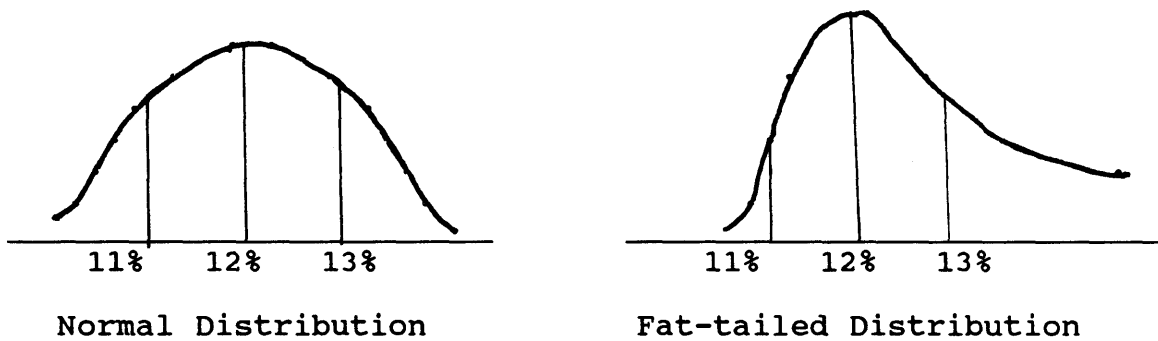
In order to understand the problems involved in applying Modern Portfolio Theory to real estate, we begin with an historic overview of MPT, and later discuss real estate's unique characteristics.

In the context of Modern Portfolio Theory, return is defined as the "dividend" yield plus the capital appreciation, with both terms expressed as a percentage of the value of the investment at the beginning of the holding period. The typical time used as the holding period is one year. An investment of \$100 is made to purchase a bond, which is held for one year. During that time, the bond pays a dividend of \$9 (9%), and realizes capital appreciation (from a drop in interest rates) of \$4 (4%). The total return on this investment is 13% per annum.

Risk is defined as the amount of variability in the returns. Investment risk is often expressed in terms of standard deviation of annual returns from the mean return for a particular investment. Assuming that real estate returns were normally distributed, there would be a 67% likelihood that the actual return would fall within one standard deviation of the expected mean return. In the bond example above, if the mean return was 12% and the standard deviation 1.0, actual returns between 11% and 13% are expected 67% of the time. In practice, however, real estate

returns are not normally distributed. They tend to be fat-tailed, biased upward, reflecting the fact that investors are risk averse, and must see some upward bias in returns in order to be motivated to place their capital at risk (Figure 2.1). In the above example, this means that actual returns will be above 11% more than 83% of the time, and be below 13% less than 83% of the time. Implicit in the use of any of these statistical approaches is the assumption that historical risk and returns are predictive of future risk and returns, at least in the long run.

FIGURE 2.1 - Normal vs. Fat-tailed Distributions



The first contribution to Modern Portfolio Theory was made by Markowitz in 1952. He proposed that the value of an asset was a function of the mean and variance of the expected return on that asset. A central tenet of

Markowitz's idea was that risk must be considered in the context of a portfolio. That is, an investor may purchase a combination of assets inter-related in such a way as to make the risk on the overall portfolio significantly less than the risk on any of the individual assets.

To illustrate this point, consider the case of two companies whose expected earnings vary inversely to one another. Firm A is a health food store. Firm B is a butcher shop. Both stores operate in the same isolated community. In addition both stores' earnings will vary according to the health conscious whims of the community. Every time the Medi-Van comes to town to perform cholesterol tests (once every three or four years), community residents stop eating meat for a year and eat health food instead. In years that the Medi-Van comes but does not run tests, residents eat both meat and health food. In years that the Medi-Van does not come, residents eat only meat and no health food.

The expected returns for the two firms under each of these scenarios is presented below. From the table we can see that investing in the stock of either firm will bring significant risk, in terms of variations in returns realized. At the same time, a portfolio containing 50% of stock A and 50% of stock B will be effectively riskless.

Under any of the three Medi-Van scenarios, the portfolio return would be 10%.

FIGURE 2.2 - Risk Diversification Example

| | Scenario | Return |
|--------------------------------|---------------|------------------------------|
| Firm A: Health Food | Van & Test | 20% |
| | Van & No Test | 10% |
| | No Van | 0% |
| Firm B: Butcher | Van & Test | 0% |
| | Van & No Test | 10% |
| | No Van | 20% |
| Portfolio: 50% A & 50% B | Van & Test | $.5(20\%) + .5(0\%) = 10\%$ |
| | Van & No Test | $.5(10\%) + .5(10\%) = 10\%$ |
| | No Van | $.5(0\%) + .5(20\%) = 10\%$ |

From the above example we can see that the returns on the two firms vary inversely. In order to quantify this covariance between returns on different assets, Markowitz proposed using correlation coefficients. In our Health Food and Butcher example, the correlation coefficient between the two stocks is -1.0. This is an idealized example. In theory, correlation coefficients can fall between 1.0 and -1.0. In practice, it is rare to find coefficients that are significantly below zero.

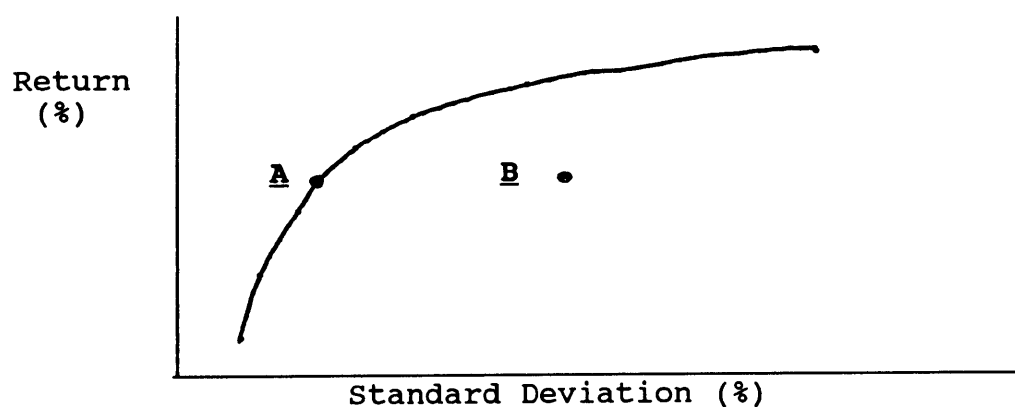
Extending the notion of diversifiable risk, Markowitz identified two kinds of risk: systematic and unsystematic.

Systematic risk is that risk that is endemic to the system; market risk. Unsystematic risk is asset specific risk. Examples of systematic risk in the stock market are changes in interest rates or changes in the condition of the overall economy. Examples of unsystematic risk (also called specific risk) in the stock market are the price of crude oil for oil companies' stocks and the price of silver for photographic companies' stocks. The point here is that unsystematic risk can be diversified away in a portfolio context, while systematic risk cannot be diversified away.

Subsequent additions to Markowitz's ideas lead to the argument that not only can unsystematic risk be diversified away, it must be diversified away. All other investors in the marketplace will recognize the benefits of diversification and invest accordingly. Anyone who does not do so is not receiving returns adequate to compensate for the level of risk incurred. That is, premium returns are afforded commensurate with the level of systematic risk an investment incurs. No such compensation is granted for unsystematic risk. This risk-reward relationship is best illustrated by the "efficient frontier", that describes the outer limit achievable by an investment portfolio. A portfolio that falls below the frontier line can be diversified to achieve either higher returns for the same level of risk or lower risk for the same level of returns.

Once a portfolio is on the frontier line, higher returns cannot be achieved without incurring higher risk. In Figure 2.3, A is an efficient portfolio and B is not. That is, A and B both yield the same return, but A does this with less risk, and is therefore a better investment.

FIGURE 2.3 - The Efficient Frontier (E.F.)

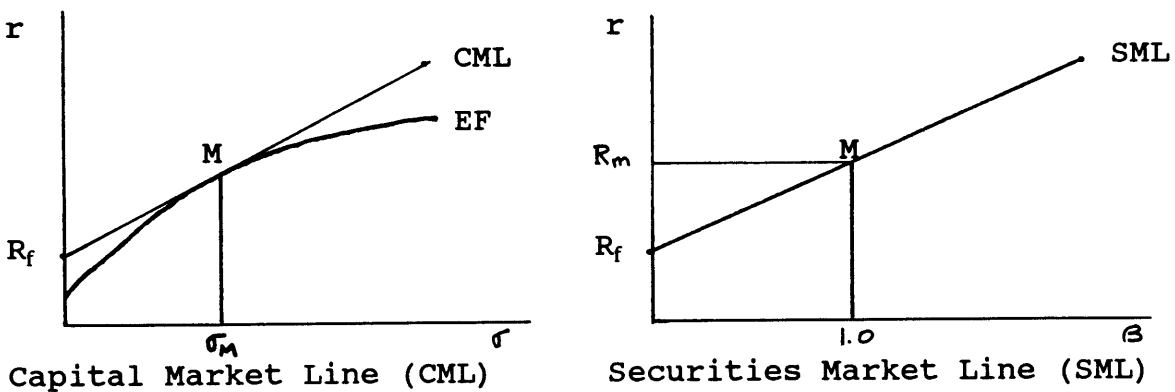


For investors in the stock and bond markets, Markowitz's theory was compelling, but nearly impossible to implement. The calculation of correlation coefficients across hundreds of assets proved quite cumbersome. This shortcoming was addressed by William Sharpe in 1964. Building on Markowitz's ideas, Sharpe introduced the Capital Asset Pricing Model. The key argument of CAPM is that the only variance that matters in a diversified portfolio is the

variance between the returns on an asset and the market. The covariance of that asset and the market, standardized by market variance, yields a "beta". Beta is the measure of an asset's volatility relative to the market, and is actually the regression slope coefficient of the individual asset regressed with respect to the market. An asset with a beta of 1.0 will move exactly in step with the market. An asset with a beta greater than 1.0 will tend to rise and fall by a greater percentage than the market. In this way, the high beta asset is said to have a high level of systematic risk. Conversely, an asset with a beta that is less than 1.0 will exhibit more stable returns and is said to have a low level of systematic risk. In place of Markowitz's Efficient Frontier, CAPM proposed a Capital Market Line to describe the outer limit of returns that can be obtained for a given level of risk. Regression of the Capital Market Line yields the Securities Market Line (Figure 2.4), which is normalized for the securities market. The risk measure in this case is beta. As can be seen below, the expected return on an investment has two components, the risk free return (R_F), and the risk premium return (R_S). The risk premium for an asset is equal to the asset's beta multiplied by the difference between the market's return (R_M) and the risk free return (R_F). In this way, assets are priced such that:

$$R_S = R_F + \text{Beta}_S(R_M - R_F).$$

FIGURE 2.4 - The Capital and Securities Market Lines



Since its introduction, the Capital Asset Pricing Model has enjoyed widespread use in the securities markets. Although the theory's validity has been called into question over the years, it is still in use in these markets today. CAPM has not, however, been applied to the real estate market, until recently. A dearth of historical data, an unclear market definition, and uncertainty about the validity of the theory have combined to limit the transfer of this technique from securities markets to real estate. Markowitz's principle of risk diversification in a portfolio context still applies however, and investors have used Markowitz's correlation coefficients method to direct their real estate diversification efforts. This subject is covered in more depth in the next chapter on portfolio diversification. Before continuing this line of inquiry

however, it is necessary to develop an understanding of the unique characteristics of real estate that may effect portfolio diversification. These characteristics are considered in two groups, real estate return variables and real estate risk variables.

