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A Study on the Risks of Real Estate Investment

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Abstract:

This paper examines the risks associated with real estate investment, leveraging Modern Portfolio Theory (MPT) introduced by Harry Markowitz and later applied to real estate by Nigel Dubben and Sarah Sayce. MPT emphasizes balancing expected returns and risk through diversification, crucial in real estate due to its low correlation with other assets and its inflation-hedging properties. Despite global economic integration increasing systemic risks, real estate remains a key asset class for risk management. The literature review highlights traditional strategies focusing on diversifying by property type and geographic location. Studies show mixed results: some suggest property type diversification yields higher returns, while others find geographic diversification more effective for risk mitigation. Chinese market studies reveal that real estate investments can provide predictable returns and act as a hedge during economic downturns. Research on Beijing and Shanghai supports the effectiveness of geographic diversification within China. Applying MPT to real estate, the paper demonstrates through case studies how investment combinations can balance risk and returns. It discusses the Efficient Frontier, CAPM, and Arbitrage Pricing Theory to illustrate the relationship between risk and return in real estate portfolios. The analysis concludes that diversification strategies, though complex, are essential for optimizing performance and mitigating risks in real estate investments.

Keywords: Real Estate Investment; Portfolio Diversification; Risk Management.

1. Introduction

In 1952, Nobel laureate economist Harry Markowitz first introduced the Modern Portfolio Theory (MPT) in his article "Portfolio Selection" published in the Journal of Finance, which measures the return and risk of assets by the expected rate of return and standard deviation (or variance) of risky assets, providing a relatively complete theoretical framework for portfolio selection [1]. This marked the formal formation of the asset selection theory. In 1991, Nigel Dubben and Sarah Sayce first applied it to real estate investment, systematically discussing the risks, returns, and portfolio management in real estate investment [2]. With the NCRIEF Real Estate Index (NPI) covering 20 years of market data in the late 90s of the 20th century, showing two complete economic cycles, real estate investors began to have a deeper understanding of the impact of the real estate cycle on the performance of individual assets and asset portfolios, which further promoted the widespread application of MPT in the construction of real estate portfolios. Driven by global economic integration, while market convergence has brought significant economic benefits to countries and investors around the world, it has also increased their exposure to market and systemic risks. Closely linked asset returns make diversification much less effective in reducing risk. Real estate, on the other hand, is a safe haven during recessions and a key driver of economic recovery due to its immovable nature and low correlation with other types of assets, not only to protect against inflation but also to provide predictable returns. This underscores the importance of studying risk diversification, capital flows and the real estate cycle in real estate portfolios.

2. Literature Review

When it comes to exploring real estate portfolios, strategies have traditionally consisted of organizing real estate according to the type of property and its geographic location, with the aim of diversifying and reducing investment risk. This practice is widely adopted in practice. The so-called "property type" refers to properties with different characteristics in terms of development processes and methods, operating characteristics and revenue models, covering real estate with different development processes, operating characteristics and profit models, such as shopping malls, apartments and villas. On the other hand,

"region" refers to geographical clusters that are spatially contiguous or similar in terms of economic development attributes, and experts and scholars have only studied them in terms of narrow portfolios [3].

Miles and McCue conducted a study in 1982 using sample data from real estate investment trusts (REITs) and found that portfolios based on property type resulted in higher returns than geographic regions [4]. Nonetheless, the advantages between this asset class-based portfolio and a geographic-region-based portfolio are not widely recognized or supported by actual case studies. In 1984, Webb found in its survey that 61% of investors preferred a portfolio by property type, while 62% opted for a location-based portfolio [5]. Hartzell et al. further noted that when systemic risk is low, the distinction between portfolios based on property type and geographic region is not significant due to the higher cost of the portfolio [6]. In 1992, Louargand's research found that 89% of institutional investors preferred diversification by property type, while 72% used geographic areas for portfolio (41% of which were grouped by economic region), and 54% believed that portfolio based on property type was the most important way to diversify risk [7]. In his 1996 study, De Witt confirmed that most real estate fund managers are extremely cautious when assembling their portfolios, using property type or location as the primary basis for portfolio construction [8].

