



Illiquidity, transaction cost, and optimal holding period for real estate: Theory and application

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ABSTRACT

Choosing the optimal holding period is an important part of real estate investment decisions, because “when to sell” affects “whether to buy”. This paper presents a theoretical model for such decision making. Our model indicates that the optimal holding period is affected by both systematic and non-systematic factors—market conditions (illiquidity and transaction cost) and property performance (return and return volatility). Other things being equal, higher illiquidity and transaction costs lead to longer holding periods, while higher return volatility implies shorter holding periods. Our empirical application suggests that the optimal holding period based on our model is quite consistent with previous empirical findings. In addition, we find that when illiquidity risk is incorporated the true real estate risk is significantly higher than the conventional risk estimate. Therefore, the current practice of real estate valuation, which is naively borrowed from finance theory, substantially underestimates real estate risk.

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1. Introduction

The real estate investment decision is not just “to buy, or not to buy”. It is as much “when to sell”. In fact, the two decisions are inherently interdependent, since the timing of the sale, which provides the single largest cash flow, critically affects the expected overall return of the investment. In the current practice, however, the issue of holding period for a real estate investment is basically a matter of arbitrary assumption. For example, a typical Discounted Cash Flow (DCF) analysis for commercial property valuation usually assumes a holding period of 10 years. A limited partnership may agree on the duration of the business to be a certain number of years. A private real estate equity fund may plan its mandatory liquidation date (extendable under certain condition) based on what is conventional in the industry. Whether such expected (*ex ante*)

holding periods are economically or financially optimal is usually considered less important than and separate from deciding how much to pay for an asset (the valuation decision). Most investors understand that holding period affects investment performance. For instance, we know that real estate must be held long enough to mitigate illiquidity risk and high transaction costs. But how long must a property be held to achieve optimal performance? Is longer better, or is there an optimal holding period, at which time the expected (*ex ante*) risk-adjusted return is the highest? This is an important question because, to the extent that a property’s expected optimal performance determines the maximum valuation an investor should place on the property, finding the property’s *ex ante* optimal holding period is inseparable from the asset valuation decision.

Classical finance theories argue that in an efficient market where asset returns over time are assumed to be independent and identically distributed (i.i.d.), holding period has no effect on an asset’s periodic (e.g. annualized) expected return and volatility. In other words, there is no

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optimal holding period for financial assets. Although the issue of i.i.d. remains debatable in the finance field, it is clear that the real estate market is not efficient and property returns are thus not i.i.d.¹ The non-i.i.d. feature implies that real estate performance is holding period dependent. That is, the expected return and risk of holding a property for 1 year is different from the average annual return and risk of holding the property for multiple years. The purpose of this paper is to find out how *ex ante* holding periods affect the expected performance of a property, and to develop a theoretical framework that provides a formal analysis on an optimal holding period.

Our analysis begins with a simple setting: a rational investor who has a mean–variance preference attempts to determine the appropriate price he is willing to bid on a property without overpaying for it. Since his valuation is determined by his expected performance of the investment, and the performance is holding period dependent, he first needs to determine the *ex ante* optimal holding period of the property before he can properly estimate the asset's expected *ex ante* return and risk. His decision is determined by several competing effects: on one hand, due to high transaction cost and the difficulty involved in trading properties in general, he needs to hold the property long enough to achieve the desired investment return. On the other hand, holding the property for too long makes the future asset price (as well as income) much more uncertain; that is, it increases the risk of his investment. His objective, therefore, is to find the optimal holding time at which the expected risk-adjusted return is maximized. In order to solve this problem, he must first address two issues: (1) *how does holding period affect real estate return and risk?* (2) *What is the proper measure for the risk-adjusted return?* Presumably, such measure must integrate the effect of holding period, the uncertainty of future price, illiquidity risk, and transaction costs.

The remainder of the paper is structured as follows. The next section provides a brief review of previous literature on the issue of real estate holding period. Section 3 presents an analysis that empirically examines the relationship between real estate performance and holding period. The findings of Section 3, in conjunction with recent developments in the literature, provide the foundation of our model in Section 4. Section 5 provides an empirical application of the model. Section 6 concludes.

2. Research on real estate holding period

Traditionally, real estate holding period is often considered as an *ex post* investment decision after the property has been acquired. The question of “when to sell” is typically studied in the context of sell versus hold decision. Early studies on the issue are often driven by tax laws that govern issues related to the depreciation or tax shield benefits of commercial properties. Optimal holding period is

¹ In fact, numerous studies have documented that the real estate returns exhibit strong serial persistence and predictability. For examples, see Case and Shiller (1989), Young and Graff (1995), Englund et al. (1999), and Gao et al. (2009), among others.

prescribed based on the trade-off between the costs of selling the current property and the additional depreciation benefit from acquiring the next property. Brueggeman et al. (1981), Albert and Castanias (1982), Hendershott and Ling (1984), and Pellechio (1988) are a few examples of this type of studies. Over the subsequent years, however, revisions to the tax code have greatly reduced the tax-shelter benefit of owning commercial real estate. Moreover, after the enactment of the ERISA in 1974, institutional investors started to enter the real estate market, and many of them were large tax-exempt institutions such as pension funds, non-profit organizations, and endowment funds. As tax-related benefits became less relevant to these investors, so did prescriptions of optimal holding period based on such benefits analysis.

Subsequent research on holding period seems to have shifted from prescriptive to descriptive. Rather than deriving what the holding period should be, many researchers seek to find out what the holding periods actually are for various investors. Webb (1984) and Webb and McIntosh (1986) find that most real estate investors expect to hold their properties for 10 years or less. Gau and Wang (1990) analyze over 1000 Canadian commercial real estate transactions and find an average holding period of about 5–8 years, depending on property types. Fisher and Young (2000) find the median holding period for properties in the NCREIF database to be about 11 years. Collett et al. (2003) study the UK property market (where no depreciation is allowed for commercial properties) and find that institutional property holding period changes over time and varies by property type. They find that the median holding period of UK properties generally fell from around 12 years in the early 1980s to less than 8 years in the late 1990s. Through a sample of small apartment buildings over the period from 1970 to 1990 in the city of San Diego, Brown and Geurts (2005) find that the average holding period for these properties is around 5 years.

The current study differs from previous research in that we consider the issue of holding period in the context of asset valuation prior to acquisition. We focus on the *ex ante* optimal holding period. Our objective is to derive a formal model in which property price risk and illiquidity risk are explicitly introduced into the return–valuation–optimal holding period framework. This is in contrast to the more standard discounted cash flow approach to valuation, in which price risk and illiquidity risk are only implicitly accounted for in the discount rate.

3. Holding period dependence of real estate performance

In this section, we conduct a direct examination of the relationship between holding period and real estate return and volatility. The findings, together with recent development in the literature, provide the foundation of our model in the next section.

We obtain the widely available quarterly NCREIF Property Index (NPI) for the period from 1978Q1 to 2008Q4. During this time span, the NCREIF index exhibits average quarterly return and standard deviation of 2.45% and

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