REAL ESTATE RETURNS

Returns in real estate investment depend primarily on three factors; net income, appreciation, and tax effects. The income return component is derived from income on leases less operating expenses and management fees. On most properties, the income return is relatively stable from year to year. In this sense, the value of this component can be figured much like a bond. Factors that influence this value include inflation, interest rates, and credit quality considerations.

Appreciation:

The appreciation component of real estate investment returns is derived from changes in the market value of the property from period to period. Since the property does not actually change hands each period, determination of market value is estimated by using independent appraisals. This component of returns tends to be more volatile than the income, and its fluctuations dominate the property's total return. Factors that influence the appreciation component

include local supply and demand considerations, capital market considerations, and bias in the appraisal process. It has been argued that as long as the appraisal bias is consistent over time, the net effect on the validity of the numbers will be negligible. It is important to note, however, that even if this assertion is true, the appraisal bias does tend to smooth over market fluctuations, and therefore describes lower levels of variance (risk) than actual market conditions would warrant.

Tax Effects:

The tax component of real estate returns is derived primarily from the depreciation and mortgage interest deductions permitted by the federal tax code, as well as special credits to provide incentives for historic restoration, elderly housing, etc.. Anytime that the tax code is changed, it may impact the effective return from real estate. These changes can be direct ones, such as revising the depreciation schedule, or indirect ones, such as lowering the overall tax rate. The impact of tax code changes may be reflected in either the income return, or the appreciation return, or both.

REAL ESTATE RISK

Risk in real estate investment depends primarily on six factors, some of which have been mentioned above; inflation,

tax effects, investor confidence, financing, leasing, and market factors. Of these, the first three represent systematic risks in real estate, while the last three tend to be unsystematic risks. This is not a hard and fast rule, however, since the definition of the "market" will influence the systematic vs. specific risk determination.

Inflation:

The primary source used to develop the following overview of risk factors in real estate is a 1990 article by Randall Zisler on Real Estate Portfolio Management.[22] It has long been felt that real estate represents a hedge against inflation. Recent studies on the subject support this assertion, to a certain degree. A 1987 study by Hartzell, Heckman, and Miles [6] found that "real estate offers a 20% reduction in inflation risk with a 20% share of real estate in a portfolio." They went on to suggest that "the ability of real estate to hedge against inflation has been greater since 1978 than before." A separate study conducted by Michael Giliberto [4] in 1989 found that "Real estate was an effective hedge against high inflation but will not necessarily hedge all inflation." A 1989 study by Marc Louargand and Lynne Sagalyn [13] found that supply and demand imbalance in the local leasing market tends to limit the extent to which real estate owners can pass inflation through to tenants. This supply-demand imbalance was found

to be most pervasive for office and retail properties, and least evident for industrial properties. In light of these findings, it follows that real estate returns will likely suffer some degradation as inflation increases. That is, changes in inflation will effect the real rate of return for both the income and appreciation.

Tax Effects:

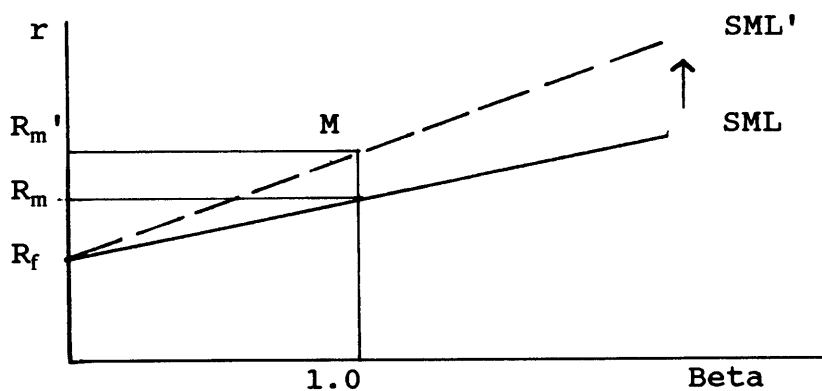
As mentioned above in the discussion on real estate return variables, tax effects can impact both the income and appreciation return components. It is important to recognize that real estate is a marketplace for both tax-exempt and taxable investors. Nevertheless, changes in the tax code can effect real estate values for both groups. In particular, to the extent that tax code changes can stimulate overbuilding, as was the case in the early 1980's, the impact of a glut of properties effects the income and appreciation returns for both tax-exempt and taxable investors. The Tax Reform Act of 1986, which limited and eliminated many prior tax incentives, has given rise to some innovative financial structures designed to allow the tax burden to be shifted from one investor group to another. One such technique is the use of refinancing (a non-taxable event), instead of an outright sale, to extract appreciation without incurring a tax liability. The use of convertible mortgages, in particular, allows for a sharing of the value

of the tax deferral by tax-exempt and taxable investors.

Investor Confidence:

Investor confidence in the broader United States securities markets tends to have a positive effect on real estate returns. A multi-variate regression run by Russell-Zisler [22] on FRC data found that as investor confidence erodes (as measured by the spread between the return on corporate and U.S. Government Bonds), real estate returns rise. This provides confirmation of the conventional wisdom that in times of trouble, investors take flight to hard assets. Another way to view this effect is as a shift in the Securities Market Line. That is, as high real rates obtain, the risk premium increases. This can be seen graphically in Figure 2.5 below.

FIGURE 2.5 - Securities Market Line Shifts



Financing:

Financial risk has three primary components; interest rate risk, refinancing risk, and default risk. Even if an investor owns a property not subject to any debt, shifts in interest rates will effect the value of the expected income stream from the property. If interest rates rise, the value of the expected cash flows is diminished due to the higher discount rate used to compensate for the higher interest rates. This reflects the opportunity cost of capital. A similar argument can be made for a property that is subject to debt. In this case, however, it is possible that the existing debt may work to counteract the change in discount rate. If the debt is fixed-rate, a rise in interest rates will give the debt some positive value, since it is now at a below market rate.

Interest rate changes also contribute to refinancing risk. In the case of a property with a five year term bullet loan (that will require repayment of a large outstanding balance at the end of five years), refinancing at a higher interest rate will reduce the property's net income. In addition, if market conditions have deteriorated over the term of the loan, refinancing may result in recognizing a loss of principal, if the lender determines that the property experienced negative appreciation.

Default risk is non-existent in the case of a property with no debt, and quite high in the case of a property with 100% debt. The greater the debt service burden a property has to carry, the more likely it is that other risk variables may cause the property to realize a period of negative cash flow.

Leasing:

Leasing risk has four components; re-leasing risk, tenant default risk, interest rate risk, and inflation risk. Re-leasing risk increases as average lease maturity decreases and as the number of near-term lease expirations increases. The potential impact of this risk on property value will depend on market conditions. A healthy leasing environment, where market rents are higher than contract rents for the property, will allow a high level of leasing risk to exist without degrading property values.

Tenant default risk is the risk that a tenant will not fulfill its obligations under the lease contract. This in turn depends mostly on the regional and national economic climate and the credit quality of the tenants. Here again, the broader market conditions can effect the extent to which high default risk will impact a property's value. As the probability increases that a replacement tenant can be found to pay the same or higher rent as the defaulted tenant, the

impact of impending default on the property value decreases.

Interest rate risk relates to the interaction of several factors; inflation, lease characteristics, and market conditions. Neglecting influence from these three factors, as interest rates rise, the value of the lease contract income stream decreases, as it must be discounted at a higher rate. Shifts in nominal interest rates are usually accompanied by shifts in the inflation rate. Leases are often written to pass-through increases in operating expenses, in order to maintain a constant level of net income. Even when this pass-through provision is present, however, the constant level of net income is eroded by the effects of inflation. Beyond this, market conditions will dictate to what degree pass-through provisions can be included in leases, and what payment is extracted by the tenants for the provision.

For the discussion in this section, the market, as it relates to market risk, is defined to be a local geographic area (i.e. Boston metropolitan area). Market risk is closely tied to many of the other factors listed above. The level of market risk depends on the level of economic growth in a region together with supply and demand balance in that region's leasing market. As supply exceeds demand and/or economic growth becomes negative, market risk increases.

Poor market conditions have the greatest effect on appreciation returns. These conditions can also impact income returns by increasing vacancy rates, increasing rental concessions (free rent, high tenant fit up allowances, reduced inflation pass-through provisions, etc.), and increasing uncertainty.

In the next chapter the Modern Portfolio Theory concepts are applied to some of the unique characteristics of real estate that have been outlined above. The focus of the chapter will be on techniques currently in use that look to diversify risk in a portfolio context across property type and location. As these methods continue to develop, their effectiveness increases. However, the increasing sophistication of the techniques make them most appropriate for very large portfolios. Chapter Four presents a simplified approach that can be used by portfolios of any size to balance a portfolio's risk across types of specific risk. This method is particularly appropriate for all but the largest portfolios. It is not resource intensive, and attempts to more fully exploit the asset management functions already performed by real estate investors.

**CHAPTER THREE:
PORTFOLIO DIVERSIFICATION & SYSTEMATIC RISK**

Chapter Summary: Many institutional investors in real estate have employed strategies to diversify away two easily identified specific risks; product-type and location. Over time these strategies have become more refined. The strategies that are currently in place are more sophisticated and effective than those used a decade ago. A major problem that still plagues strategy formation and implementation is the limited data available on real estate.

The Real Estate Market:

In order to classify real estate risks as being systematic or unsystematic, a clear definition of the market boundary is required. To investors in the stock, bond, and real estate markets, the relevant market boundary for diversification is one that includes all of these markets. In this sense, the individual asset categories (i.e. real estate, stocks, and bonds) in the overall portfolio would not need to be fully diversified within that category. That is, the portfolios of these investors could use stock market assets to diversify risk factors that are either systematic or specific to the real estate markets. In contrast, the best that an investor with only one asset category can do is to diversify a portion of the multi-asset specific risk. From this investor's perspective, the remaining portion of the multi-asset specific risk appears to be systematic risk within the single asset category. MPT suggests that this

single asset category investor has not optimized his risk/return relationship until he expands his portfolio to include allocations in other asset categories. The logical extension of this argument is that investment portfolios should include all asset categories in all locations, globally. While this may be a valid theoretical construct, most institutional investors restrict their activities to a few select asset categories, that only recently have expanded to include real estate.

The argument for a more discreet market definition is strengthened by the fact that most investment managers specialize in particular markets. The consequence of this specialization is that a portfolio that crosses asset classes is treated as though it were separate portfolios invested in each asset class. An initial asset allocation decision is made to invest a certain percentage of the portfolio in each asset class. The portion of funds allocated to real estate is then invested in ignorance of the remaining funds. It follows from this discussion that the most appropriate definition of a market boundary, for use in the following pages, would not extend beyond the real estate market. It should be understood that employing this market boundary specification neglects opportunities for improving diversification further in the overall investment portfolio by explicitly addressing relationships across

asset categories.

For the purposes of this paper, the real estate market is defined to be equity interest in real assets (land and improvements), of institutional quality (as defined below), within the United States domestic market. The justification for this definition is that this is the market that most institutional real estate investors limit themselves to. Debt instruments are not considered explicitly, although the arguments made in general for equity interests could be extended to include debt once the different risk/reward structure inherent in debt is corrected for. Real assets include land and all building product types (apartments, hotels, offices, industrial). The institutional quality requirement is a bit fuzzy in that it can shift over time, according to institutional preferences (i.e. junk bonds from 1970-1990). In the market today, institutional quality is primarily expressed as a minimum asset value of \$3-4 million. Single family homes for rental are definitely not institutional quality investments. The restriction to the United States domestic market is again derived from institutional preferences. The current interest in international real estate investment may warrant an extension of the domestic boundary sometime in the future. For now, however, the domestic market is most appropriate given the scope of this paper.