In their study of the Chinese market, Newell et al. found that between 1995 and 2002, unlisted real estate (e.g., office buildings) and listed real estate performed much less risk-adjusted than other types of assets, although recent studies have found that portfolio returns for these two types of properties have improved in recent years [9]. In addition, Zheng and Liu used data from Cushman & Wakefield to study the real estate markets in Beijing and Shanghai from 1991 to 2003 and confirmed that they were non-efficient markets, pointing out that it is possible to predict future excess returns based on available information and that there is an opportunity for market arbitrage [10]. This provides empirical support for the necessity and feasibility of a geographic portfolio in real estate investment. In addition, Xu preliminarily discussed the application of portfolio theory to the field of real estate investment in his research, and briefly verified the effect of the method of geographical and economic region diversification in the real estate market in Tianjin by taking Tianjin as an example [11]. Wang and Zhang conducted an empirical study of two real estate investment strategies for diversification by property type and geographic region using data from Cushman & Wakefield [12]. Their research analyzes the residential and office markets in four cities: Beijing, Shanghai, Guangzhou, and Shenzhen, and confirms that both diversification strategies are effective in reducing investment risk.

Scholars led by Miles, McCue, and Hamelink hold the view that different property types have a more significant effect on the diversification of market risk, while geographic areas have a very limited effect on diversifying investment risk. More academics such as Hartzell, Grissom and Piet hold the opposite view, and their studies all show that real estate portfolios built around different geographic regions have better risk diversification under the same property type. It cannot come up with a definite answer to which is better or worse. As more and more real estate enterprises in China go international, large domestic real estate enterprises urgently need theoretical support on real estate venture capital. It attempts to study the effect of the portfolio of intra-city geographic locations. They looked at the apartment market in the western United States, and through a geographically based study of portfolios, they reflected the intricate correlations between the subjects of study. Sometimes the geographical location of different cities also plays a subtle role in the investment portfolio, although so far no accurate theoretical framework has been reached. American scholars tried to use this method to explore a condominium market in Seattle, USA, but they could only explore the economic dependence between the research subjects. Compared to the research on risk diversification around property types and geographical areas, there are not many other research methods on risk diversification, and they are not recognized by the academic community. It can be seen that scholars at home and abroad have mainly conducted relevant research on the risk control of real estate portfolios from the perspective of property types and geographical regions.

3. The Calculation of Risk & Return of Real Estate Investment

Markowitz sees investors as structuring portfolios to find a balance between yield and risk [13]. Based on this, Markovice constructed a model of mean one-sided difference. The profitability of a real estate investment is usually measured by the expected cash flow return $E(x)=\mu$, which represents the weighted average of the returns on individual assets; Risk, on the other hand, is measured by variance $D(x)=\sigma^2$ or standard deviation σ, reflecting the variance of each asset and the correlation of each pair of assets.

The data explores the relationship between the risks and returns of real estate investments. Portfolio investments in different projects can play a role in risk diversification, or even complete risk diversification. It can be seen that for a single project, investors only need to consider the expected return and variance, while for multiple projects, they

need to consider the relationship between projects. Let's discuss an example: the combination of two investment projects. Assuming that there are three investment projects A, B, and C, A is a low-risk project, and the investment returns of B and C fluctuate greatly, and the three states of their returns are equally possible, conservative investors will choose project A because its standard deviation is the smallest. However, if an investor combines two projects and invests 50% of the funds in each project, the expected rate of return for all three investment options is equal, and the standard deviation of the combination of B and C is zero (i.e., the risk is zero). It rarely encounters this situation in actual investment activities, and most investment activities are basically not completely linear, so a diversified portfolio of investment projects can eliminate some of the risks.

Due to the correlation of assets, the risk of the overall portfolio is lower than the simple weighted sum of the risks of the constituent assets. In this case, as shown in Figure 1 below, where the x-axis represents the portfolio's risk (i.e., variance) and the y-axis represents the yield, allowing the investor to plot all potential portfolios in a coordinate system and plot a curve that connects all the most optimized portfolios. This curve is called the "efficient frontier". Portfolios below this curve are not optimal because they do not achieve maximum returns at the same level of risk. The efficient boundary shows how to achieve the highest level of return at the lowest risk level and is seen as central to modern portfolio theory. If a portfolio is on the right side of the efficiency boundary, it is taking too much risk relative to the expected return; Below the slope of the efficient boundary, it indicates a lower return relative to a portfolio of the same risk.

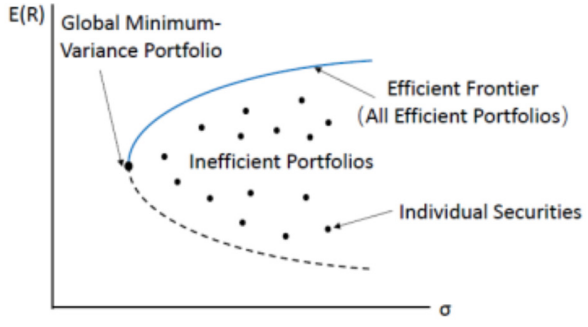

Fig. 1 Efficient Frontier [13].

