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Liquidity risk and cross-sectional return in the housing market

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ABSTRACT

The role of liquidity in asset pricing model has attracted much attention in recent financial literature. However there is a paucity of studies on liquidity and asset pricing in the real estate market. It is expected that as the housing market is less liquid than the stock market, it should incur more significant illiquid effects. Motivated by such intuition, this paper carries out an asset pricing analysis that investigates the role of liquidity risk in explaining cross-sectional housing returns. Using a unique database of 55 popular housing estates, the study reveals that housing estates with a high sensitivity to market liquidity command a higher risk premium. Such positive relationship between expected return and liquidity beta is proved robust under different model specifications. The findings of this study not only shed new light on the positive price–volume correlation and the cross-sectional liquidity–return relationship in the financial literature, but also provide useful implications for real estate investment.

1. Introduction

In classic Asset Pricing Theory (APT), the market is perfectly frictionless and centralized; hence there will be no correlation between asset price and liquidity. On the other hand, the Liquidity Asset Pricing Theory (LAPT) relaxes the assumption of price-taking behavior and the frictionless hypothesis, which sparks off numerous studies to investigate the linkage between liquidity risk and expected returns (see Amihud, Mendelson, & Pedersen, 2006; Chen, 2005; Korajczyk & Sadka, 2008; Pástor & Stambaugh, 2003; Sadka, 2006; Watanabe & Watanabe, 2008 for examples in stock market). The intuition is straightforward that if liquidity affects asset price, then rational agents may take it (e.g. trading cost) into account and require higher risk premium for bearing the liquidity risk. The process of housing transactions is characterized by a high level of uncertainty, due to not only market price uncertainty, but also the length of time it will take to make transactions. If market liquidity is an important consideration for market participants of securities, it could be even more so for investors in a real estate market, because the market *per se* is much more illiquid than the security market.[1]

The LAPT has attracted much attention in recent financial studies after the groundbreaking work by Amihud and Mendelson (1986), who conduct a cross-sectional study on the relationship between stock return and liquidity. Introducing liquidity factor can help explain several puzzles in the stock market. For instance, why illiquid stocks are relative cheap and earn high returns (the equity premium puzzle); why small stocks offer high returns after controlling for other pricing characteristics (the small firm effect), *etc.* (see Amihud et al. 2006 for an excellent review). Many financial studies provide empirical evidence that an asset whose return is more sensitive to market-wide (systematic) liquidity should offer a higher return to compensate investors for holding the asset and bearing the high risk. For example, Holmström and Tirole (2001) derive a liquidity-based asset pricing model and find that equities' expected returns are related to their sensitivity to aggregate market liquidity (see also Amihud et al., 2006; Pástor & Stambaugh, 2003).

The recent literature has shed promising light on the role that liquidity risk plays in explaining financial asset returns; however there is a paucity of literature with respect to liquidity risk in the direct real estate market. The housing market is by nature

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[1] One may argue that investors would rationally reduce their trading frequency (*Buy-and-Hold* strategy), if they are investing in illiquidity market and facing lager transaction costs. Indeed, the transaction cost or liquidity risk could be diluted if the holding period is taken into account. However, the liquidity-induced transaction cost relies on the market liquidity at the time of transaction, rather than how long an investor has held the residential property.

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characterized by high search costs, inelastic supply and short-sale constraints. More importantly, housing investments are largely undiversifiable and account for a large proportion of households' financial risk. Therefore, it is expected that the liquidity factor could have a significant role in price discovery in housing markets. Indeed, the liquidity factor has long been recognized as the most critical factor that determines real estate price and investment (e.g. Dhar & Goetzmann, 2006; Krainer, 2001); however relevant empirical studies are scare due to the limitation of micro transaction data.

To our best knowledge, there are only a couple of empirical studies that investigate cross-sectional variations of housing returns, but none of them considers liquidity risk. Cannon, Miller, and Pandher (2006) conduct an APT test of U.S. metropolitan housing markets, which consist of 7234 ZIP code annual housing data from 1995 through 2003. They adopt a similar procedure to Fama and French (1992)'s three-factor asset pricing model, and explore the explanatory power of risk, volatility, and price level on cross-sectional housing returns. They find a positive return–volatility relation. A 1% increase in annual volatility leads to a 0.25% increase in returns. Besides, housing return is positively related with the price level with a diminishing effect. Finally a 1% increase in idiosyncratic price risk raises the annual return by 0.188%. Using the same dataset, Miller and Pandher (2008) adopt a two-factor (i.e. excess returns of stock and national housing markets.) asset pricing model to remove the systematic component from the U.S. metropolitan housing return series, and measure idiosyncratic volatility of housing return as the standard deviation of the estimated residuals. They suggest that a 1% increase in idiosyncratic volatility leads to a 0.21% annual housing return increase.