Systematic and Specific Risks:

Working with this understanding of the market boundary, it is now possible to continue the discussion about systematic and specific risk in real estate investment. In the last chapter, six risk variables for real estate investment were identified; inflation, tax effects, investor confidence, financing, leasing and market factors. In the context of the national real estate market, all of these factors can be seen to have both systematic and specific components.

An increase in the overall U.S. inflation rate will affect all regions equally. In that sense, inflation would be characterized as systematic risk. It cannot be diversified away by any combination of assets in the domestic real estate market. At the same time, inflation in a certain sector can affect regions of the country differently, depending upon their degree of reliance on inputs from the inflated sector. A prime example of this was the energy crisis of the 1970's. The escalation in oil prices created a boom in regions that could drill for oil (Texas), and created a bust for regions who were most heavily dependent on oil consumption (the Northeast). In this sense, inflation that is driven by a particular sector is a specific risk that can be diversified away.

A similar argument that inflation has both systematic and specific components can be made with respect to product types within or across regions. In the rising energy cost example above, it is likely that within the Northeast region the effect of this inflation would be greater for a multi-family residential property than for an office property. Multi-family residential properties are less able than other property types to pass on increases in energy costs (tenants are constrained by a total housing budget), and it follows that their net income would be affected most by changes in the cost of energy. The systematic component to this sector inflation, would be the lowest common denominator cost increase experienced by the various product types.

In the case of tax effects, the argument is much simpler. Changes in the Federal Tax Code represent a systematic risk to domestic U.S. real estate investors. Although tax burdens can be shifted from one party to another, this is not the same as diversifying tax effects away. State Tax Code changes represent specific risk. By holding properties in different states, the impact of a change in the income or capital gains tax rate can be minimized. An investor whose real estate holdings are all in one state is incurring a tax risk that he is not being compensated for.

Changes in investor confidence can also be seen to have both systematic and specific components. Recall from the last chapter that a multi-variate regression by Russell-Zisler [22] on FRC data found that as investor confidence erodes (as measured by the spread between the return on corporate and U.S. Government Bonds), real estate returns rise. In the context of this study investor confidence can be characterized as a systematic risk. The effect of confidence changes was nearly the same across all regions and property types. Given this, it is not possible to diversify the risk away.

Within real estate, however, investor confidence acts as a specific risk. The bad press that a region or product type may receive tends to create an overreaction by investors. For example, the early part of 1990 has seen a reluctance of investors to participate in new ventures in the Northeast region. It has been suggested that this withdrawal from the region may be in excess of what is fundamentally warranted. Only time will tell for sure. Conversely, in Houston in the 1970's and early 1980's the level of investor confidence in the region resulted in a development glut that continues to depress returns on those investments.

While it has been argued that these risk variables

(inflation, tax effects, and investor confidence) have both systematic and specific components, the systematic risk component is dominant in each case. As discussed above, the specific components of these risks can be diversified by holding a portfolio across product and regional lines. The three remaining risk variables (financing, leasing, and market) are dominated by their specific components. To a certain extent, these may also be diversified away by holding a portfolio across product and regional lines. The next chapter discusses these three risks in more detail, and develops an approach to enhance the effectiveness of portfolio diversification efforts, by using asset management functions to the portfolio managers' advantage.

Early Diversification:

In the early days that preceded the participation of institutional investors, real estate development and investment was largely characterized by specialists. The most specialized investors restricted their activities to one product type in one region. When diversification did occur, it usually took one of two forms. The easiest way to diversify was to invest in more than one product type in a familiar region. This strategy could achieve a certain measure of diversification, while incurring a minimum increase in overhead costs. A somewhat more difficult way to diversify was to invest in familiar product type in

several different regions. Opening up new regional markets required an upfront investment to learn and establish a presence in the market.

As institutional investors entered the real estate marketplace, seeking to diversify their holdings in the securities markets, they sought to improve upon the diversification strategies in practice at the time. The desired end was to own a real estate portfolio that approximated an index of the overall real estate market. This notion was transferred from the stock market where portfolios of thirty to forty stocks could, if chosen correctly, approximately mirror the performance of the Standard and Poor's 500 stock market index. This objective was hampered by the lack of a market index for real estate, and the lack of historical data from which to generate betas or correlation coefficients.

Institutional investors responded to these constraints by acquiring assets that seemed to be diversified. The new real estate investors had sufficient resources to attempt diversification across both region and product type. Rules of thumb were used to set asset allocation targets, across both regions and product types. Because these rules of thumb were developed without any fundamental justification, this practice has become known as naive diversification

(naive in that there is no statistical study to justify the allocation targets).

The initial efforts to diversify across regional real estate markets were not very effective. The dramatic decline of real estate values in cities such as Denver, Houston, and New Orleans, that accompanied the drop in oil prices, caused investors to critically assess their diversification strategies. New Orleans, classified as a southern city, was intended to diversify exposure to Denver, a western city. The then prevailing regional classification scheme was obviously flawed.[20] As time went on, investors were able to refine the strategies by using historical total return data from their own portfolios.

Over the last few years, the body of literature pertaining to locational and product type diversification has been growing rapidly. Most articles consider product type and location considerations separately. The next three sections present a summary of the most recent of these articles, followed by observations and recommendations.

Diversification by Product Type:

The first compelling evidence of diversification benefits derived from real estate portfolios holding different product types was provided by a 1987 study by Firstenberg,

Ross, and Zisler.[2] Using data from the Frank Russell Company (FRC) Index, the authors developed an efficient frontier, across five property types. The efficient portfolio mixes are shown in Figure 3.1. The highest returns are achieved by holding a portfolio heavily weighted in hotel and office properties. This strategy, however, exposes the investor to higher levels of systematic risk. The lowest risk portfolios would contain mostly apartment, industrial, and retail properties.

FIGURE 3.1 - Efficient Portfolio by Property Type
(Proportions, %)

| Apartment | Hotels | Indust. | Office | Retail | Mean | Std. Dev. |
|-----------|--------|---------|--------|--------|--------|-----------|
| 4% | | 4% | | 92% | 11.80% | 2.10% |
| 9 | | 20 | | 71 | 12.30 | 1.97 |
| 13 | | 36 | | 51 | 12.80 | 1.94 |
| 18 | | 50 | 1% | 31 | 13.30 | 2.01 |
| 23 | | 61 | 3 | 13 | 13.80 | 2.18 |
| 30 | | 61 | 9 | | 14.30 | 2.43 |
| 41 | 2% | 34 | 24 | | 14.80 | 2.81 |
| 53 | 3 | 7 | 38 | | 15.30 | 3.29 |
| 38 | 16 | | 46 | | 15.80 | 4.03 |
| 15 | 33 | | 53 | | 16.30 | 5.23 |
| | 49 | | 51 | | 16.80 | 6.67 |
| | 67 | | 33 | | 17.30 | 8.40 |
| | 84 | | 16 | | 17.80 | 10.29 |
| | 98 | | 2 | | 18.20 | 11.88 |

Source: Firstenberg, Zisler, and Ross [1987]

Subsequent studies have verified these findings. It is interesting to note that a more recent study by Randall Zisler [22], which excluded apartments and hotels, yielded a somewhat different efficient mix. Zisler's study described high return portfolios which were dominated by office and

retail. The lowest risk portfolios contained mostly R&D and warehouse properties.

While most researchers agree that diversification across product types reduces portfolio risk, some criticism has been directed at investor's implementation of property type diversification strategies. In their 1987 article, Firstenberg, Ross, and Zisler [2] caution that often "within a given city, the same economic forces that influence the business demand for industrial and office space also affect the demand of workers for residential space, customers' demand for hotel room-nights, and the demand of retailers who sell to the workers." A thorough analysis of inter-industry and inter-occupational linkages is advocated.

In a 1989 article by Hopkins and Shulman [18], the observation is made that institutional portfolios exhibit significant deviation from an actual index of the real estate market. The study estimates the market (defined to be all commercial buildings constructed over the last twenty years) to consist of 35% apartments, 30% offices, 18% retail, 11% warehouses, and 6% hotels. This mix is contrasted with the FRC index (as a proxy for institutional holdings) which includes 4% apartments, 58% office, 22% retail, 15% warehouses, and 2% hotels. This deviation suggests an institutional bias that may reduce the

effectiveness of their product-type diversification efforts.

Despite these limitations, it is apparent that diversification across product-type, when properly executed, can reduce portfolio risk. The most difficult obstacle that needs to be overcome in devising an effective product type diversification strategy is the absence of adequate data on historical returns. This subject is addressed in more detail in a later section of this chapter.

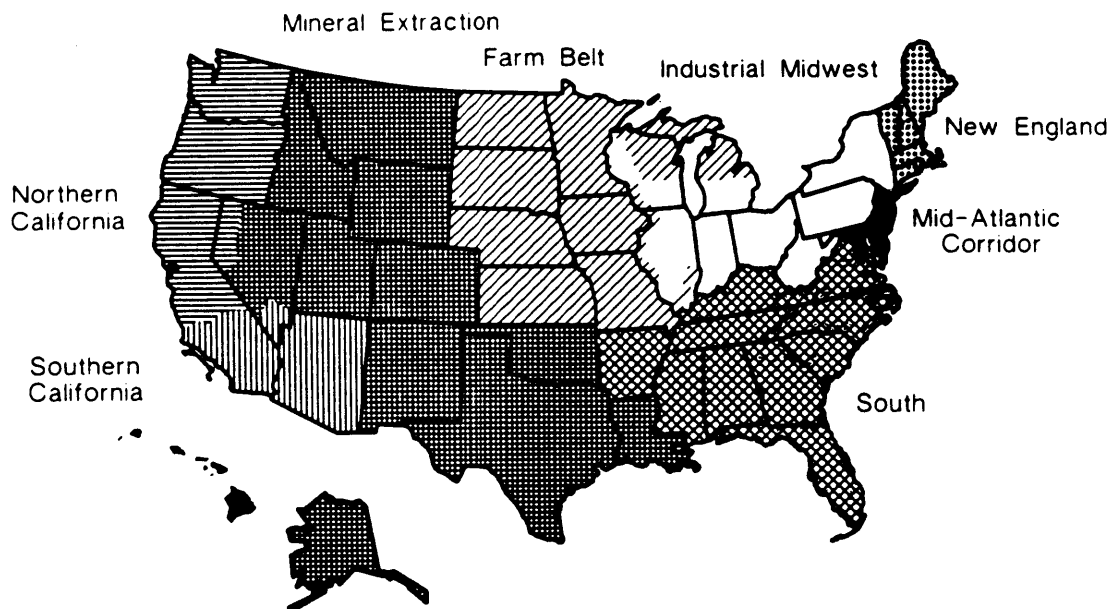
Diversification by Location:

A 1986 article by Hartzell, Heckman, and Miles [6] reviewed the benefits derived from diversification by region (East, West, South, and Midwest) and property type. Among the findings cited in the article was that the "results suggest that current industry practice represents little more than naive diversification. Due to the low levels of systematic risk, current distinctions by region and property type make little sense in a world of costly diversification. ... more exacting categories [are needed]."