In 1964, based on the theory of securities portfolio, the American scholar Sharp proposed the Capital Asset Pricing Model (CAPM) under the framework of general economic equilibrium. CAPM illustrates the relationship between the expected return of a single asset and its relative risk, i.e., the expected return of any asset is equal to the risk-free rate of return plus risk compensation, which increases as the asset's risk increases relative to the overall market portfolio [14]. On the other hand, the Arbitrage Pricing Theory (APT), first introduced by Ross in 1976, examines the pricing of risky assets from a different perspective. APT believes that arbitrage behavior in the market is a key factor in the formation of an equilibrium price. If the market fails to reach equilibrium, risk-free arbitrage opportunities arise [15]. The mean-variance model, CAPM model and arbitrage pricing theory have been criticized in various ways since they were proposed, and the cost of real estate transactions is much higher than that of other investment products, making it difficult to apply Markovitz's mean variance model directly. In addition, because the real estate market information is not public, the degree of access to information by buyers and sellers is asymmetrical, and the remaining two models are equally difficult to apply directly. But it is undeniable that the three models have played an important role in the development of the portfolio.

4. Real Estate Portfolio and its Risk Analysis

4.1 The Definition of Real Estate Portfolio

By using an intuitive metaphor to illustrate the concept of a real estate portfolio, assumed that put all the eggs in one basket, if something happens, all the eggs can be damaged at the same time. Conversely, if spread the eggs into different baskets, the eggs in other baskets will still be safe even if something happens to some baskets. Similarly, funds are allocated across multiple real estate projects to form a real estate portfolio. In a narrow sense, a real estate portfolio refers to a portfolio of properties of different types and urban areas, i.e., the diverse property types and geographical distributions mentioned above. Broadly speaking, a real estate portfolio is a portfolio allocation with assets such as stocks and securities. All investments carry some risk, with high-risk investments expected to deliver greater returns, while low-risk investments typically expect smaller returns. Where funding allows, it is ideal to spread the funds across multiple real estate projects or other sectors, which is likely to achieve good returns and reduce risk.

4.2 The Risk of Real Estate Portfolio

When investors are exposed to risk, they usually seek compensation accordingly, and this compensation is known as the risk premium in economic terms. This means that investors can often expect higher returns in the face of high-risk investments. While diversifying risk through a portfolio is a strategy, it can also mean a reduction in the risk premium. For example, when investing in

two residential buildings, if the price trend of the two is the same, i.e. rising or falling at the same time, this situation is usually regarded as a complete positive correlation, i.e. the performance of the two investments is affected by the same factors, so that the risk will not be effectively diversified. Conversely, if the price of one building rises and the other falls, such a portfolio can effectively mitigate the risk of investing in a single project.

Although a perfect positive or negative correlation is rare in a given portfolio, this possibility is theoretically possible for generalized portfolios. Often, diversifying investments across different properties can be an effective way to mitigate overall risk and increase returns. Past data (e.g., 1988 to 1998) have shown that there were periods when real estate investments were riskier than both, even though they had lower returns than equities but higher than bonds, suggesting that riskier investments did not always lead to higher returns. Therefore, building a portfolio based solely on the returns and volatility of individual investments does not always guarantee optimal results. In fact, investors need to consider how the new investments affect the risk and return of the portfolio as a whole, as the investments in the portfolio interact with each other. For any new investment added to the portfolio, the judgment should be made on the basis of the combined effect of the portfolio, and it is important to assess whether it is maintaining or enhancing the expected return while reducing the overall risk. Therefore, the utility of an investment can be judged by whether it reduces portfolio risk while maintaining the expected return on investment or increasing it.

5. Conclusion

Real estate investment has a more volatile income and risk compared to other investments, and the success rate of real estate investment has not been shown to be high after research. Although it will not be affected by inflation and most other factors, there will be risks to the external environment, financial risks, accidents (man-made or natural disasters), etc., and investors need to make sufficient judgment when investing to minimize the risks that will occur. Through research, diversification can minimize losses and maximize returns. Assuming that the investor invests all his money in a project, in most cases, if there is any risk, the loss rate will be greater than the income, if the investor invests in diversified real estate, even if one of the projects loses money, the income of the other projects can make up for the loss of this project, thereby reducing the risk of investment and increasing the income of diversification. This research is intended to help those who are new to real estate investment or who want to learn about it to acquire basic knowledge and information. Rather than delving into the field, this article is intended to help readers who do not have any knowledge of this to gain a shallow understanding of investment risks in order to facilitate in-depth learning of various aspects. In the future, the study will provide a broader analysis of the various sectors discussed.

Authors Contribution

All the authors contributed equally and their names were listed in alphabetical order.

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