These two studies make a breakthrough for the asset pricing test of cross-sectional housing markets. However, they have two drawbacks due to the deficiency of the datasets available. First, the data quality of these two papers seems somewhat questionable, because only annual housing price data are available at ZIP code level. The dataset includes only 9 (year) time-series observations, though they might have a rich cross-sectional sample, which covers 155 MSAs across the U.S. Second, due to limited number of time-series observations, they perform a single cross-sectional regression of average annual housing returns on estimates of betas. This, however, results in the inference problem[2] caused by the correlation between residuals in cross-section regressions (Cochrane, 2005).

This study adds to new knowledge to the existing literature by providing empirical evidence regarding the linkage between liquidity risk and expected return in housing markets. It differs markedly from Cannon et al. (2006) and Miller and Pandher (2008) in the following aspects. First, the study can offer a new understanding of the extent to which liquidity risk explains the cross-sectional variations of housing estate returns in Hong Kong's private housing market. Second, we adopt a better data classification, i.e. the housing estate level data rather than the regional housing data. That is more in line with the traditional asset pricing test. Third, we use a unique dataset that has a rich time-series property (i.e. 80 quarters). This allows us to perform the standard Fama-MacBeth two-stage procedure. Fourth, we use rolling-regression beta rather than the full-sample beta. Such analysis offers an advantage of ruling out possible look-forward bias.

The primary contribution of this paper is the exploration of the linkage between liquidity risk and cross-sectional variations in housing returns within the asset pricing framework. Specifically, we attempt to answer whether and to what extent can liquidity explain variations in cross-sectional housing return. The rest of the paper is organized as follows. Section 2 provides a theoretical framework within which to analyze the relation between liquidity and housing price, and presents the hypotheses. The research methodology is described in Section 3. Section 4 presents and discusses the empirical results and robust tests. The final conclusions are drawn in Section 5.

2. Background and hypotheses

2.1. The relation between price and liquidity

The concept of liquidity is first introduced by Keynes (1930 Vol. II, p. 67), who defines that an asset is considered to be more liquid if it is "*more certainly realizable at short notice without loss*". Boulding (1955) further suggests that "*Liquidity is a quality of assets … which (liquidity) is not a very clear or easily measurable concept*." Liquidity is by definition a complex and intangible concept. Roughly speaking, a liquid market can be defined as the markets where larger quantity of assets can be sold quickly with limited impacts on price, at low transaction cost (e.g. Pástor & Stambaugh, 2003). Liquidity is a desirable feature for real estate investment, because the owners can realize capital gains when the property price increases, or they can cut losses before price plunges any further (Ho, 2003).

Investors in illiquid markets with searching friction face a *trade-off* between waiting cost and liquidity cost.[3] Waiting cost can be explained as opportunity cost or inventory cost, while liquidity cost is the discount that a seller concedes or the premium that a buyer pays for an instant transaction (e.g. Amihud, 2002). Consider that a homeowner has a housing flat, if he can instantly sell it in the market at the fundamental price (i.e. no liquidity cost or waiting cost), then the market is considered to be perfectly liquid.[4] Obviously, he cannot close the deal immediately at the price of fundamental value because housing market is less than perfect liquid (Chacko, Jurek, & Stafford, 2008). Instead, he could wait and search for counterparts who are willing to take the price higher than her reservation one. Under this scenario, he must take the risk of waiting. Alternatively, he could opt to sell her property quickly, and a considerable discount (i.e. incurring liquidity costs) from the fundamental price must be offered (e.g. Krainer, 2001). Similarly, a buyer must offer additional transaction cost if she wants to purchase a property quickly.

The degree of housing market liquidity varies considerably over time. For instance, in the double-sided search model, Fisher, Gatzlaff, Geltner, and Haurin (2003) contend that "… *the mean constant-liquidity price will be higher than the mean variable-liquidity transaction price during up markets and lower than the observed transaction average in down markets*." It appears that realized housing prices do not fall enough in down markets, and do not rise enough in up markets, or housing prices do not adjust enough to clear the market (see also Clayton, MacKinnon, & Peng, 2008).

[2] The cross-sectional metropolitan housing returns are likely to heteroskedastic and cross-sectional correlated, hence the regression standard errors are not reliable.

[3] Note that liquidity cost is a major component of transaction cost in the housing market, and we use the terms 'liquidity cost, and 'transaction cost' interchangeably throughout this paper.

[4] Actually, such perfect liquid condition is rarely in the real world, even for the '*liquid*' money exchange market, both buyer and seller incur transaction cost, the spread between buy rate and sell rate charged by liquidity provider, e.g. commercial bank. Similarly, in the real estate market, brokers charge brokerage, because they provide liquidity to market participants.