The call for more refined regional categories to better reflect the economic factors influencing real estate returns was answered in a 1987 article by Hartzell, Shulman, and Wurtzbaach [8]. The thrust of this article was to propose a redefinition of regions that are "economically cohesive."

The inspiration for the classification was a book by Joel Garreau, The Nine Nations of North America. Drawing from his experience as a newspaper reporter, Garreau divided the country into nine distinct regions. Working along these lines, Hartzell, Shulman, and Wurtzebach identified eight economic regions; New England, Mid-Atlantic Corridor, Old South, Industrial Midwest, Farm Belt, Mineral Extraction Area, Southern California, and Northern California (Figure 3.2).

FIGURE 3.2 - Eight-Region Segmentation



Source: Salomon Brothers Inc, February 1988

The study provided economic profiles for each of the regions. New England has an employment base in high-

technology and defense related production and business, financial and education services. The region is characterized as a net energy importer. The Mid-Atlantic Corridor depends on international trade, government/defense spending and financial and business services. This area is also a net energy importer. The Old South has growing manufacturing and office sectors, resulting from the region's low production and living costs. The Industrial Midwest is dominated by unionized mass production industries; steel, automobiles, machinery, and farm equipment. This region is a net energy importer. The Farm Belt economy depends on the production and processing of agricultural commodities. The Mineral Extraction Area depends mostly on oil. Some cities in this area have seen recent growth in services and high-technology production. Southern California's economic activities include Far East trade, defense production, and low wage manufacturing and services. Northern California depends on trade, defense, services, and lumber.

The regressions run using this regional classification scheme gave rise to the following conclusion:

Regional diversification does matter for real estate portfolios, in the sense that the eight-region categorization produces lower correlation coefficients than the traditional classification into four regions. ... the traditional four-region analysis does not capture the impact of regional diversification. This study represents an attempt to move from mere geographic diversification to a more economic base-

oriented concept.

In a subsequent article, Wurtzebach [20] suggested that the above study could be further improved with a more refined analysis of the characteristics underlying regions. Wurtzebach advocates two approaches to achieve this end. Locations can be classified by analysis of relative employment growth patterns, or by analysis of employment composition (economic base). Both of these methods allow locational classification at the metropolitan (SMSA) level, as opposed to broad geographic regions.

The employment growth approach identifies five growth categories; consistently higher growth (Atlanta and San Francisco), recently higher growth (Oakland and Jacksonville), recently lower growth (Houston and Miami), consistently lower growth (Kansas City and Cleveland), and cyclical growth (New York and Indianapolis). Back testing these categories against the same data base as the Hartzell, Shulman, and Wurtzebach study resulted in even lower correlation coefficients, indicating superior performance.

The economic base approach proposes five broad categories of employment composition; diversified (St. Louis and Wilmington), energy (Houston, Tulsa), government (Washington and San Antonio), manufacturing (Chicago and Anaheim), and services (New York and San Francisco). The broad categories

were intended to maintain statistical significance subject to the size of the historical data base. Testing of this method proved it to be more effective than the four-regions approach, but less so than the eight-regions approach. One advantage cited for the economic base approach is that it "facilitates the translation of sectoral forecasting to analysis of investment strategy."

In a 1990 study, S. Michael Giliberto [5] proposed an economic location diversification scheme that builds upon both the eight nation regional classification and the employment growth approach. Giliberto argued that employment growth is the best proxy of demand for real estate. In any given regional market, employment growth can be seen to have three components; a national effect, an industry mix effect, and a regional effect. The first two components represent systematic risk in the U.S. domestic real estate market. The third component, the regional effect, is specific risk within the real estate market. As such, the variations in regional employment growth across the country describe the opportunities for diversification of location specific risk. The two tables below summarize the results of Giliberto's regressions utilizing this method.

FIGURE 3.3 - Correlations between Total Employment in the Eight Nations, 1976-89 (Annual Data)

| | NEG | MAC | IMW | SOU | FMB | MEX | NCA | SCA |
|--------------------------|------|------|------|------|------|------|------|------|
| New England (NEG) | 1.00 | | | | | | | |
| Mid-Atlantic (MAC) | 0.88 | 1.00 | | | | | | |
| Industrial Midwest (IMW) | 0.73 | 0.79 | 1.00 | | | | | |
| Old South (SOU) | 0.86 | 0.97 | 0.88 | 1.00 | | | | |
| Farm Belt (FMB) | 0.77 | 0.82 | 0.96 | 0.89 | 1.00 | | | |
| Mineral Extraction (MEX) | 0.42 | 0.27 | 0.21 | 0.19 | 0.20 | 1.00 | | |
| North. California (NCA) | 0.76 | 0.73 | 0.84 | 0.81 | 0.86 | 0.41 | 1.00 | |
| South. California (SCA) | 0.81 | 0.86 | 0.93 | 0.90 | 0.92 | 0.38 | 0.94 | 1.00 |

Sources: U.S. Bureau of Labor Statistics and Salomon Brothers, Inc.

FIGURE 3.4 - Correlations between Regional Employment Effects in the Eight Nations, 1976-89 (Annual Data)

| | NEG | MAC | IMW | SOU | FMB | MEX | NCA | SCA |
|--------------------------|-------|-------|-------|-------|-------|------|------|-----|
| New England (NEG) | 1.00 | | | | | | | |
| Mid-Atlantic (MAC) | 0.64 | 1.00 | | | | | | |
| Industrial Midwest (IMW) | -0.45 | -0.27 | 1.00 | | | | | |
| Old South (SOU) | 0.65 | 0.81 | 0.05 | 1.00 | | | | |
| Farm Belt (FMB) | -0.22 | -0.18 | 0.63 | 0.13 | 1.00 | | | |
| Mineral Extraction (MEX) | 0.27 | 0.29 | -0.73 | -0.14 | -0.64 | 1.00 | | |
| North. California (NCA) | -0.14 | -0.44 | -0.29 | -0.35 | -0.09 | 0.07 | 1.00 | |
| South. California (SCA) | -0.07 | -0.01 | 0.24 | -0.18 | 0.52 | 1.00 | | |

Sources: U.S. Bureau of Labor Statistics and Salomon Brothers, Inc.

Figure 3.3 shows that all but the Mineral Extraction Region experienced employment growth consistent with the national growth rate. During this same time period, Figure 3.4 shows that the differences in the regional component of employment growth across the country was quite significant. "These values imply that diversification gains are possible and support the regional diversification thesis. To understand a potential source of diversification gains, real estate investment managers can examine regional employment changes that remain after the removal of national and industry-mix effects."

Giliberto's approach seems most promising. Several observations should be noted at this time. The lack of good data on real estate adds support for the method, since it uses data that is readily available from the U.S. Bureau of Labor Statistics. In this way, it avoids the major pitfall inherent in most of the other quantitative based diversification schemes. Furthermore, the general approach allows the use of economic forecasts, so that investors do not fall prey to the tenuous assumption that historical trends are predictive of the future. In these two ways this approach is superior to the other strategies considered so far. However, it is important to understand that this method only looks at half of the equation - real estate demand. As Giliberto points out, "An important caveat is that the employment data do not reflect the supply side, so caution must be exercised in extrapolating correlations in job changes to investment returns."

One suggestion that is beyond the scope of this paper, is to use the three component approach (national, industry-mix, and regional effects) to regress real estate return data for the eight regions. The results of this exercise can then be compared to Giliberto's numbers. It may be possible to infer something about the supply elasticities for each of the regions. Given sufficient data, this exercise might

best be conducted at the SMSA level, since supply effects tend to be most related to local regulations and developer capacities.

Diversification by Product Type and Location:

In a 1989 article, Susan Hudson-Wilson [10] advocated a diversification approach that is something of a hybrid of the property-type and location techniques discussed above. Hudson-Wilson argues that it may be inappropriate to use the same property type allocation for each region, and vice versa. Instead, she proposes a simultaneous (as opposed to sequential) approach. "Thus an asset class is defined as, for example, Baltimore-Office, Baltimore-Apartment, Baltimore-Retail, Baltimore-Industrial, San Francisco-Office, San Francisco-Apartment, etc." After performing statistical regressions according to these parameters, groups of assets with shared attributes are clustered.

One criticism of this approach is that it amounts to looking for answers without knowing what the questions are. A problem arises when clusters are defined that don't seem to make sense. What is the meaning of a high correlation between apartments in San Bernadino and office buildings in Boston? Without an explanation of the forces underlying the behavior, it may be inappropriate to assign predictive potential to the observed historical relationship.

Even if one were to put aside the above concern, successful implementation of this intensive quantitative method is hampered by data constraints. Only the largest investors have enough historical data to attempt this kind of approach. For those few investors with sufficient resources, it seems that the best use of this detailed approach is to suggest relationships to seek explanations for. The result will be an improved understanding of causes and effects in real estate, which can enhance an overall diversification strategy. However, smaller scale investors will need to implement strategies that are less quantitatively demanding.

Data Constraints:

By now it is apparent that a common thread running through the research is that the data currently available severely limits the extent to which diversification can occur. Many institutions do not have sufficient data in-house to successfully implement anything beyond naive diversification. These investors depend on outside data sources to suggest allocation targets. This reliance on outside data creates a problem for smaller firms. There is very little outside data currently available, and what is available isn't very good or very detailed.

The FRC index is the oldest and most commonly used real estate data source. It is a quarterly time series running from 1978 to the present. The asset mix of the index by product type and regional composition as of June 30, 1987 is shown in the tables below.[17]

FIGURE 3.5 - Property Composition of FRC Index
(All dollars in Millions)

| <u>Property Type</u> | <u>Property Value</u> | <u>Percent by Value</u> | <u>Number of Properties</u> | <u>Percent by Number</u> |
|----------------------|-----------------------|-------------------------|-----------------------------|--------------------------|
| Office | \$ 5,212 | 47% | 300 | 30% |
| Retail | 2,166 | 20 | 133 | 13 |
| Industrial | 3,080 | 28 | 521 | 52 |
| Hotels | 255 | 2 | 12 | 1 |
| Apartments | <u>343</u> | <u>3</u> | <u>29</u> | <u>3</u> |
| Total | \$11,056 | 100% | 995 | 100% |

Source: Ross and Zisler [1987]

FIGURE 3.6 - Regional Composition of FRC Index
(All dollars in Millions)

| <u>Property Type</u> | <u>Property Value</u> | <u>Percent by Value</u> | <u>Number of Properties</u> | <u>Percent by Number</u> |
|----------------------|-----------------------|-------------------------|-----------------------------|--------------------------|
| East | \$ 2,420 | 22% | 137 | 14% |
| Midwest | 1,584 | 14 | 208 | 21 |
| South | 2,635 | 24 | 307 | 31 |
| West | <u>4,417</u> | <u>40</u> | <u>343</u> | <u>35</u> |
| Total | \$11,056 | 100% | 995 | 100% |

Source: Ross and Zisler [1987]

Zisler and Ross [17] caution that "there may be systematic features of the FRC properties that affect the pattern of returns. In particular, the decisions to buy and

sell may not be representative of a value-weighted real estate index. This notion of a bias to the index is supported by the Hopkins and Shulman [18] study cited earlier. The property type weighting of the FRC Index differs substantially from a value weighted index of the overall real estate market.

A further concern has been voiced by a number of researchers who question the validity of the index return data. In a 1988 article, Hartzell and Webb [9] reported responses to a survey of over 100 major real estate investors and researchers. "Only 18% of the respondents said they believed that the FRC Index approximated the actual volatility of real estate. The reason most often cited for this anomaly is the smoothing caused by using appraisals to estimate property appreciation. This belief has stimulated interest in the development of a transaction based real estate index. To date, however, no one has been able to overcome the "noise" in the transaction data that is derived from the heterogeneous nature of real estate. Price variations between two properties will most likely be dominated by differences in their respective leasehold interests. The Frank Russell Companies recently abandoned its attempt to develop a transaction data base, citing the noise issue as the primary obstacle. A transaction database sponsored by Standard and Poor's 500, the National Real

Estate Index, has not been well received by investors. Despite the company's claim that the index has been "normalized" to correct for differences in property characteristics, the perception among investors is that this database is less useful than the appraisal-based FRC index.[14]

Recommendations:

In view of the information presented in this chapter, two recommendations are in order. First, the economic location approaches offer the most promising portfolio diversification strategies for all real estate investors. In particular, Giliberto's focus on regional variations in employment growth appears to be the most appropriate strategy for all but the largest investors, for three reasons. First, it has an intuitive appeal lacking in the other trend oriented approaches. Second, implementation of an investment strategy incorporating this technique would not be overly resource intensive. The data needed to run the regressions is readily available. Third, this method facilitates the possibility of a "forward" looking approach, rather than relying solely on historical trend analysis. Asset allocation decisions could be made with the use of economic sector forecasts. As mentioned earlier, this approach needs to be supplemented with some accounting for the supply characteristics of the individual markets. If no

statistical technique can be devised to describe supply, investors could still use Giliberto's demand description, and supplement it with their own knowledge of local market supply constraints.

The second recommendation is that investors would do well to look beyond location and property-type diversification for risk management opportunities. The "noise" cited in the transaction data stems from factors that are internal to the property. The magnitude of this variation, relative to variation across external factors, suggests that significant benefits can be derived from diversification across specific risk factors that do not vary along location or product-type lines. The asset management function that is inherent in the real estate investment process offers an opportunity to achieve this objective. Managing portfolio risk in this way is covered in more detail in the next chapter.

**CHAPTER FOUR:
PORTFOLIO MANAGEMENT & SPECIFIC RISK**

Chapter Summary: While location and property-type variations have been shown to offer significant opportunities for portfolio diversification, real estate investors should also look to diversify specific risks that are not addressed by these two approaches. One tool to accomplish this task is a matrix that ranks several categories of specific risk for each property, and attempts to coordinate decision-making between asset management and portfolio management.

In Chapter Two, six factors comprising risk in real estate investment were identified; inflation, tax effects, investor confidence, financing, leasing, and market factors. The first three of these were said to represent systematic risk within the U.S. domestic real estate markets. The remaining factors were characterized as being primarily specific risk. In chapter three, all of the risks were discussed in more detail, and techniques were presented for diversification of a portion of the specific risks identified.

Investors who are able to own properties in several different locations are able to diversify the specific risk component of tax effects, investor confidence, and market factors. Diversification across locations is most effective for specific risk due to market factors. Product-type diversification strategies address portions of the specific

risk arising from leasing and market factors.

From this discussion it is clear that while the diversification strategies presented in chapter three may be effective in dealing with some of the specific risk in real estate investment, other specific risks are ignored. Furthermore, investors who do not have a significant presence in the national or multi-product real estate market are unable to exploit the risk reduction opportunities presented by location and product-type diversification strategies. For these two reasons, it appears that an additional investment tool is needed to facilitate portfolio risk reduction supplementary to, or in lieu of location and product-type diversification. One possible tool to accomplish this end is presented below, in a case study of Perini Investment Properties, and their Risk Evaluation Matrix. Following the case study is a critical review of the matrix.

THE CASE

For the past four years, Perini Investment Properties, a Massachusetts based real estate investment company has been using a risk management technique that its president had helped to develop. The centerpiece of this strategy was the Portfolio Risk Evaluation Matrix (Figure 4.2). The purpose of the matrix was to describe the level of risk in the

portfolio broken down by location, product-type, and risk component. This information was then used to help set acquisition targets, by property-type and market. In addition, the matrix could be used to suggest ideal criteria for tenant selection, and finance and lease structure. This analysis of the individual components of property-specific risk was used as a planning tool for future portfolio-level decisions.

Since the matrix was first introduced, PIP's portfolio had reduced its concentration in the California market, and in the office property-type. While it is difficult to assess the extent to which the Risk Evaluation Matrix contributed to this improved diversification, the president was convinced that it had facilitated the process, at the very least. As he put it:

The matrix provides a clear rationale for allocation of capital and people resources in each area and product type. This reduces the time required to explain to area managers and get them to buy into the process.

Overall, he felt that the Risk Evaluation Matrix satisfied seventy to eighty percent of Perini's risk management needs.

Perini Investment Properties:

Perini Investment Properties was started in 1984 as a spin-off of Perini Corporation, to own, manage, and develop

a variety of income properties for the purpose of generating cash flow and long-term asset appreciation. A primary motivation for the company's creation was to break out the cash-flow oriented real estate properties in order to highlight their cash flow and asset appreciation benefits. Standard GAAP accounting practice treats real estate as a depreciable asset. In addition, publicly traded companies are valued on an earnings per share basis, which fails to reflect the tax benefits afforded real estate investors. By spinning PIP off from Perini Corporation as a separate, publicly traded real estate investment company, it was hoped that equity investors would be less inclined to discount the appreciation and tax benefits inherent in real estate. Towards this end, PIP's annual reports included both income and cash flow statements, and balance sheets on a historical cost basis and a current value basis. The company maintains that "cash flow and net current value are the most relevant measures of the Company's performance."

PIP's real estate holdings were concentrated in five markets: Massachusetts, Florida, Northern California, Arizona, and Georgia. One reason for selecting these particular markets is that they were locations that Perini Land and Development Company (a wholly-owned subsidiary of Perini Corporation) had already established a presence in. This allowed PIP to share resources with PL&D, and lower its

start-up and search costs. In addition to diversification across markets, Perini also invested in a variety of investment property-types: Apartment, Retail, Office, Mixed-Use, Office/Industrial, and Hotel.

In 1984, the portfolio contained assets with a market value of \$120.5 million. Ninety-two percent of this was in Northern California, and the remaining eight percent was in Massachusetts. The product mix was sixty-two percent offices, thirty percent apartments, and eight percent industrial properties. At the end of 1989, the portfolio had grown in size to \$300.6 million. The relative weighting by region was: California 65%; Arizona 16%; Florida 12%; and Massachusetts 6%. The composition by property-type was: Apartments 32%; Industrial/R&D 13%; Office 40%; Retail 11%; and Hotel 5% (Figure 4.1). PIP intended to continue making acquisitions at the rate of \$50-\$60 million per year. In addition, the company wanted to use these acquisitions to further diversify its portfolio.

In the company's last strategic planning meeting, the prospects for each of the markets and product-types were discussed. California looked good, Arizona and Massachusetts did not look good, and Florida and Georgia were mixed. Similarly, residential and industrial looked good, office looked poor, and retail and hotel were mixed.

FIGURE 4.1 - PIP Portfolio

| | | | | | | | At December 31, 1989 |
|----------------------------------|-----------------------|------------|---------------------------|--------------------|--------------------------------|---------------------|----------------------|
| | Project Type | Date Acq'd | Area ⁽¹⁾ Units | Current % Leased | Appraised Value (In Thousands) | % Economic Interest | |
| CALIFORNIA | | | | | | | |
| San Francisco | | | | | | | |
| Golden Gateway Center | Apartments/Commercial | 5/84 | 1,254 | 97% | \$150,600 | 66.3% | |
| Rincon | Mixed-Use | 12/85 | | | | 22.8% | |
| Apartments | | | 320 | | In Lease-Up | | |
| Retail | | | 78,000 s.f. | | In Lease-Up | | |
| Office | | | 418,000 s.f. | | In Lease-Up | | |
| Mountain View | | | | | | | |
| Mountain Bay Plaza | Office | 12/84 | 153,000 s.f. | 91% | \$ 28,500 | 100% | |
| San Jose | | | | | | | |
| South Bay Office Tower | Office | 12/85 | 153,000 s.f. | 81% | \$ 22,100 | 92.25% | |
| Walnut Creek | | | | | | | |
| Walnut Creek Executive Park | Office Park | 12/88 | 431,000 s.f. | 84% | \$ 39,000 | 100% | |
| ARIZONA | | | | | | | |
| Phoenix | | | | | | | |
| Valley North Business Park | Commercial/Industrial | 9/85 | 200,000 s.f. | 87% | \$ 7,900 | 95.5% | |
| Southwest Villages | Apartments | 12/85 | | | | 40% | |
| Phase I | | | 176 | 92% | \$ 11,560 ⁽³⁾ | | |
| Phase II | | | 240 | 92% | | | |
| Phase III | | | 194 | Under Development | | | |
| Fairmount Square | Office | 10/88 | 36,000 s.f. | 100% | \$ 5,000 | 100% | |
| Tampa | | | | | | | |
| Hayden Square | Mixed-Use | 12/86 | | | \$ 16,800 | 79.9% | |
| Office | | | 61,000 s.f. | 100% | | | |
| Retail/Commercial | | | 45,000 s.f. | 89% | | | |
| Tucson | | | | | | | |
| Radisson Suite Hotel | Hotel | 1/85 | 306 suites | 77% ⁽²⁾ | \$ 18,000 | 100% | |
| North Tucson Business Center | Office/Industrial | 3/88 | 91,000 s.f. | 100% | \$ 5,700 | 100% | |
| MASSACHUSETTS | | | | | | | |
| Easton | | | | | | | |
| Easton Industrial Park | Commercial/Industrial | 5/84 | 110,000 s.f. | 91% | \$ 6,400 | 100% | |
| Needham | | | | | | | |
| 410 First Avenue | Commercial/Industrial | 10/83 | 35,000 s.f. | 100% | \$ 5,700 | 100% | |
| Concord | | | | | | | |
| Comtech Park | Commercial/R&D | 12/85 | 107,000 s.f. | 20% | \$ 9,700 | 94% | |
| FLORIDA | | | | | | | |
| Boca Raton, Pompano Beach | | | | | | | |
| Boca-Pompano Properties | Commercial/Industrial | 2/87 | 252,000 s.f. | 68% | \$ 10,500 | 94.5% | |
| Longwood | | | | | | | |
| Dynamic Control Office Park | Office | 9/87 | 93,000 s.f. | 100% | \$ 9,300 | 93.5% | |
| Fort Lauderdale | | | | | | | |
| 1200 Weston Road | Office | 6/88 | 15,000 s.f. | 100% | \$ 2,600 | 100% | |
| West Palm Beach | | | | | | | |
| Village Commons Shopping Center | Shopping Center | 9/88 | 170,000 s.f. | 87% | \$ 20,750 | 100% | |

In setting acquisition targets, PIP took this information into consideration, together with the information provided by the matrix about risk levels across the portfolio.

The Risk Evaluation Matrix:

In 1986, the CEO was looking to develop a tool to help manage risk in Perini's portfolio. A literature survey on the subject of diversification failed to uncover any existing dependable tools for portfolio management. Working with a consultant, the Risk Evaluation Matrix was developed (Figure 4.2). The purpose of the matrix was to assess and quantify real estate investment risk. The matrix evaluates five separate elements that contribute to overall real estate risk. Each of the five elements is assigned a risk factor weight from 1 (low risk) to 5 (high risk). Based on these factors a mean and "value weighted" mean risk for the portfolio were calculated. The first element the matrix considered was capital exposure. The purpose of this factor was to assess the company's exposure to additional investment and/or costs to maintain or re-fit a property. For most of the established operating properties, this factor warranted a low risk rating. For most new properties, where costs are uncertain and financing structure is not yet set, this category elicits a high risk rating. A good example is Rincon Center, a newly developed mixed-use office, retail and apartment building located on

FIGURE 4.2 - PIP Risk Evaluation Matrix

| State Property / Weights: | Current Value Capital Investment | Capital Exposure | Lsg. Risk | Mkt. Risk | Oper. Risk | Valuation Risk | |
|---------------------------|----------------------------------|------------------|-----------|-----------|------------|----------------|------|
| | | | | | | | 1 |
| CA | Mountain Bay Plaza | \$28,500 | 2 | 3 | 4 | 2 | 3 |
| | South Bay Office Tower | 20,387 | 2 | 4 | 4 | 2 | 3 |
| | Walnut Creek Exec. Park | 39,000 | 3 | 3 | 2 | 2 | 6 |
| | Rincon Center | 37,620 | 5 | 3 | 2 | 3 | 2 |
| | Golden Gateway Center | 99,848 | 1 | 1 | 1 | 2 | 1 |
| | sub-total | \$225,355 | 13 | 14 | 13 | 11 | 15 |
| | Value Weighted Means | | 2.23 | 2.20 | 1.99 | 2.17 | 2.47 |
| AZ | Valley North Bus. Pk. | \$7,545 | 2 | 4 | 5 | 1 | 4 |
| | Hayden Square | 13,423 | 2 | 2 | 2 | 2 | 3 |
| | Alphagraphics | 5,700 | 1 | 1 | 1 | 1 | 3 |
| | Fairmont Square | 5,000 | 2 | 4 | 5 | 2 | 4 |
| | Radisson Hotel | 18,000 | 1 | 3 | 3 | 2 | 4 |
| | Southwest Villages | 7,155 | 4 | 5 | 5 | 2 | 4 |
| | sub-total | \$56,823 | 12 | 19 | 21 | 10 | 22 |
| | Value Weighted Means | | 1.83 | 3.04 | 3.26 | 1.77 | 3.66 |
| FL | Boca/Pompano Properties | \$9,713 | 2 | 3 | 3 | 1 | 3 |
| | Dynamic Control Office Pk. | 8,463 | 1 | 2 | 3 | 1 | 3 |
| | Weston Building | 2,600 | 1 | 1 | 1 | 1 | 3 |
| | Village Commons Shop. Ctr. | 20,750 | 4 | 4 | 4 | 3 | 2 |
| | sub-total | \$41,526 | 8 | 10 | 11 | 6 | 11 |
| | Value Weighted Means | | 2.73 | 3.17 | 3.37 | 2.00 | 2.50 |
| MA | Easton Industrial Park | \$6,400 | 1 | 2 | 3 | 1 | 2 |
| | 410 First Ave. | 5,700 | 1 | 1 | 1 | 1 | 2 |
| | Comtech Park | 9,700 | 5 | 5 | 5 | 3 | 5 |
| | sub-total | \$21,800 | 7 | 8 | 9 | 5 | 9 |
| | Value Weighted Means | | 2.78 | 3.07 | 3.37 | 1.89 | 3.33 |
| Total | | \$345,504 | 40 | 51 | 54 | 32 | 57 |
| Means | | | 2.22 | 2.83 | 3.00 | 1.78 | 3.17 |
| Value Weighted Means | | | 2.26 | 2.51 | 2.45 | 2.06 | 2.72 |

Portfolio Target: Value weighted Risk Factor - 3.0

the edge of San Francisco's financial district. The property experienced a certain amount of construction delay and cost overruns. As the building approaches full occupancy, the risk rating will move lower. Older properties with major lease turns expected near-term will also face high capital exposure risk. This is especially true in markets with high vacancy rate and tenant concessions.

The second element included in the matrix was leasing risk. This was defined as the sensitivity of rents to market forces. Two factors fed this component of risk. First was the relationship between average rents for the property and average rents for the market. Second was the impact of impending lease rolls. Staggered lease turns, and a balanced mix of lease terms contribute to a low risk ranking in this category. In contrast, a property that benefited from rents that were significantly above market rents, but had a major tenant's lease expiring in a year, would be subject to a high level of leasing risk.

The third element in the matrix was market risk. For the purpose of the matrix this was defined as the acceptability of the product in the marketplace. Forces impacting this risk component include prevailing vacancy rates, lease default rates, and lease concessions. In practice, the

distinction between leasing risk and market risk was not always clear. The original intent was for this category to be more property specific than leasing risk. In that sense, market risk reflected the attractiveness of Perini's property relative to other properties in the market.

The fourth element in the matrix was operating risk. This was defined as the company's ability to control the property's cost of operations. The forces driving this risk were similar to capital exposure. In new properties, the baseline costs are not known. This risk was typically high for a new property, but dropped as the property matured. The onset of high inflation in conjunction with a tough leasing environment might cause this risk to increase for established properties. On balance, it was felt that this risk was not as important as most of the others. That is, it did not tend to have a significant effect on either income or appreciation returns.

The fifth element in the matrix was valuation risk. The working definition for this category was risk of changes in perception of value of the income stream. To a certain extent, this risk was driven by the other four elements. It also picked up influences not included in the other four categories. One recent example of an external factor was the change in appraiser's behavior, particularly in certain

markets. A change from a liberal to a conservative appraisal could have a major impact on appreciation returns, independent of any of the other risk elements. Similarly, the valuation risk category includes systematic influences such as changes in cap rates resulting from capital market changes which may be independent of property markets.

In putting the matrix together, it was clear that not all of the risk categories were equally important. To compensate for this inequity, a weighting scheme was included. Capital exposure was deemed least important and given a weight of one. Leasing Risk, Market Risk, and Operating Risk were all judged to be equally important and given a weight of two. Finally, valuation risk was determined to be the most important element and given a weight of three.

Using the Matrix:

The matrix was viewed as a conceptual tool by most of PIP's executives. It was reassessed a couple of times a year, and used to set targets. To date, the matrix had been used exclusively for acquisitions. The target level of risk for the overall portfolio was 3.0. As of the 1989 Planning Session, the portfolio's risk level fell below this target at 2.45 (Figure 4.3). This suggested that the overall portfolio should seek to incur slightly more risk in pursuit

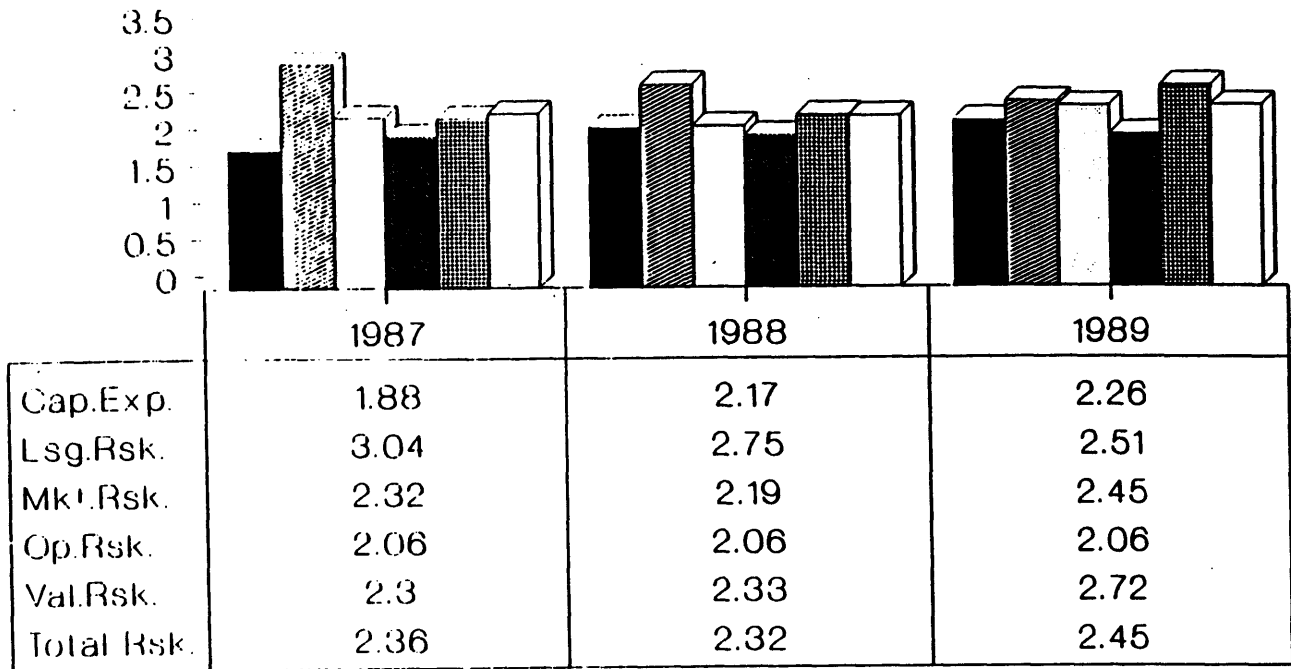
of higher returns. In addition to this overall risk assessment, the levels of risk elements, markets, and product-types were also important to consider.

In 1989, the risk levels by market were: California 2.24; Arizona 2.89; Florida 2.73; and Massachusetts 2.94. From these numbers, investment criteria for each of the markets was determined. Deals in Massachusetts should be fairly low risk. At the other end of the spectrum, the California portfolio allowed acquisitions with significantly higher levels of risk. A moderate risk level was desired for acquisitions in Florida and Arizona.

The risk levels by product-type were: office 2.52; residential 1.59; industrial 1.94; retail 2.92; hotel 2.90. Using this information, it was decided that any hotel or retail acquisitions would only be considered if they were deemed to be low risk. Higher risk acquisitions were considered appropriate for residential and industrial properties. In the case of offices, the poor market conditions for the product-type warranted a low risk approach, independent of the matrix rating.

Finally, the matrix also provided insight to levels of risk by its various components. These were: Capital Exposure 2.26; Leasing Risk 2.51; Market Risk 2.45;

FIGURE 4.3 - PIP Portfolio Risk Levels



Cap.Exp.
 Lsg.Rsk.
 Mkt.Rsk.
 Op.Rsk.
 Val.Rsk.
 Total Rsk.

Operating Risk 2.06; and Valuation Risk 2.72. In this case, the relatively high valuation risk was the source of some concern, while the low risk levels for operating risk and capital exposure suggested that it was possible to structure deals that were more aggressive in these two areas.

In theory, the matrix could be used for portfolio management issues that extended beyond acquisitions. One such example would be to suggest the most appropriate lease structure (term, index for escalation clause, etc.) for new tenants. In practice, there were several obstacles to achieving this end. In the leasing example, market conditions will often dictate to what extent property owners obtain their desired lease structure, and at what cost. Another impediment to overcome would be resistance from personnel within the organization. Unless area and asset managers could be convinced of the value of this kind of intervention, they were not likely to buy into it. To the people in the field, real estate investment was "the good deals", not the acquisition targets. To these people asset management was "tenant retention", and this started with established relationships that grew out of a hands-on approach.

The Internal Critique:

The company's CFO was the designated "custodian of the matrix". He served as the objective coordinator of the subjective ranking process. One concern he had voiced was not really being clear about what the overall risk target for the portfolio should be. The 3.0 target didn't directly relate to anything tangible and, in that sense, the matrix lacked a pragmatic benchmark. At the same time, the CFO was quite positive about the matrix's usefulness for focusing management's attention on particular issues, projects, and markets. If a project were listed in the matrix with a five rank for leasing risk, the portfolio manager would maintain close contact with asset management regarding the lease.

The area managers gave the matrix mixed reviews. Their enthusiasm for the tool did not quite match that of PIP's president. It was not clear whether or not this had been or would be a problem. There were no serious complaints about the matrix. No one cited it as an impediment to doing their jobs. At the same time, no one credited it with making their jobs any easier. In particular, where tough market conditions prevail, good deals are often few and far between. In this situation, the targets set by the matrix lose their relevance. At least one of the regional managers had, however, indicated that it was worthwhile having a tangible representation of senior management's

decision-making process.

There was some sentiment in the field that the area managers' market expertise was more important than the information in the matrix. Beyond this, some concern had been voiced that the matrix could sometimes be misleading. A product-type that is high risk in one location, may be low risk elsewhere. Despite these reservations, there was a general consensus that as the portfolio increases in size, the value of the matrix as a tool was likely to increase.

THE CASE ANALYSIS

In reviewing the merits of the Perini Investment Properties' Risk Evaluation Matrix as a risk reduction tool, two issues must be addressed. First, How useful is the general approach that employs a matrix to rank specific risk categories in a portfolio context? Second, How successful is this particular matrix, with its five categories of risk, in fulfilling the potential for risk reduction offered by a matrix approach.

The general approach of using a matrix to evaluate portfolio risk appears to have some merit. At the very least, it serves as a useful communication tool, within a real estate investment organization. In this way, the tension inherent between top-down portfolio decision-making

and bottom-up deal generation is somewhat abated. Beyond this, it may be inappropriate to label the matrix as a diversification technique in the MPT sense. The lack of a quantitative foundation defies any attempt to generate an "efficient frontier" with which diversification could take place. Instead, the matrix allows for a balancing of the portfolio across categories of specific risk, albeit in a somewhat naive form. This lack of statistical backup warrants the matrix a classification as a portfolio management tool, rather than an MPT diversification strategy. However, the risk evaluation matrix is useful, independent of its classification, as a tool for managing a portfolio's risk exposure. To maximize the effectiveness of the tool, investors should use the matrix to coordinate their asset management decisions with their portfolio management objectives.

The second issue to be addressed in the analysis, the effectiveness of PIP's matrix strategy in particular, is somewhat more involved, and is considered in three parts. The first part is to determine whether or not the information provided by the matrix could be further exploited to more fully manage portfolio risk on an on-going basis. In order to accomplish this, the matrix information would need to permeate more decisions than just the acquisition ones. Under the current strategy, rebalancing

of the risk levels in the portfolio is only accomplished via new acquisitions. As the portfolio grows, it will become increasingly difficult to achieve the desired balance, unless other asset management functions are also used. Leasing, financing, and dispositions all seem like areas in which the matrix information could be useful, and which could be used to rebalance the portfolio over time. Of these, leasing and refinancing are probably the most practical, and cost effective techniques to be used for this purpose on an ongoing basis. It is important to note, however, that with the PIP portfolio valued at \$300 million, and growing at \$50-60 million per year, it is possible that risk rebalancing can be fully accomplished by using only acquisitions. This approach will only need to be supplemented if the rate of growth in the portfolio significantly decreased. Under current conditions, PIP would probably not benefit enough from a more intensified "micro" management effort to offset the added costs incurred.

The second part of the analysis is to determine if opportunities exist to supplement or enhance the Risk Evaluation Matrix in order to deal with risk characteristics not reflected in the current strategy. There is nothing in the matrix to describe market cycles that might be specific to each area. If contrary market cycles could be identified

from among Perini's five areas, the effectiveness of their diversification efforts could be improved. In order to check on this, correlation coefficients for market vs. market (Figure 4.4), and product-type vs. product-type have been calculated. One serious constraint to drawing conclusions from these results is that the sample size is quite small. In view of the implications of the 1986 Tax Reform Act, and significant structural shifts in the portfolio, the correlations were calculated using only the data from 1987 on. One observation that can be made is that these small-sample correlation coefficients show how the performance of an actual portfolio can differ markedly from general expectations about regional markets and product types. These coefficients do, in fact, show diversification effects (or lack thereof) which are contrary to the expectations based on large sample study (e.g. FRC Index). This finding is reinforced by a recent survey of institutional real estate investors, conducted by Tate Taylor and Marc Louargand, which found that only 36% of respondents thought that the FRC Index matched the actual volatility of their own portfolios.

The third part of this analysis attempts to quantify the effectiveness of the Risk Evaluation Matrix as a tool for portfolio diversification. In order to accomplish this, correlation coefficients were calculated for income

FIGURE 4.4 - PIP Correlation Coefficients (1987-1989)

Market vs. Market:

| | California | Arizona |
|---------------|------------|---------|
| Arizona | 0.20 | . |
| Massachusetts | 1.00 | 0.21 |

Product vs. Product:

| | Residential | Office | Industrial |
|------------|-------------|--------|------------|
| Office | -0.67 | | |
| Industrial | 0.85 | -0.96 | |
| Hotel | -0.85 | 0.18 | -0.45 |

Income vs. Value - by Market:

| | |
|---------------|-------|
| California | -0.59 |
| Arizona | -0.02 |
| Florida | -0.13 |
| Massachusetts | 0.98 |

Income vs. Value - by Product:

| | |
|-------------|-------|
| Residential | -0.94 |
| Office | -0.18 |
| Industrial | 0.94 |
| Hotel | 0.97 |

return vs. appreciation return for each market and product-type (Figure 4.4). The intent here was to compare these results to the risk ratings for the areas and product-types to determine if the matrix accurately reported the relative volatility of income vs. appreciation returns. This attempt was again hampered by the small sample size. Looking at the bottom of Figure 4.4, with a correlation coefficient of 0.98, it can be inferred that the Massachusetts should have a Valuation Risk Ranking approximately equal to the ranking on all its other risk categories. This would mean that changes in valuation for the region tend to be consistent with changes in the income stream. The same argument can be made for industrial and hotel properties, which have coefficients of 0.94 and 0.97 respectively. Meanwhile, the regions of California, Arizona, and Florida, and the property-types of residential and office, all experienced valuation movements that were not driven by changes in income. This situation would suggest that the Valuation Risk Ranking in these cases should be higher than the category's average risk ranking. It is important to restate that the sample size is very small (three years of data) and these results may change significantly over time.

Finally, the performance history of the portfolio (Figures 4.5, 4.6, and 4.7) has been examined. One asset that stands out (not shown explicitly in the Figures)

FIGURE 4.5 - PIP Income Return Relationships

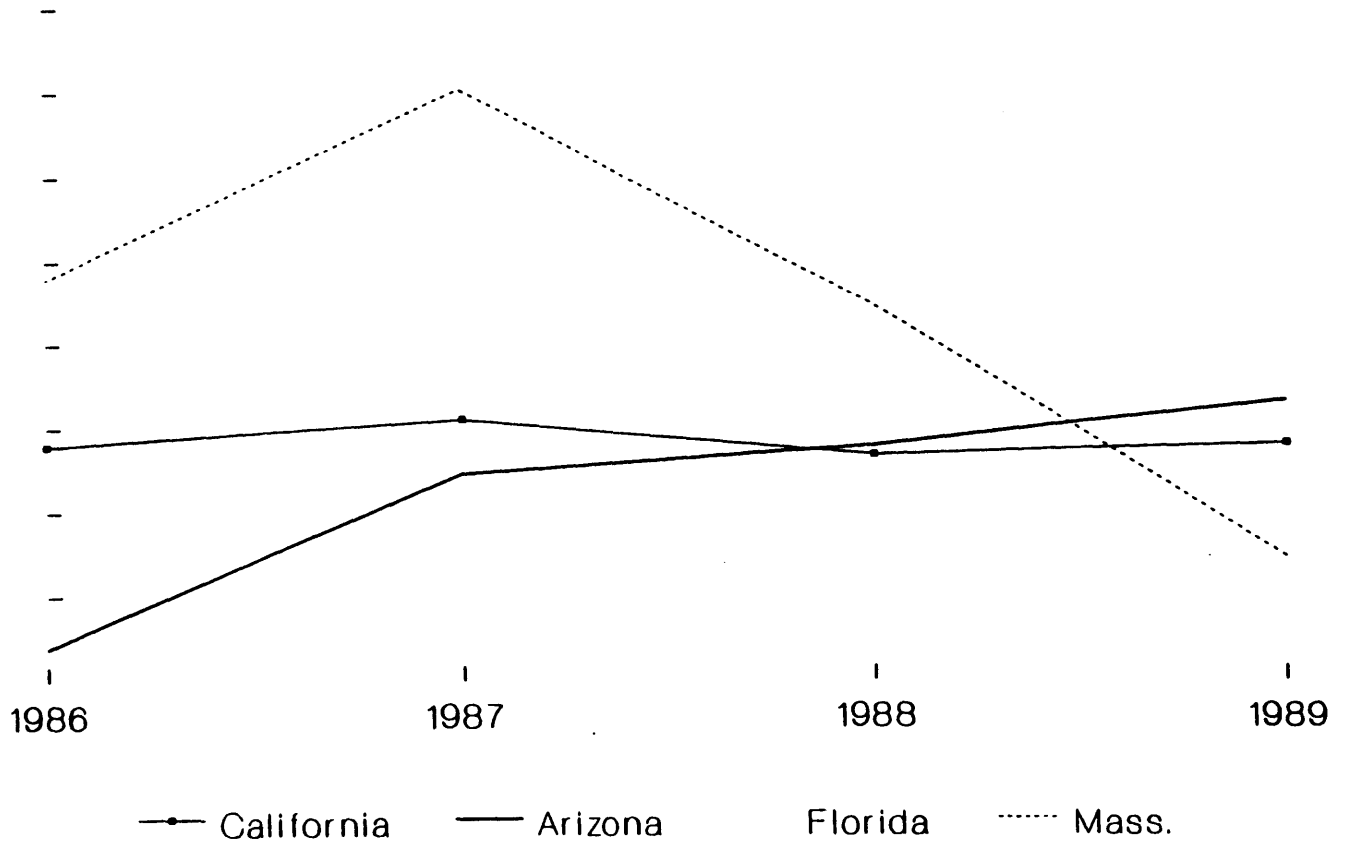


FIGURE 4.6 - PIP Appreciation Return Relationships

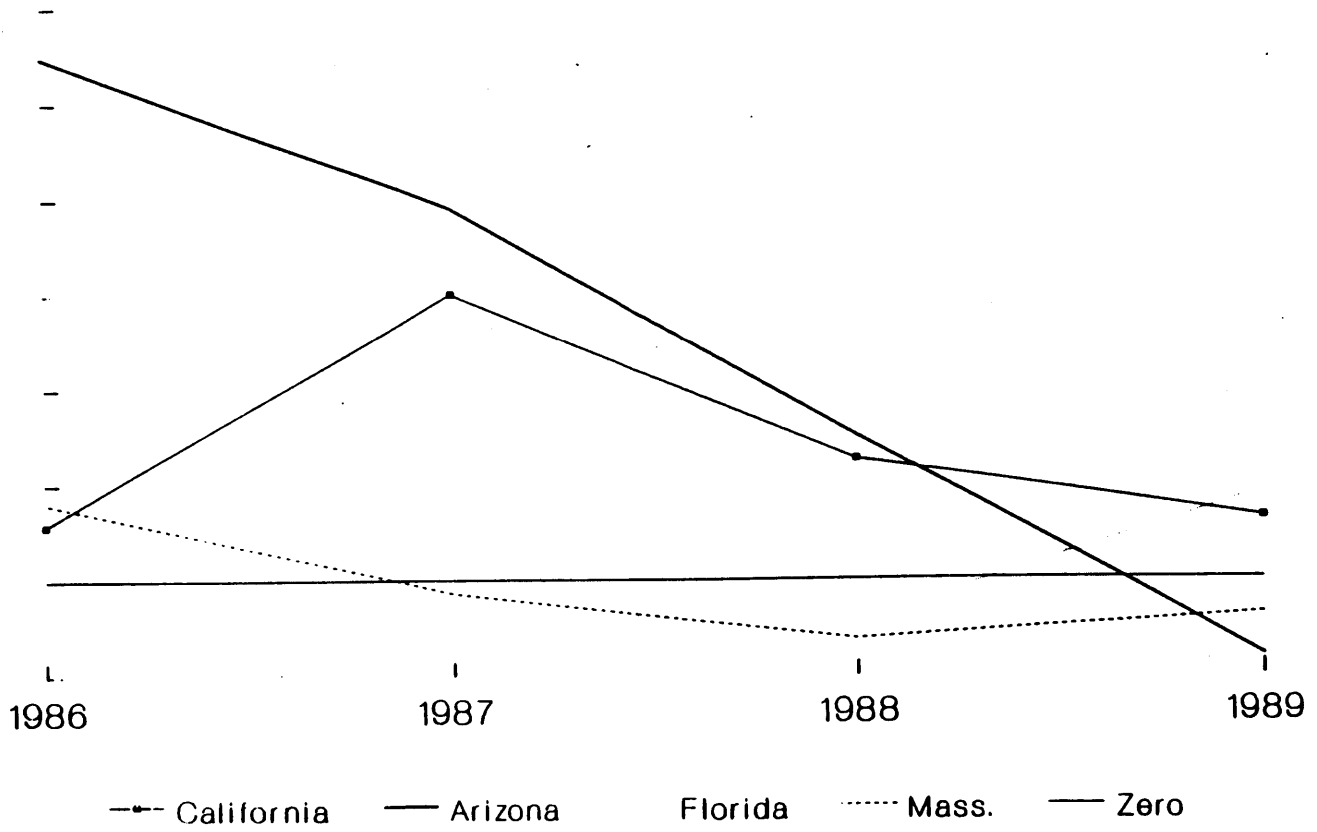
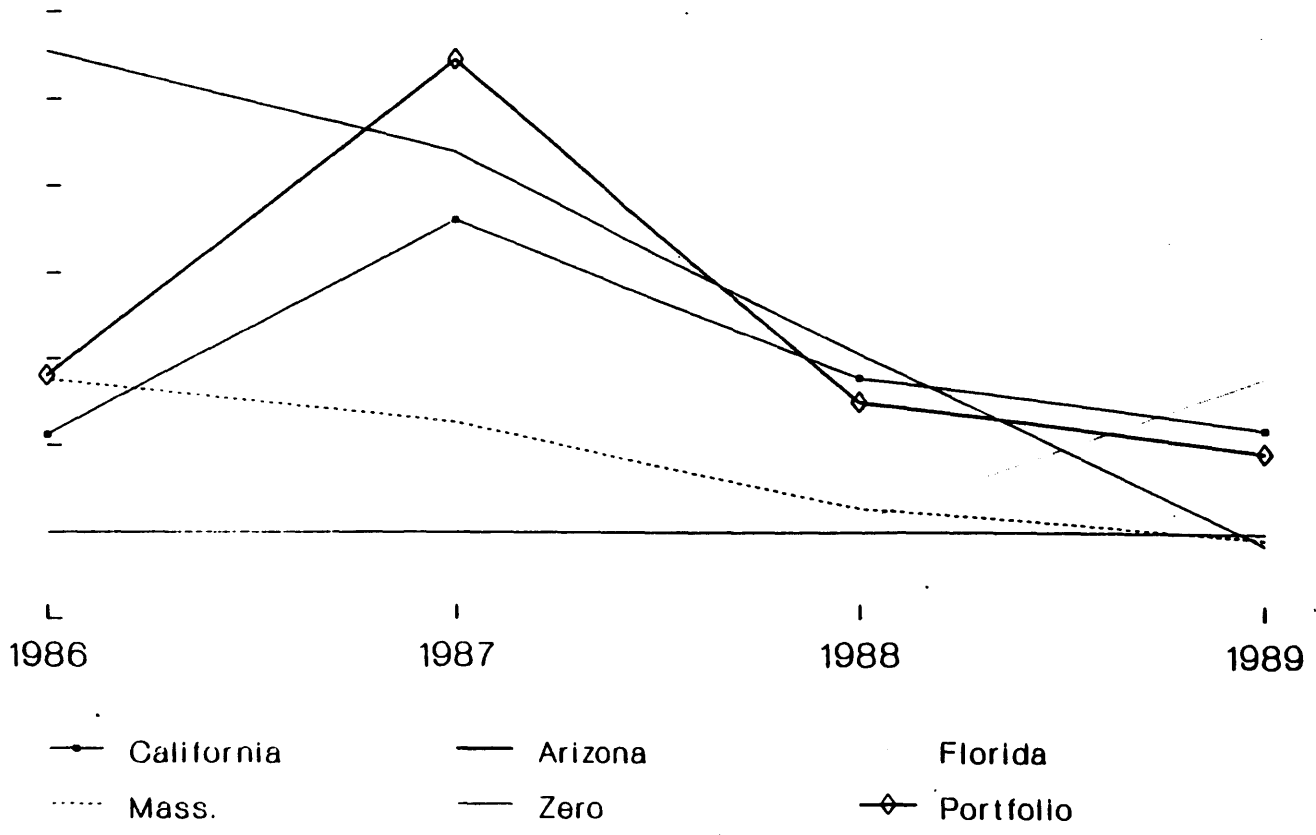


FIGURE 4.7 - PIP Total Return Relationships



is the Valley North Business Park property in Arizona, which had taken a \$5.3 million devaluation at the end of 1989. Prior to this time, Valley North had been a dependable cash flow producer for the portfolio. The reason for the devaluation was the impending lease expiration, in 1990, of a tenant that occupied 60% of the space, in conjunction with the soft leasing market prevailing in the area. Perini expected that the tenant would renew the lease, and if that had happened, the property would have remained "insulated" from the market.

Looking back at the decision history of the Risk Evaluation Matrix showed that the matrix failed to reflect this impending devaluation until 1988. This did not seem consistent with the three year time horizon that the matrix was intended to have. Furthermore, it wasn't clear, even in retrospect, that the matrix rating would have picked up the risk any earlier. That is, PIP perceived the long-term relationship with the tenant to effectively mitigate the risk of the lease turn, and the soft leasing market. The central question here was whether or not it was proper to reflect risk "mitigation" in the matrix. It seems that the answer to this question should be no. Risk is, by definition, uncertainty. Under this definition, it is inappropriate to deny the existence of risk that is "mitigated" by anything short of a signed contract (and even

then, there is the risk of default on the contract).

Another issue raised by the Valley North devaluation was that the weighting of the risk elements in the matrix might not be correct. It seems that a reduction in asset value of this magnitude dwarfs return fluctuations resulting from any of the other risk elements. In this sense, it would be appropriate for the valuation risk element to have a weighing factor of four or five, instead three.

Perhaps the most interesting question to come out of the Valley North situation, was: What is the definition of risk for the purpose of the matrix? Is risk downside exposure, or variability in returns? One might expect the appreciation risk ranking to drop after the property was devalued. Dropping the ranking would reflect the diminished downside valuation exposure to the property. The CFO felt quite strongly, however, that the five ranking should stay with the property. Under this line of reasoning, the high valuation risk reflects a potential upside revaluation at some time into the future. In this particular case, the limited information available is insufficient to derive a hard and fast rule. It is most important that the matrix administrator maintain consistency across the board, and that his methods are understood by those who read the matrix. Beyond this it seems that if the likelihood of a

rebound in the property's valuation is better than one in a hundred, then it is o.k. to leave the risk ranking high. However, if the devaluation occurred as the result of a one-time structural shift (i.e. the property went from being used as office space to warehouse space) then the risk rating should drop to reflect the likelihood of future stability in the property's value.

In total, it appears that PIP's Risk Evaluation Matrix is a useful tool for managing specific risk that is not addressed by location and product-type diversification strategies. In addition, the matrix facilitates coordination of asset and portfolio management efforts to achieve diversification. Other companies interested in employing a matrix approach would be best served to use PIP's setup as a starting point. The five risk categories may be added to or changed to improve the fit between the matrix and the company. In addition, the weighting scheme may be altered to reflect eccentricities of a given company's portfolio. For example, a portfolio that is entirely invested in a single metropolitan market should look at weighing leasing, and appreciation more heavily than in PIP's case. The important point here is that this general approach of using as matrix to evaluate risk across an investment portfolio can be an important tool. At the same time, characteristics unique to each portfolio may

warrant some custom tailoring of the general approach.

**CHAPTER FIVE:
CONCLUSION AND RECOMMENDATION**

As we move into the 1990's, some trends are clearly evident. Institutional investors have emerged as major players in the domestic United States real estate market, and will continue to have a strong presence throughout the decade. It is also apparent that these new real estate investors have changed the way real estate investment is done, by introducing Modern Portfolio Theory concepts to real estate. The real estate investment roller coaster ride that has occurred since the mid-1970's has made it clear to even the old guard that diversification across regions and property-types is essential for long term survival in the marketplace.[14]

Much has been written over the last few years concerning diversification strategies for real estate investment. The most promising of these is the recent article cited in this paper by S.M. Giliberto [5] on the use of regional employment growth variations to diversify across regions. As noted this method does a good job of defining diversification opportunities on the demand side of the equation. Additional research will need to be conducted to account for supply influences in order for this method to be complete. A quantitative study could be conducted to

outline probable supply responses for each of the 97 MSA's in Giliberto's study. Otherwise, individual investors could rely on their market knowledge to predict supply effects for the locations they invest in.

While this approach has much to offer, its sophistication makes it most appropriate for very large portfolios. Investors with limited portfolios will need a supplement or substitute, to address specific risk forces that are unique to their holdings. This thesis has shown that by coordinating asset management decisions with portfolio level objectives, real estate investors can enhance their specific risk management efforts. Towards this end, regional diversification should be supplemented by portfolio management techniques designed to monitor and manipulate other categories of specific risk. One tool to accomplish this task is the Risk Evaluation Matrix, presented in Chapter Four. The matrix ranks several categories of specific risk for each property and facilitates coordination of decision-making between asset and portfolio management. In so doing, it offers portfolio managers an important tool for managing risk and communicating decisions to affected parties within an organization.

Finally, local market knowledge, the traditional focus of real estate investment decisions, will continue to play a

major role in decision making. It is important that the front-line personnel understand the portfolio implications of the decisions that they are called upon to make in the field. The Risk Evaluation Matrix helps to accomplish this end.

The best real estate investment strategies will have elements of the three processes listed above; portfolio diversification, portfolio management, and individual deal analysis. The relative importance of each of these will be up to the individual decision makers. As regional real estate markets continue to cycle, there is a strong likelihood that the balance between these three disciplines will continue to favor a portfolio view.

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